THE EFFECTIVENESS OF THREE PRESENTATION FORMATS OF THE WEST VIRGINIA WRITTEN TEST FOR DRIVER LICENSURE with HEARING IMPAIRED APPLICANTS

by

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ABSTRACT

THE EFFECTIVENESS OF THREE PRESENTATION FORMATS OF THE WEST VIRGINIA WRITTEN TEST FOR DRIVER LICENSURE WITH HEARING IMPAIRED APPLICANTS

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The purpose of this study was to examine the effectiveness of three presentation modes of the West Virginia written test for a driver's license with hearing impaired applicants. The presentation modes were: (1)regular written test; (2)video tape test; and (3)abbreviated English Syntax Test for the Deaf. The study compared the video tape test with the regular written test, and the Abbreviated English Syntax Test for the Deaf to determine if either presentation mode was more effective than the regular written test. The investigation involved a Randomized Block or Split-Plot design.

The subjects used for the study were fifty-four high school age students from the West Virginia School for the Deaf and six additional high school age resident students who were attending the West Virginia Rehabilitation Center in Institute, West Virginia. All subjects volunteered to participate in this study.

Students were assigned by stratified sampling to

complete one of the three modes of the West Virginia test for driver licensure. The blocking variable used was the Stanford Diagnostic Reading Test, Brown Level, Form A.

To analyze the data, a one-way analysis of variance was applied. The results indicated no significant differences at the 0.05 level. A two-way analysis of variance was also applied with the subjects divided into high and low verbal grouping. The results did not show any significant difference among the three treatment groups at the 0.05 level.

The major findings of this study were: (1)The mean scores of hearing impaired subjects taking the West Virginia written test for driver licensure on the video tape test and the Abbreviated English Syntax Test for the Deaf were not significantly different from the mean scores of hearing impaired subjects taking the regular written test at the 0.05 level; (2)the mean scores of hearing impaired subjects taking the video tape test were higher than the mean scores of hearing impaired subjects taking the regular written test and the Abbreviated English Syntax Test for the Deaf, but not significantly different; and (3)the hearing impaired low verbal ability subjects scored higher on the Abbreviated English Syntax Test for the Deaf than the hearing impaired high verbal ability subjects.

Dedication

To my wife, Ruth,

and

my son, Jay,

for their encouragement and support.

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The writer wishes to take this opportunity to thank the many people who have helped in the completion of this study.

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THE PROBLEM

Statement of the Problem

The central problem addressed in this study was the inability of hearing impaired driver license applicants to demonstrate competency in the written portion of the West Virginia Driver's Licensing Test. Hearing impaired applicants may suffer discrimination by a written knowledge test when their most common means of communication is with sign language.

Background of Study

Public Law 94-142, The Education of all Handicapped Children Act states, "More than half of the handicapped children in the United States do not receive appropriate educational service which would enable them to have full quality of opportunity."

Many hearing impaired persons have severe learning problems. These problems may be caused by their reading levels, attention span, or conceptual understanding of materials.

Han Furth in his book, Thinking Without Language; Psychological Implications of Deafness, notes, "Those who

have hypothezied differences in the thinking of the deaf usually employed verbal tests and found their theory borne out as they observed that deaf persons were in general poorer than hearing persons in such tasks." (1966: 5)

Coppin and Peck concluded, "A number of questions were left unresolved by the present study, and that additional research is necessary before the practical and theoretical significance of deafness as a factor in driving can be completely assessed." (1964: 21)

Mr. Edward Czernicki, the driver education instructor for the West Virginia School for the Deaf, who is himself deaf, stated that, "The biggest problem for his deaf students was inability to demonstrate competency in the West Virginia Written driving test for beginners." He observed that hearing impaired have difficulty passing the written portions of the driver's license examination. In a letter dated June 2, 1981, Mr. Czernicki stated, "All deaf students failed the first time they attempted the test. Fifty percent passed the second time, and an additional ten percent passed the third time. The remainder did not pass the test before school closed for the summer."

Mr. Paul St. Pierre, driver education instructor and evaluator for the Crotched Mountain Foundation, Greenfield, New Hampshire in a letter dated October 13, 1980 stated, "I can state from personal experience that a very high percentage of deaf persons that I have worked with in the past fourteen years do have difficulty passing the written

test on the first try, especially those deaf from birth. Questions having to do with concepts are especially difficult for them." He further stated, "I have had persons that had a terrible time passing the written exam, yet performed very well in the car on the highways. Unfortunately, persons failing the written test are not allowed to take the road test."

Several states such as California, Delaware, Florida, and Wyoming do allow an interpreter to use sign language to test hearing impaired applicants for driver licensure. According to the Dictionary of Education, sign language is a means of communication by the use of gestures, or more specifically, a highly developed system of conventionalized gestures used in communication with the deaf or among the deaf themselves as a substitute for speech.

In the state of West Virginia, drivers who are deaf or hearing impaired are not identified as such on their driver's license, nor in any statistical records that are kept by the Department of Motor Vehicles, Charleston, West Virginia. There has been no information that would allow a comparison of hearing impaired persons who have failed the written driver's test with hearing persons who have also failed. However, there are some observations which indicate that hearing impaired persons have had a higher failure rate on the written portion of the driver's test. Lt. Gary Hill, Chief of the Traffic Research and Safety Division of the West Virginia Department of Public Safety,

made a study of the failure rate for this test between two similar towns in West Virginia. This study found that the failure rate of beginning drivers during the year 1978 was two times greater in Romney, West Virginia than in Petersburg, West Virginia. The West Virginia School for the Deaf is located at Romney, where most beginning hearing impaired drivers take their licensing examination. Romney also has a greater percentage of hearing impaired persons living there than any place in West Virginia.

Finesilver (1962: 90) stated, "Several administrators cite the need for improved communication between deaf applicants and licensing examiners. In this regard, many terms relating to traffic laws or driving practices are unknown in the vocabulary of many deaf people. Their lack of ability to communicate or express themselves is clearly no indication of their driving ability or knowledge of traffic laws. For that reason, and coupled with views of experienced licensing examiners, exploration into promulgating a standard examination for deaf drivers would not only be of help, but perhaps might very well be overdue. Several administrators state that a standardized exam would not only expedite the testing, but also improve the test itself."

In July, 1980, the Governor of West Virginia announced the adoption of a new test for the deaf and hearing impaired in West Virginia. This test was written in an abbreviated syntax form such as an interpreter would write

if using sign language, a means of communication using hand and fingers. This test was modified from the West Virginia State Police Operators and Chauffeurs Examination, Test D, by members of the Traffic Research and Safety Division of the Department of Public Safety, and staff members of West Virginia Rehabilitation Department Services for the Deaf. It was field-tested at Romney, West Virginia. It is believed that West Virginia was the first state to adopt a written test specifically for the hearing impaired.

Furth states, "There is one trait most deaf persons do share and that is objective and measureable lack of language skills. If educators agree that education should primarily teach and develop thinking according to a child's optimal potential, they would readily seek non-verbal teaching methods, particularly in cases where linguistics skill is retarded or absent." (1966: 71)

On the above information, the writer proposed that the regular written Test D of the West Virginia State Police Operators and Chauffeurs Examination be presented on video tape with an interpreter doing the exact test in sign language.

Purpose of the Study

The writer's purpose in this study was to examine the effectiveness of three presenation modes of the West Virginia written test for a driver's license with hearing

impaired applicants. The three presentation modes were:

(1) Regular Written Test --- Test D, one of four written tests given by the Department of Public Safety in West Virginia to test the knowledge of driver license applicants. This test was developed by the University of Arizona data analysis team from the West Virginia Driver's Handbook. Using a method by Ebel (1967), the reliability index is in the range of .55 to .70.

(2) Video or Visual Tape Test --- The Regular Written Test D, presented by an interpreter on video tape using sign language.

(3) Abbreviated English Syntax Test for the Deaf --- This test was adopted in July, 1980 by the Department of Public Safety in West Virginia. This test is the same as the Regular Written Test D, except it is written in an abbreviated syntax form such as the interpreter would write the questions if he/she was using sign language.

The writer attempted to indicate which of the three different modes was most effective in administering the written driver's test to hearing impaired applicants.

Significance of the Study

The significance of this study was in its potential to help hearing impaired persons understand and be more successful in passing the written portion of the West Virginia Driver's Licensing Test. It seems appropriate that

one be able to take this test in one's own language.

The ability to drive a car and finding proper employment are closely related for many people--and this is particulary so for hearing impaired people.

Finesilver stated, "We recognize that one of our most precious possessions is our complete freedom of mobility. To a person who is deaf this freedom of movement--for the most part--is centered around driving privileges and these privileges to the deaf take on additional importance. They run the broad horizon of driver licensing, mental and physical condition, driver records and accident involvement." (1962:11)

For hearing impaired persons driving is a necessity and often the means of earning a livelihood. It is undeniably clear that the ability to work is an essential ingredient for self-respect.

In a report titled Impact Study on Driving by Special Populations, Vol. 1, it was noted that as greater numbers of the population grow older, as automotive technology advances, and as special interest groups assert the rights of their constituents, there will be increased pressure on licensing administrators and driver education to modify existing licensing procedures and education programs to insure personal mobility, (Brainin, et al.: 1977: 13).

If this study proves significant, the Department of Public Safety could adopt the most effective method for testing all hearing impaired drivers in the written portion

of the driver's test. Other states may wish to adopt the most effective format for testing of their hearing impaired driver applicants.

Questions to be Addressed

1. Will the use of specially prepared visual tapes using sign language and visualization for hearing impaired persons result in higher scores on the written part of the driver's test than the use of the regular written test?

2. Will the use of the Abbreviated Syntax Test for the Deaf result in higher scores on the written part of the driver's test than the use of the regular written exam?

3. Will persons who score high or low on the verbal tests score equally as high or low on the written driving tests?

Hypotheses

Research Hypotheses

1. There will be a significant difference between the mean scores of the hearing impaired persons taking the driver's test on the visual tapes in sign language and the scores of hearing impaired persons taking the regular written test.

