

AN EXPERIMENTAL STUDY OF TRAFFIC SAFETY
FILMS, THE FACTORS INVOLVED IN
DETERMINING DRIVER BEHAVIOR, AND THE
PREDICTIVE EFFECTS OF A BEHAVIORAL
CHANGE ANALYSIS

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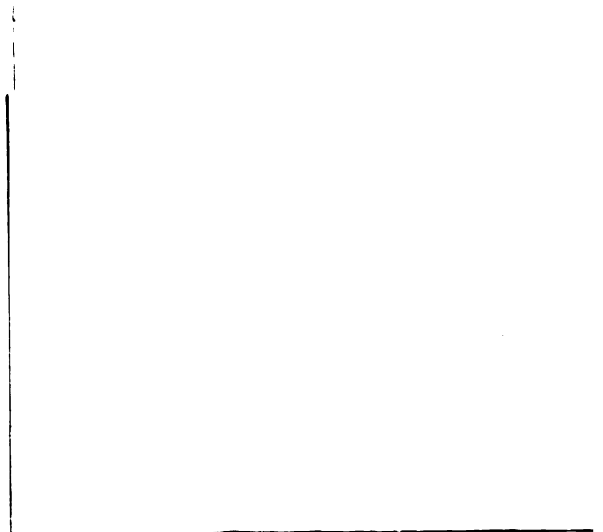
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Hildreth Hoke McAshan

A THESIS

Submitted to the School for Advanced Graduate Studies
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To the young men and women who acted as subjects in the study, the writer wishes to extend his thanks for their invaluable cooperation.

Dedicated To

My Wife, Jerry, and Children,
Brian and Beth

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Charles F. Schuler

ABSTRACT

It was the purpose of the study to make factual, attitudinal, and behavioral analyses of traffic safety films and to investigate the factors involved in determining driver behavior.

The experiment was conducted at Michigan State University. Facilities and materials were generally provided by the Highway Traffic Safety Center and the Audio-Visual Center of Michigan State University in conjunction with a research grant from the Public Health Service Division of the United States Department of Health, Education, and Welfare.

The subjects were one hundred sixty-five sophomore, junior, and senior students, sixty-five of whom were male and one hundred one females. The selection of these people was by both the purposive and random assignment methods. The purposive selection was to insure heterogeneity of the types of students selected, and the random assignment indicated into which of two control or two experimental groups each would be placed.

The research design placed the sample population into two non-related film groups and two experimental film groups. Experimental Groups III and IV were shown a film on "Driving at Night." At the same time Control Groups I and II viewed a non-related film entitled "The A. B. C. of Internal Combustion Engines." Immediately following the showing of the above mentioned films, Control Group I and Experimental Group III were administered written tests concerning attitudes, achievement, and driving skills. Six weeks after the showing of the films, Control Group II and

Experimental Group IV were given tests on attitudes, achievement, and driving skill to determine the retention effects of the experimental film.

The experimental film was selected because of the following factors: (1) the frequency of use of the film in driver-training courses, (2) the educational level for which the film was best suited, (3) the subject matter content, (4) the quality of photography and sound effects, (5) the adaptability of the film to the objectives of this particular research, and (6) the important contributions which the film can make toward the goals of highway traffic safety.

A behavioral analysis was developed by projecting the film and making a record of all of the important commentary and visual events as individual statements of facts. These facts were analyzed in order to estimate the reaction of viewers of the film. Next, potential change components were obtained from personal interviews and street corner observations. Each one of the behavioral change components was then analyzed to determine how learning, attitude, and behavior might change. The instrument was administered to ten judges who made predictions on the possible changes in learning, attitude, and driving performance which might result from viewing the film.

The writer constructed and pre-tested instruments to measure achievement and attitude shift. A skill test was developed but pre-testing was deemed unnecessary since the test was designed to allow direct observation of driving behavior of each member of the sample.

Evaluation of results was accomplished by: the F test to determine if the variances of the two populations might be presumed equal; the t-test of significance to determine whether the results

obtained were significant; and the Pearson r was employed in the analysis of the data for purposes of evaluating the behavioral analysis technique.

The results of the statistical analyses reveal that experienced drivers do learn factual information from viewing traffic safety films, and this learning prevails both immediately after viewing the film and for a long period afterward. However, the learning of factual information does not necessarily coincide with a corresponding shift in attitudes or improvement of driving skill. The analysis also reveals that it is possible to predict the proportion of learning increase, but very difficult to predict shifts in attitude and driver performance which may be obtained from viewing a film.

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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

Each year there are about forty thousand deaths from automobile accidents and several hundred thousand people are seriously injured. If present trends continue, it may be expected that one person out of every one hundred and fifty in this country may be killed or injured in a motor vehicle accident within a period of one year. This traffic toll is greater than that of several of our most serious diseases. Among various efforts being made to attack this problem, several million dollars have been and are being spent to produce educational films on traffic safety. However, there has as yet been no objective evidence that these films are improving driver behavior.

I. THE PROBLEM

Statement of the problem. The purpose of this study is to make factual, attitudinal, and behavioral analyses of traffic safety films. A secondary objective is to investigate the factors involved in determining driver behavior.

Importance of the study. Traffic safety has frequently been stressed as one of the most important considerations for the educators of America and for society in general. Educationally speaking, there are many needs such as:

1. The need to better plan and organize all instructional materials.
2. To develop improved techniques to show what change of learning, attitudes and behavioral skills can be accomplished through films.
3. To understand the impact of films and audio-visual services on driver education.
4. To develop administrative procedures which will better evaluate factual information contained in films.
5. To be able to improve programs of traffic safety and other instructional fields through better utilization of educational films.
6. To determine how much academic training should be given in the classroom and how much time and money should be spent using laboratory techniques, such as driver trainers.
7. To study other administrative and teaching practices involving educational communication media in order to promote more effective types of educational programs, improve the methods of instruction, and advance the techniques of program supervision.
8. To add to the general understandings which involve the learning, attitudes, and behavioral characteristics of people in relation to traffic safety.
9. To determine the correlation between film facts and those presented by textbooks and other sources.
10. To develop improved and more objective methods of presenting qualitative data in quantitative form.

Despite recognition by various groups of these educational and safety needs, and of the seriousness of our traffic problem, the accident rate has continued to increase each year. Over three hundred films have been produced on traffic safety. These films are being shown to a large number of viewers each month with little evidence that traffic safety is being improved. Film research studies have shown that the dramatic type of film most often produced actually may be very ineffective in changing a person's attitudes and habits. A careful analysis of the learning from the content of traffic films could have an important bearing on other safety training methods and could conceivably be applied to other fields of education. Such research could show which facts employed in films may be expected to have the greatest effect in changing human behavior.

Assumptions.

1. Driving behavior is a function of immediate knowledge, long range knowledge, attitudes, chance situations, and other components directly affecting driving behavior.
2. It is possible to separate, isolate and analyze components of driving behavior.
3. Films are probably more effective for new drivers than for experienced drivers.
4. Some of the factors involved in driving behavior possibly cannot be changed.
5. Because of the relatively rough measuring devices we must use in determining behavior, we shall assume that behavioral change can occur only if there are significant results obtained in the measurement of the dominating purposes of each film. These purposes will be considered to be gain in knowledge,

shift in attitude, and improvement in driving skill. Change at the five percent level of significance will be considered adequate.

6. A substantial part of driving behavior is determined by individual driving experiences received in everyday life, personal judgments, disagreement with certain laws, negligence, and chance factors.

Testable Hypotheses.

1. There is no immediate difference in the learning of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film.
2. There is no permanent difference in the learning of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film.
3. There is no immediate difference in the driving attitudes of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film.
4. There is no permanent difference in the driving attitudes of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film.
5. There is no immediate difference in the measurable change in driving skill of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film.
6. There is no permanent difference in the measurable change in driving skill of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film.

7. It is possible to predict, by the use of a behavioral analysis, the measurable change in knowledge, driving attitudes, and driving skills which will occur as a result of viewing the film "Driving at Night."

II. DEFINITIONS OF TERMS USED

Driving attitude. Throughout the report of this investigation, the term "driving attitude" shall be interpreted as meaning a mental state or disposition toward driving a motor vehicle, and toward traffic safety in general, which tends to cause a person to perform certain driving behaviors.

Experienced driver. An "experienced driver" shall be interpreted as meaning a licensed driver with a total driving time of over six months.

Learning. In this experiment the term "learning" shall be interpreted as meaning the acquisition of new facts or knowledge which may enable an individual to improve his driving performance by making wiser, better informed decisions.

Driving skill. In this experiment the term "driving skill" shall refer to the measurable behavior displayed by automobile drivers when performing a specific driving function.

CHAPTER II

REVIEW OF THE LITERATURE

Little has been written with respect to the effect of an audio-visual experience upon the driving behavior of the viewers. Traditionally, we teach factual information in an attempt to increase knowledge, shape attitudes, and develop motor skills while anticipating that these will change behavior. A brief summary will be given here of the work done on those problems which appear to be very closely related to the problem at hand. This problem involves the analyses of traffic safety films in order to determine their effect upon experienced drivers.

I. LITERATURE ON TRAFFIC SAFETY

There have been few studies made previously on the general problem of the role played by knowledge and attitudes with respect to traffic safety. This deficiency in study also applies to the evaluation of traffic safety films to determine their effect upon an audience. However, some research has been done and certain important points of general interest to this writer's research will be given here.

The National Research Council, in attempting to explain the causes of accidents, states that "human limitations, misjudgments or lapses are among the causes in from 75 to 90% of the highway traffic accidents." (18, p. 22) These findings were based upon accident record data kept by public authorities. However, the report emphasizes that such accident records are often incomplete, and that the number of accidents

for a given group of drivers is usually so small that pure chance may play a large part in their occurrence. (18, p. 22)

The National Academy of Sciences and the National Research Council report that the human element involved in problems of traffic safety changes very little and presents the greatest challenge to scientists and other traffic authorities in general. In order to achieve the ultimate in highway safety, they report that "traffic authorities need to have a great knowledge of man." (17, p. 0.2) McFarland, Moore and Warren have made valuable contributions concerning human variables in driving. Among the variables investigated are the attitudes drivers hold toward driving and toward various social aspects of the total driving situation. They report that the driving behavior in particular situations "often depends on the attitudes which have been developed over a period of time." (16, p. 91) They further state that "practically nothing is known concerning the attitudes of drivers nor of the factors which play significant roles in their formation or modification." (16, p. 91)

The Center for Safety Education at New York University reports that psychologists are beginning to discover that there are habit patterns and consistent attitudes incorporated within drivers which are significant as causes of automobile accidents. (5, p. 139) This group is said to have faulty attitudes which may be either temporary (due to an immediate problem) or permanent (arising from inherited weakness, faulty upbringing or other sociological factors). The N. Y. U. research refers to these habit patterns and attitudes as the individual's personality traits. (5, p. 139)

The N. E. A. National Commission on Safety Education states that "analysis of the causes of motor vehicle accidents clearly indicates that human factors such as skill deficiencies, psychophysical disabilities, attitudes, and other personal limitations, account for the majority of accidents. Such analyses strongly suggest that in the area of accident

research and prevention, paramount attention must be focused upon the personal characteristics of the driver." (19, p. 115) The implication to be derived from this analysis is that we must study 'whole persons' rather than just 'drivers'." (19, p. 116) Major factors which determine accidents are listed as the role of chance, temporary emotional stress, and inadequate sense of personal and social responsibility. According to this study, "most of the reasons why we behave as we do stem from experiences we have had in the course of our growing up and of which we are no longer aware." (19, p. 128) Obviously, the problem is not just the psychology and sociology of human behavior in general. It is not the problem of driver educators and safety educators, but it is the problem of educators and society in general. (19, p. 130)

The American Automobile Association says that "why the driver behaves as he does is a problem of driver psychology." (1, p. 74) A few of the variables listed as components of good driver behavior are judgment, physical condition, attitudes, emotions, negligence, driver education and other factors. (1, pp. 15-87)

II. LITERATURE ON BEHAVIOR

The ultimate end of any educational message is to stimulate its target audience in such a manner as to produce a change in behavior toward some desirable goal. In the case of traffic safety films, the behavioral change desired is increased skill or performance by all drivers. Much has been written in regard to defining and changing behavior in general. However, there seems to be a variety of opinions with regard to the definition of behavior and how it may be altered. Certain findings pertinent to the present study and a general understanding of behavior are referred to in the following discussion.

In a joint report sponsored by The American Trucking Industry and the Pure Oil Company, it is stated that "driver behavior is largely determined (a), by his awareness of the traffic situation and (b), his attitudes and emotions." (3, p. 2) McFarland broadly states that "a man drives as he lives." (15, p. 236) Brody suggests that driver behavior patterns are a product of certain personality factors peculiar to the individual. (4, p. 2)

Hartshorne and May have done valuable work devising tests of behavioral and character traits. They succeeded in constructing tests which will measure certain phases of character. The behavior or traits evaluated were cheating, stealing, and other violations of trust. The correlations secured between moral knowledge as measured and actual deception were not high; however, Hartshorne and May (seem to have) uncovered usable measures of the components of behavior and human character. (6, pp. 179-189) One observation, published by the American Educational Research Association, concerning this study is that "knowledge and behavior do not seem to be closely related." (2, p. 192)

Definitions of behavior are plentiful. This leaves much of the interpretation of behavioral patterns up to the individual. Hull states that behavior is primarily response to a stimulus according to the conditions under which the stimulus occurred. (9, p. 6) Kaplan and Baron indicate that the mainsprings of human behavior are determined by individual personality. Therefore behavior is the activity caused by the motivation of human personality. (10, p. 116) Kimble defines the behavior of living organisms as being any of the observable characteristics of the gross, modifiable actions of whole, intact individuals. (11, p. 11) Neilson and others define the behavior of people as the mode of conducting oneself. (20, p. 246)

More important and more difficult is the problem of attempting to measure various phases of behavior, and to determine the actual manner in which we may change existing, set patterns of behavior. Watson says that the way to change behavior is to change our personality. (31, pp. 301-307) Marx devised a theory that unseen causal agents such as the mind, past experiences, instincts, and organic change make it impossible to predict behavior completely. He states further that initiating causes of behavior are immediate purposes, capacities of the individual to mediate these purposes and corrective behavior adjustments. (13, pp. 325-425) Osgood writes that the "more closely a training situation resembles that in which the training is to be used, the more effective will be the training." (23, p. 351) The American Educational Research Association states that "human behavior is determined by a complex pattern of limiting and motivating factors. A change of one factor alters the whole configuration." (2, p. 761) The Association also states that behavior is sometimes due to the immediate situation and temporary motivation. (2, p. 128)

III. LITERATURE ON PERSONALITY

This researcher considered it important to briefly mention certain findings concerning personality since this component of all human beings appears to be closely associated with behavior. Personality is a difficult term to define because of the multiple characteristics it seems to possess. It apparently has its roots in genetic factors determined before birth and grows during the entire life of each individual. Personality is interaction between genetic traits and the total number of environmental factors which influence each of our lives. The end result is what distinguishes each individual from every other individual.

Watson, in attempting to define personality, implied that it consists of the sum of all observable activities of behavior which can be detected over a long enough time to give reliable information. He also says that the only way to change personality is to unlearn things we have already learned and then learn new things. (31, pp. 274-302)

The American Educational Research Association states that personality is the result of interaction between genetic and environmental factors, and that this must be accounted for in any discussion of human behavior. This concept emphasizes the growth and behavior of the individual as a whole. (2, pp. 806-815)

Neilson, W. A. Knatt, and others define personality as an integrated group of emotional tendencies and behavior tendencies which include the totality of an individual's characteristics. This integration results in distinctiveness and individuality of personal character. (20, p. 1828)

Kimble states that each adult human has a fairly permanent set of characteristics which distinguishes that individual from any other individual. These characteristics are organized and integrated by their interaction upon one another into unique combinations which may be called personality. These factors are important to his behavior, and at the same time will determine how other people respond to him. (11, p. 358)

Pressey and Robinson write that an individual's attitudes will partially depend upon his personality, and "as the personality becomes integrated, attitudes tend to be more consistent." (25, p. 268)

IV. LITERATURE CONCERNING ATTITUDES AND LEARNING AND THEIR ACQUISITION THROUGH FILM PRESENTATION

One assumption stated in the first chapter of this study is that we may assume that behavioral change can occur (from viewing a film) if there is a significant gain in knowledge or shift in attitude. This assumption required further investigation, by the researcher, on both attitudes and learning and of the effects which films may have upon either of them. There have been many studies made previously on these general components of behavior. Findings which were considered pertinent to the present study are referred to in the following discussions.

