A STUDY OF THE EFFECT OF PERCEPTUAL AND LANGUAGE TRAINING UPON KINDERGARTEN CHILDREN'S READING READINESS PERFORMANCE

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TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

CHAPTER I

PRESENTATION OF THE PROBLEM

Introduction

Kindergarten children in our elementary schools devote a substantial portion of their class time to reading readiness activities. Thus, an important function of the curriculum is the provision of effective readiness experiences enabling kindergarten students to benefit maximally from future instruction in reading.

Smith and Dechant (1961) considered reading readiness to be a complex of many abilities, skills, understandings, and interests, each of which contributes in some measure to the process of learning to read. Adequate proficiency in two of these skills, visual perception and oral language, is considered essential to early reading progress and for the future development of cognitive abilities (Vernon, 1957; Harris, 1961; Frostig and Horne, 1964).

Studies by Goins (1958), Simpson (1960) and Feldman (1963) provided evidence that there is a relationship between measures of visual perception and achievement in the early stages of reading. The results of studies by Simpson (1960) and Akers (1969) indicated that the perceptual subtests of commonly used reading readiness tests are good indicators of later reading achievement.

Perceptual abilities seem to be highly developed in most children by the age of seven and one-half years. These abilities, however, may not develop as early in some children, creating a need for experiences directly related to the lacking perceptual skill deficits (Feldman, 1963; Frostig and Horne, 1964).

Language development plays an equally significant and unique role in reading readiness. Smith and Dechant (1961) had described language as the very basis of the thinking process. Ray and Rodenborn (1969) considered the quality with which a learner can understand the language used for instruction to be in direct relationship with the ability of the learner to profit from the instruction.

Many kindergarten children need to develop more highly refined levels of language usage. Adequate mastery of oral language skills is important for progress in academic tasks, most particularly developing adequacy in reading (Harris, 1961). The current interest in materials designed to improve language development, both receptive and expressive, reflect this need. Perhaps the most important gains in language development can be provided by the classroom teacher through the identification of skill needs and the selection of a program of language training directly related to the child's needs (Ray and Rodenborn, 1969).

The need for experimental programs in visual perception and language training has been established through research (Goins, 1958; Smith, 1962; Feldman, 1963). This is based upon the assumption that reading readiness is furthered through training of specific abilities and the development of prerequisite skills. Thus the training of specific readiness skills should be an important educational objective.

Need for the Study

This study is based upon the assumption that reading readiness consists of a number of closely related skills that must be developed prior to the child's learning to read (Gates, 1937; Hildreth, 1965; Spache and Spache, 1969). The development of these skills is based upon successful experiences within the child's environment. When the environment does not provide these experiences, special instruction in the form of training is necessary to provide these experiences.

The literature reveals two extreme positions regarding the role of training in early childhood education. Durrell and Nicholson (1961) described these extreme positions as the nature-nurture controversy. At one extreme, it is assumed that maturation is primarily genetic development; that maturation follows a definite path, will not be hurried, and will be little affected by special training. At the other extreme, it is assumed that maturation is mainly nurture; that accidental or planned experiences determine later characteristics and achievement of the individual.

This study is based upon the conceptual premise that the most acceptable position of the nature-nurture controversy appears to be that physical structure and function are largely genetic but may be modified by environment; that behavioral patterns may be genetic in origin but are highly modifiable; that knowledge and skills result from experience and training within the environment, but learning may be limited by genetic structure.

This study has a research design based upon the premise that knowledge and skills result from the experience and training within

the school environment. It will seek to answer questions regarding the effect of two programs of training upon reading readiness performance of kindergarten children. In addition, it will attempt to determine the effect of the training upon levels of pupil readiness status and the category of sex.

Only a few experimental studies evaluating the importance of visual perception and language training have been initiated with kindergarten children as the subjects and those few were concerned with comparing two methods of training with little thought about the effect of the training upon the prerequisite skills for reading (Meyerson, 1967; McBeath, 1966; Dunn and Mueller, 1965). The recognition that reading readiness depends upon the developmental growth through training of specific abilities and is dependent upon the development of prerequisite skills has stimulated this study.

Definitions of Terms

A number of terms are used in this study which should be defined for clarity of reading. These definitions and clarifications of terms will be applied throughout this study:

Reading readiness consists of many abilities, skills, understandings, and interests deemed necessary in certain quantities to insure success in reading. This definition is designed to be global in nature and does not limit reading readiness to the skills measured by the Metropolitan Readiness Test.

Pupil readiness status is the level of development in those skills, knowledge or experiences related to reading readiness as measured by the Metropolitan Readiness Test, Form A.

The classification of pupil readiness status stated in the Manual for the Metropolitan Readiness Test (1965) applies to children who have completed or nearly completed kindergarten. For this study, it was necessary to classify students using an instrument administered at the beginning of the kindergarten year. Based upon the standard deviation levels for the end of the year performance, classifications were made for each subtest, the perceptual subtests, the language subtests, and the total test scores of the screening instrument.

This classification of levels of pupil readiness status was based upon the criteria that follow:

Above Average Status - This level of status represents those pupils more than .5 standard deviation distance above the mean. This includes the superior and high normal students who are apparently very well equipped for first-grade work.

Average Status - This level of status represents those pupils .5 standard deviation distances above and below the mean. This group of students are likely to succeed in first-grade work.

Below Average Status - This level of status represents those pupils more than .5 standard deviation distance below the mean. This includes the low and low normal who will likely have difficulty or chances of difficulty are high.
(Hildreth, Griffith, and McGauvran, 1965, p. 11)

Perceptual subtests are the Alphabet, Numbers, Matching, and Copying subtests of the 1965 edition of the Metropolitan Readiness Test. These subtests are considered to be measures of visual perception and perceptual motor development which are considered to be some of the readiness abilities needed for successful reading development.