$H_1: \mu_2 > \mu_1$

2. There will be a significant difference between the mean scores of the hearing impaired person taking the driver's test on the Abbreviated English Syntax Test for the Deaf and the scores of hearing impaired persons taking the regular written test.

$H_1: \mu_3 > \mu_1$

3. There will be a significant difference between the mean scores of the hearing impaired persons with high or low verbal ability taking the West Virginia test for driver licensure with the three different treatment groups.

$H_1: \mu_4 \neq \mu_1 \neq \mu_2 \neq \mu_3$

Null Hypotheses

1. There will be no difference between the mean scores of the hearing impaired persons taking the driver's test on visual tapes in sign language and the scores of hearing impaired persons taking the regular written test.

$Ho: \mu_2 = \mu_1$

2. There will be no difference between the mean scores of the hearing impaired persons taking the driver's test on the Abbreviated English Syntax Test for the Deaf and the scores of hearing impaired persons taking the regular written test.

$Ho: \mu_3 = \mu_1$

3. There will be no difference between the mean scores of the hearing impaired persons with high or low verbal ability taking the West Virginia written test for driver licensure with the three different treatment groups.

Ho: $\mu_4 = \mu_1 = \mu_2 = \mu_3$

μ_1 = Mean scores for the regular written test.

μ_2 = Mean scores for the video tape test.

μ_3 = Mean scores for the syntax test.

μ_4 = Mean scores for high and low verbal ability students.

Hypotheses will use an alpha of 0.05.

Basic Assumptions

In this study the following assumptions were made:

1. The validity and reliability of the West Virginia State Police Operators and Chauffeurs Written Examination for beginning drivers was sufficient for the purpose of this study.

2. The validity and reliability of the Stanford Diagnostic Reading Test, Brown Level, Form A was sufficient for the purpose of this study.

3. All subjects in the sample were hearing impaired of high school age, and considered to be suitable for this study.

4. The number of subjects in the sample was sufficient for the purpose of this study.

Definitions of Terms

To clarify terms in this study, the following definitions are used.

(1) Congenital --- Actually or potentially present in the individual at birth.

(2) Deafness, adventitious --- A condition occurring after birth, in a person born with natural hearing as a result of accident or disease.

(3) Deafness, congenital --- A general term for deafness dating from birth or earlier.

(4) Decibel --- A unit used to measure the relative loudness of sounds. One decibel is considered to be the faintest sound that can be heard by a normally hearing person.

(5) Hard of Hearing --- Having defective hearing that is, however functional, for the ordinary purposes of life.

(6) Hearing Impairment --- The most general term for mal-function of the auditory mechanism; does not distinguish either the anatomical area primarily involved or the functional nature of the impairment.

(7) Interpreter --- One who translates orally for a person speaking in a different language.

(8) Knowledge --- The accumulated facts, truths, principles, and information to which the human mind has access.

(9) Knowledge Test --- Any test designed to measure what an individual or group knows about a particular subject.

(10) Language --- A code for conveying the thoughts and feelings of one individual to another which has been accepted and is mutually understood by both.

(11) Language, Sign --- A means of communication by the use of gestures. More specifically, a highly developed system of communication conventionalized gestures used in communication with the deaf or among the deaf themselves as a substitute for speech.

(12) Mode --- The form or manner, as in mode of communication or "teaching mode".

(13) Oral Aural --- Pertaining to speaking and hearing as applied to language teaching.

(14) Syntax --- The area of grammatical study dealing with sentence structure and word relations as established by usage.

(15) Test, information --- A test designed to measure the subject's knowledge of facts.

(16) Test, verbal --- Any test depending on written and spoken language.

(17) Vocabulary, basic --- The words and idioms considered essential for minimal use of a language.

(18) Vocabulary, comprehension --- Words having meaning when heard or seen even though not produced by the individual himself to communicate with others.

(19) Vocabulary, reading --- The word forms that one recognizes when he sees them in print or writing.

The above definitions were taken from the Dictionary of Education, New York, Good, Carter, V. ed. McGraw-Hill, 1973.

The following definitions were taken from the Educator's Resource Guide to Special Education. Davis, William E., Boston, Mass., Allyn and Bacon, Inc., 1980.

(20) American Sign Language --- A communication system used by the deaf. General ideas or thoughts are conveyed through the use of various gestures. The system has its own grammatical rules and is mainly concept based.

(21) Auditory --- Pertaining to the sense of hearing.

(22) Verbal Intelligence --- A type of intelligence that involves skills in the use of spoken or written language.

SUMMARY

The hearing impaired do have special problems in communications. The hearing impaired seem to have difficulty with comprehending the wording on most tests. The language and vocabulary deficiency of the hearing impaired is clearly shown in several studies that have been conducted. It was shown that hearing impaired children do as well as hearing children in taking non-verbal tests.

Hearing impaired applicants should be able to take the

written portion of the West Virginia Driver's Test in the language they find most comprehensible, and the true language of the deaf and hearing impaired is sign language. According to the Dictionary of Education, sign language is a means of communication by the use of gestures. This study attempted to prove the most effective mode for the West Virginia written driver licensing examination for the hearing impaired. There may be a need for licensing administrators to modify existing licensing procedures to insure personal mobility for the hearing impaired.

Literature relating to language and vocabulary deficiency among the hearing impaired will be reviewed in Chapter II. The review of literature will also include studies related to the driving records of hearing impaired persons, and different non-verbal tests to aid the hearing impaired in comprehending communication.

CHAPTER II

REVIEW OF LITERATURE

The review of literature in this chapter includes the following topics: (1) educational achievement of deaf students, (2) driving records of deaf drivers, and (3) special testing.

Educational Achievement of Deaf Students

Intelligence scores are distributed essentially the same in the deaf population as among the non-deaf. This is the conclusion of Vernon (1968: 1-12) after examining over fifty studies.

The educational achievement of the young deaf is somewhat different than that of hearing students. In a survey by McClure (1966) covering 93 per cent of the deaf students in the United States who were sixteen or older, it was found that 30 per cent were functionally illiterate, 60 per cent were achieving at 5.3 grade level or below and only five per cent were achieving at the tenth grade level or above.

The Office of Demographic Studies, Gallaudet College, Washington, D.C., made a study of 6,871 hearing impaired

persons in 1974. The results showed that the median reading scores for students aged twenty or above corresponded to a grade equivalent of slightly over 4.5. The results also showed that only ten per cent of hearing impaired eighteen year old students read at or above the eighth grade level. (An average hearing child reaches a grade equivalent of 8.2 before age fourteen.) The Gallaudet study found that the difference between the mean achievement of hearing students, when compared with the mean achievement of the non-hearing students, increased approximately one and one-half grades to more than five grades by age fourteen. Trybus & Karchmer (1977: 64-67) concluded the study by urging a reduction of the substantial educational disadvantage faced by hearing impaired students.

Wrightston, Aronow, and Moskowitz (1963: 311-316), in their study of 73 school programs for the deaf (54% of the deaf school children in the United States), found the average reading achievement of sixteen year olds to be below 4.9 grade level.

Markowin (1960: 136-137) stated, "In language there are special difficulties for the deaf child--understanding the use of metaphors, distinguishing between words of several meanings, finding special meanings for abstract concepts of causal or conditional relationships, and understanding the principles of grammatical and syntatic structure of language."

Furth (1966: 71) observed that one trait most deaf

persons share is "an objective and measurable lack of language skills."

Schein (1968: 91) reported that the average deaf student is retarded 2 to 5 years on various measures of language achievements.

Furth (1973:94) reported a study in which 12,000 deaf persons were given the Stanford Achievement Test. Twenty per cent of 540 pupils aged 15-17 reached a reading level of fifth grade or higher.

Raymond J. Trybus and Michael A. Karchmer (1977: 67) reported that "since many hearing impaired children appeared to be unprepared for the question types found on tests, and had difficulty with the mechanics of marketing responses in specified locations on the test booklet or answer sheet, practice test materials must be used before actual testing."

Furth (1966: 205) stated that, "By the time the child enters school the battle for mastery of language is already lost. The child's intelligence has been developing without benefit of language. He is still below the level that would enable him to readily form and comprehend connected language." On the brighter side, Furth (1973: 91) concluded, "Because of these difficulties, it might appear that the deaf children would perform poorly on non-verbal tests of intelligence, but their overall scores have never been demonstrated to be greatly lower than national norms, although occasionally some significant differences in favor

of hearing norms are reported."

Furth (1973: 91) also acknowledged that on an individual basis, non-verbal intelligence tests are frequently and successfully given to deaf children, and that standard norms can be used. Furth (1973: 92) concluded that a non-hearing child compares favorably with a hearing child on visual and manipulatory skills.

Furth (1973: 91) also stated that, "The same children who perform normally on non-verbal intelligence tests fail rather miserably in language learning."

Driving Records of Deaf Drivers

The Department of Motor Vehicles of Washington, D.C. examined the actual records of traffic infractions and accidents for every deaf person in the area who had received a ticket or had been involved in an accident during the years 1960, 1961, and 1962. The results as reported by Schein, (1968: 82-83) were:

(1) deaf drivers had less than one-third as many accidents on the average as did hearing drivers,

(2) deaf drivers were ticketed for all moving violations about half as frequently as hearing drivers and

(3) the average deaf driver drives more miles than the average hearing driver because the hearing impaired driver cannot use the telephone.

A survey conducted by Coppin and Peck (1963:30) for the California Department of Motor Vehicles compared the driving records of a large number of members of the California Association of the Deaf with a sample of hearing drivers. The drivers were matched for driving records, annual mileage, occupation, and age. The sample of deaf drivers had 1.78 times as many accidents and 1.26 times as many convictions as did the non-deaf. However, this group of deaf drivers was not properly matched to the hearing sample for two reasons: (1) the records of the deaf drivers covered the years 1950-62, while the records for the hearing drivers were for the years 1955-58. (2) Eighty per cent of the deaf drivers lived in San Franciso or Los Angeles areas compared to 66.42 per cent of the hearing sample. The report concluded that the deaf driver did not "represent any serious problems in terms of traffic safety and driving performance in this state."