Many attempts to define attitudes have been made during the past twenty years. Remmers, in attempting to define attitudes, considers them as an "emotionalized tendency, organized through experience, to react positively or negatively toward a psychological object." (26, p. 362) He further indicates that attitudes are a function of specific situations and that each person will behave differently as the situations are changed. (26, p. 359)

Newcomb states that "an individual's attitude toward something is his predisposition to perform, perceive, think and feel in relation to it." (21, p. 118) He also elaborates upon attitudes to the extent of stating that there are varying degrees of organization of attitudes, which are not independent causes of behavior, but are outgrowths of experiences through which we have gone. (21, p. 121)

Two other interesting definitions of attitudes are advanced by Stouffer, who referred to an attitude as "a delimited totality of behavior," (27, p. 49) interchangeable with opinion, and Young, who defined an attitude as a "mental organization which predisposes an individual towards or away from a verbal statement." (32, p. 242)

The U. S. Army and the U. S. Navy have done valuable work in determining how much attitude change will result from seeing a film. These studies included measurement of the effects of entertainment films on both specific and general attitudes, and the influence of films on opinions. Some of these studies concerned the effect of films on attitudes toward Negroes, Chinese, Germans, criminals, crime, moral values, soil erosion, W. P. A., movie heroes and "books," prohibition, sex, escape from danger, militarism, war, U. S. entry into war, democracy, nationalism, willingness to serve as a soldier, resentment against the enemy, and other subjects. (28, pp. 5-1, 5-18)

The summary of these reports states that: "Few, if any, specific attitude changes will result when the film bias is strongly contradictory to the social norms. In the case of contradictory influence, film bias may actually reinforce the existing attitude, rather than modify it." (29, pp. 5-18)

"There is, however, no direct evidence that motion pictures are reliably superior to other media of communication in their influence on general attitudes. Some evidence exists to the contrary." (29, pp. 5-18)

"A person soon forgets the ideas he has learned which are not consonant with his predispositions, but he retains without loss or even with an increment those ideas consonant with his predispositions." (29, pp. 5-18)

The American Educational Research Association states that studies indicate important social attitudes which form in early childhood tend to be firmly established, and mere presentations of information are not likely to effect modification. (2, p. 82)

Pressey and Robinson have made valuable contributions in the determination of attitudes. Their study indicates that attitudes come

from the total condition of affairs dealing with a specific subject. Children develop attitudes quickly from the attitudes of adults, and these attitudes tend to become more consistent as their personalities become integrated. (25, pp. 267-280) As a result, Pressey and Robinson state, "most important and most subtle of all determinants of attitudes is culture--the total complex of beliefs and values and accepted points of view of a nation, class or community." (25, p. 276)

Newcomb approaches attitude change by suggesting that we may modify attitudes slightly by becoming more familiar with them. This is true, however, only if existing attitudes are not very intense, and if the new experience is predominantly favorable, or predominantly unfavorable, in relation to the object of the attitude. He further says that influences in changing attitudes are more effective if they are vivid and involve first-hand experience. In summary he states that:

Attitudes will be affected by external influences to the extent that previous attitudes are not strongly held, to the extent that such influence is not neutralized by contrary influences, and to the extent that the influences are vivid, first-hand ones. (21, p. 209)

Hovland, Lumsdaine, and Sheffield contributed another study which was very pertinent to this research due to its implications concerning attitudes or opinion formation. The film "The Battle of Britain" was selected for its possible effect on short and long time film effects. Four groups of soldiers (two experimental and two control) were given an opinion questionnaire. One experimental and one control group was given a second questionnaire five days after the film presentation. A second experimental and control group received the after-questionnaire nine weeks after the film was shown. The findings report that opinion changes showed an average increase with the passage of time. The authors hypothesize that a person soon forgets the ideas he has learned which are not consonant with his predispositions, but may retain or

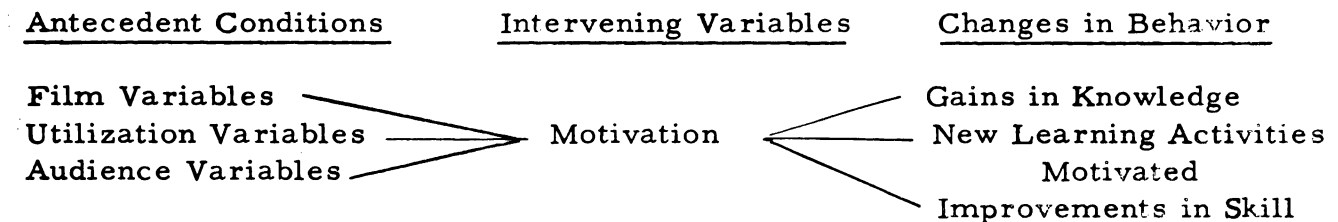
even increment ideas which are consonant with his predispositions. The delayed change of opinion may be termed the "sleeping effect." This sleeping effect assumes equal learning of content with initial resistance to acceptance of the material presented. This resistance to acceptance diminishes with time while the content is forgotten more slowly. Thus, the elapsed time interval allows the individuals to think and talk about the communication message, and allows the people with agreeable predispositions to change in extent of favorable agreement with the communication. (29, pp. 182-200)

There is an abundance of literature concerning learning. The definitions of learning range from the dictionary concept that learning is the acquisition of knowledge, to the psychologists' belief that learning is synonymous with behavior.

Kimble says learning is primarily a permanent change in behavior which results from practice. He also indicates that learning may produce widely different performances in people. Learning depends upon variables such as the amount of practice, interstimulus time, schedule of reinforcement, amount of reward, and the delay of the reward. Variables which are important to performance are motivation, the intensity of the conditioned stimulus and effortfulness of the response. He further states that there are two kinds of learning. These consist of verbal learning and the acquisition of skill. Each individual is said to select from a wide array of possible reactions one appropriate to the particular situation. This is known as selective learning. (11, pp. 192-243)

The American Educational Research Association says that "It is a persistent belief that the person who is best informed will also be the one to make the best decisions." (2, p. 128)

Relating learning to films, we find that Norbeck states that visual presentations may result in learning. (22, no. 146-8) Hoban and van Ormer write that "in communicating facts and demonstrating concepts, films (or filmstrips) are about equivalent, and sometimes better than superior instruction." (7, pp. 6-22) Kopstein and Roshal indicate that pictures are more effective than words as stimulus terms but less effective as response terms. (12, p. 407) May and Lumsdaine write that there are intervening variables which are the basic determinants of learning. This may apply to films as follows:



May and Lumsdaine measure the amount of learning from films by using certain dependent variables. These dependent variables are ones upon which learning always depends (in some part at least). The problem is to find measures of these variables among the complex manifolds of film, utilization, and audience variables. These dependent variables (basic determinants of learning) are illustrated above as "intervening variables" because they are set between the antecedent conditions on the one side and the consequent changes in pupils on the other. They are dependent variables to the antecedent conditions and independent variables to changes in behavior. Motivation may be viewed as one intervening variable upon which most types of learning at least partially depend. It is essential for the acquisition of knowledge or skill, and also for follow up activities after a film has been seen. (14, p. 7)

Probably the principal value of learning or a knowledge of facts (with reference to behavior) lies in the ability of the individual to apply,

or use, the facts. A number of studies have been completed which furnish data on various phases of acquiring factual knowledge from motion pictures. The following discussions will refer to a few of the pertinent findings from these studies.

Holoday and Stoddard attempted to measure both immediate and delayed gain in knowledge based on film experience. The study utilized seventeen films, approximately 3000 children in grades two through ten, and 200 graduate students and faculty members. The conclusions revealed that the general information of children and adults is increased considerably by information correctly shown in motion pictures; that information presented incorrectly by pictures may be accepted as valid unless the incongruity is quite apparent, and that the retention of the specific incidents of motion pictures is high. (29, p. 3-2)

Hovland, Lumsdaine, and Sheffield attempted to show the effect of films on increasing factual knowledge of Army trainees concerning the background of the war, the Nazi strategy, and the events of the Battle of Britain. Measurements were made one week after the trainees had been shown one or more of the Why We Fight films. The analysis of the results reveals that the Film Group exceeded the Control Group in learning by 14.5 percent on the background of the war, 19.2 percent on the Nazi strategy, and 22 percent on the events of the Battle of Britain. (29, p. 3-3)

Knowlton and Tilton conducted an experiment with seventh-grade pupils to determine if learning will take place by the use of silent films, and the kinds of facts and concepts that may be learned from specific kinds of films. The results of this study "reported that the scores of the groups who received film instruction in addition to the regular instruction exceeded those of the groups that received the regular instruction only." (29, p. 3-4)

Rulon investigated the influence of films on "rote" and "eductive" learning by studying the effect of adding eight sound films to usual methods of instruction. His tests showed that ninth-grade pupils taught by text plus films excelled the text-only pupils by a larger margin on the eductive items than on the rote items. He also states that the tests reveal that performance on "eductive items can be predicted more accurately from a knowledge of mental ability and previous achievement than can performance in terms of Rote Items." (29, p. 36)

Vernon conducted a study on the effectiveness of motion pictures by themselves in aiding conceptual learning which comes from motion pictures and filmstrips. His work indicates that filmstrips, motion picture films, good instructors, and high intelligence are the most effective ingredients in instruction. He pointed out that the addition of the film to the usual instruction aided all groups tested. (29, p. 3-7)

Gibson and others conducted a study which found that "aviation cadets learned and remembered more about the system of position firing from a training film than they did from either classroom teaching or study of a manual." (29, p. 3-8)

The Holaday and Stoddard, Hovland, Lumsdaine, and Sheffield, and Knowlton and Tilton studies were also tested for long-time retention of knowledge from films. Each of these studies reported that retention remained high over a long period of time, that the contribution of films is greater for immediate learning than in retention of material, and two of the studies indicated the presence of a sleeper effect in learning with the passage of time. (29, p. 3-9)

CHAPTER III

POPULATION, MATERIALS USED, AND EXPERIMENTAL DESIGN

I. POPULATION

One of the general assumptions concerning this study is that inexperienced drivers would probably show greater increase in knowledge, shift in attitude, and improvement in driver skill than will experienced drivers. However, the experiment was set up to evaluate the effects of the film upon experienced drivers, since this group appears to be the most likely target audience which could benefit from any film effects.

The groups for the study were drawn from a population of sophomore, junior, and senior students at Michigan State University. The selection of these people was by both the purposive and random assignment methods. The samples utilized consisted of approximately one hundred and sixty students from classes representing the departments of Education, Health, Physical Education, Audio-Visual, Police Administration, and Highway Traffic Safety. The purposive selection of these people was to insure heterogeneity of the types of students. In most instances the samples used consisted of volunteers from the classes selected. Each volunteer filled out an information and signature card. The cards were then shuffled and dealt into four groups which indicated into which of two control or two experimental groups he, or she, was placed.

II. MATERIALS USED

Due to the complexity of the problems undertaken in this study, the author was required to use a diversified assortment of materials and tests in the development of this research project. Among these are the following:

1. A research of pertinent related literature, street corner driver observations, depth interviews, and the previewing of many films were utilized in the development of a prediction device called a behavioral analysis technique.
2. An attitude scale was developed, pre-tested, and administered to the sample population to determine shifts in attitude. The type of scale used is commonly referred to as a "Semantic Differential" rating device.
3. An achievement test was developed, pre-tested, and administered to measure increase in knowledge which could be attributed to viewing the experimental film.
4. A driving skills test was developed and used to measure improvement in driving performance which could be brought about by viewing the experimental film. This test required the use of fifteen driver trainer cars, Michigan State Universities' Driving Range, and twenty-five professional driving instructors.
5. The film "Driving at Night" was utilized as the experimental mechanism which differentiates between the two control and two experimental groups.

6. Other materials utilized were film projectors, screens, various office supplies, tabulating and computer equipment, and miscellaneous physical facilities belonging to Michigan State University.

III. EXPERIMENTAL PROCEDURES AND DESIGN

In order to secure information on the effects of a traffic safety film upon its target audience, an instructional and demonstrational film, Driving at Night, was selected for the experiment. A matched group technique was employed as the best method of determining what changes among the sample population could be attributed solely to the effects of the experimental film. This technique was carefully prepared with a view to eliminate bias in its results and confusion in the interpretation. It was checked by six Michigan State University faculty members before being put in its final form.

Tests and measures were developed to evaluate the audience reaction to knowledge, attitudes, and driving skills on both an immediate and a retention basis. These tests were administered to the sample subjects in such a manner that no student was required to take any test more than one time. Thus, the debatable bias frequently levied upon "Before and After Tests" was eliminated.

The test of knowledge was coded to include the major informational points in the film. These were divided into four categories termed (1) limitations of headlights, (2) proper use of headlights, (3) special visibility hazards of night driving, and (4) problems involving fatigue. The semantic differential attitude scale was based upon seven concepts thought to be the most significant contributions obtainable from this film. These concepts were measured by the use of a seven point scale. The following is a list of the seven concepts as they

were developed in the test of attitudes:

- a) Night Driving Skill
- b) Headlight Limitations
- c) Night Driving Visibility
- d) Night Driving Fatigue
- e) Proper Headlight Use
- f) Pedestrians
- g) Driving at Night

A series of nine skill items were included in the test of driver performance. These skill items which were carefully chosen as representative of what skills the film might be expected to improve were supplemented by three additional test items in an effort to measure the populations driving ability prior to the experiment. The supplementary items were (1) an X turn, (2) a Y turn, and (3) a figure 8. The skill items chosen from the film were as follow:

1. The switching off of inside lights before starting the car.
2. Headlights on the dim position when approaching an oncoming car.
3. Speed reduced within safe limits when rounding a curve.
4. Special precaution or consideration of pedestrian safety.
5. A general reduction of speed due to the hazards of night driving.
6. The flickering of headlights when passing a car.
7. Slowing down and pulling to the right when approaching a one-eyed car.
8. Parking lights used properly when parking beside the highway.
9. The general concentration and caution shown by the driver.

A complete analysis of the data gathering instruments will be given in the following chapter.

The experimental design may be viewed graphically by reference to Figure 1.

EXPERIMENTAL DESIGN

Control Group I <u>58 Drivers</u>	Control Group II <u>28 Drivers</u>	Experimental Group III <u>54 Drivers</u>	Experimental Group IV <u>26 Drivers</u>
1. Show non-related film	1. Show non-related film	1. Show experimental film	1. Show experimental film
<u>Test Immediately</u>	<u>Test six weeks later</u>	<u>Test Immediately</u>	<u>Test six weeks later</u>
1. Attitude 2. Achievement 3. Skills	1. Attitude 2. Achievement 3. Skills	1. Attitude 2. Achievement 3. Skills	1. Attitude 2. Achievement 3. Skills

Figure 1.

The method or procedure of administering this experimental design was as follows:

1. Before the beginning of the experiment, this writer completed a behavioral analysis (explained in Chapter IV) of the film "Driving at Night." This predictive instrument was then administered to five audio-visual and five traffic safety experts. At the completion of the experiment, the results obtained from the sample population were compared with the predictions of each of the groups of experts.
2. The sample population was divided into two control and two experimental groups by random sample procedures.
3. Experimental Groups III and IV were shown a film on "Driving at Night." At the same time Control Group I and

Control Group II were viewing a non-related film entitled "The ABC of Internal Combustion Engines. "

4. Immediately following the showing of the above mentioned films, Control Group I and Experimental Group III were administered tests concerning attitudes, achievement, and driving skills.
5. Six weeks after the showing of the films, Control Group II and Experimental Group IV were given tests on attitudes, achievement and driving skills.
6. Analysis of the data was made following the testing of Control Group II and Experimental Group IV.

CHAPTER IV

DATA GATHERING INSTRUMENTS

I. SELECTION OF THE FILM

The film "Driving at Night" was selected after thirty traffic safety films had been carefully previewed. Among the factors taken into consideration in the selection of the film were the following: (1) the frequency of use of the film in driver training courses, (2) the educational level for which the film was best suited, (3) the subject matter content, (4) the quality of photography and sound effects, (5) the adaptability of the film to the objectives of this particular research, and (6) the important contributions which the film can make toward the goals of highway traffic safety.

Before the final selection was completed, a complete film analysis was made to interpret the main purposes of the film. This film analysis is as follows:

FILM ANALYSIS FOR "DRIVING AT NIGHT"

Introduction

Daytime driving requires skill and concentration. However, night drivers need an extra measure of concentration, skill, caution, and courtesy in order to drive safely and to decrease the high percentage of accidents which occur after dark.

Assumption

There are correct solutions to the night driving hazards produced by poor visibility and fatigue.

I. Problems and Solutions to Poor Visibility

A. Limitations and Proper Use of Headlights

1. Limitations of headlights

- 1 (a) **Problem:** How to compensate for the short range of a car's headlights?
- 1 (b) **Solution:** Decrease your speed at night so that you will not overdrive the headlights.
- 2 (a) **Problem:** How to compensate for the small angle of vision created by a car's headlights?
- 2 (b) **Solution:** Decrease your speed at night so that you will have time to react to emergency situations.