In a follow-up study, the California researchers Coppin and Peck (1964: 23) compared matched samples of deaf and non-deaf on violation points and reported accidents. The groups were matched on the variable of age, sex, annual mileage, occupation and area of residence.

Deaf females did not differ significantly from matched non-deaf females on violation points or reported accidents. The deaf males did not differ significantly from non-deaf males when compared on total conviction points. Deaf males had a significantly greater number of

accidents than the non-deaf males.

Coppin and Peck noted that only one out of eight deaf drivers had any formal training in driving. They concluded their report by urging the need for further research "before the practical and theoretical significance of deafness as a factor in driving can be completely assessed."

Finesilver (1961: 12) compared the records of one hundred Colorado deaf drivers with two groups of one hundred hearing drivers. The deaf group had fewer accidents than either group of hearing drivers.

Finesilver (1968: 3) in a survey of the fifty states found that 41 of 49 states ranked deaf drivers at least as good as hearing drivers. Another study of 160 deaf drivers in Colorado showed that 75 per cent of the deaf drivers had perfect driving records and not one deaf driver had had a fatal accident or citation in the five year period studied.

Finesilver (1968: 3) cited a study of 18,000 persons with poor driving records in the state of Oregon which revealed that fewer than ten of them were deaf motorists. In the same article, Finesilver noted Pennsylvania driving records over a ten year period involving three million drivers showed that deaf drivers did not cause an injury producing accident while Wisconsin driving records of two thousand deaf drivers indicated none were involved in a fatal accident.

Finesilver (1961: 12) also reported that in Kentucky, a deaf driver had never been called for a hearing preliminary to revocation of a driver's license, and out of 127,162 Virginian drivers involved in accidents in 1959, only 111 were reported to have defective hearing.

Judge Finesilver hypothesized that some of the reasons for the good records of the deaf drivers were that the deaf were free from the hypnotic effect of noise which often causes inattention and mental lapses, that their handicaps caused them to remain alert and attentive when driving, that there was an esprit-de-corp among the deaf to keep good driving records so that they would not lose either licenses or insurance. Finesilver (1968: 3) stated that, "It has been the universal conclusion of all my studies that the deaf driver is at least as good as the hearing driver, and there is compelling evidence that he is far better." Finesilver (1968: 3) stated that the "proper seeing habits and well-developed perceptions of potential driving hazards are highly prevalent in deaf drivers."

Special Testing

When educators work with the deaf, visual training aids are used extensively. It has been estimated that more than 90 per cent of the information used in driving is visual. Aaron and Strasser (1973: 15)

Joseph Pernick, a Detroit Attorney, was instrumental

in establishing an appeal procedure for deaf applicants for driver's licenses in Michigan. Pernick observed that in many instances deaf people did not understand the examination questions, and as a result failed the test. The appeal procedure, which began in 1959 gave the deaf applicant an opportunity to take a special test. This appeal was available to the deaf applicant only after having failed the driver's test twice. (Finesilver, 1962: 134)

In California, Dr. Jones conducted a study to consider ways to make the driving test fair to all applicants, regardless of their language ability and driving ability or cultural background. Dr. Jones (1980: 4) stated there is not necessarily a relationship between language ability and driving ability; "Just because a person isn't very verbal doesn't mean he can't drive very well." Believing that the traditional testing system for driver's licensing puts a premium on verbal, clerical, and test taking skills, the newly constructed test was aural. The applicant listened to the questions on cassette tapes and responded by marking answers in a picture book.

Dr. Joseph Shrader (1980: 4) evaluated 326 high school students from twelve Ohio high schools who had just completed a driver education course. His study concluded that multimedia had no significant effect on students' knowledge of driving.

Schneidman (1975: 8) reported in the Chicago Tribune

that policemen Sam Anthony and Pat McGoldrich had established a Driver Improvement School in Chicago. The program was designed to prepare novice drivers for the written examination. A test and permit preparation questions were part of the program of instruction. They had trained more than two hundred deaf drivers, none of which have had a fatal accident.

A report by Cunningham (1970: 372-375) showed that the use of special captioned simulator films can be an effective tool.

Dr. Joseph W. Sendelbaugh (1980: 542-544) compared three methods that could be used to modify driver simulator films for hearing impaired students. Three groups were matched for hearing loss, educational level, type of communication, and sex. None of the hearing impaired students in this study could hear any of the instructions given on the driver simulator film. The three treatments were (a) captioned (white letters on blank) via slides; (b) picture (drawings of driver action); and (c) flashlight patterns. A modification using graphics indicating various driving commands with the use of some captioning proved to be the most effective of the methods studied. In this same study Sendelbaugh reported "that the subjects received greater understanding from the film that used the picture-captioned slides."

Dan McGill taught driver education to 150 hearing-impaired 15 year olds at the Texas school for the

deaf at Austin, Texas. He used captions on all visual materials to reinforce his lectures. (Driver Education Digest, Vol. IX, 4, 1977-78) In this same study, McGill stated that deaf students "often are safer drivers than the hearing because of their handicap. The deaf depend on looking."

It is believed that West Virginia is the first state to adopt a special test for the deaf. This test, adopted in July 1980, used an abbreviated syntax form of presentation. The questions were stated in phrases as an interpreter would write the test using sign language. All other state agencies were contacted, but none replied that it had such a test.

Summary

This review of literature indicated that the deaf students were retarded in reading skills, two to five years behind hearing students. They do not do well on verbal achievement tests, but do score as well as hearing students on non-verbal achievement tests.

Statistics show that the deaf drivers have as good, if not better, driving records based upon accidents and violations.

Several states provide interpreters to help the deaf understand the written portion of the driver's tests. Two states, California and West Virginia, have developed new modes of presenting the test questions to applicants who have language disabilities.

Chapter III will explain the design and procedure used in this study. The chapter will include: (1) source of data; (2)source of subjects; (3) methods and conditions of data collection; (4) design of the study; (5) method for analysis of data and (6) data collection instruments.

CHAPTER III

DESIGN AND PROCEDURE OF THE STUDY

The major objective of this study was to examine the effectiveness of three presentation modes of the West Virginia knowledge test for a driver's license with hearing impaired applicants.

The preceding chapter dealt with a review of literature related to these objectives, i.e., academic achievement of hearing impaired students, driving records of deaf and hearing impaired people, and special tests for the deaf and hearing impaired persons.

In this chapter, the following items will be presented: (1) source of data, (2) source of subjects; (3) methods and conditions of data collection; (4) design of the study; (5) method for analysis of data; and (6) data collection instruments.

SOURCE OF DATA

The subjects for this study were taken from two sources: (1) high school students from West Virginia School for the Deaf, Romney, West Virginia, and (2) hearing impaired high school age students who were attending the West Virginia Rehabilitation Center, Institute, West Virginia.

SOURCE OF SUBJECTS

The largest selection of subjects were hearing impaired students enrolled in vocational education classes at the West Virginia School for the Deaf, Romney, West Virginia. These students were all hearing impaired, enrolled in the high school and were fifteen to twenty-two years of age. All students used in this study were volunteers.

There was a total of 108 students available for this study at the West Virginia School for the Deaf, with 54 students volunteering to participate. The School for the Deaf in Romney, West Virginia is the only school in the state for the deaf and hearing impaired. The students who attend this school come from all geographical areas of the state.

Additional subjects were hearing impaired high school age resident students in the West Virginia Rehabilitation Center, Institute, West Virginia.

Six hearing impaired students from a total of 8 agreed to take part in this study. There were other hearing impaired persons at the center, but they had other defects, and were not considered school-age students.

METHODS AND CONDITIONS OF DATA COLLECTION

The procedures used for collection of the data included: (1) completion of a pre-test or blocking

variable, the Stanford Diagnostic Reading Test, Brown Level, Form A and (2) completion of one of the three different modes of the West Virginia written test for driver license applicants.

The Stanford Diagnostic Reading Test, Brown Level, Form A was used to place subjects in one of the three different modes of the written test for driver license applicants. The hearing impaired subjects were tested on reading comprehension and given fifteen minutes to complete the test. Raw scores were used and the subjects were randomly assigned by stratified sampling to take one of the three different tests. This was done to insure that all three cells had subjects of approximately equal reading ability.

School records at the West Virginia School for the Deaf were used to determine that all students were hearing impaired.

During a telephone conversation with Mr. Haught, Vocational Education Principal for the West Virginia School for the Deaf, a time and place to meet with students of the school was arranged. At this meeting, the students were (1) told the purpose of the study, and (2) asked if they would be willing to complete a reading test and one of the three different modes of the West Virginia written test for the driver license applicants. Fifty-four subjects from a total of 108 agreed to participate in this study.

The student's own school was chosen as the test site

because the students were familiar with the building and neighborhood. This also eliminated transporation problems to and from a test site. School officials willingly granted permission to use the school facilities in the interest of driver education. Mr. Haught provided time for the students to participate in this study. The Stanford Diagnostic Test was administered and monitored by Mr. Haught the first day. After the tests were scored, subjects were randomly assigned by stratified sampling or randomized blocks to one of the three different presentation modes of the West Virginia written tests for driver license applicants. (Refer to Figure 1)

The following day, the subjects completed one of the three different modes of the West Virginia written test for driver license applicants. Mr. Haught monitored these test for this study. He was able to communicate with these students by the use of sign language, essential for giving directions for these tests.

Additional subjects were needed to provide twenty subjects in each of the three cells. Arrangements were made with Mr. Purvis, Supervisor of the Personal Adjustment Unit, West Virginia Rehabilitation Center, Institute, West Virginia to meet with some of his summer students in residence at the center. Six high school age subjects who were hearing impaired volunteered to take part in this study. Permission to use the center's facilities and time for the subjects to take the tests were arranged by Mr.

Purvis. Miss Elkins, a teacher in the deaf unit administered and monitored these tests. The same procedure as used at the West Virginia School for the Deaf was followed for randomly assigning these subjects to the three treatment groups.