2. Proper use of headlights

- 1 (a) **Problem:** How to be sure that maximum brightness is obtained from the headlights?
- 1 (b) **Solution:** Be sure the headlights lenses are clean at all times.
- 2 (a) **Problem:** What is the proper use of the lights when parking at night on a highway?
- 2 (b) **Solution:** Switch off headlights and turn on parking lights.
- 3 (a) **Problem:** At what time should the headlights be turned on?
- 3 (b) **Solution:** One-half hour before dark or whenever there is a need for them.
- 4 (a) **Problem:** When should the headlights be switched to the dim position?
- 4 (b) **Solution:** Whenever approaching an oncoming car or when following close behind a car.
- 5 (a) **Problem:** What use should be made of the headlights when passing another car?
- 5 (b) **Solution:** Signal the driver in the other car of your intention to pass by flickering your headlights.

B. Special Visibility Hazards of Night Driving

- 1 (a) Problem: What action should be taken when a driver is approaching a car which has only one headlight?
- 1 (b) Solution: Slow down and pull to the right.
- 2 (a) Problem: What action should be taken when a driver is approaching an oncoming car whose headlights are still in the bright position?
- 2 (b) Solution: Slow down and look at the right edge of the road.
- 3 (a) Problem: How may a night driver best eliminate the hazard of seeing pedestrians at night?
- 3 (b) Solution: Be alert and slow down in order to drive within the range of the headlights.
- 4 (a) Problem: What is the use of inside lighting when driving at night?
- 4 (b) Solution: Never light cigarettes or turn on inside lights while the car is in motion.

II. Problems and Solutions Involving Fatigue

- 1 (a) Problem: What should a driver do in order to combat lack of vigilance, loss of judgment concerning speed and distance, and slower reaction time caused by fatigue?
- 1 (b) Solution: Night drivers should develop their skill, concentration, and alertness. When fatigue sets in they should pull off of the road, get out of the car to relax, take a nap, or let someone else drive before continuing on their journey.

The writer felt fortunate in being able to secure the reaction of Jervis B. McMechan, the director-producer of the film, to this film analysis. Among his comments was the following statement: "I believe it is an excellent analysis and summarizes the content of the film most precisely."

II. THE DEVELOPMENT OF THE BEHAVIORAL ANALYSIS TECHNIQUE

Two of the first activities carried out by the writer, during the planning stages of this study, were the securing of personal interviews of one hour's duration and the direct observation of driver behavior through street corner observations. The findings derived from these activities indicated that there are various factors which contribute toward driving behavior. Therefore, these factors must be influenced or changed if a person's driving behavior is to be improved. The development of the behavioral analysis technique takes these factors into account and suggests a new method for evaluating the effect of an audio-visual message upon the behavior of the viewers.

A behavioral analysis technique was used which was restricted to a few behavioral components that may be presented in a single film. When we consider all behavioral components involved in a good traffic behavior, we find that the number of components is too great to be tackled in any definitive manner. Once a film has been selected that appears to present desirable behavior to be acquired, it is then necessary to list every film component. This can be done by making a record of the commentary and visual events in the film as individual statements of fact. It is usually necessary to convert compound sentences into the simple sentences making up the complex idea. The test of completion of this stage is that every item that the film can be expected to teach, or might possibly teach, is included in the listing.

This may be accomplished by projecting the film as few as three or four times. Certain components which are listed may be stated in a form which makes it difficult to interpret the meaning. It is necessary to make a slight conversion such as removing names and filling in references to previous parts of the film. It is very important to convert

the facts to basic facts without alteration in meaning or general intent. This may require a rewording of the fact. Where visual information has been presented in such a way as to produce an impact on the individual, this needs to be stated as a fact also.

When all facts have been listed, they can be analyzed. As an aid to doing this, the facts should be categorized. The four categories of facts shown in Figure 2 are background, unimportant, learnable, and behavioral. The first two are incidental to the film's main message and can be listed and then ignored. This includes background facts which are those which give the setting or general conditions of the film. Unimportant facts are those peculiar to the situation depicted and which were not intended to be learned as facts. It may be difficult to separate these categories and it is not necessary to do so.

The remaining facts include that information which the film purports to transmit to the viewer. Of these, the most important category can be classified as behavioral. That is, it can be assumed that when these facts are viewed, one can expect some change in the behavior of the viewer. These will be treated more fully in the following paragraph. Those facts which appear to be important components of the film but which may not be expected to change behavior have been called learnable facts. Actually all facts are learnable, however the learnable facts we refer to here may be retained in the mind, but should not effect an individual's behavior. These facts become part of the mentality but are not actionable. They might be labelled "mental facts," "rational facts," or "facts that make up attitudes." It is these two categories of behavioral and learnable facts that must be fully analyzed.

After the facts in the film have been categorized, it becomes necessary to analyze the reaction of the viewer. How a message is received depends on the previous experience of the viewer and on the

facts which he brings to bear on the message. Therefore, for each fact which may result in a change of behavior, we must list that information which we expect the learner to associate with the fact. This has been called the listing of situational reality. A typical example of the operation of these components is in teaching one to respect speed laws. A film might state that one should not exceed the speed limit, but the viewer of the film is forced in everyday driving habits to exceed speed limits on certain roadways. He also knows that he can exceed the limit by a few miles per hour and still not be ticketed. Therefore, based on the facts stated in the film and his knowledge of common behavior, the learner may fail to learn anything new and will certainly not change his behavior. Consequently, each fact must be treated in context with the reality of the situation in order to obtain an accurate estimate of anticipated behavior. The behavioral items in Figure 2 show how this is done for each behavioral fact. It may be desirable to do this also for learnable facts.

At this point, it is possible to begin making estimates of the impact of the film. To do this realistically, one must select the target audience for which the estimates are to be made. The necessity for selecting the proper audience is important since new learners, having little experience, are prone to accept the information as correct and final, whereas older learners bring to bear a greater amount of experience. The population to be used in this research was composed entirely of experienced drivers, representing sophomore, junior, and senior students at Michigan State University, and the analysis has been made for them.

One of the first estimates is that of the percentage of the viewers who know the facts. If they know the information, no learning can occur and certainly no behavior change is anticipated. This estimate can be checked by means of tests if it is not felt that the estimate is correct.

The remaining percentage consists of the learning potential. If 80% know a fact, then, theoretically, 20% could learn the information. However, the estimated learning refers to the actual percentage of people who will probably learn the fact, and is stated for both immediate and permanent effects (Figure 2) This is the estimate of learning achieved. If material being presented is too difficult, then the estimate of actual learning is probably somewhat less than that remaining to be learned. Although learning is probably not related directly to behavior, we can assume that there will be no behavioral changes without learning. Therefore, the estimates of learning are of value.

To determine the possibility for a change in behavior, it is first necessary to estimate to what extent an individual may improve his attitudes and driving skill. If the film fact states that one should stop completely at a stop sign, and if the average person does so 70% of the time, this 70% represents present performance. This leaves a potential change in behavior of 30%. It is important to base these estimates on the number of incidents of the fact or performance, rather than on the percentage of time involved. From the present performance, we come to the most important estimate, that of possible change in behavior.

It is assumed in this research that the basic ingredients which make up a persons driving behavior are his knowledge, attitudes and driving skill. Therefore, the components of these three behavioral ingredients are considered highly related or interchangeable with one another. The major components are illustrated in Figure 2. If a film does not have many components with large possibilities for change in knowledge, attitudes, and driving skill, then it cannot effectively change behavior to any extent. Now we will analyze this potential behavioral change into its components. The method for doing this is one of working back from the reasons stated by drivers for failure to perform correctly.

These reasons were obtained in personal interviews of one hour's duration, in which the most basic reasons were obtained. Actually, these reasons may overlap and, in so far as possible, one must break down complex categories into discrete categories that may be treated individually. Some of the categories that have been obtained are personal judgments, other people's behavior, negligence, lack of knowledge, chance situations, and other factors. These categories were developed for driver-safety films. Other categories would need to be developed for other types of behavior. When these categories have been set, it is possible to distribute the percentage of total possible change in attitudes and skills to the various components. It has been found that there is relatively consistent agreement in assigning these percentages when it is known what is being considered. For instance, out of the possible change of 30%, the reason for not conforming to recommended behavior in 10% of the instances may be due to personal judgment.

Now that all the components in the film which could affect attitudes and skills have been listed and estimates made of the reasons why drivers have not changed, it is possible to analyze the films more completely. One of the first steps is to rank the facts of the film in order of decreasing possibility for learning change. This will indicate which items will change the viewers' knowledge, even though no change in behavior may result. From such an analysis, it has been found that in a ten minute film, there may be only a few facts which affect learning. In particular, it has been found that dramatic or attitudinal type films present so much situational information that there is little time to present factual information which might change behavior. There is probably a need to avoid presenting more factual information than can be adequately absorbed by the viewer. From this analysis of attitude and skill change possibilities, it is then desirable to test actual attitude and skill reactions to determine conformance with the estimates.

From this analysis, it may be seen that lack of knowledge is an insignificant reason for not behaving as desired. In cases we have studied, personal judgment and disagreement with laws and other drivers' behavior seem to be more important factors. To determine the relative impact of these factors, one should add together the estimates of possible change of each factor and determine which could be most easily changed to result in improved behavior.

After one has estimated values for each of the behavior change components, it is then necessary to estimate how much change in attitudes and skill may be expected as a result of seeing the film. For instance, if personal judgment accounts for 10% of the lack of correct behavior skill, it might be estimated that the film will affect the viewer and produce an estimated change of 2% in the desired direction. Similar estimates can be made for other components. When these are totaled, one obtains an estimate of total change in behavior resulting from the presentation of that one fact as might be measured soon after seeing the film. An estimate can also be made for any permanent change that could be expected.

Each one of the behavior change components must be analyzed to determine how behavior might change. There are a number of possibilities. If the major reason for lack of correct performance is personal judgment or disagreement with the law, then efforts should be made to give understanding to the law or the law should be changed. If a major lack of compliance is due to chance situations beyond any control of the individual, one would not expect to obtain any improvement. If the major factor is lack of knowledge, then improved methods for presenting information might be employed. One should study the extent to which personal judgment is involved and should analyze the factors that make it up.

If there is reason to analyze the effect of the film on other age levels or levels of experience, then new estimates should be made.

Estimates can be made by one person and a great deal of clarification can be obtained in this way. If possible, it would always be desirable for a number of persons to make estimates of the film so that the reliability of these estimates would provide an index to the degree to which the estimates should be relied upon.

There are probably many instances in which learning is assumed to be the end goal, rather than a change in behavior. Certain psychologists have related learning to behavior and consider them synonymous. However, the method described above can be used to estimate how much could be learned from any presentation. One can rank items on the basis of knowing the facts which will result in the reinforcement of the information presented.

The method described is one developed from information obtained in depth interviews. It is assumed that an individual can make estimates of the various factors involved in his conformity to a particular pattern. Research has been done to validate these estimates. One method used was to make observations of traffic behavior. These have been called street corner observations, and one of these involved measurement of the compliance to the regulation of complete stops at stop signs. Therefore, this bit of information acts as a check on the estimates which were made of the stated film fact. Depth interviews were found to be valuable for assigning values to the reasons for non-compliance. Other values in the behavioral analysis will be checked by tests to determine the level of knowledge, attitudes and behavioral skills before and after seeing the film. The various behavior components were checked where possible. In some cases, estimates were far too generous, and it was necessary to re-evaluate the estimates. In these cases it became apparent that

A. Film Fact B. Conversions C. Situational Reality	Behavior Change Components														
	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
<u>Unimportant Facts</u>															
(A) 1. Driving can be mighty pleasant.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(A) 2. It is easy to see pedestrians in the daytime.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<u>Background Facts</u>															
(A) 1. As a general rule, pedestrians should face traffic and wear light clothes.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(A) 2. Even during the day, many split-second decisions must be made when driving.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<u>Learnable Facts</u>															
(A) 1. 60% of the total automobile accidents occur at night.	40	40	15	0	0	0	0	0	0	0	0	0	0	0	0
(A) 2. Objects more than 150 feet away cannot be identified clearly.	30	30	10	0	0	0	0	0	0	0	0	0	0	0	0
<u>Behavior Facts</u>															
(A) 1. If you are parking away from the city street-lights, leave your parking lights on when pulling off the highway.	75	15	5	50	50	25	6	10	6	0	3				
(B) 1. Use your parking lights after dark															
(C) 1. This depends on how far off the highway and for how long.						1	1	1				3	1	2	0
2. This may wear out the battery.															
3. Batteries cost a lot of money.															
(A) 1. Don't light matches or cigarettes while driving.															
(B) 1. Don't let minor things take your attention from your driving or interfere with your vision.	50	30	10	60	40	25	5	5	5	0	0				
(C) 1. This is too impractical to be of any value.						1			1			2	0	0	0
2. The risk is small compared to the inconvenience.															
3. This is idealistic and impractical.															

Figure 2.

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the film would have very little effect on behavior. After becoming experienced in estimating behavior, it was felt that the estimates closely approached actual conditions. This technique was further validated by the judgment of competent persons representing traffic safety and film production experts. A preliminary experiment was conducted and an item analysis made of the data which could be analyzed and thus improve the validity and reliability of the tests used on the final experiment.

The reliability of the behavioral analysis technique was determined by administering the instrument to two groups of experts from the audio-visual and traffic safety fields. The Pearson r formula was applied to both sets of predictions concerning both immediate and retention estimates of learning, attitudes, and knowledge. (30, p. 233)

The two halves of the expert panel correlated to a high degree ($r = +.72$) in their prediction of immediate learning, and to a lesser degree ($r = +.29$) in predicting permanent learning. The expert panel correlated very highly in their prediction of attitudes with an immediate attitude correlation of $r = +.93$ and a permanent attitude correlation of $r = +.78$. The panel correlated at $r = -.21$ on their predictions of both immediate and permanent skill change. However, this was not considered significant due to the very low estimates concerning skill change benefits of the film.

III. DEVELOPMENT OF AN ACHIEVEMENT TEST

An achievement test was constructed by the writer since there were no standardized tests available covering the specific information desired from the subject-matter area of the film. The steps used in validation of the achievement test were, (1) analyses of the film used in the study and verification of this analysis by the producer of the film, (2) judgment

of five specialists involved in traffic safety film research, (3) use in a preliminary experiment, and (4) item analyses.

The writer first made a factual analyses of the film in order to determine what the objectives, purposes, and potentials for learning might be. The facts obtained were then utilized to formulate questions for a preliminary experiment. These questions were reviewed, edited, and formed into a complete multiple choice test. General instructions were prepared which were simple and complete in order to minimize the verbal assistance required of the test administrator. The preliminary experiment was conducted as a before and after type of test design, and the verbal instructions were short and concise in order to best determine what benefits were derived solely from the film content, rather than from the manner in which it was presented.

In preparing the questions for the preliminary test, the writer was more concerned with testing all possible facts than with balancing the questions according to difficulty. The initial test included fifty questions which were of the multiple choice type, and the student had a choice of one of five answers. Later analyses reduced the final test to thirty-seven questions. The final test may be found in the Appendix of this study. Special pencils and printed answer sheets were used, and the tests were scored by electric scoring machines.

Several indices were used in the analysis of the preliminary test. A simple index of discrimination was provided by dividing the group of tests into an upper half and a lower half according to scores. The difference between the proportion of students in each group answering the question correctly was one index. Further item analyses revealed that the upper group missed four of the questions more frequently than the lower group. Three questions were answered equally well by both groups while there were no misses by either group on six items. These thirteen

questions were eliminated from the final test which was administered to the control and experimental groups.

On the basis of the item analysis, evaluation by the researcher, and other data from the trial experiment, the test was revised. The test items were arranged so that each question could be applied directly to a corresponding fact in the behavioral analysis. The final revision of the test resulted in thirty-seven questions constructed so that answer sheets for machine scoring could be used. The tests were scored by the number of "rights."

The reliability of the final test was established by administering it to two matched groups. The Pearson r formula was applied and the groups found to be correlated at $r = +.93$ with $N = 37$. This was considered very high and was tested and found to be significant at $t_{.001}$. (30, p. 233)

IV. DEVELOPMENT OF AN ATTITUDE TEST

The writer constructed an attitude test covering the subject matter area of the film since there were no standardized tests available for this film. Validation of this test was obtained by use in a preliminary experiment and by item analysis. The attitude scale was a type of semantic differential test which has proved to be very worth-while in similar experiments. Tannenbaum secured test-retest reliability data for each of six concepts and six evaluative scale of a semantic differential attitude test in 1953. The test-retest coefficients obtained a mean r of .91. (24, p. 192) The evaluative dimensions of the semantic differential display reasonable face validity as a measurement of attitudes. Suci, in 1952, and later Tannenbaum and Kerrick were able to discriminate in expected ways in studies of voting behavior and pictorial political symbolism. (24, p. 192) The semantic differential attitude scale has

been compared with both the Thurstone and the Guttman-type scales. It was apparent from this analysis that whatever these scales measure, the evaluative factor of the semantic differential measures just as well. The correlation between the semantic differential scores and the corresponding Thurstone or Guttman scores was significantly greater than chance with $p < .01$ in each case.