Figure 1

Randomized Blocks or Split-Plot Design

A. Regular Written Examination	B. Video Tape Examination	C. English Suntax For Deaf Exam
N = 20	N = 20	N = 20
S_1	S_2	S_3
S_6	S_5	S_4
S_7	S_8	S_9
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
S_{60}	S_{59}	S_{58}

S_1, S_2, S_3, S_4, - - - - - S_{60} = Subjects in Population

	Treatment
Group A	T_1
Group B	T_2
Group C	T_3

T_1 = Regular Written Test

T_2 = Video Tape Test

T_3 = Abbreviated English Syntax Test for the Deaf

DESIGN OF THE STUDY

The research design used for this study is called Randomized Blocks or Split-Plot design. The 60 subjects were assigned to one of three treatment groups.

The independent variables measured were the three different presentation modes of the West Virginia written test for driver license applicants: (1) regular written examination, (2) video tape examination, and (3) English Syntax for the Deaf examination.

The dependent variable was the number of correct answers on the three different presentation mode of the West Virginia written test for drivers license applicants. A diagram of this design is found in table 1.

METHOD FOR ANALYSIS OF DATA

A one way analysis of variance was used to analyze the data. This test is one of the more powerful procedures in experimental studies (Bowker and Lieberman, 1959-286). This is a statistical method of testing for significant differences between mean scores of two or more groups of subjects which have been exposed to different experimental treatments. The performance of these groups can be considered to represent results of the treatment by an independent variable whose possible relationship to a dependent variable is being studied (Popham, 1967: 164).

A two way analysis of variance was also applied with subjects divided into high and low verbal ability groups. The purpose of the two way analysis of variance was an attempt to see if reading scores were a factor in this study.

The statistical model capitalizes on the integral relationship between the mean and the variance so that by analyzing variances of several groups, a conclusion can be drawn regarding the similarity of the means of the group.

All F values are reported in the next chapter.

DATA COLLECTION INSTRUMENTS

The instruments used in this study included the following: (1) Stanford Diagnostic Reading Test, Brown Level A, (2) Test D, one of the four traditional written tests given by the Department of Public Safety in West Virginia to test driver license applicants, (3) the regular written Test D, presented on video tape by an interpreter using sign language, and (4) Abbreviated English Syntax Test for the Deaf.

The Stanford Diagnostic Reading Test

This test was used as a blocking variable to measure reading ability, and used only to place the subjects in one of the three different treatment groups. The subjects were given fifteen minutes to complete this test and raw scores

were used.

The Regular Written Test

Test D is one of four written tests given by the Department of Public Safety in West Virginia to test the knowledge of driver license applicants. This test, from the West Virginia Driver's Handbook, was developed by the University of Arizona data analysis team. Using a method by Ebel (1967:125-128), the reliability index is in the range of .55 to .70. There were twenty-five multiple-choice questions in each of the three different presentation modes. Answer sheets were provided for the subjects to record their answers. An answer sheet booklet was available to score tests. The subjects were given a choice of four answers. The complete test is in Appendix A.

Video or Visual Tape Test

This test is the regular written Test D, presented by an interpretor (Mr. Keith Hamilton, of the West Virginia Rehabilitation Center, Institute, West Virginia) on video tape using sign language, which is a means of communication by the use of hand gestures. It was produced by the Communications Department of the West Virginia Rehabilitation Center for the purpose of this study in the fall of 1980.

Abbreviated English Syntax Test for the Deaf

Through the cooperative efforts of the Division of Vocational Rehabilitation, the Department of Public Safety, and the Department of Motor Vehicles, this test was adopted in July 1980 by the Department of Public Safety in West Virginia. This was the same as the regular written test D, except it was written in abbreviated syntax form. In this modified test, sentence construction and phrasing of questions were changed to a conceptual language more readily understood by individuals with minimal language skills (Campbell, 1981:2). A sampling of 100 consumers was used in the process of determining effective, functional questions applicable for use in this test. Vocational Rehabilitation deafness specialists then made the final revisions on the twenty-five questions that made up this modified test (Campbell, 1981:2). The complete test in Appendix B.

SUMMARY

In summary, the following procedures for collection and analysis of the data were conducted.

1. During the spring of 1981, 54 hearing impaired students participated in the study from the West Virginia School for the Deaf, Romney, West Virginia.

2. During the summer of 1981, an additional 6 hearing impaired students from the West Virginia Rehabilitation Center, Institute, West Virginia participated in this study.

3. Permission to use the test scores was obtained from the West Virginia School for the Deaf, and the West Virginia Rehabilitation Center, Institute, West Virginia during the spring and summer of 1981.

4. Permission to use the regular written test and the Abbreviated Syntax Test for the Deaf was obtained from Lt. Gary Hill of the West Virginia Department of Public Safety.

5. The selection and placement of subjects was conducted using a blocking variable, the Stanford Diagnostic Reading test. Subjects were assigned by stratified sampling to take one of the different tests.

6. The video tape test was filmed by the West Virginia vocational Rehabilitation Center Communications Department, with Mr. Keith Hamilton, a hearing specialist as the interpreter.

7. The research design used for this study was called

Randonized Blocks or Split Plot design.

8. To analyze the data, a one way analysis of variance and a two way analysis of variance was applied.

The following Chapter IV will include: (1) Findings; (2) Ad Hoc Findings; and (3) Summary of Findings.

CHAPTER IV

ANALYSIS OF DATA

The purpose of this study was to examine the relative effectiveness of three presentation modes of the West Virginia written test for a driver's license with hearing impaired applicants.

The study compared the video or visual tape test with the regular written test, and the Abbreviated English Syntax Test with the regular written test to determine if either was more effective or less effective than the regular written test. The three presentation modes were (1) Regular written test, (2) Video or visual tape test, and (3) Abbreviated English Syntax test for the Deaf (see Appendix A and B).

In the preceding chapter the design and procedures of the study were presented. A total of 60 hearing impaired high school age subjects volunteered to participate in this study. The subjects were students at the West Virginia School for the Deaf, Romney, West Virginia and the West Virginia Rehabilitation Center, Institute, West Virginia. These students completed a pre-test or blocking variable test, the Stanford Diagnostic Reading Test, Brown Level, Form A. After the tests were scored, subjects were assigned by stratified sampling or randomized blocks to one of the three different modes of the West Virginia written tests for driver license applicants (see Appendix A and B). The

design for this study was called Randomized Blocks or Split-Plot Design and may be seen in Figure 1, Chapter Three. In this chapter, the analysis of data is presented. The following items are included in this section:

(1) Findings
    (A) Hypothesis 1, 2, and 3

(2) Ad Hoc Findings

(3) Summary of Findings

Findings

Hypothesis #1

There will be no significant difference between the mean scores of hearing impaired persons taking the West Virginia written test for driver licensure on the video or visual tape test and the mean scores of hearing impaired persons taking the regular written test. (Ho=$\mu_2 = \mu_1$)

A one way analysis of variance procedure compared the mean scores of the video tape test to the regular written test for driver licensure. There was a difference in the mean scores between the video tape test (12.15) and the regular written test (10.35). (See Table 2) The results were not statistically significant at the .05 level. (F=1.12, dF 1.38, Pr--> F=0.2970). With 1 and 38 degrees of freedom, an F of 4.10 was required for the result to be significant at the .05 level. Since the F was 1.12, this null hypothesis could not be rejected. The results are shown in the ANOVA Table 1.

Table 1

ANOVA for Video Tape Test as compared to the Regular Written Test for Driver Licensure

Source	dF	SS	MS	F	PR --> F
Model (Among)	1	32.400	32.40	1.12	0.2970
Error (Within)	38	1101.100	28.976		
Corrected Total	39	1133.500			
Treatment	1	32.400			

Significance = 4.10 at .05 Level

The Coefficient of Variation was 47.8486, and the R. Square was 0.028584. The grade mean was 11.25.

Table 2

Treatment Group Mean Scores and Standard Deviations

Treatment	Mean N=20 for all Cells	S.D.
Video Tape Test	12.15	4.6370
Regular Written Test	10.35	6.0373
English Syntax Test for the Deaf	10.95	3.1367

Hypothesis #2

There will be no significant difference between the mean scores of hearing impaired persons taking the West Virginia written tests for driver licensure on the Abbreviated English Syntax Test for the Deaf and the mean scores of hearing impaired persons taking the regular written test. (Ho= $\mu_3 = \mu_1$)

A one-way anaylsis of variance procedure compared the mean scores of the Abbreviated English Syntax Test for the Deaf to the regular written test for driver licensure. The difference between the mean scores of the Abbreviated English Syntax Test (10.95) and the mean scores for the regular written test (10.35) was very small. The results of the one-way analysis of variance procedure (F=0.16, dF 1.38, Pr--> F=0.6955) were not statistically significant at the .05 level. With 1 and 38 degrees of freedom an F of 4.10 was required for the result to be significant. Since the F was 0.16, this null hypothesis could not be rejected. The analysis of variance proved that the Abbreviated English Syntax Test for the Deaf was not more effective for the hearing impaired than the regular written test. The results are shown in the ANOVA Table 3.

Table 3

ANOVA for Abbreviated English Syntax Test for the Deaf as compared to Regular Written Test for Driver Licensure

Source	dF	SS	MS	F	PR--> F
Model (Among)	1	3.60	3.60	0.16	0.6955
Error (Withing)	38	879.50	23.144		
Corrected Total	39	883.10			
Treatment	1	3.60			

Significance = 4.10 at .05 Level

The Coefficient of Variation was 45.1727, and the R square was 0.004077. The grade mean was 10.05.

Hypothesis #3

There will be no significant difference between the mean scores of the hearing impaired persons with high or low verbal ability taking the West Virginia written test for driver licensure with the three different treatment groups. ($H_0 : \mu_4 = \mu_1 = \mu_2 = \mu_3$)

On the basis of the reading scores of the Stanford Diagnostic Reading Test, Brown Level, Form A, the subjects were divided into high and low verbal ability groupings. The top ten students of each test (Video, Regular, and English Syntax) were placed in the high verbal ability groups, while the lower ten were placed in the low verbal groups.

The high verbal students had mean scores of 13.3 for the video tape test, compared to 11.8 for the regular written test, and 10.6 for the English Syntax Test for the Deaf.