The items on the attitude scale were organized under two types of components. The first component consisted of ten concepts which were selected as being the major attitudinal considerations of the film. The second component included eight sets of scales representing variations of a good-bad rating. Each of the concepts was matched with each of the scales in a heterogeneous manner in order to determine the impact of each concept upon the respondent.

The preliminary experiment required each respondent to score eighty items on a one to seven rating scale. This test was given to each student before and after viewing the experimental film. General instructions were made available to each student in printed form, and supplemented with verbal assistance from the test administrator. A time limit was set at twenty minutes which was not exceeded by any of the respondents.

Upon completion of the preliminary experiment an item, concept, and scale analysis was used to differentiate between which items should, and should not, be used in the final experiment. A .5 shift in attitude was arbitrarily used as the minimum change which would be acceptable in this research. This rating had been previously approved in other research studies. On the basis of this analysis, evaluation by the project director, and the research findings mentioned previously, the test was revised. The writer decided to eliminate one set of scales and three of the concepts from the preliminary test. This revision of the test

resulted in the number of items being reduced from eighty to forty-nine.

The final attitude scale was given a time limit of fifteen minutes, since it was the first reactions of the students to each concept that were desired, and it was then administered to Groups I and III (immediate effect groups) as soon as the showing of the experimental and non-related films was completed, and before the administration of any other tests. The retention groups, II and IV, were given this scale six weeks later, prior to their examinations on achievement and driving skill.

The reliability of the final test for attitude change was established by correlating the results of two matched control groups. The Pearson r formula was applied to the seven concepts and the groups were found to be correlated at $r = +.98$. As a further check the same formula was applied to each item and found to be correlated at $r = +.93$ with $N = 49$. Both of these correlations were high and were further tested by the t -test of significance and found to be significant at $t_{.001}$.

V. DEVELOPMENT OF A DRIVING SKILL TEST

The writer developed a driving performance or skill test which was representative of the traffic safety elements the film was intended to teach. Validation was based upon the approval of the selection of these elements by the producer of the film, expert opinion, and the face validity obtained by the direct observation of individual driver performance.

An analysis of the basic instructional elements presented through visual demonstration and verbalization was first made. From this preliminary list of fifteen elements, nine were chosen to be used in the driving experiment. The test consisted of two parts. First were the

nine important film related elements, and second were three general skill tests to determine if previous driving skill had any effect upon the performance of the respondents. The final test was approved by fifteen traffic safety experts before being used in the experiments.

The administration of the test was quite simple. Each group member was scheduled to drive an automobile immediately after taking the attitude and achievement test. General instructions were given to the students ahead of time which only referred to the second part of the test concerning the general skill observations to be administered at the driving range. Each respondent was to drive his automobile from a fixed starting point over a prescribed route to the driving range. A professional driving instructor accompanied each driver in order to help familiarize the person with the type of automobile he, or she, was using before reaching the driving range.

Without the students being aware of it, the nine film related elements were secretly installed along the route taken by each automobile to reach the driving range. Each driving instructor privately rated each respondent on all nine elements. The students were turned over to another group of instructors when they arrived at the driving range. This enabled the original instructors to make their ratings privately on a two point (right-wrong) scale.

The reliability of the driving test was established by correlating the results of the two matched control groups. The Pearson r formula was again applied and the groups were found to be correlated at $r = +.86$. The t -test was applied to these results and found to be significant at $t_{.01}$.

CHAPTER V

TEST RESULTS AND ANALYSES OF DATA

Complete data was obtained on 165 students, and only these students are included in the analysis. Of this group of students, 57 were in Control Group I which saw the non-related film; 28 were in Control Group II which saw the non-related film; 54 were in Experimental Group III which viewed the experimental film; and 26 were in Experimental Group IV which viewed the experimental film.

I. RESULTS OF THE TESTS FOR IMMEDIATE AND RETENTION LEARNING

In order to provide a sound basis for inference, the hypotheses in this study were formulated in exact terms. Six of the seven testable hypotheses were stated in the null form because the null hypothesis is stated so that the data are given a chance to disprove the hypothesis. The first two hypotheses stated that there is no immediate or permanent difference in the factual knowledge of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film. These hypotheses seek to determine if the mean proportion of correct answers for individuals in Experimental Groups III and IV are greater than the mean proportion of correct answers for individuals in Control Groups I and II immediately after and six weeks after viewing the films.

Since all groups used the same test, the individual scores made by the students on each test were used in the statistical analysis. First, the F test was used to determine if the variances of the matched populations might be presumed equal. Second, the null hypotheses were tested by the t-test of significance. The result of the F test revealed that there was no statistically significant difference between variances of the two groups of matched populations. The probability was between $F_{.025}$ and $F_{.975}$; that is, the chances of the variances of the matched groups being different were less than 5 in 100. Thus the t-test of significance of the difference between the means of the control and experimental groups was made assuming that differences among the respondents were negligible.

The mean proportion of correct answers for individuals in Group III was found to be 28.963. The mean proportion of correct answers for respondents in Group I was 21.877. The difference between the means of the experimental and control groups was significant with a probability of 99.9 in 100. This indicates that the experimental film group and non-related film group were significantly different in their amount of factual knowledge immediately after viewing the films. Therefore, on the basis of this evidence, the writer must reject the first null hypothesis.

The mean proportion of correct answers for individuals in Experimental Group IV was found to be 26.154. The mean proportion of correct answers for individuals in Control Group II was 23.429. The difference between the means of the experimental and control groups was significant with a probability of 95 in 100. This indicated that the experimental film group and non-related film group were significantly different in their learning and in their retention of factual knowledge as a result of viewing the films. On the basis of these results, therefore,

the writer rejects the second null hypothesis. Table I lists the results of the analyses of the data concerning learning.

TABLE I
RESULTS OF F TESTS, t-TESTS, AND MEAN SCORES

ITEM	MATCHED GROUPS		MATCHED GROUPS	
	I	and III	II	and IV
F TEST	$p < .05$		$p < .05$	
MEAN SCORES	<u>I</u> 21.877	<u>III</u> 28.963	<u>II</u> 23.429	<u>IV</u> 26.154
t-TEST	$p > .999$		$p > .95$	

II. RESULTS OF THE TESTS FOR IMMEDIATE AND PERMANENT ATTITUDE CHANGE

The third and fourth null hypotheses state that there is no immediate or permanent difference in the driving attitudes of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film. These hypotheses were to determine if the mean score for individuals in Experimental Groups III and IV were different from the mean score for individuals in Control Groups I and II immediately and six weeks after viewing the experimental and non-related films. The test for attitude change consisted of seven concepts on which to determine differences and there were four evaluative scales for each concept. The evaluative scales used were good-bad, safe-dangerous, nice-awful, and wise-foolish. Both groups

used the same test. The individual scores made by the respondents on each of the concepts were used in the statistical analysis.

The F test was utilized to determine if the variances of the matched populations were equal. This was done separately for each of the seven concepts. Secondly, the null hypotheses were tested by the t-test of significance for each concept. The results of these tests were as follow:

1. Night Driving Skill

The F tests of the first concept revealed no statistically significant difference between variances of the matched populations. The probability was between $F_{.025}$ and $F_{.975}$. This indicated that the chances of the variances of the matched groups being different were less than 5 in 100. Thus, the t-tests of significance of the difference between the means of the control and experimental groups were made by assuming that the differences between the respondents was negligible. The mean score for individuals in Group III was found to be 4.0550. The mean score for Group I was 3.82995. The t-test of significance between these two mean scores was not significant within a probability of 95 in 100. The mean score for individuals in Group IV was found to be 5.375. Group II had a mean score of 4.625. The t-test of significance between the two mean scores of the experimental and control groups was found to be significant with a probability of 95 in 100. This indicates that there is some difference between the two film groups on this particular concept and suggests the presence of a "sleeper effect" connected to the concept of "night driving skill."

2. Headlight Limitations

The F tests of the second concept showed no statistically significant difference between the variances of the matched populations.

The probability was between $F_{.025}$ and $F_{.975}$. This indicated that the chances of the variances of the matched groups being different were less than 5 in 100. The mean score for individuals in Group IV was found to be 4.403846. The mean score of Group II was 4.526786. Groups III and I had mean scores of 4.45370 and 4.45614 respectively. The t-tests of the significance of the differences between the mean scores of the matched groups were not significant within a probability of 95 in 100.

3. Night Driving Visibility

The third concept was given the F tests and found to have no statistically significant difference between the matched population variances. The probability was between $F_{.025}$ and $F_{.975}$ which means, again, that the chances of the variances of the matched groups being different were less than 5 in 100. The mean scores of Groups III and I were found to be 3.45833 and 3.28070 respectively. Groups IV and II had mean scores of 3.288462 and 3.419643. The t-test of significance of the difference between the mean scores of the experimental and control groups was not significant within a probability of 95 in 100.

4. Night Driving Fatigue

The F tests of the fourth concept revealed no statistically significant difference between variances of the matched populations. The probability was again between $F_{.025}$ and $F_{.975}$. This indicates that the chances of the variances of the matched groups being different were less than 5 in 100. The mean score for individuals in Group III was found to be 3.912037. The mean score for Group I was 3.723684. The t-test for significance

of the difference between the two mean scores was not significant within a probability of 95 in 100. The mean score for individuals in Group IV was found to be 4.278846. The mean score for individuals in Group II was 3.544643.

The t-test of significance of the difference between the two mean scores of the experimental and control groups was found to be significant with a probability of 95 in 100. This indicates that there is some difference between the two film groups on this concept. This difference also indicates that the concept "night driving fatigue" has a "sleeper effect."

5. Proper Headlight Use

The fifth concept was evaluated by the F tests and revealed no statistically significant difference between the variances of the matched populations. Again, the probability was between $F_{.025}$ and $F_{.975}$. Thus, as in the previous concepts, the chances of the variances of the two groups being different were less than 5 in 100. The mean scores for Control Groups I and II were 4.30000 and 4.098214. Experimental Groups III and IV had mean scores of 4.12963 and 3.990385 respectively. The t-tests for significance of the difference between the matched group mean scores were not significant within a probability of 95 in 100.

6. Pedestrians

The sixth concept was administered the F test and found to have no statistically significant difference between the matched population variances. The probability was between $F_{.025}$ and $F_{.975}$ which means that the chances of the variances of the matched groups being different were less than 5 in 100. The mean scores of Groups III and I were found to be 3.995370 and

4.223684 respectively while the respective mean scores of Groups II and IV were 4.276786 and 4.182692. The t-tests of significance of the difference between the mean scores of the experimental and control groups were not significant within a probability of 95 in 100.

7. Driving at Night

The F tests of the seventh concept revealed no statistically significant difference between variances of the two groups of matched populations. The probability was again (as was the case in all of the concepts) between $F_{.025}$ and $F_{.975}$. This, as before, indicated that the chances of the variances of the two groups being different were less than 5 in 100. The mean score for individuals in Group III was found to be 3.601852. The mean score for Group I was 3.526316. Group IV and Group II had mean scores of 3.586538 and 3.607143 respectively. The t-test for significance of the difference between the matched mean scores was not significant within a probability of 95 in 100.

In all of the F tests of the seven concepts, N was 228 for Control Group I and 216 for Experimental Group III, while N was 112 for Control Group II and 104 for Control Group IV. All of the t-tests of the seven concepts concerning immediate shift in attitude were conducted with 442 degrees of freedom. The t-test of the seven concepts concerning permanent shift in attitude had 214 degrees of freedom.

The analysis of the results of the tests for both immediate and permanent attitude shift may be interpreted as being meaningful in either of two directions. First, did any significant attitude shift occur? Second, did the results obtained by the whole of the concepts allow us to accept or reject the null hypotheses stated.

The former case may be answered in the affirmative. While there was no shift in attitude detected immediately after viewing the film, a positive shift was established for the concepts "night driving skill" and "night driving fatigue" by the analysis concerning the permanent effects of the film upon attitudes. This attitude shift represents the same type of "sleeper effect" which was found by Hovland, Lumsdaine, and Sheffield in their study of the motivational film "The Battle of Britain." This represents a significant finding since the experimental film utilizes approximately fifty percent of its footage in visualizing the importance of skill and the awareness of factors involving fatigue. Apparently the concepts representing hazards of visibility and general problems of driving at night were not affected by this film presentation. The differences found were evidently not due to preferential treatment by the producers of the film since the presentation of all of the concepts was by both visual and verbal instruction of equal quality.

The second question is summed up in the following statistical analysis: The F test of the total concepts revealed no statistically significant difference between the variances of any of the matched populations. The probability, in all cases, was between $F_{.025}$ and $F_{.975}$, that is, the chances of the variances of the matched groups being different were less than 5 in 100. The t-test of significance of the difference between the means of the control and experimental groups was made assuming that differences between the respondents were negligible. The N values were 1,596 for Control Group I, 1,512 for Experimental Group III, 784 for Control Group II, and 728 for Experimental Group IV in the F test. The mean scores for Groups I, II, III, and IV were found to be 3.91040, 4.01403, 3.94378, and 4.15797 respectively. The difference between the means of the matched experimental and control groups was not significant within a probability of 95 in 100. The t-tests, which were conducted with 3,108 degrees of freedom in the evaluation

of the immediate shifts and 1,510 degrees of freedom, in the retention analysis, indicated that the experimental film groups and non-related film groups had no significantly different shift in their attitudes either immediately or six weeks after viewing the films. Therefore, on the basis of all of this evidence, the writer accepts the null hypotheses that there is no immediate or permanent difference in the driving attitudes of experienced drivers who have seen the film "Driving at Night, " and of experienced drivers who have not viewed this film. Table II lists the results of the F tests, t-tests, mean scores, and the disposition of the hypotheses.

III. RESULTS OF TESTS FOR IMMEDIATE AND PERMANENT CHANGE IN DRIVING PERFORMANCE

The fifth and six null hypotheses stated that there is no immediate or permanent difference in the measurable change in driving performance of experienced drivers who have seen the film "Driving at Night" and experienced drivers who have not viewed this film. The objective of this hypothesis is to determine if the mean proportion of correct answers for individuals in Experimental Groups III and IV are greater than the mean proportion of correct answers for individuals in Control Groups I and II immediately and six weeks after viewing the experimental and non-related films. The test for driving performance change consisted of nine items which contribute to the mean scores of the respondents. These items may be observed in the Appendix of this study. There were also three general driving skill test items (X turn, Y turn, and figure 8) to determine if prior driving skill had any effect upon the test performance. All groups used the same driving test. The individual scores made by the respondents on each of the twelve items were used in the statistical analyses. More specifically, the writer attempted:

TABLE II

THE RESULTS OF THE F TESTS, t-TESTS, MEAN SCORES,
AND HYPOTHESES DISPOSITIONS FOR ATTITUDE SHIFTS

Immediate Attitude Shifts				
Concept	F Test	Mean Scores		Hypothesis Disposition
		I	III	
1. Night Driving Skill	p < .05	3.82995	4.05500	Accept
2. Headlight Limitations	p < .05	4.45614	4.45370	Accept
3. Night Driving Visibility	p < .05	3.28070	3.45833	Accept
4. Night Driving Fatigue	p < .05	3.72368	3.912037	Accept
5. Proper Headlight Use	p < .05	4.30000	4.12963	Accept
6. Pedestrians	p < .05	4.223684	3.99537	Accept
7. Driving at Night	p < .05	3.526316	3.601852	Accept
8. Total Concepts	p < .05	3.91040	3.94378	Accept

Permanent Attitude Shifts				
Concept	F Test	Mean Scores		Hypothesis Disposition
		II	IV	
1. Night Driving Skill	p < .05	4.62500	5.37500	Reject
2. Headlight Limitations	p < .05	4.52679	4.40385	Accept
3. Night Driving Visibility	p < .05	3.419643	3.288462	Accept
4. Night Driving Fatigue	p < .05	3.54464	4.278846	Reject
5. Proper Headlight Use	p < .05	4.09821	3.99039	Accept
6. Pedestrians	p < .05	4.276786	4.18269	Accept
7. Driving at Night	p < .05	3.60714	3.58654	Accept
8. Total Concepts	p < .05	4.01403	4.15797	Accept

(1) to compare the two control groups as to nine item scores (driver skill test items one through nine as shown in Appendix), (2) to ascertain if the more skilled drivers performed better than the less skilled drivers on the nine item test, regardless of the film viewed or the time the driving test was taken, and (3) to determine if Experimental Groups III and IV did better than Control Groups I and II on the nine item test.

The F test was utilized to determine if the variances of the matched populations were equal. This was done separately for each of the specific comparisons being made. In each comparison the null hypotheses were tested by the t-test of significance for each concept. The results of these tests were as follow:

1. The F test revealed that there was no statistically significant difference between the variances of the two control groups. The probability was between $F_{.025}$ and $F_{.975}$, that is, the chances of the variances of the two groups being different were less than 5 in 100. N was equal to 49 in the first control group and equal to 28 in the second. Thus the t-test of significance of the difference between the means of the control and experimental groups was made assuming that differences between the respondents were negligible.

The mean proportion of correct answers for individuals in the first control group was found to be 5.2245. The mean proportion of correct answers in the second control group was 5.4643. The difference between the means of the two groups was not significant within a probability of 95 in 100 with the degrees of freedom equal to 75.

2. The F test revealed that there was no statistically significant difference between the variances of groups which were divided according to the test for prior skill. The probability was

between $F_{.025}$ and $F_{.975}$ which indicates the chances of the variances of the two groups being different were less than 5 in 100. N for the most skilled group was 96, and 54 for the lesser skilled group. This test had 148 degrees of freedom.

The mean proportion of correct answers for individuals in the highly skilled group was found to be 5.5625. The mean proportion of correct answers for the lesser skilled group was 5.3148. The difference between the means of the two groups was not significant within a probability of 95 in 100 with the degrees of freedom equal to 148.

3. The result of this F test revealed that there was no statistically significant difference between the variances of Control Group I and Experimental Group III or of Control Group II and Experimental Group IV. The probability was between $F_{.025}$ and $F_{.975}$ which indicates that the chances of the variances of the matched populations being different were less than 5 in 100 with $N = 48$ for Group III, $N = 49$ for Group I, $N = 25$ for Group IV, and $N = 28$ for Group II.

The mean proportion of correct answers for individuals with Experimental Group III was found to be 5.8542. The mean proportion of correct answers for individuals in Control Group I was 5.2245. The difference between the means of the two groups was not significant within a probability of 95 in 100 with the degree of freedom set at 95.

The mean proportion of correct answers for individuals in Group IV was 5.24000. The mean proportion of correct answers for individuals in Group II was 5.46429. The difference between the means of the two groups was not significant within a probability of 95 in 100 with the degrees of freedom set at 51.

These test results indicate that the experimental film groups and the non-related film groups had no significantly different change in their driving skill either immediately or six weeks after viewing the films. Therefore, on the basis of the evidence derived, the writer accepts the null hypothesis.

Table III lists the results of the F tests, t-tests, N, Mean Scores, and Degrees of Freedom for the test designed to show change in driving performance.

TABLE III

RESULTS OF THE F TESTS, t-TESTS, MEAN SCORES,
DEGREES OF FREEDOM, AND N FOR CHANGE
IN DRIVING PERFORMANCE

<u>Analyses of Control Groups I and II</u>						Degrees of Freedom
F Tests	t-Test	N		Mean Scores		
p < .05	p > .95	$\frac{I}{49}$	- $\frac{II}{28}$	$\frac{I}{5.2245}$	- $\frac{II}{5.4643}$	75
<u>Analyses of Groups Divided According to Skill</u>						Degrees of Freedom
F Tests	t-Test	N		Mean Scores		
p < .05	p > .95	$\frac{\text{Skilled}}{90}$	$\frac{\text{Normal}}{54}$	$\frac{\text{Skilled}}{5.5625}$	$\frac{\text{Normal}}{5.3148}$	148
<u>Matched Group Analyses I and III, II and IV</u>						Degrees of Freedom
F Test	t-Test	N		Mean Scores		
p < .05	p > .95	$\frac{I}{47}$	$\frac{III}{48}$	$\frac{I}{5.2245}$	$\frac{III}{5.8542}$	95
p < .05	p > .95	$\frac{II}{28}$	$\frac{IV}{25}$	$\frac{II}{5.46429}$	$\frac{IV}{5.2400}$	51

CHAPTER VI

RESULTS AND ANALYSIS OF THE TESTS DESIGNED TO EVALUATE THE SUCCESS OF THE BEHAVIORAL ANALYSES TECHNIQUE

The seventh hypothesis states that it is possible to predict, by the use of a behavioral analysis, the measurable change in knowledge, driving attitudes, and driving skills which will occur as a result of viewing a traffic safety film. This hypothesis seeks to determine how the estimates of the panel of experts correlate with the actual performance of students on tests of learning, attitude, and potential driving behavior. In the analysis of this hypothesis, the writer treated each component tested as though it were a separate problem. However, the acceptance or rejection of the original hypothesis will be based upon the degree of conformance of all three of the components to the conditions set forth in the study.

Learning

First, the writer determined the correlation between the immediate learning estimates of the panels as to the proportion of total students answering questions correctly after, but not before, the film viewing, and the difference between the proportion of correct answers to an item by Control Group I and Experimental Group III. This process was then repeated for Control Group II and Experimental Group IV to show the correlation of the retention estimates.

Since both groups used the same test, the difference between the scores made by the students on each test item was used in the statistical analysis. These differences were correlated with the predictions for immediate change made by the two panels of experts representing both subject matter (Traffic Safety Panel) and film production experts (Audio-Visual Panel). The Pearson r , coefficient of linear correlation, was used because of its ability to determine the mutual relationship between two variables such as predicting of achievement from a prognostic test. (30, p. 233)

The Pearson r was applied to the following relationships:

1. Correlation between the predictions of the two panels of experts.
2. Correlation between the combined group predictions of the expert panels and the population results.
3. Correlation between the predictions of the Audio-Visual Panel and the population results.
4. Correlation between the predictions of the Traffic Safety Panel and the population results.

Each of these correlations was then tested by the t -test of significance as a means of later accepting or rejecting the hypothesis.

The result of the correlation test between the predictions of the two panels of experts revealed that $r > .5189$. The t -test placed t at 6.169341 with $t_{.0005} = 3.60$ at 35 degrees of freedom. This means that the two groups are highly correlated and the probability of having obtained the above r value by chance is less than 5 in 10,000.

The r -test between the combined group predictions of the expert panels and the population results showed that $r = .3571$. This shows relatively high agreement between the total panel and the test results. The t -test placed t at 2.262 with $t_{.05} = 2.03$ at 35 degrees of freedom.

This means that the probability of having obtained the above r correlation by chance is less than 5 in 100.

The r -test between the predictions of the Audio-Visual Panel (film production experts) and the population results revealed r to be .4303 which is, also, a relatively high correlation. t was found to be 2.820 with $t_{.01} = 2.720$ at 35 degrees of freedom. Therefore, the probability of having obtained the r value by chance is less than 1 in 100.

The final correlation concerning the immediate learning estimates and test results was between the predictions of the Traffic Safety Panel (subject matter specialists) and the population results. r was established at .2175 which represents a moderately acceptable positive agreement between these two groups. The t -test placed t at 1.318 with $t_{.10} = 1.306$ at 35 degrees of freedom. This sets the probability of having obtained the r correlation by chance as less than 10 in 100.

Table IV lists the panel predictions, observed change in immediate learning, r coefficients, and the results of the t -test of significance. The positive relationships found in the above correlations appear to be significant and to reveal substantial agreement between the predictions of the various panels and the results obtained by the testing of sample subjects for learning achievement. On the basis of this evidence, the writer would accept the seventh hypothesis as far as the immediate effects of the first component (prediction of the measurable change in immediate learning) is concerned.

The second phase of testing the sample population for learning increase was to determine the correlation between the estimates of learning retention by the panels as to the proportion of total students answering questions correctly six weeks after, but not before, the film viewing, and the difference between the proportion of correct answers to an item by Control Group II and Experimental Group IV.

TABLE IV

COEFFICIENTS OF LINEAR CORRELATION FOR
IMMEDIATE INCREASE IN LEARNING

Items	X ₁ Traffic Safety	X ₂ Audio- Visual	X ₃ T. S. and A. V. Combined	X ₄ Observed Increase
1	.096	.130	.113	.140
2	.180	.070	.125	.039
3	.070	.074	.072	.163
4	.084	.164	.124	.045
5	.120	.200	.160	.286
6	.124	.200	.162	.458
7	.156	.130	.143	.372
8	.352	.300	.326	.190
9	.210	.090	.150	.272
10	.114	.110	.112	.174
11	.114	.112	.113	-.011
12	.128	.140	.134	.409
13	.152	.280	.216	.495
14	.206	.200	.203	.407
15	.064	.004	.079	.113
16	.074	.050	.062	.007
17	.070	.068	.069	.034
18	.074	.060	.067	.032
19	.106	.076	.091	.243
20	.102	.084	.093	-.168
21	.046	.090	.068	.063
22	.086	.042	.064	.051
23	.060	.070	.065	.467
24	.340	.340	.340	.094
25	.110	.122	.116	.066
26	.280	.190	.235	.390
27	.130	.054	.092	.284
28	.088	.074	.081	-.091
29	.140	.102	.121	.074
30	.040	.070	.055	.210
31	.046	.064	.055	.326
32	.270	.110	.190	.458
33	.160	.210	.185	.185
34	.110	.096	.103	.088
35	.080	.100	.090	-.118
36	.030	.046	.038	-.002
37	.062	.041	.052	.122

$$r_{14} = .2175$$

$$r_{24} = .4303$$

$$r_{34} = .3571$$

$$t_{14} = 1.318$$

$$t_{24} = 2.820$$

$$t_{34} = 2.262$$

$$(t_{.01} = 2.72 \text{ at } 35 \text{ d.f.})$$

$$(t_{.05} = 2.03 \text{ at } 35 \text{ d.f.})$$

$$(t_{.10} = 1.306 \text{ at } 35 \text{ d.f.})$$

Both groups used the same test and the difference between the scores made by the students on each item of the test was used in the statistical analysis. These differences in scores were then correlated with the predictions for permanent change made by the two panels of experts. The Pearson r was applied to the relationships stated below:

1. Correlation between the predictions of the Traffic Safety and Audio-Visual experts.
2. Correlation between the combined group predictions of the Traffic Safety and Audio-Visual experts and the results obtained from the sample population.
3. Correlation between the predictions of the Audio-Visual Panel and the population results.
4. Correlation between the predictions of the Traffic Safety Panel and the population results.

Each of these correlations was then tested by the t -test of significance as a means of later accepting or rejecting the hypothesis.

The correlation test between the predictions of the Traffic Safety and Audio-Visual experts revealed that $r = .2913$. The t -test placed t at 1.80 with $t_{.10} = 1.69$ at 35 degrees of freedom. This means that the two groups are positively correlated to a moderate degree. The t -test shows that the probability of having obtained that particular r correlation by chance is less than 10 in 100.

The r -test for correlation between the combined group predictions of the Traffic Safety and Audio-Visual experts and the results obtained from the sample population placed r at .4753. The t -test revealed that $t = 3.20$ with $t_{.01} = 2.73$ at 35 degrees of freedom. This meant that the two groups have a relatively high positive correlation, and that the probability of having obtained that particular value for r by chance is less than 1 in 100.

The r-test for correlation between the predictions of the Audio-Visual Panel and the population results revealed r to be .3497. The t-test for significance of the correlation placed t at 2.20 with $t_{.05} = 2.03$ at 35 degrees of freedom. This means that the two groups have a moderately high positive correlation, and that the probability of having obtained that r value by chance is less than 5 in 100.

The correlation test between the prediction of the Traffic Safety Panel and the population results revealed that $r = .2575$. The t-test for significance of the correlation placed t at 1.58 with $t_{.15} = 1.47$ at 35 degrees of freedom. This means that the positive correlation between the two groups was relatively low and that the probability of having obtained that particular r value by chance is less than 15 in 100.

Table V lists the panel predictions, observed increase in permanent learning, the r coefficients, and the results of the t-test for significance. The positive relationships found for the estimates of retention learning appear to be on the borderline of significance, as set forth in the limitations of this study. It is evident that the agreement between the two variables tested in each case is much greater than a chance relationship. Taken as a whole the writer would accept the part of the hypothesis concerned with the prediction of the measurable change in retention learning.

The first component of the seventh hypothesis is concerned with the ability of the judges to predict both immediate and retention increases in learning, as a result of having viewed the film. On the basis of the total evidence obtained by all of the above correlations, the writer would accept the seventh hypothesis with relationship to this component.

Attitudes

The writer first correlated the predictions of the two panels of experts in regard to the immediate change in attitudes anticipated as a

TABLE V

COEFFICIENTS OF LINEAR CORRELATION FOR
PERMANENT INCREASE IN LEARNING

Items	X ₁	X ₂	X ₃	X ₄
	Traffic Safety	Audio Visual	T. S. and A. V. Combined	Observed Increase
1	.04	.06	.05	.04
2	.10	.02	.06	-.13
3	.03	.03	.03	.02
4	.03	.07	.05	-.05
5	.05	.11	.08	.19
6	.04	.07	.06	.08
7	.06	.07	.06	.06
8	.09	.13	.11	.13
9	.07	.04	.05	-.20
10	.04	.04	.04	.03
11	.06	.07	.06	.03
12	.07	.06	.07	.28
13	.07	.08	.08	.34
14	.04	.07	.05	.02
15	.03	.03	.03	.06
16	.04	.02	.03	-.16
17	.04	.03	.03	-.08
18	.04	.02	.03	.03
19	.06	.04	.05	.02
20	.04	.03	.03	-.17
21	.03	.05	.04	.00
22	.04	.02	.03	.01
23	.03	.02	.03	.10
24	.07	.10	.09	.20
25	.06	.07	.06	.06
26	.11	.08	.10	.21
27	.07	.03	.05	.17
28	.04	.03	.03	-.17
29	.08	.03	.06	.20
30	.03	.04	.04	.28
31	.03	.03	.03	.23
32	.13	.03	.08	.19
33	.05	.07	.06	.23
34	.05	.05	.05	-.07
35	.03	.05	.04	-.03
36	.02	.01	.02	.07
37	.04	.01	.03	.13

$$r_{14} = .2575$$

$$t_{14} = 1.58$$

$$r_{24} = .3479$$

$$t_{24} = 2.20$$

$$r_{34} = .4753$$

$$t_{34} = 3.20$$

$$(t_{.01} = 2.72 \text{ at } 35 \text{ d.f.})$$

$$(t_{.05} = 2.03 \text{ at } 35 \text{ d.f.})$$

$$(t_{.10} = 1.306 \text{ at } 35 \text{ d.f.})$$

result of viewing the film. Next the writer determined the correlation between the estimates of the panels for all seven concepts (average of sub-estimates) for a shift in the desired direction and the actual desired direction shift observed in the sample population (based upon the difference between Groups I and Groups III). This same process was repeated for Control Group II and Experimental Group IV to show correlations in the retention of attitude shifts.

Both groups used the same attitude test, and the differences between the scores made by the students on each concept of the test was utilized in the statistical analysis. The Pearson r coefficient was applied to the following relationships:

1. Correlation between the predictions made by the two panels of experts as to immediate attitude shift.
2. Correlation between the immediate attitude predictions of the Traffic Safety Panel and the test results.
3. Correlation between the immediate attitude predictions of the Audio-Visual Panel and the test results.
4. Correlation between the combined group (Traffic Safety and Audio-Visual) immediate attitude predictions and the test results.

Upon completion of the above correlations, the t -test of significance of the value obtained for r was applied to the correlation between the two panels of experts. The significance for the other r values was determined by use of a table designed to show this relationship.

The r -test between the predictions made by the two panels of experts revealed that $r = .9280$. The t -test for the significance of the correlation showed t to be 5.57 with $t_{.01} = 4.03$ at 5 degrees of freedom. This means that there was a very high positive correlation between the predictions of the two panels, and that the probability of having obtained that particular r value by chance is less than 1 in 100.

The r-test between the immediate attitude predictions of the Traffic Safety Panel and the test results revealed r to have the value of .3003. The table of significance for r correlations revealed that $r_{.01} = .6694$ at 5 degrees of freedom. This means that the positive correlation found was not significantly enough better than chance to accept in this investigation.

The correlation test between the immediate attitude predictions of the Audio-Visual Panel and the test results revealed that $r = .3611$. Since $r_{.10} = .6694$ at 5 degrees of freedom, this value of r was not considered significantly different from chance to accept in this study.

A final correlation was established between the immediate attitude predictions of the combined panels (Traffic Safety and Audio-Visual) and the attitude test results. The r -value was found to be .3367. This, too, was considered insignificant since $r_{.10} = .6694$. The probability that this particular value of r could have been obtained by chance was too great to accept in our present investigation.

Table VI lists the panel predictions, the observed shift of the sample population, and the r coefficients of linear correlation. The positive relationships found in the above correlations do not have substantial enough agreement to be considered significant in this study. This evidence would tend to reject the hypothesis with reference to the predictability of immediate attitude shifts.

The second phase of testing the sample population for attitude shift was to correlate the predictions of the experts regarding the retention of the attitude shift resulting from viewing the film. This involved comparing the estimates of the panels for all seven concepts for a shift in the desired direction and the actual shift observed in the sample population (based upon the difference between Groups II and IV) six weeks after viewing the film.