The low verbal students had mean scores of 11.3 for the English Syntax Test for the Deaf, compared to 11.0 for the video tape test, and 8.9 for the regular written tests. The mean scores for these groups are shown in Table 5 and Figure 2.

A two-way analysis of variance with high and low verbal ability grouping did not show any significant differences among the three different treatments. The columns ($F=0.74$) with 2 and 54 degrees of freedom, an F of 3.17 was required for the result to be significant at the

0.05 level. The experimental determined F statistic using the SAS Program was 0.74. The rows (F=1.4997, dF 1 and 54) with 1 and 54 degrees of freedom an F of 4.02, was required for the result to be significant at the 0.05 level. The experimental F statistic using the SAS Program was 1.497. The interaction (F=0.83, dF 2 and 54) with 2 and 54 degrees of freedom, in F of 3.17 was required for the result to be significant at the 0.05 level.

The experimentally determined F statistic using the SAS Program was 0.83 on the basis of the results of the two-way analysis of variance, the original null hypothesis could not be rejected. The results are shown in the ANOVA Table 4.

Table 4

Two-way Analysis of Variance (i.e. ANOVA) for three Presentation Modes of the West Virginia Written Tests for Driver Licensure

	dF	SS	MS	F
Columns	2	33.6	16.8	0.74
Rows	1	33.7	33.7	1.497
Interaction	2	37.2	18.6	.83
Within Cells	54	1217.1	22.54	
Total	59	1321.65		

Significance = 3.17 at .05 Level
Significance = 4.02 at .05 Level
Significance = 3.17 at .05 Level

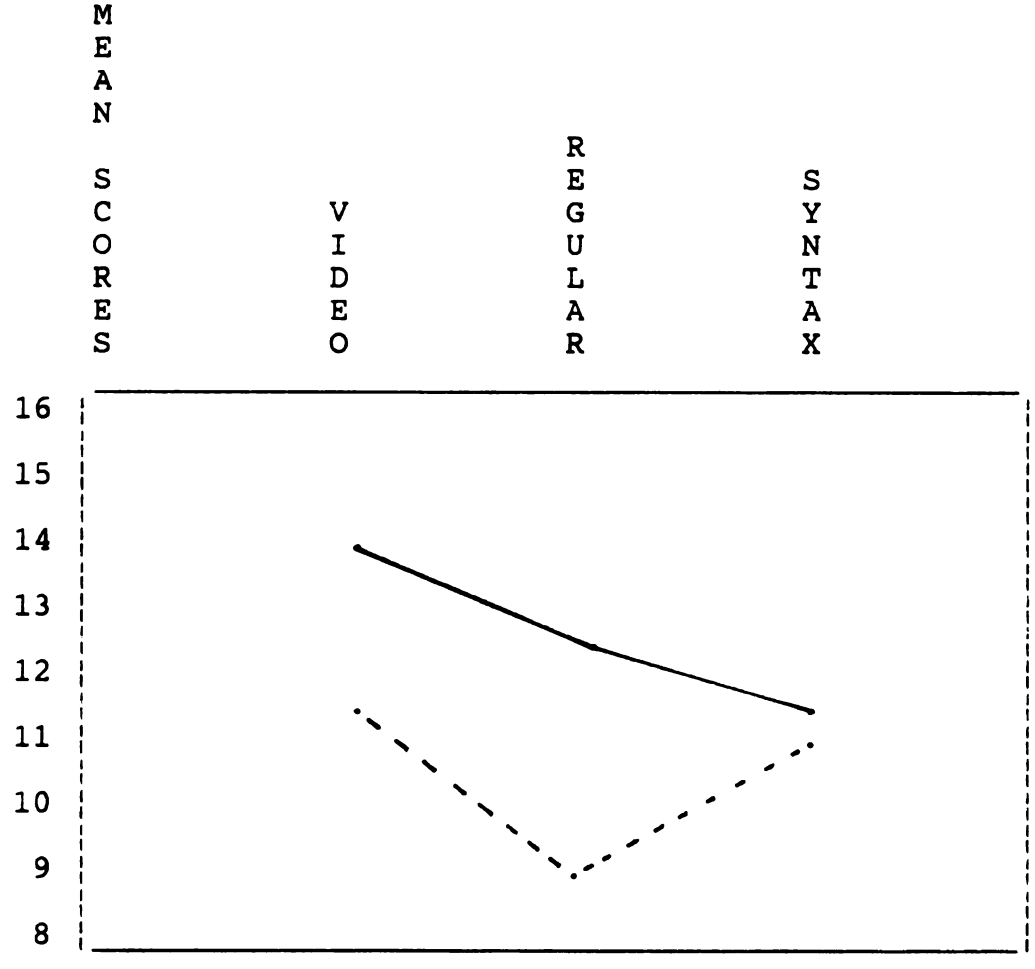
Table 5

Variable Matrix with Means for three Presentation Modes of the West Virginia Test for Driver Licensure

Reading	Treatment Group N=10 for all Cells: Video Tape Test	Regular Written Test	English Syntax Test for the Deaf	rows
High	13.3	11.8	10.6	35.7
Low	11.0	8.9	11.3	31.2
Column	24.3	20.7	21.9	66.9

Figure 2

Two-Way ANOVA - Mean Scores



Ad Hoc Findings

Comparison of All Three Treatments

A one-way Analysis of Variance (ANOVA) was used to test the null hypothesis that the sample means of the three treatments were equal.(HO=$\mu_1=\mu_2=\mu_3$) The experimentally determined F statistic using the SAS (Statistical Analysis System) program was 0.743. The given value for statistical significance at the 0.05 level of significance from the table given in (Appendix C) for 2 and 57 degrees of freedom was 3.17. The table can also be used to determine the degree of confidence one can have in saying that the means are not equal. With the F value of 0.743, the table shows that the probability of the sample means not being equal is 0.48. The results are not statistically significant at the .05 level, the F=0.743 with 2 and 57 degrees of freedom 3.17 was required for the result to be significant at the 0.05 level. The null hypothesis could not be rejected. The ANOVA results as obtained using the SAS program are summarized in Table 6.

Table 6

ANOVA for three Presentation Modes of the West Virginia Written Tests for Driver Licensure

Source	dF	SS	MS	F	PR-->F
Model(Among)	2	33.6	16.8	0.743	0.4800
Error (Within)	57	1288.05	22.5		
Corrected Total	59	1321.65			
Treatment	2				

Significance = 3.17 at the .05 level

The coefficient of variation was 42.6338, and the R Square (whic

measures how much variation dependent variable can be accounted) was 0.25423. The grade mean was 11.15.

Video Tape Test vs Abbreviated English Syntax Test

A one-way analysis of variance procedure compared the Video Tape Test and the Abbreviated English Syntax Test for the Deaf. The results were not statistical significant at the .05 level (F=0.92, dF 1.38, PR F 0.3438). With 1 and 38 degrees of freedom, an F of 4.10 was required for the result to be significant at the 0.05 level. The experimental F statistic using the SAS was 0.92. The coefficient of variation was 34.2742, and the R square was 0.023610. The grade mean was 11.55. The results are shown in the ANOVA Table 7.

Table 7

ANOVA for Video Tape Test Compared to the Abbreviated English Syntax Test for the Deaf for Driver Licensure

Source	dF	SS	MS	F	PR-->F
Model (Among)	1	14.40	14.40	0.92	0.3438
Error (Within)	38	595.50	15.67		
Corrected Total	39	609.90			
Treatment	1	14.40			

Significance = 4.10 at .05 Level

Summary of Findings

The purpose of this study was to examine the relative effectiveness of three presentation modes of the West Virginia written test for a driver's license with hearing impaired applicants (see Appendix A).

Based on statistical analysis, the original null hypotheses were not rejected. The analysis of variance test showed no significant difference between video tape test and the regular written test at the .05 level (F=1.12, dF 2.57, PR ---> F 0.2970). The video tape test and the Abbreviated English Syntax for the Deaf showed no significant difference with the regular written test. The mean scores for the video tape test were higher than the regular written test and the Abbreviated English Syntax Test, but not significantly different.

A two-way analysis of variance with high and low verbal ability grouping was also performed, but did not show the difference to be significant among the three different treatments.

A one-way analysis of variance was also performed between the video tape test and the Abbreviated English Syntax Test for the Deaf, but did not show the difference to be significant at the .05 level.

The final chapter will include: (1) A summation of this study including methods and findings, (2)

Interpretation and discussion, (3) Findings, (4) The conclusions warranted by the resulting data or findings, (5) Recommendations and (6) Recommendations for further study.

Chapter V

SUMMARY, CONCLUSIONS, DISCUSSION

AND RECOMMENDATIONS FOR FURTHER STUDY

This chapter includes:

(1) a summation of the study, including methods and findings

(2) conclusions warranted by the findings;

(3) a discussion

(4) recommendations and

(5) recommendations for further study

SUMMARY

The purpose of this study was to examine the relative effectiveness of three presentation modes of the West Virginia written test for a driver's license with hearing impaired applicants. The presentation modes were: (1) Regular written test; (2) Video tape test; and (3) Abbreviated English Syntax Test for the Deaf. (See Appendix A and B). The study compared the video with the regular written test, and the Abbreviated English Syntax Test for the Deaf with the regular written test to determine if

either test was more effective than the regular written test. This investigation involved a Randonized Block or Split-Plot design.

The subjects for the study were high school age students from West Virginia School for the Deaf, in Romney, West Virginia, and hearing impaired high school age students who were attending the West Virginia Rehabilitation Center in Institute, West Virginia. A total of 54 students agreed to participate in this study from the West Virginia School for the Deaf and six students volunteered to participate from the West Virginia Rehabilitation Center.

The procedure used for collection of data included: (1) completion of a pre-test or blocking variable, the Stanford Diagnostic Reading Test, Brown Level, Form A, and (2) completion of one of three modes of the West Virginia Written Test for driver licensure applicants. (See Appendix A and B).