TABLE VI
COEFFICIENTS OF LINEAR CORRELATION FOR
IMMEDIATE ATTITUDE SHIFTS

Concepts	X_1	X_2	X_3	X_4
	Traffic Safety	Audio- Visual	T. S. and A. V. Combined	Observed Shift
1. N. D. S.	3.400	3.800	3.600	.002
2. H. L.	7.600	7.700	7.650	.188
3. N. D. V.	4.514	4.029	4.270	-.228
4. N. D. F.	4.371	4.520	4.443	.075
5. P. H. U.	4.150	5.600	4.875	.203
6. Ped.	2.800	3.200	3.000	.178
7. D. N.	4.555	4.755	4.655	.227
Sum of X	31.390	33.604	32.493	.645
Sum of X^2	154.612	174.603	163.890	.217379
$N \text{ Sum } X^2 - (\text{Sum } X)^2$	96.952	92.992	91.435	1.105628
$\sqrt{N \text{ Sum } X^2 - (\text{Sum } X)^2}$	9.8464	9.6432	9.5622	1.05149

$$\text{Sum } X_1 X_4 = 3.1091$$

$$\text{Sum } X_2 X_4 = 3.6614$$

$$\text{Sum } X_3 X_4 = 3.3854$$

$$r_{14} = \frac{3.1091}{(9.8464)(1.05149)} = \frac{3.1091}{10.353} = \underline{.3003}$$

$$r_{24} = \frac{3.6614}{(9.64321)(1.05149)} = \frac{3.6614}{10.140} = \underline{.3611}$$

$$r_{34} = \frac{3.3854}{(9.5622)(1.05149)} = \frac{3.3854}{10.055} = \underline{.3367}$$

$$(r_{10} = .6694)$$

The differences between the test score by the students on each concept were again used in the statistical analyses. The Pearson r was used to determine the following relationships:

1. Correlation between the predictions made by the two panels of experts as to permanent attitude shifts.
2. Correlation between the predictions of the Traffic Safety Panel and the test results as to permanent attitude shift.
3. Correlation between the predictions of the Audio-Visual Panel and the test results as to permanent attitude shift.
4. Correlation between the combined group (Traffic Safety and Audio-Visual) predictions and the test results as to permanent attitude shift.

The t-test of significance for the r -value was applied to the correlation between the two panels of experts. The r -table of significance was used to determine the significance of the other r values.

An r -test between the permanent attitude shift predictions of the two panels of experts revealed that $r = .7757$. The t-test for the significance of the correlation revealed t to be 2.75 with $t_{.05} = 2.57$ at 5 degrees of freedom. This means that there was a relatively high positive correlation between the predictions of the two panels, and that the probability of having obtained the r -value by chance is less than 5 in 100.

The r -test between the permanent attitude predictions of the Traffic Safety Panel and the sample population results showed r to be .0602. The r -table of significance revealed that $r_{.10} = .6694$ at 5 degrees of freedom. This would indicate that the positive correlation obtained is too small to be significant in this research.

The r -test between the permanent attitude predictions of the Audio-Visual Panel and the sample population results showed that $r = .1192$. Since r was already known to be .6694 at 5 degrees of freedom, this value for r was, also, considered to be too small to be significant.

The final correlation established was between the permanent attitude predictions of the combined panels (Traffic Safety and Audio-Visual) and the sample population results. This r value was found to be .0914 and was considered too small to have any significance since we had previously established $r_{.10} = .6694$.

Table VII lists the panel predictions, the observed attitude shift of the sample population, and the r coefficients of linear correlation. Although the relationships found in the retention attitude prediction correlations were positive, they were too small to accept as significant in the context of this research. Therefore, this evidence would, also, tend to reject the hypothesis.

The second component of the seventh hypothesis is concerned with the ability of the judges to predict both immediate and permanent shifts in attitude, as a result of having viewed the film. On the basis of all the evidence obtained by the above correlations, the writer would reject this part of the seventh hypothesis.

Skill

In this experiment the term "driving skill" refers to potential driving behavior or performance when performing a specific driving function. This component of the behavioral analysis intends to measure the correlation between the predictive estimates of the expert panels and the actual results obtained when the students were administered a driving test. It specifically attempts to determine the correlation between the estimates of the increase in proficiency on nine items, and the difference between Control Group I and Experimental Group III. Upon completion of the analysis of these groups, the process is then repeated for Control Group II and Experimental Group IV.

All of the groups used the same driving tests. However, Groups I and III were administered the test immediately after viewing the film

TABLE VII
COEFFICIENTS OF LINEAR CORRELATION FOR
PERMANENT ATTITUDE SHIFT

Concepts	X ₁ Traffic Safety	X ₂ Audio- Visual	X ₃ T. S. and A. V. Combined	X ₄ Observed Shift
1. N. D. S.	1.80	1.40	1.61	.123
2. H. L.	2.25	3.10	2.68	.734
3. N. D. r	7.25	4.20	5.73	-.094
4. N. D. F.	7.10	5.88	6.50	-.021
5. P. H. U.	3.60	5.70	4.65	.108
6. P. E. D.	1.20	1.05	1.13	-.131
7. D. N.	1.98	1.83	1.90	.341
Sum of X	25.18	23.16	24.20	1.060
Sum of X ²	129.5954	100.7158	111.3668	.708268
N Sum X ² - (Sum X) ²	273.1354	168.6950	193.9276	3.834276
$\sqrt{N \text{ Sum } X^2 - (\text{Sum } X)^2}$	16.5268	12.9883	13.9258	1.95813

$$\text{Sum } X_1 X_4 = 1.9491$$

$$\text{Sum } X_2 X_4 = 3.0314$$

$$\text{Sum } X_3 X_4 = 2.4921$$

$$r_{14} = \frac{1.9491}{(16.5268)(1.95213)} = \frac{1.9491}{32.362} = .0602$$

$$r_{24} = \frac{3.0314}{(12.9883)(1.95813)} = \frac{3.0314}{25.433} = .1192$$

$$r_{34} = \frac{2.4921}{(13.9258)(1.95813)} = \frac{2.4921}{27.269} = .0914$$

$$(r_{.10} = .6694)$$

in order to observe the immediate film effects, and Groups II and IV received the test after six weeks' delay in order to determine the permanency of the film effect upon driving skill. The differences between the scores made by the students on each of the nine items tested were used in the statistical analysis. The differences in scores between Group I and Group II were correlated with the panel predictions by using the Pearson r , coefficient of linear correlation, which was applied as follows:

1. Correlation between the predictions of the two panels of experts.
2. Correlation between the combined group predictions of the expert panels and the population results.
3. Correlation between the predictions of the Audio-Visual Panel and the student results.
4. Correlation between the predictions of the Traffic Safety Panel and the student results.

Upon the completion of each correlation, each r -value was tested by the t -test of significance as a basis for accepting or rejecting the hypothesis.

The correlation of the predictions of the two expert panels showed that $r = -.211640$. The t -test placed t at $-.5730$ with $t_{.43} = .570$ at 7 degrees of freedom. This means that there was very little correlation between the two groups or that the correlation was not significantly different from zero in either a negative or positive direction.

The r -test between the combined groups predictions of the expert panels revealed r to be $.392$. A t -test found t to be 1.128 and $t_{.40} = .890$ at 7 degrees of freedom. This means that, within the limits set in this study, there was no significant correlation between the two groups.

The r-test between the predictions of the Audio-Visual Panel and the population results revealed that $r = -.0527$. The t-test of significance showed that $t = -.1398$ with $t_{.50} = .710$ at 7 degrees of freedom. This may be interpreted as meaning that there was no significant correlation between the two groups.

The fourth correlation was between the predictions of the Traffic Safety Panel and the student results. r was found to be $.6112$. The t-test of significance revealed t to be 2.046 with $t_{.10} = 1.89$ at 7 degrees of freedom. This means that there was moderately high agreement between the two groups. The probability of having obtained the r -value by chance is less than 10 in 100.

Table VIII lists the panel predictions, observed performance of the sample population, the r coefficients, and the t scores. The relationships observed in the above correlations show little agreement between the variables measured and cannot be considered significant in this experiment. This evidence tends to reject the major hypothesis with reference to the predictability of change in immediate driving performance.

The second phase of the analysis of skill was to determine the correlation between the estimates of the increase in proficiency on nine items, and the difference between Groups II and IV. The differences between the scores made by the students on each of nine items were used in this analysis. The Pearson r was determined for the following correlations:

1. Correlation between the predictions of the two panels of experts.
2. Correlation between the combined group predictions or the expert panels and the population results.

TABLE VIII
COEFFICIENTS OF LINEAR CORRELATION FOR
IMMEDIATE CHANGE IN DRIVING SKILL

Item	X_1 Traffic Safety	X_2 Audio Visual	X_3 T. S. and A. V. Combined	X_4 Performance of Sample
1	.024	.005	-.008	.015
2	.024	.007	.078	.016
3	.012	.007	-.119	.010
4	.016	.005	.175	.011
5	.022	.009	-.090	.016
6	.025	.012	.241	.019
7	.024	.015	.049	.020
8	.028	.013	.350	.021
9	.012	.025	-.070	.019

$$r_{14} = .6112$$

$$t = 2.046$$

$$r_{24} = -.053$$

$$t = -.1398$$

$$r_{34} = .392$$

$$t = 1.128$$

$$(t_{.10} = 1.89 \text{ at } 7 \text{ d.f.})$$

$$(t_{.40} = .890 \text{ at } 7 \text{ d.f.})$$

$$(t_{.50} = .710 \text{ at } 7 \text{ d.f.})$$

3. Correlation between the predictions of the Audio-Visual Panel and the student results.

4. Correlation between the predictions of the Traffic Safety Panel and the student results.

The t-test of significance was applied to each of the r-values obtained as a method of latter accepting or rejecting the hypothesis.

Predictions of the two panels of experts were correlated at $r = -.2065$. A t-test of significance revealed that $t = .56$ with $t_{.50} = .71$ at 7 degrees of freedom. This means that the correlation between these two groups of judges was not significant.

The r-test between the combined group predictions of the expert panels revealed that $r = -.3787$. The t-test proved that $t = 1.08$ with $t_{.40} = .90$ at 7 degrees of freedom. This result may, also, be classed as insignificant for the purposes of this study.

The correlation between the predictions of the Audio-Visual Panel and the population results revealed r as $-.5649$. The t-test showed t to be 1.81 with $t_{.10} = 1.89$ at 7 degrees of freedom. This means that the agreement between the two groups is not significant.

The r-test between the predictions of the Traffic Safety Panel and the population results proved r to be $.1128$. The t-test revealed that $t = .30$ with $t_{.50} = .71$ at 7 degrees of freedom. This means that there is no significant correlation between these two groups.

Table IX lists the panel predictions, observed performance of the sample population, the r coefficients, and the t scores. The above correlations reveal very little agreement between the variables tested, and must be considered insignificant for the purposes of this experiment. The evidence gathered on this component of the behavioral analysis tends to reject the major hypothesis with reference to skill.

TABLE IX
COEFFICIENTS OF LINEAR CORRELATION FOR
PERMANENT CHANGE IN DRIVING SKILL

Item	X ₁ Traffic Safety	X ₂ Audio- Visual	X ₃ T. S. and A. V. Combined	X ₄ Performance of Sample
1	.024	.005	.015	.070
2	.024	.007	.016	.030
3	.012	.007	.010	.090
4	.016	.005	.011	-.060
5	.022	.009	.016	-.110
6	.025	.012	.019	-.040
7	.024	.015	.020	-.070
8	.028	.013	.021	.020
9	.012	.025	.019	-.110

$$r_{14} = .1128$$

$$t = .30$$

$$r_{24} = -.5649$$

$$t = 1.81$$

$$r_{34} = -.3787$$

$$t = 1.08$$

$$(t_{.10} = 1.89 \text{ at } 7 \text{ d.f.})$$

$$(t_{.40} = .90 \text{ at } 7 \text{ d.f.})$$

$$(t_{.50} = .71 \text{ at } 7 \text{ d.f.})$$

Table X lists the r coefficients of linear correlation and the t -values of significance for all of the component areas of the behavioral analysis. These correlations reveal high predictability for increase in learning, and low predictability correlation for both attitude and behavior change. The seventh hypothesis which states that it is possible to predict, by the use of a behavioral analysis, the measurable change in knowledge, driving attitudes, and driving skills which will occur as a result of viewing a traffic safety film, is so stated that its acceptance or rejection must be based upon the conformance of all three components to the conditions set forth in the study. Therefore, on the basis of the total evidence, the writer rejects the hypothesis.

TABLE X
 COEFFICIENTS OF LINEAR CORRELATION AND t-VALUES OF
 SIGNIFICANCE FOR ALL COMPONENTS OF THE
 BEHAVIORAL ANALYSIS

Component	r_{12}	t	r_{14}	t	r_{24}	t	r_{34}	t
Immediate Learning	.5189	$t_{.01}$	.2175	$t_{.10}$	.4303	$t_{.01}$	.3571	$t_{.05}$
Permanent Learning	.2913	$t_{.10}$	.2575	$t_{.10}$	.3479	$t_{.05}$	.4753	$t_{.01}$
Immediate Attitude Change	.9280	$t_{.01}$	.3003	$t_{.10}^+$	.3611	$t_{.10}^+$	.3367	$t_{.10}^+$
Permanent Attitude Change	.7757	$t_{.05}$	.0602	$t_{.10}^+$	.1192	$t_{.10}^+$	.0914	$t_{.10}^+$
Immediate Skill Change	-.2116	$t_{.43}$	.6112	$t_{.10}$	-.053	$t_{.40}$	.392	$t_{.50}$
Permanent Skill Change	-.2065	$t_{.50}$	.1128	$t_{.50}$	-.5649	$t_{.10}$	-.3787	$t_{.40}$

r_{12} = Traffic Safety Predictions vs Audio Visual Predictions

r_{14} = Traffic Safety Predictions vs Population Scores

r_{24} = Audio Visual Predictions vs Population Scores

r_{34} = Combined Group (T. S. and A. V.) Predictions vs Population Scores

CHAPTER VII

SUMMARY AND CONCLUSIONS

I. SUMMARY

The purpose of the study was to obtain data to test the hypotheses which were set up regarding the effectiveness of a traffic safety motion picture film upon its viewers. This involved determining the immediate and permanent increase in learning, the immediate and permanent shift in attitudes, the immediate and permanent change in driving skill, and the development of a predictive instrument, called "Behavioral Analysis," by which these changes might be anticipated.

The film "Driving at Night" was selected as the experimental film, after thirty traffic safety films had been previewed. Factors such as the frequency of use of the film in driver training courses, the educational level for which the film was best suited, the subject matter content, the quality of photography and sound effects, the adaptability of the film to the objectives of this particular research, and the important contributions which the film can make toward the goals of highway safety traffic, were factors in the film selection. A behavioral analysis was developed by projecting the film and making a record of all of the important commentary and visual events as individual statements of fact. After the facts in the film were categorized, the reaction of the viewer was analyzed by listing that information which we expected the learner to associate with the fact. At this point estimates were made of the impact of the film. Next the writer analyzed potential behavioral change into its components.

The components were obtained from personal interviewers and street corner observation. Each one of the behavior change components was analyzed to determine how behavior might change. Upon the completion of the "Behavioral Analysis" it was administered to ten judges, consisting of five Traffic Safety experts and five Audio-Visual experts, who made predictions on the possible changes in learning, attitude, and driving performance which might result from viewing the film.

The data to be obtained from the sample population included measurement of achievement, attitude shift, and change in driving skill. The writer constructed and pretested instruments to measure achievement and attitude shift. The reliability of the achievement test was established at $r = +.93$ with $N = 37$. It was tested and found to be significant at $t_{.001}$ with 35 degrees of freedom. Reliability of the attitude test was found to be $r = +.98$ for the seven concepts, and $r = +.93$ with $N = 49$ for the items. These correlations were revealed to be significant at $t_{.001}$ with 47 degrees of freedom. The skill test was not pre-tested, but was constructed in such a manner as to allow direct observation of the driving behavior of each member of the sample population.

In the experiment, emphasis was placed upon the ability to estimate and obtain effects which were due only to the strength of the film, and not by how it was administered. Therefore, the verbal instructions were short, and the written instructions were designed to enable the student to understand what was required on each test. May and Lumsdaine state that the best results are obtained and learning is increased by: (1) use of the film at the correct ability level of the students, (2) using the film in context with the subject taught and the unit of instruction, (3) giving prior instruction on the content of the film and the purpose for seeing it, (4) stopping the film for practice or test questions, and (5) clarifying obscure points in the film after it is viewed. (14, p. 310) They also indicate that "a strong interaction effect will be found between these

devices and the general competence of the teacher." (14, p. 317) Therefore, the researcher, recognizing the important roles of the teacher and supplementary instruction, limits his general conclusions to those findings which may represent film effects obtainable when a film is used out of phase with any unit of instruction.

The groups for the study were drawn from a population of sophomore, junior, and senior students at Michigan State University. The selection of these people was by both the purposive and random assignment methods. The experimental design placed (by random selection) all members of the sample population into one of two control or two experimental groups. Control Groups I and II viewed a non-related film and Experimental Groups III and IV viewed the experimental film. Control Group I and Experimental Group III were tested immediately after viewing the films for immediate effects. Control Group II and Experimental Group IV were tested six weeks after viewing the film in order to determine the permanent effects.