The Stanford Diagnostic Reading Test, Brown Level, Form A was used as a blocking variable to place subjects in one of the three modes of the written test for driver licensure. These students were assigned by stratified sampling to take one of the three different modes of the written test for driver licensing, which were: (1) regular written test; (2) video tape test; and (3) Abbreviated English Syntax Test for Deaf. The twenty-five item multiple choice test administrated was hand-scored using answer

sheets and a grading booklet on a total correct, raw score basis.

To analyze the data, a one-way analysis of variance was applied. The results indicated no significant differences at the 0.5 level.

Video vs Regular -F = 1.12, dF 1,38, PR F 0.2970
Significance = 4.10 at the .05 Level

English Syntax vs. Regular -F = 0.16, dF 1,38, PR F 0.6955
Significance = 4.10 at the .05 Level

Video vs English Syntax -F = 0.92, dF 1,38, PR F 0.3438
Significance = 4.10 at the .05 Level

Video vs Regular vs English Syntax
-F = 0.74, dF 2.57, PR F 0.4800
Significance = 3.17 at the .05 Level

The Mean Scores for the video tape test were higher than the regular written test, and the abbreviated English Syntax Test (Refer to Table 2).

A two-way analysis of variance was also (i.e. ANOVA) applied at the .05 level. The purpose of the two-way ANOVA was to address the question of whether the reading scores achieved on the Stanford Diagnostic Reading Test, Brown Level, Form A was major factor in determining if the video tape test or the abbreviated English Syntax test for the deaf was more effective than the regular written test. The two-way ANOVA addressed the question: Will subjects who score high on the verbal tests score equally as high on the written driving test? On the basis of the reading scores of the Stanford Diagnostic Reading Test, Brown Level, Form

A, the subjects were divided into high and low verbal ability group. The top ten scores of each group (Video, Regular, English Syntax) were placed in the high verbal group. A variable matrix with means is shown in Table 5 in Chapter IV. The results of the two-way analysis of variance with high and low verbal grouping did not show any significant differences among the three different treatments. The results are shown in the ANOVA Table 4 in Chapter IV.

FINDINGS

1. The mean scores of hearing impaired volunteer subjects taking the West Virginia Written Test for driver licensure on the video tape test were not significantly different from the mean scores of hearing impaired subjects taking the regular written test.
2. The mean scores of hearing impaired volunteer subjects taking the West Virginia Written Test for driver licensure on the Abbreviated English Syntax Test for the Deaf were not significantly different from the mean scores of hearing impaired subjects taking the regular written test.
3. The mean scores of hearing impaired volunteer subjects taking the video tape test were not significantly different than the hearing impaired subjects taking the regular written test and the Abbreviated English Syntax Test for the Deaf.
4. The hearing impaired volunteer subjects scoring highest on the Stanford Diagnostic Test, Brown Level, Form A, did not necessarily score equally as high on the three different modes of the West Virginia written tests for driver licensing.

5. **The hearing impaired low verbal ability subjects scored higher on the Abbreviated English Syntax Test for the Deaf than the hearing impaired high verbal ability subjects.**

CONCLUSIONS

The following conclusions are based on the findings of this study.

1. The mean scores of hearing impaired subjects taking the West Virginia written test for driver licensure on the video tape test was not more effective than the regular written test. The writer concluded that the video tape test did not prove to be more effective than the regular written test. The writer also concluded that the video tape test was apparently not a valuable service for the hearing impaired as a group, but can provide individuals an option with which they might feel more comfortable. It may not be the fault of the video tape method of presentation as much as hearing impaired subjects having linguistic deficiency.
2. The means scores of hearing impaired subjects taking the West Virginia written test for driver licensure on the Abbreviated English Syntax Test for the Deaf were not significantly different than hearing impaired subjects taking the regular written test. The Abbreviated English Syntax Test for the Deaf did not prove to be more effective than the regular written test.

3. **Subjects with low verbal skills might find it advantageous to take the West Virginia Written Test for driver licensure with the Abbreviated English Syntax for the Deaf.**

DISCUSSION

The results from an analysis of the data from the three different presentation modes (see Appendix A and B) of the West Virginia written test for driver licensure did not prove the sample means to be statistically significant.

The coefficient of variations on all of the analysis of variance procedures was quite large relative to the mean and would suggest much variability in this study.

The R-Square is the amount of variability independent variables are able to explain in relation to dependent variables. The Squares were low in the analysis of variance procedures and suggest the treatment was not a "major factor" in the test scores. In the analysis of variance comparison between video tape test and regular written test, the R-Square was .028584, which says the independent variable explained about 3% of total variability in grade. Other factors explained about 97%.

A number of reasons might account for the ineffectiveness of the video tape test and the abbreviated English Syntax Test for the Deaf.

(1) The students at the West Virginia School for the Deaf were not well adapted to American Sign Language, which was used on the Video

Tape Test. Mr. Haught, Principal of the school, in a personal interview stated, "Their students do not use the American Sign Language, but use a different version of slang sign language which they acquired from their teachers, who are graduates of Galladette College in Washington, D.C. It was later found out that the American Sign Language is used by hearing impaired adults at the Rehabilitation Center.

(2) Many terms relating to West Virginia traffic laws or driving practices are unknown to many hearing impaired persons. This parallels Finesilver's opinion (1962:90). If the subjects of this study did not know the vocabulary of driving terms on West Virginia traffic laws, it would make little difference as to what mode would be most effective in administering the written driver licensing test for hearing impaired applicants.

(3) It is difficult to know if all of these students really tried to do their best when taking the three different driving test. They volunteered to take the test, but some may not have been interested in the subject.

Dr. Sendelbaugh (1980:542) stated that hearing impaired students do not perceive instructions completely

and therefore cannot adequately identify information. He concluded that there was not sufficient time given on the films to allow the students to comprehend and execute the procedures within an acceptable time-frame.

It was of interest to note on the two-way analysis of variance that the subjects who scored the highest on the reading test did not necessarily score the highest on the West Virginia written drivers test for driver licensure. It was also interesting to note that the low verbal ability students scored higher on the Abbreviated English Syntax Test than the high verbal ability students. This could indicate that the Abbreviated English Syntax Test for the Deaf is more effective with students that have poor reading skills.

The raw scores of the subjects were not particularly high on the three presentation modes of the West Virginia written test for driver licensure: (1) Video Tape Test; (2) Regular written Test D; and (3) Abbreviated English Syntax Test for the Deaf. Applicants need to score correctly 20 out of 25 questions to pass this test, and in this study 3 out of 60 subjects achieved this score.

The raw test scores confirm the statement made in Chapter I by Mr. Czernicki that, "Hearing impaired students at the West Virginia School for Deaf have difficulty passing the knowledge test for driver licensing." The scores also parallel the statement made in Chapter 1 by Mr. St. Pierre who stated, "I can state from personal

experience that a very high percentage of deaf persons that I have worked with in the past fourteen years do have difficulty passing the written test on the first try, especially those deaf from birth."

The writer undertook this study in an attempt to develop a better mode of testing hearing impaired applicants for the West Virginia Driver's Licensing Test. The writer was interested in finding the most effective mode for testing beginning hearing impaired applicants in the West Virginia Driver's Licensing Test.

A review of literature in Chapter II indicated that hearing impaired persons may have excellent driving records, but often have difficulty with comprehending the wording on written tests. It seemed only fair that hearing impaired applicants for the beginners driver's license should be able to take the written portion of the West Virginia Driver's Test in the language they find most comprehensive, and the true language of the hearing impaired is sign language. It was for the above reason that the writer developed a video tape test from the West Virginia Regular Written Test D, with an interpreter using sign language.

Before the analysis of data, the writer expected the sample means of the video tape test to be statistically significant, and vastly superior to the other two modes.

It is still the writer's belief that hearing impaired applicants will be more successful in passing the written

portion of the West Virginia Driver's Licensing Test by using the Abbreviated English Syntax Test for the Deaf or the video tape test.

On the basis of results from the one-way analysis of variance and the two-way analysis of variance procedures, the video-tape test and the Abbreviated English Syntax Test for the Deaf did not prove to be significantly more effective than the Regular Written Test D. The sample means of the video tape test (12.15) were higher than the regular written Test D (10.95), but not statistically significant at the .05 Level (See Table 2)

The study did provide information that low verbal ability subjects scored higher on the Abbreviated English Syntax Test for the Deaf than on the regular written Test D or the video-tape test. (See Table 5) The study also provided information that the high verbal ability subjects did not necessarily score the highest on the West Virginia Driver's Licensing Test.

RECOMMENDATION

At the present time West Virginia should not change its licensing procedure with hearing impaired applicants.

RECOMMENDATIONS FOR FURTHER STUDY

1. A replication of this study should be attempted using a larger group of hearing impaired subjects. With increased sample size, means tend to become a more stable representation of group performance. The larger the sample, the greater confidence one can place in a relative minor difference between means. (Popham, 1967:134) Large-sample statistics involve smaller sampling errors, greater reliability, and increase the power of a statistical test applied to the data (Issac and Michael: 1971,69).
2. A replication of this study should be attempted using a control group having a background in driver education in the secondary schools.
3. Perform a replication of this study with each hearing impaired subject given a West Virginia Driver Licensing handbook. The subjects could study this handbook before taking one of the presentation modes of the West Virginia written test for driver licensure.
4. A replication of this study should be attempted using a modified slang version of the American sign language for the video tape tests. This is important if students from the West Virginia School for the Deaf are to be used as subjects.

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APPENDICES

D 325 WEST VIRGINIA STATE POLICE D

OPERATORS AND CHAUFFEURS EXAMINATION

Answer All Questions On Both Sides Of This Test

Mark All Answers On Answer Sheet

Do Not Mark On This Sheet

1. This sign means:

A. Crossing not permitted.
B. Slow, hospital zone ahead.
C. Stop, then proceed with caution.
D. School crossing ahead.

1

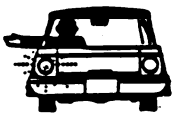
2. You are passing a car on the highway. When should you return to your lane?

A. About one car length ahead of the car being passed.
B. As soon as possible after signaling.
C. When you can see the car in your rear view mirror.
D. As soon as you have signaled.