The F test was employed to determine if the variances of the two populations might be presumed equal in the analysis of the data obtained concerning the six null hypotheses. The t-test of significance was used to determine whether the results obtained were significant. The Pearson r coefficient of linear correlation was employed in the analysis of the data obtained for purposes of evaluating the behavioral analysis technique. The r -value was then tested by the t-test of significance in order to determine whether to accept or reject the seventh hypothesis.

In view of the fact that there was statistically significant difference found in achievement between Groups I and III, and Groups II and IV, it was logical to reject both the first and second null hypotheses. There was no statistically significant difference in attitude shift or change in driving skill between Groups I and III, and Groups II and IV. Therefore, the writer accepted the third, fourth, fifth, and sixth null hypotheses.

The three basic components of the "Behavioral Analysis" revealed statistically significant difference in regards to the prediction of learning, but no statistically significant difference with reference to the predictions of change in attitude shift and driving skill. Therefore, the seventh hypothesis was rejected because of the lack of positive results for all three components.

The results of the statistical analyses reveal that experienced drivers do learn factual information from viewing traffic safety films, and this learning is dominant both immediately after viewing the film and for a long period afterwards. However, the learning of factual information does not necessarily coincide with a corresponding shift in attitudes or improvement of driving skill. The analysis also reveals that it is possible to predict the proportion of increase in learning which may be obtained from viewing a film, but that it is very difficult to predict shifts in attitude and changes in driver performance. It is possible that the failure to predict these two components successfully is due to the small amount, if any, of change that actually occurs as a result of viewing the film.

Careful effort was made in the experiment by the researcher to control all variables which could be anticipated. Special tests were constructed which were used as both pretests and final tests, and the tests were administered under similar environmental conditions in order to prevent contamination by unforeseen variables. All of the tests were submitted to subject matter experts and driver training teachers for their evaluation and suggestions. Those factors which could not be controlled were randomized, so that their effects could enter into the estimate of error term provided in the statistical analysis. Therefore, on the basis of the type of experiment used, the kind of analyses made, and on the evidence found it seems logical to infer that motion pictures

concerning Traffic Safety make significant contributions to learning, but little contribution to attitude shift or improved driving performance insofar as the conditions of use were those followed in this experiment. Upon completion of the film analysis, the writer compared the deviant cases, resulting from bad predictions by the panel of experts, with the type of film treatment given these particular points of instruction. This comparison revealed no differences in film treatment which might explain why those particular cases were deviant.

II. CONCLUSIONS

It would seem to the writer that the findings of this experiment further emphasize the need for many carefully designed and statistically analyzed studies before a generalization can be made concerning all Traffic Safety films. The results of the evaluation of this film are indicative of the benefits and effects which may be obtained by a teacher who makes only casual use of films as a supplement to a learning situation. In reviewing the steps taken in conducting the research, the writer finds a generally systematic approach to the study of the problems involved. However, fault may be found in the administration of the "Behavioral Analysis" to the two panels of experts. Possibly significant results might be obtained if a replicate of the study were to include a more elaborate orientation of the judges to the predictive instrument. This could result in a more systematic evaluation by the judges of all subjective ratings of the behavioral change components.

The findings of this experiment lead the writer to believe that the predictive instrument may be used equally as well by the subject matter (Traffic Safety Panel) or film production (Audio-Visual Panel) experts. The subject matter experts did slightly better in predicting driver change, slightly worse in the prediction of learning, and about equally well in

the prediction of attitudes when these factors were correlated against student performance. The differences were generally not significant and a very high degree of correlation was obtained when the two expert panels were compared to each other.

The writer would recommend that further study be made concerning the following:

1. Apply the predictive instrument to several films to determine its ability to predict accurately the total amount of learning, attitude shift, and skill improvement which may result from viewing a film.
2. Investigate all deviant estimates where both panels were about equally deviant.
3. Investigate all estimates where one panel estimated closely and where the other panel was off.
4. Determine if any relationships exist between deviant estimates and the type of information presented concerning that portion of the film.
5. Investigate the relationship between the use and success of the "Behavioral Analysis" and the purposes of the film content.
6. Investigate the possibility of producing future Traffic Safety films based upon the behavior change components listed in the "Behavioral Analysis."
7. Investigate further the cause and nature of the "sleeper effect" found in the tests for attitude shift, and determine whether or not this same type of effect may also exist in tests of learning and behavior.

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APPENDIX

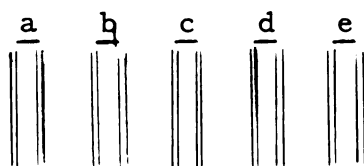
DRIVING AT NIGHT

General Information

1. Date _____ Number _____
2. Age _____ Sex _____
3. Educational background (high school and college)
 High School - Number years completed _____
 College or University - Number years completed _____
 Other _____
4. Residence: Street address, city, state _____
 _____ Local phone _____
5. Driving experience: (a) Year you obtained your original driver's license _____; (b) Number of years or months (specify which) you have driven a motor vehicle _____.

Listed below are questions about problems related to the night driving of motor vehicles. There are five possible answers (a, b, c, d, and e) listed for each question. Black out the space provided on the answer sheet which you think represents the best answer to each statement.

EXAMPLE:



An automobile has

- (a) 4 wheels
- (b) 3 mufflers
- (c) 3 radios
- (d) 6 tires
- (e) 3 sets of brakes

In this example the correct answer is (a).

BE SURE TO ANSWER EACH QUESTION. WORK QUICKLY AND DO NOT SPEND MUCH TIME WITH ANY ONE QUESTION.

"Driving at Night"

SELECT ONE CORRECT ANSWER.

1. Two essentials needed to drive safely after dark are:
 - (a) fast reactions and good timing
 - (b) fatigue and good visibility
 - (c) companionship and alertness
 - (d) real skill and concentration
 - (e) knowledge of the road and automobile
2. Changing situations on the road ahead require which of the following?
 - (a) complete control of car and readiness to react
 - (b) driver courtesy and patience
 - (c) eye focus far ahead with good visibility
 - (d) reduced speed and knowledge of the road
 - (e) knowledge of the road and of the fundamentals of driving
3. Which of the following items most nearly represents the most dangerous factors to be aware of when driving at night?
 - (a) blowout and other car failures
 - (b) stop signs and pedestrians
 - (c) speed and concentration
 - (d) fatigue and visibility
 - (e) headlight glare and headlight use
4. The best guarantee for safety after dark is to:
 - (a) have knowledge of the road
 - (b) clean the windshield
 - (c) exercise real caution
 - (d) stay right of center line
 - (e) study rules of traffic safety
5. The most important consideration for the driver concerning his headlights is that they be:
 - (a) focused toward the center of the road
 - (b) focused toward the edge of the road
 - (c) focused downward
 - (d) focused with left beam down and right beam up
 - (e) clean and clear
6. Which of the following indicates the proper time to turn on your headlights?
 - (a) one-half hour before sunset
 - (b) at dusk

"Driving at Night"

- (c) whenever visibility is impaired
 - (d) as soon as it's dark
 - (e) when you notice other people have done so
7. If you are pulling off the highway at night with the intention of parking away from the city street lights you should:
- (a) signal 500 feet before pulling off
 - (b) signal 300 feet before pulling off
 - (c) signal 150 feet before pulling off
 - (d) leave parking lights on
 - (e) park on left side of road
8. At night it is impossible to identify objects clearly if they are:
- (a) over 200 feet away
 - (b) over 150 feet away
 - (c) over 100 feet away
 - (d) over 75 feet away
 - (e) over 50 feet away
9. The range of even the best headlights is far less than the stopping distance required for a speed of:
- (a) 30 m.p.h.
 - (b) 35 m.p.h.
 - (c) 40 m.p.h.
 - (d) 45 m.p.h.
 - (e) 50 m.p.h.
10. The first rule for safe driving at night is to:
- (a) rest before driving
 - (b) have a thorough car checkup
 - (c) make sure visibility is good
 - (d) study night driving
 - (e) reduce your speed
11. A night driver should always do which of the following?
- (a) start car in second gear
 - (b) drive less than 40 m.p.h.
 - (c) know the road thoroughly
 - (d) use headlights properly
 - (e) carry a passenger for conversation
12. When other cars approach, do the following:
- (a) look at the center line
 - (b) watch the other cars' lights
 - (c) look at the edge of the road

"Driving at Night"

- (d) pass as quickly as possible
 - (e) stop if convenient to do so
13. With reference to smoking while driving, don't do the following:
- (a) smoke while driving
 - (b) light matches or lighters
 - (c) smoke anything but a pipe
 - (d) smoke when meeting cars
 - (e) throw ashes out the window
14. The best conclusion to draw if a car approaches with only one headlight is to:
- (a) dim your lights
 - (b) assume it is the right one
 - (c) blink your lights
 - (d) slow down and pull to the right
 - (e) pass as quickly as possible
15. A night driver should always:
- (a) inspect his headlights before driving
 - (b) keep his eyes on the road
 - (c) know all road signs
 - (d) review night driving rules
 - (e) stop smoking while driving
16. One reason why inside lights should not be on is:
- (a) it distracts other drivers' attention
 - (b) it takes the driver's attention off the road
 - (c) it irritates other drivers
 - (d) it reduces the range of visibility
 - (e) it annoys the passengers
17. With reference to pedestrians, drivers should:
- (a) drive slower
 - (b) look for their flashlight
 - (c) remember that they will probably wear white clothes
 - (d) have complete knowledge of the road
 - (e) blow the horn
18. If sleepy, a driver should do which of the following:
- (a) blink his eyes rapidly
 - (b) get out of the car and stretch
 - (c) turn on the radio
 - (d) take deep breaths for five minutes
 - (e) go faster so he can get where he is going quicker

"Driving at Night"

19. The greatest hazards in night driving are:
 - (a) poor visibility and fatigue
 - (b) other car headlights and slow reactions
 - (c) drunk driving and pedestrians
 - (d) speed and visibility
 - (e) personal negligence and fatigue
20. Conditions necessary for night driving are:
 - (a) courtesy, proper use of headlights, reduced speed
 - (b) ability to guess correctly, freedom from fatigue, courtesy
 - (c) readiness to react, concentration, good eyesight
 - (d) driver training experience, slow speed, good reactions
 - (e) steady nerves, good visibility, road knowledge
21. Night driving is made more complex by:
 - (a) multi-focus headlight beams
 - (b) the increased number of rules to remember
 - (c) limited visibility due to headlight glare
 - (d) lack of driver courtesy
 - (e) inefficient preparation for night driving
22. Before taking to the road after sunset we must:
 - (a) check the car mechanically
 - (b) check the gas and oil
 - (c) master the fundamentals of driving
 - (d) practice night driving
 - (e) first master daytime driving
23. The hazards of night driving are greatly increased by:
 - (a) car passengers
 - (b) lack of driver training
 - (c) dangers lurking at every shadow
 - (d) low pressure tires
 - (e) strong headlight beams
24. Which of the following correctly represents the number of fatal accidents occurring at night?
 - (a) 30%
 - (b) 70%
 - (c) 65%
 - (d) 50%
 - (e) 60%

"Driving at Night"

25. Which of the following statements is true with regard to night driving?
- (a) problems are multiplied many times over
 - (b) flicker your lights when meeting a car
 - (c) use bright lights in the city
 - (d) dim lights in the rural areas
 - (e) at night use only bright lights
26. One courtesy of the road to remember and practice is:
- (a) flick your lights before passing
 - (b) blow your horn before passing
 - (c) pass one car width to the left
 - (d) pass only one car at a time
 - (e) do not pass on two lane highways
27. When approaching an oncoming car at night:
- (a) look at the center line
 - (b) look directly at the oncoming car
 - (c) look down at the road
 - (d) look away from the headlights
 - (e) increase speed
28. Why should a night driver always decrease his speed when rounding a curve?
- (a) he can't see to the right
 - (b) he can't see to the left
 - (c) the tires have better traction
 - (d) to compensate for the small angle of the headlight beam
 - (e) he doesn't have complete visibility
29. At night you can't see one side of the road when making a turn because:
- (a) of split vision
 - (b) of windshield reflection
 - (c) of the corner structure of the car
 - (d) of night shadows
 - (e) the lights slant diagonally as you turn
30. At night the range of visibility is most important in order to:
- (a) identify road signs
 - (b) follow the center line
 - (c) read advertisements
 - (d) see night riders or pedestrians
 - (e) develop confidence in driving

"Driving at Night"

31. A special hazard to the night driver is:
 - (a) other car lights
 - (b) seeing pedestrians
 - (c) looking out for drunk drivers
 - (d) reducing speed
 - (e) cars with one headlight
32. The majority of pedestrian accidents occur:
 - (a) in the daylight
 - (b) after dark
 - (c) due to drunk drivers
 - (d) due to high speed
 - (e) due to pedestrian error
33. The factor considered to be the most dangerous at night is:
 - (a) speed
 - (b) intoxication
 - (c) inexperience
 - (d) poor reactions
 - (e) fatigue
34. When you are tired, you are less vigilant and lose your sense of judgment about which of the following?
 - (a) alcohol
 - (b) reaction time
 - (c) road signs
 - (d) speed and distance
 - (e) visibility
35. One result associated frequently with driving while tired is:
 - (a) reduced driver courtesy
 - (b) mental errors
 - (c) increased driving speed
 - (d) falling asleep
 - (e) lack of driver courtesy
36. A common way for a night driver to ask for trouble is to:
 - (a) listen to the radio
 - (b) talk with other passengers
 - (c) smoke while driving
 - (d) turn off the dash lights
 - (e) drive while tired

"Driving at Night"

37. Your ability to handle the car skillfully at night is affected most by:
- (a) pedestrian problems
 - (b) fatigue and visibility
 - (c) weather conditions
 - (d) mechanical condition of the car
 - (e) road conditions
38. When stopping a car at night, which of the following five factors will probably be the most important?
- (a) the type of pavement
 - (b) the weight of the car
 - (c) reaction time
 - (d) braking time
 - (e) barometer pressure
39. When a car approaches without both headlights, you should do the following:
- (a) blink your lights
 - (b) dim your lights
 - (c) signal with your horn
 - (d) turn your lights off
 - (e) slow down
40. In order to be an efficient night driver we must:
- (a) memorize all driving rules
 - (b) understand the car mechanically
 - (c) practice night driving
 - (d) be familiar with the road
 - (e) be courteous at all times

Study 593 - September, 1959
PreDAN (final)

NOTICE: The identity of persons responding to this questionnaire will not be revealed to anyone. Completion time is 10 minutes.

STUDY OF THE MEANING OF DRIVING AT NIGHT

We would like to know what driving at night means to you. We are using a novel way to give people an opportunity to express the feelings they have about things. It consists of a number of words which refer to some aspects of driving at night and a number of scales.

On each scale you can indicate the direction and intensity of your association for a given word by placing an "X" in an appropriate space.

Here is an example:

DIRTY HEADLIGHTS Intelligent: __ : __ : __ : __ : __ : __ : Stupid

If your association was that dirty headlights are "extremely intelligent" factors of night driving you would mark as follows:

DIRTY HEADLIGHTS Intelligent: X : __ : __ : __ : __ : __ : Stupid

If you felt they are "somewhat stupid" factors you would mark:

DIRTY HEADLIGHTS Intelligent: __ : __ : __ : X : __ : __ : Stupid

If you felt they are neither intelligent nor stupid factors (or both intelligent and stupid) you would mark:

DIRTY HEADLIGHTS Intelligent: __ : __ : X : __ : __ : Stupid

Please give your first reaction. Work quickly. It shouldn't take more than three minutes to finish a page.