3. The driver in the diagram is signaling that:

A. He plans to turn right.
B. He plans to turn left.
C. He plans to slow or stop.
D. It is clear to pass.

3



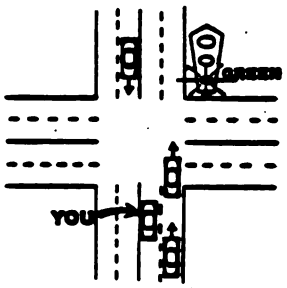
4. If you park your car headed downhill, beside the curb, you should set your parking brake and turn your steering wheel:

A. In any direction.
B. To the left, away from the curb.
C. To the right, toward the curb.
D. Either to the right or to the left is correct.

5. You see a sign with this shape at the corner. What should you always do?

A. Stop, then go with caution.
B. Yield to other vehicles.
C. Do not enter, there is one-way traffic ahead.
D. Slow, look for danger ahead.

5



6. If convicted of driving while under the influence of intoxicants:

A. You will lose your license.
B. You may pay a fine.
C. You may be sentenced to jail.
D. All of the above are correct.

7. You want to turn right at this intersection. What should you do?

A. Signal and turn right.
B. Signal and wait for a car in the right lane to turn.
C. Go straight, you are in the wrong lane to turn right.
D. Stop at the corner, signal and turn right.

7

8. If you are driving at a high speed and have a blowout, what should you do?

A. Slow down gradually and then pull off the road.
B. Slow down quickly and pull off the road.
C. Shift into neutral and coast to a stop off the road.
D. Pull off the road immediately and stop quickly.

9. You see this sign beside the road. What should you do?

A. Slow and look for road construction trucks ahead.
B. Go on, the sign is for trucks only.
C. Slow and look for trucks crossing ahead.
D. Slow and check your brakes.

9

10. You want to turn left but see this sign at the corner. What should you do?

A. Turn left but yield to other traffic.
B. Go straight ahead.
C. Pull off the road and turn around.
D. Turn left without stopping.

10

11. When you see these flashing red lights, what should you do?

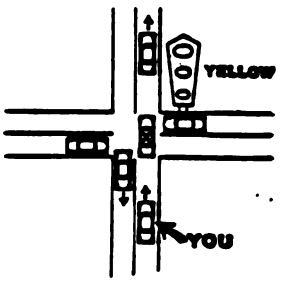
A. Stop, wait for the lights to stop flashing.
B. Stop, and drive quickly across the tracks.
C. Slow, and stop only if a train is near.
D. Stop, and then go if the way is safe.

11

12. The traffic light has just turned from green to yellow and the car ahead of you is going on through the intersection. What should you do?

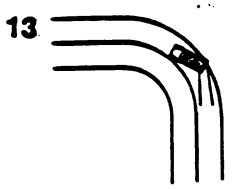
A. Follow him through the intersection.
B. Slow and proceed with caution.
C. Stop at the corner.
D. Speed up to clear the intersection.

12



13. What should you do if the back of your car skids to the right?

A. Turn right, in the direction of the skid.
B. Steer straight ahead and brake hard.
C. Pump the brake.
D. Turn left, away from the direction of the skid.



14. You should stay far enough behind the vehicle ahead to:

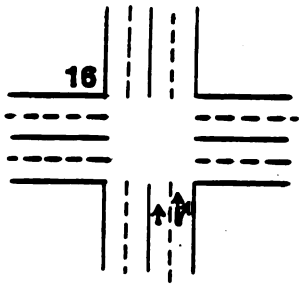
A. See the roadway between you and the car ahead.
B. Stop your vehicle in an emergency.
C. Let passing vehicles in.
D. See on-coming traffic.

15. You are driving on the interstate and realize that you have just passed your exit. What should you do?

A. Go on to the next exit.
B. Turn right behind the exit sign.
C. Use the next driveway across the median to turn around.
D. Stop on the shoulder and back up.

16. You are approaching an intersection and see these arrows painted on the street. What do the arrows tell you?

A. Cars in the right lane must turn right.
B. The two lanes will merge into one.
C. You can make a right turn from the right lane only.
D. You can turn left from the left lane only.



17. You are driving on a two lane roadway and you see a car coming toward you in your lane, you should:

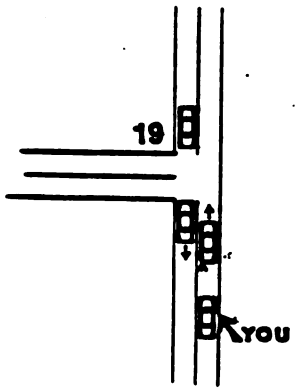
A. Sound your horn and flash your headlights.
B. Brake and move to your right.
C. Signal and move left.
D. Maintain your speed and prepare to brake.

18. When should parking lights be used?

A. Within one hour of sunset or sunrise.
B. When visibility is poor.
C. Only when parked.
D. In heavy traffic.

19. A car ahead of you is signaling for a left turn, what should you do?

A. Slow down and prepare to stop.
B. Pass on the right.
C. Stop, signal for a left turn.
D. Slow down and signal for a left turn.



20. You see a man with a white cane at the corner. What should you do?

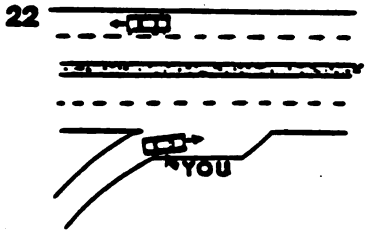
A. Tap your horn and prepare to stop.
B. Slow down and proceed with caution.
C. Pull over to the curb and stop.
D. Let him cross in front of you.

21. If the oncoming drivers lights are blinding you, what should you do?

A. Look toward the right edge of the road.
B. Flash your lights "up and down" until he dims.
C. Look toward the center line.
D. Turn on your bright lights to teach him a lesson.

22. You are on the entrance ramp to an interstate highway and plan to enter traffic ahead. You should step only if:

A. Visibility is poor.
B. Traffic is moving fast.
C. There are no cars behind you.
D. There is no opening in traffic.



23. All vehicles registered in the State of West Virginia are required to be inspected at a Licensed Inspection Station:

A. Every six months.
B. Every other year.
C. Every year.
D. Every time repairs are made.

24. Drowsiness can be caused by:

A. Medicine prescribed by a doctor.
B. Antihistamines and tranquilizers.
C. Combinations of medicine and alcohol.
D. All of the above can cause drowsiness.

25. If you have an accident, what must you do?

A. Stay in your car and wait for the police.
B. Stop, help, and give information.
C. Drive to the nearest police station.
D. Continue on your way if there is less than $50 damage.

WEST VIRGINIA STATE POLICE
OPERATORS AND CHAUFFEURS EXAMINATION
FOR THE DEAF

Answer All Questions On Both Sides Of This Test

Mark All Answers on Answer Sheet

Do Not Mark On This Sheet

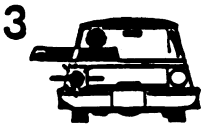
1. What mean sign?

   ___ A. Do not cross street here.
   ___ B. Drive slow, hospital close.
   ___ C. Stop, look, drive careful.
   ___ D. School close, children crossing street.

2. You pass a car. How quick back your side?

   ___ A. One car size (20 ft.).
   ___ B. Quick as can after signaling.
   ___ C. Quick as you see car in rear view mirror.
   ___ D. Quick as you signal.

3. What mean sign?



   ___ A. Right turn.
   ___ B. Left turn.
   ___ C. Slow or stop.
   ___ D. OK to pass.

4. You park your car down hill, close to curb. You set parking brake. How turn steering wheel?

   ___ A. Doesn't matter.
   ___ B. To the left, miss curb.
   ___ C. To the right, against curb (to hit curb).
   ___ D. To left or right.

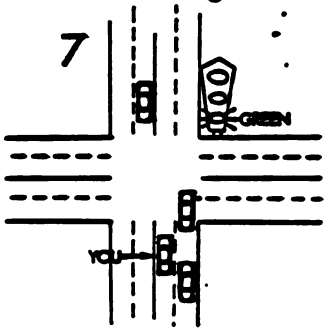
5. What mean sign?

   ___ A. Stop, drive careful.
   ___ B. Drive slow, other car go first.
   ___ C. Do not enter.
   ___ D. Look for danger.

6. What happens to you, if caught driving drunk?

   ___ A. Lose license.
   ___ B. Pay fine (pay money).
   ___ C. Go to jail
   ___ D. May do all.

7. You want to turn right. What you do?



   ___ A. Make signal and turn right.
   ___ B. Make signal and let car in right lane turn first.
   ___ C. Don't turn, you in wrong lane.
   ___ D. Stop at corner, make signal and turn right.

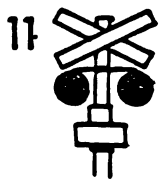
8. You driving fast; tire blows out. What you do?

   ___ A. Put on brake easy. Turn off road.
   ___ B. Put on brake hard. Turn off road.
   ___ C. Shift to N (nothing). Drive slow to stop. Don't use brake.
   ___ D. Turn off road fast and stop fast.

9. You want to pass slow big truck. Yellow line your lane. What you do?

   ___ A. Pass the truck.
   ___ B. Pass if no other cars coming.
   ___ C. Driver tells you to pass. OK pass.
   ___ D. Stay behind the truck.

10. What mean sign?

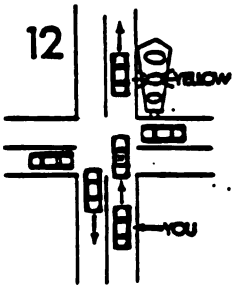


   ___ A. Let other car go first. OK to turn left.
   ___ B. Go straight. Do not turn.
   ___ C. Drive off road and turn around.
   ___ D. Turn left without stopping.

11. What mean flashing red light?

   ___ A. Stop. Wait for light to go out.
   ___ B. Stop. Then drive fast across tracks.
   ___ C. Slow. Stop if train is near.
   ___ D. Stop. Look. Cross if safe.

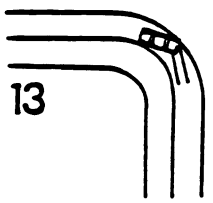
12. Traffic light turned to yellow. Car in front of you doesn't stop. What you do?