Traffic Safety Film Research Project

September 1959

Study 593

C 1, 2, 3

FACE SHEET -- SEMANTIC DIFFERENTIAL -- PreDAN (Final)

Name: _____

Card #1
80Subj. _____
C 4, 5, 6

		Col.	Punch
NIGHT DRIVING SKILL	Passive: _ _ _ _ _ : Active	7	_____
HEADLIGHT LIMITATIONS	Nice: _ _ _ _ _ : Awful	8	_____
NIGHT DRIVING VISIBILITY	Easy: _ _ _ _ _ : Difficult	9	_____
PEDESTRIANS	Bad: _ _ _ _ _ : Good	10	_____
NIGHT DRIVING FATIGUE	Wise: _ _ _ _ _ : Foolish	11	_____
DRIVING AT NIGHT	Large: _ _ _ _ _ : Small	12	_____
PROPER HEADLIGHT USE	Dangerous: _ _ _ _ _ : Safe	13	_____
NIGHT DRIVING SKILL	Nice: _ _ _ _ _ : Awful	14	_____
HEADLIGHT LIMITATIONS	Easy: _ _ _ _ _ : Difficult	15	_____
NIGHT DRIVING VISIBILITY	Bad: _ _ _ _ _ : Good	16	_____
PEDESTRIANS	Wise: _ _ _ _ _ : Foolish	17	_____
NIGHT DRIVING FATIGUE	Large: _ _ _ _ _ : Small	18	_____
DRIVING AT NIGHT	Dangerous: _ _ _ _ _ : Safe	19	_____
PROPER HEADLIGHT USE	Passive: _ _ _ _ _ : Active	20	_____
NIGHT DRIVING SKILL	Easy: _ _ _ _ _ : Safe	21	_____
HEADLIGHT LIMITATIONS	Bad: _ _ _ _ _ : Good	22	_____
NIGHT DRIVING VISIBILITY	Wise: _ _ _ _ _ : Foolish	23	_____
PEDESTRIANS	Large: _ _ _ _ _ : Small	24	_____
NIGHT DRIVING FATIGUE	Dangerous: _ _ _ _ _ : Safe	25	_____
DRIVING AT NIGHT	Passive: _ _ _ _ _ : Active	26	_____
PROPER HEADLIGHT USE	Nice: _ _ _ _ _ : Awful	27	_____
NIGHT DRIVING SKILL	Bad: _ _ _ _ _ : Good	28	_____

Study 593 - September 1959
PreDAN (Final)

		<u>Col.</u>	<u>Punch</u>
HEADLIGHT LIMITATIONS	Wise: __:__:__:__:__:__:__:Foolish	29	_____
NIGHT DRIVING VISIBILITY	Large: __:__:__:__:__:__:__:Small	30	_____
PEDESTRIANS	Dangerous: __:__:__:__:__:__:__:Safe	31	_____
NIGHT DRIVING FATIGUE	Passive: __:__:__:__:__:__:__:Active	32	_____
DRIVING AT NIGHT	Nice: __:__:__:__:__:__:__:Awful	33	_____
PROPER HEADLIGHT USE	Easy: __:__:__:__:__:__:__:Difficult	34	_____
NIGHT DRIVING SKILL	Wise: __:__:__:__:__:__:__:Foolish	35	_____
HEADLIGHT LIMITATIONS	Large: __:__:__:__:__:__:__:Small	36	_____
NIGHT DRIVING VISIBILITY	Dangerous: __:__:__:__:__:__:__:Safe	37	_____
PEDESTRIANS	Passive: __:__:__:__:__:__:__:Active	38	_____
NIGHT DRIVING FATIGUE	Nice: __:__:__:__:__:__:__:Awful	39	_____
DRIVING AT NIGHT	Easy: __:__:__:__:__:__:__:Difficult	40	_____
PROPER HEADLIGHT USE	Bad: __:__:__:__:__:__:__:Good	41	_____
NIGHT DRIVING SKILL	Large: __:__:__:__:__:__:__:Small	42	_____
HEADLIGHT LIMITATIONS	Dangerous: __:__:__:__:__:__:__:Safe	43	_____
NIGHT DRIVING VISIBILITY	Passive: __:__:__:__:__:__:__:Active	44	_____
PEDESTRIANS	Nice: __:__:__:__:__:__:__:Awful	45	_____
NIGHT DRIVING FATIGUE	Easy: __:__:__:__:__:__:__:Difficult	46	_____
DRIVING AT NIGHT	Bad: __:__:__:__:__:__:__:Good	47	_____
PROPER HEADLIGHT USE	Wise: __:__:__:__:__:__:__:Foolish	48	_____
NIGHT DRIVING SKILL	Dangerous: __:__:__:__:__:__:__:Safe	49	_____
HEADLIGHT LIMITATIONS	Passive: __:__:__:__:__:__:__:Active	50	_____
NIGHT DRIVING VISIBILITY	Nice: __:__:__:__:__:__:__:Awful	51	_____
PEDESTRIANS	Easy: __:__:__:__:__:__:__:Difficult	52	_____
NIGHT DRIVING FATIGUE	Bad: __:__:__:__:__:__:__:Good	53	_____
DRIVING AT NIGHT	Wise: __:__:__:__:__:__:__:Foolish	54	_____
PROPER HEADLIGHT USE	Large: __:__:__:__:__:__:__:Small	55	_____

PROJECT 593M

NAME _____ Date _____ Group _____

<u>No.</u>	<u>Test Items</u>	<u>Right</u> (Yes)	<u>Wrong</u> (No)	<u>Code</u>
1.	INSIDE LIGHTS OFF			3
2.	HEADLIGHTS ON DIM POSITION WHEN APPROACHING AN ONCOMING CAR			2
3.	SPEED REDUCED WITHIN SAFE LIMITS WHEN ROUNDING CURVE			1
4.	SPECIAL PRECAUTION OR CONSIDER- ATION OF PEDESTRIAN SAFETY			3
5.	GENERAL REDUCTION OF SPEED DUE TO HAZARDS OF NIGHT DRIVING			1
6.	FLICKERING OF HEADLIGHTS WHEN PASSING A CAR			2
7.	SLOWING DOWN AND PULLING TO RIGHT WHEN APPROACHING ONE-EYED CAR			3
8.	PARKING LIGHTS USED PROPERLY WHEN PARKING BESIDE HIGHWAY			2
9.	GENERAL CONCENTRATION AND CAUTION SHOWN BY DRIVER			4.
10.	X TURN			5
11.	Y TURN			5
12.	FIGURE 8			5
13.	DID STUDENT USE MATCH OR LIGHTER WHILE DRIVING?			3
14.	<u>TOTALS</u>			
15.	DOES STUDENT SMOKE?			6

----- Score _____
 (Instructor's Signature)

BEHAVIORAL ANALYSIS

A. Film Facts B. Conversions C. Situational Reality <u>BEHAVIORAL</u>	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Present Performance	Behavior Change Components								Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
					Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors					
1. A. Concentration and real skill at the wheel are needed to ride safely after dark. B. A driver must be extra cautious at night. C. 1. It is assumed that a person should concentrate on his driving and skills in the day also. 2. I don't drive at night. 3. How does this apply to me?																
2. A. We must be in complete control at all times and ready to react at any time to the changing situations on the road ahead. B. A night driver must be alert at all times. C. 1. Self-evident. 2. This is the way I normally drive. 3. Impossible to react this way completely.																

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components								Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors				
A. Film Facts B. Conversions C. Situational Reality <u>BEHAVIORAL</u>															
	3. A. Poor visibility and fatigue are the most dangerous factors to be aware of at night. B. No conversion necessary. C. 1. This is probably so; but nothing can change these factors. 2. This doesn't apply to me because I drive slowly and stop when I am tired.														
	4. A. Only an extra measure of real caution can guarantee safety in the dark. B. A night driver must be extra cautious.														
	C. 1. People use or do this subconsciously. 2. One cannot maintain this level of performance all the time.														
5. A. If you are tired, or if your headlights aren't clean and clear, you can't drive safely. B. Visibility and fatigue are major factors in accidents occurring in the															

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components								Estimate of Permanent Attitude Change	Estimate of Immediate Attitude Change	Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors				
A. Film Facts B. Conversions C. Situational Reality															
<u>BEHAVIORAL</u>															
5. B. (cont'd) hours after dark.															
C. 1. Everyone knows this.															
2. Headlights cannot stay clean on bad days.															
3. Fatigue is unavoidable, and will result in varying degrees.															
6. A. To make sure you can see your best, turn on your headlights one-half hour before sunset, or whenever visibility is limited.															
B. Turn on your headlights at the first indication of your need for them.															
C. 1. People don't all judge sunset to be at the same time.															
2. This is a normal reaction.															
3. Everyone does this anyway to the best of his judgment.															
7. A. If you are parking away from the city streetlights, leave your parking lights on when pulling off the highway.															

Continued

BEHAVIORAL ANALYSIS

A. Film Facts B. Conversions C. Situational Reality	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components									Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors					
<u>BEHAVIORAL</u>	7. B. Use your parking lights after dark.															
	C. 1. This depends upon how far off the highway and for how long.															
	2. This may wear out the battery.															
	3. Batteries cost too much money.															
	8. A. Objects more than 150 ft. away cannot be identified clearly even with good headlights.															
	B. Good headlights don't penetrate the darkness far enough to prevent accidents.															
	C. 1. Too hard to judge 150 ft. away while driving.															
	2. Other rules of safe driving make this knowledge unnecessary.															
	9. A. The range of even the best headlights is far less than the stopping distance required for a speed of 50 m.p.h., so don't overdrive your headlights.															

BEHAVIORAL ANALYSIS

	Behavior Change Components										Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning
	Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change			
A. Film Facts													Estimate of Permanent Change in Driver Skill
B. Conversions													Estimate of Immediate Change in Driver Skill
C. Situational Reality													Change in Driver Skill
<u>BEHAVIORAL</u>													
9. B. Drive slowly at night.													
C. 1. The law says it is okay to drive 50 m.p.h. at night; other people do.													
2. One can't always tell what the stopping distance is.													
3. People can't avoid taking certain calculated risks.													
10. A. If you are going too fast, by the time you've reacted to the emergency, put your foot on the brakes and stopped the car, you may be involved in an accident; the first rule for safe driving at night is to reduce your speed.													
B. Drive slowly at night, because there are many factors which might cause an accident.													
C. 1. First consideration should be given to the speed limit at night.													
2. Motivation and judgment determine this.													

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components								Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors				
A. Film Facts B. Conversions C. Situational Reality <u>BEHAVIORAL</u>	11. A. It is important to know the use of headlights; use bright lights in the country, depress lights when meeting or following another car, and flicker your lights before passing a car.														
	B. Know when and how to use your headlights.														
	C. This is normal courtesy which I do automatically.														
12. A. When other cars approach, slow down, look not at the headlights but at the edge of the road. B. Slow down when meeting another car at night. C. 1. This could be dangerous and cause an accident. 2. This detracts from the broad picture ahead.															

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components								Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change		
A. Film Facts B. Conversions C. Situational Reality <u>BEHAVIORAL</u>	12. C. 3. Bright lights don't bother some people. It may depend upon whether or not the other person dims his lights.													
	13. A. Don't light matches or cigarette lighters while driving.													
	B. Don't let minor things take your attention from your driving or interfere with your vision.													
	C. 1. This is too impractical to be of any value. 2. Risks are small compared to the inconvenience. 3. It is idealistic and impractical.													
	14. A. When a car approaches without both headlights, slow down and pull to the right.													
	B. Be careful when meeting another car at night.													

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components								Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Permanent Learning	Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors			
A. Film Facts B. Conversions C. Situational Reality	14. C. 1. This depends upon the total picture ahead.														
	2. This is necessary only part of the time.														
	3. Your present speed may make this unnecessary.														
15. A. Keep your eyes on the road at all times. B. No conversion necessary. C. 1. What does the road include, how much, which direction; impossible to do. 2. Other things rate attention. 3. The total picture is very important.															
16. A. Do not have inside lights on while driving; it creates a glare and reduces the range of visibility. B. No conversion necessary. C. No facts of life necessary.															

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Behavior Change Components										Estimate of Immediate Learning	Estimate of Permanent Learning	Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
A. Film Facts B. Conversions C. Situational Reality <u>BEHAVIORAL</u>	17. A. Pedestrians should face oncoming traffic, carry a flashlight and wear light clothes. Don't depend on this; drive slower and watch carefully.																								
	B. Drive slowly at night and be particularly careful of pedestrians.																								
	C. 1. Driving slower indicates I was driving too fast, which I may not be doing.																								
	2. Pedestrians can watch out for themselves.																								
	18. A. If sleepy, pull off the road and get out of the car and stretch; take a nap is the fresh air doesn't help.																								
	B. No conversion necessary.																								
	C. No facts of life necessary																								

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Present Performance	Behavior Change Components										Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
					Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill	
A. Film Facts B. Conversions C. Situational Reality	19. A. Fatigue and poor visibility are the two greatest hazards in driving at night.															
	B. No conversion necessary.															
	C. No facts of life necessary.															
	20. A. Reduce your speed, use headlights correctly, and courteously and be sure you've mastered the fundamentals of driving before you get behind the wheel at night.															
	B. Night driving should not be attempted by other than experienced and thoughtful drivers.															
	C. 1. A Driver's licence makes night driving possible for everyone. 2. Courtesy is correct at all times.															

Continued

BEHAVIORAL ANALYSIS

A. Film Facts B. Conversions C. Situational Reality	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components										Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change		
<u>LEARNABLE</u>	21. A. The blinding glare of the lights, limited visibility and the darkness itself, all add to the complex pattern of traffic on the streets and highways at night.														
	B. No conversion necessary.														
	C. No actionable.														
	22. A. We must master the fundamentals of driving before taking to the road after sunset.														
	B. No conversion necessary.														
	C. 1. Practice is necessary in almost anything before you become efficient.														
	2. Some people never master the fundamentals but are allowed to drive when and where they please.														

Continued

BEHAVIORAL ANALYSIS

	Behavior Change Components										
	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors
A. Film Facts											
B. Conversions											
C. Situational Reality											
<u>LEARNABLE</u>											
23. A. Don't forget that there are dangers lurking at every shadow.											
B. Night drivers must be on the lookout for hidden danger.											
C. 1. These dangers are not restricted to shadows.											
2. There are enough obvious dangers to occupy most of the driver's attention.											
24. A. Sixty percent of the fatal automobile accidents occur at night.											
B. No conversion necessary.											
C. Informational only.											
25. A. At night, problems are multiplied many times over.											
B. Most driving problems are greater at night.											
C. This is due to physiological factors.											

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components									Estimate of Permanent Attitude Change	Estimate of Immediate Attitude Change	Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change				
A. Film Facts B. Conversions C. Situational Reality <u>LEARNABLE</u>	26. A. Flicking your lights before passing is a courtesy of the road, one to remember and to practice.															
	B. Every driver should signal before passing another car.															
	C. 1. Courtesy is always important when driving a car. 2. Flicking your lights does not require much effort															
	27. A. Looking away from the headlight reduces the chances of being blinded by headlight glare.															
	B. Do not look directly into the headlights of an oncoming car.															
	C. 1. Other headlights may cause temporary blindness 2. Night driving requires full attention to be given to the road ahead.															

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components									Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill	
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors	Estimate of Immediate Attitude Change				
A. Film Facts B. Conversions C. Situational Reality <u>LEARNABLE</u>																
28. A. Even in daylight, you have to slow down because you can't see when going around a bend in the road.																
B. No conversion necessary.																
C. This applies to street corners and other situations in which your vision is restricted.																
29. A. At night the lights slant diagonally as you turn, and you can't see the right side of the road.																
B. No conversion necessary.																
C. This depends on which way you are turning. It may be the left side of the road that you cannot see.																
30. A. Because your range of visibility is limited, it is difficult to see night riders or pedestrians.																
B. No conversion necessary.																

Continued

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components								Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors				
A. Film Facts B. Conversions C. Situational Reality <u>LEARNABLE</u>	30. C. It is difficult to see any object outside of your range of visibility.														
	31. A. Seeing pedestrians is a special hazard to the driver.														
	B. Pedestrians are less likely to be seen at night, due to their size, color, lack of lighting, and other factors.														
	C. Pedestrians are also better able to care for themselves than other inanimate objects.														
32. A. The majority of pedestrians' accidents occur after dark.															
	B. No conversion necessary.														
	C. According to traffic safety statistics, the majority of all serious accidents occur at night.														

Continued

BEHAVIORAL ANALYSIS

- A. Film Facts
- B. Conversions
- C. Situational Reality

LEARNABLE

	Known Fact	Estimate of Immediate Learning	Estimate of Permanent Learning	Behavior Change Components							Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
				Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations				
33. A. Fatigue is an even greater hazard than poor visibility, because you are naturally not as alert.														
B. No conversion necessary.														
C. 1. This is a matter of opinion.														
2. One probably results in the other.														
34. A. When you are tired, you are less vigilant and lose your sense of judgment about speed and distance.														
B. No conversion necessary.														
C. This fact would be true for any other judgmental concept.														
35. A. When you are tired, your reaction time slows up and you fall asleep.														
B. No conversion necessary.														
C. This fact is self-evident and it is true of almost anything, which makes it more or less valueless.														

(Continued)

BEHAVIORAL ANALYSIS

	Known Fact	Estimate of Immediate Learning	Behavior Change Components								Estimate of Immediate Attitude Change	Estimate of Permanent Attitude Change	Estimate of Immediate Change in Driver Skill	Estimate of Permanent Change in Driver Skill
			Permanent Learning	Present Performance	Behavior Change Possible	Personal Judgments	Other People's Behavior	Negligence	Lack of Knowledge	Chance Situations	Other Factors			
A. Film Facts B. Conversions C. Situational Reality <u>LEARNABLE</u>	36. A. You are only asking for trouble if you continue to drive while tired. B. Do not drive while tired. C. 1. Sometimes this rule cannot be obliged. 2. Sometimes this rule is impractical. 3. What condition or standard determines whether a person is too tired?													
	37. A. Fatigue and poor visibility can affect your ability to handle the car skillfully. B. No conversion necessary. C. There are also other factors which determine your ability to handle the car skillfully.													

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