   ___ A. Follow car.
   ___ B. Drive slowly. Be careful.
   ___ C. Stop at corner.
   ___ D. Drive fast - get through.

13. Back end your car slides or skids to the right. What you do?

___ A. Turn right.
___ B. Don't turn, drive straight. Foot on brake.
___ C. Foot on brake, foot off brake - foot on brake, foot off brake.
___ D. Turn left.



14. How close you drive to car in front?

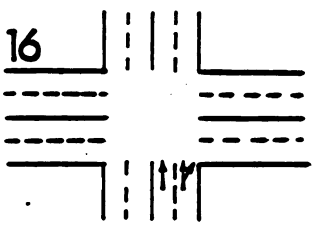
___ A. Can see road between your car and car in front.
___ B. If car stop, you can stop. No hit car.
___ C. 100 feet.
___ D. Can see cars coming the other way.

15. You drive on interstate. You pass your exit. What you do?

___ A. Drive to next exit.
___ B. Turn quick behind exit sign.
___ C. Drive cross middle. Drive back to exit.
___ D. Stop on right side and back up to exit.

16. What mean arrows on street?

___ A. Cars in right lane must turn right.
___ B. Two lanes become one lane.
___ C. Only right lane can turn right.
___ D. Only left lane can turn left.



17. You drive on little road. You meet car close in your lane. What you do?

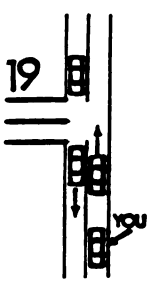
___ A. Touch horn and lights on, off, - on, off, - on.
___ B. Touch brake and drive to right
___ C. Make signal and drive left.
___ D. Keep same speed. Do not touch brake.

18. When use little lights?

___ A. 1 hour before dark and 1 hour before daylight.
___ B. When hard see.
___ C. When parked.
___ D. When many cars.

19. Car in front signals left turn. What you do?

___ A. Drive slow. Be ready to stop.
___ B. Pass on right side.
___ C. Stop. Signal left turn.
___ D. Drive slow. Signal left turn.



20. You drive on road. Right wheels go off road. What you do?

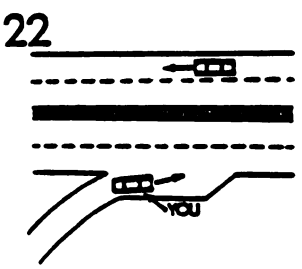
___ A. Stop quick. Keep right wheels off road.
___ B. Drive back on road fast.
___ C. Drive off road and stop.
___ D. Drive slow. Keep right wheels off road. Drive back on road careful.

21. Meet car close. Lights bright. Hard see. What you do?

___ A. Look to right side of road.
___ B. Flash your headlights "up" and "down".
___ C. Look at center line.
___ D. Turn headlights to bright. Leave on bright.

22. You drive on entrance road to interstate. What one reason you stop on entrance?

___ A. Can't see.
___ B. Other cars driving fast.
___ C. No cars behind you.
___ D. No opening in traffic. No room for your car.

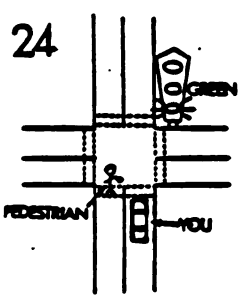


23. All cars and trucks in W. V. are registered. How often your car inspected?

___ A. Every 6 months.
___ B. Every 2 years.
___ C. Once a year.
___ D. When car fixed. Must have inspected.

24. Light turn green. Someone in street. What you do?

___ A. Go.
___ B. Start slow. Tell person to get off street.
___ C. Touch horn. Drive slowly.
___ D. Wait for person to cross.



25. You have accident. What you do?

___ A. Stay in car. Wait for police.
___ B. Stop, help, tell name, show drivers license, tell name Insurance Company.
___ C. Drive to police station.
___ D. If can fix for $50.00, drive on.

APPENDIX C

n_2	n_1 degrees of freedom (for greater mean square)																							
	1	2	3	4	5	6	7	8	9	10	11	12	14	16	20	24	30	40	50	75	100	200	500	∞
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.02	1.98	1.95	1.90	1.85	1.78	1.74	1.69	1.63	1.60	1.55	1.52	1.48	1.46	1.44
	7.17	5.06	4.20	3.72	3.41	3.18	3.02	2.88	2.78	2.70	2.62	2.56	2.46	2.39	2.26	2.18	2.10	2.00	1.94	1.86	1.82	1.76	1.71	1.68
55	4.02	3.17	2.78	2.54	2.38	2.27	2.18	2.11	2.05	2.00	1.97	1.93	1.88	1.83	1.76	1.72	1.67	1.61	1.58	1.52	1.50	1.46	1.43	1.41
	7.12	5.01	4.16	3.68	3.37	3.15	2.98	2.85	2.75	2.66	2.59	2.53	2.43	2.35	2.23	2.15	2.06	1.96	1.90	1.82	1.78	1.71	1.66	1.64
60	4.00	3.15	2.76	2.52	2.37	2.25	2.17	2.10	2.04	1.99	1.95	1.92	1.86	1.81	1.75	1.70	1.65	1.59	1.56	1.50	1.48	1.44	1.41	1.39
	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.56	2.50	2.40	2.32	2.20	2.12	2.03	1.93	1.87	1.79	1.74	1.68	1.63	1.60
65	3.99	3.14	2.75	2.51	2.36	2.24	2.15	2.08	2.02	1.98	1.94	1.90	1.85	1.80	1.73	1.68	1.63	1.57	1.54	1.49	1.46	1.42	1.39	1.37
	7.04	4.95	4.10	3.62	3.31	3.09	2.93	2.79	2.70	2.61	2.54	2.47	2.37	2.30	2.18	2.09	2.00	1.90	1.84	1.76	1.71	1.64	1.60	1.56
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.01	1.97	1.93	1.89	1.84	1.79	1.72	1.67	1.62	1.56	1.53	1.47	1.45	1.40	1.37	1.35
	7.01	4.92	4.08	3.60	3.29	3.07	2.91	2.77	2.67	2.59	2.51	2.45	2.35	2.28	2.15	2.07	1.98	1.88	1.82	1.74	1.69	1.62	1.56	1.53
80	3.96	3.11	2.72	2.48	2.33	2.21	2.12	2.05	1.99	1.95	1.91	1.88	1.82	1.77	1.70	1.65	1.60	1.54	1.51	1.45	1.42	1.38	1.35	1.32
	6.96	4.88	4.04	3.56	3.25	3.04	2.87	2.74	2.64	2.55	2.48	2.41	2.32	2.24	2.11	2.03	1.94	1.84	1.78	1.70	1.65	1.57	1.52	1.49
100	3.94	3.09	2.70	2.46	2.30	2.19	2.10	2.03	1.97	1.92	1.88	1.85	1.79	1.75	1.68	1.63	1.57	1.51	1.48	1.42	1.39	1.34	1.30	1.28
	6.90	4.82	3.98	3.51	3.20	2.99	2.82	2.69	2.59	2.51	2.43	2.36	2.26	2.19	2.06	1.98	1.89	1.79	1.73	1.64	1.59	1.51	1.46	1.43
125	3.92	3.07	2.68	2.44	2.29	2.17	2.08	2.01	1.95	1.90	1.86	1.83	1.77	1.72	1.65	1.60	1.55	1.49	1.45	1.39	1.36	1.31	1.27	1.25
	6.84	4.78	3.94	3.47	3.17	2.95	2.79	2.65	2.56	2.47	2.40	2.33	2.23	2.15	2.03	1.94	1.85	1.75	1.68	1.59	1.54	1.46	1.40	1.37
150	3.91	3.06	2.67	2.43	2.27	2.16	2.07	2.00	1.94	1.89	1.85	1.82	1.76	1.71	1.64	1.59	1.54	1.47	1.44	1.37	1.34	1.29	1.25	1.22
	6.81	4.75	3.91	3.44	3.14	2.92	2.76	2.62	2.53	2.44	2.37	2.30	2.20	2.12	2.00	1.91	1.83	1.72	1.66	1.56	1.51	1.43	1.37	1.33
200	3.89	3.04	2.65	2.41	2.26	2.14	2.05	1.98	1.92	1.87	1.83	1.80	1.74	1.69	1.62	1.57	1.52	1.45	1.42	1.35	1.32	1.26	1.22	1.19
	6.76	4.71	3.88	3.41	3.11	2.90	2.73	2.60	2.50	2.41	2.34	2.28	2.17	2.09	1.97	1.88	1.79	1.69	1.62	1.53	1.48	1.39	1.33	1.28
400	3.86	3.02	2.62	2.39	2.23	2.12	2.03	1.96	1.90	1.85	1.81	1.78	1.72	1.67	1.60	1.54	1.49	1.42	1.38	1.32	1.28	1.22	1.16	1.13
	6.70	4.66	3.83	3.36	3.06	2.85	2.69	2.55	2.46	2.37	2.29	2.23	2.12	2.04	1.92	1.84	1.74	1.64	1.57	1.47	1.42	1.32	1.24	1.19
1000	3.85	3.00	2.61	2.38	2.22	2.10	2.02	1.95	1.89	1.84	1.80	1.76	1.70	1.65	1.58	1.53	1.47	1.41	1.36	1.30	1.26	1.19	1.13	1.08
	6.66	4.62	3.80	3.34	3.04	2.82	2.66	2.53	2.43	2.34	2.26	2.20	2.09	2.01	1.89	1.81	1.71	1.61	1.54	1.44	1.38	1.28	1.19	1.11
∞	3.84	2.99	2.60	2.37	2.21	2.09	2.01	1.94	1.88	1.83	1.79	1.75	1.69	1.64	1.57	1.52	1.46	1.40	1.35	1.28	1.24	1.17	1.11	1.00
	6.64	4.60	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.24	2.18	2.07	1.99	1.87	1.79	1.69	1.59	1.52	1.41	1.36	1.25	1.15	1.00

DEGREES OF FREEDOM