Language subtests are the Word Meaning and Listening subtests of the 1965 edition of the Metropolitan Readiness Test. These subtests are both measures to a certain degree of language background and

experience. Language experience is considered fundamental to reading development.

The two methods of training utilized in this study are described as follows:

Perceptual training refers to those skills, abilities or experiences that are developed by the Frostig Program for the Development of Visual Perception (Frostig and Horne, 1964). This program of training is not directly related to the readiness skills measured by the subtests of the Metropolitan Readiness Test. It includes training in the five areas that are defined as follows:

> Visual-motor coordination is defined as the ability to coordinate vision with movements of the body or with movements of a part of the body. (Frostig and Horne, 1964, p. 16)
>
> Perceptual constancy is defined as the ability to perceive an object as possessing invariant properties, such as shape, position, and size, in spite of the variability of the impression of the sensory surface. (Frostig and Horne, 1964, p. 29)
>
> Figure-ground perception is defined as the ability to perceive most clearly those things to which we turn our attention. The human brain is so organized that it can select stimuli--auditory, tacticle, olfactory, and visual--and form the figure in the person's perceptual field, while the majority of stimuli form a dimly perceived ground. (Frostig and Horne, 1964, p. 34)
>
> Perception of position in space is defined as perception of the relationship of an object to an observer. (Frostig and Horne, 1964, p. 40)
>
> Perception of spatial relationships is defined, for the purpose of this program, as the ability of an observer to perceive the position of two or more objects in relation to himself and in relation to each other. (Frostig and Horne, 1964, p. 75)

Language training refers to those skills, abilities or experiences that are suggested in the Manual for the Readiness Record File (Ray and Rodenborn, 1969) for the improvement of language abilities and are

trained by the Peabody Language Kit, Level 1 (Dunn and Smith, 1965). This program of language training includes sixty lessons designed to improve language abilities in the following areas:

> Receptive and expressive vocabulary are defined as follows: The child's receptive vocabulary level of performance is reflected in the recognition response to stimuli presented, either visually or auditorily. While the child's expressive vocabulary level is reflected in the level of performance in spoken responses to stimuli presented. (Ray and Rodenborn, p. 6)
>
> Listening comprehension reflects the level at which the child should be able to read if he could decode the printed symbols of the language. It will reflect the ability to understand the main thought in a story, to recall specifics, and to organize in the order of presentation the idea and events in the story. (Ray and Rodenborn, 1969, p. 6)
>
> Oral comprehension and oral communication are defined as follows: Oral comprehension is the ability to understand relationships existing between ideas or objects and to utilize this ability. While oral communication is the ability to communicate ideas, and it involves organization of thoughts, memory, and anticipation of events. (Ray and Rodenborn, 1969, p. 7)
>
> Audition development is the ability to comprehend what is heard. The lowest level of audition development is becoming aware of sounds with no effort to discriminate these sounds. Listening is the level where discrimination is made between sounds heard with no association of meaningful understanding to these sounds. Auding is the internalization of words or sounds with comprehension. (Ray and Rodenborn, 1969, p. 8)

This program of training is not directly related to the readiness skills measured by the language subtests of the Metropolitan Readiness Test.

A change score refers to the differences in individual performance between the two administrations of the Metropolitan Readiness Test, Form A and B. This measured change was computed for the individual subtests, the perceptual subtests, the language subtests, and the total test. Minus values were eliminated by adding a constant of 10 to the

subtest scores and a constant of 40 was added to the total perceptual, total language, and total test scores.

Statement of the Problem

The purpose of this study was to examine the effect of language training and perceptual training upon the reading readiness performance of kindergarten children. The variables of sex and levels of pupil readiness status were also used as a means to determine additional effects of the training.

Specific aspects of readiness were investigated through the use of individual subtest results and language and perceptual groupings of subtests as well as total test performance on the Metropolitan Readiness Test.

The Hypotheses

The hypotheses to be tested are presented in this section. To provide clarity for the reader the hypotheses are presented as follows:

(1) Group A - hypotheses related to the total test performance,

(2) Group B - hypotheses related to individual subtest performance,

(3) Group C - hypotheses related to language subtest performance, and

(4) Group D - hypotheses related to perceptual subtest performance.

Hypotheses Related to Total Test Performance

The hypotheses to be tested in this area are stated in the null form as:

A-1 There are no significant differences among the reading readiness total test change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

A-2 There are no significant differences in reading readiness total test change score performances when students are categorized by levels of pupil readiness status.

A-3 There is no significant difference in reading readiness total test change score performances when students are categorized by sex.

A-4 There is no significant interaction effect within total test change scores among methods of training and levels of pupil readiness status.

A-5 There is no significant interaction effect within total test change scores among methods of training and the category of sex.

Hypotheses Related to Individual Subtest Performance

The hypotheses to be tested in this area are stated in the null form as:

B-1 There are no significant differences among the reading readiness individual subtest change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

B-2 There are no significant differences in reading readiness individual subtest change score performances when students are categorized by levels of pupil readiness status.

B-3 There is no significant difference in reading readiness individual subtest change score performances when students are categorized by sex.

B-4 There is no significant interaction effect within individual subtest change scores among methods of training and levels of pupil readiness status.

B-5 There is no significant interaction effect within individual subtest change scores among methods of training and the category of sex.

Hypotheses Related to Language Subtest Performance

The hypotheses to be tested in this area are stated in the null form as:

C-1 There are no significant differences among the reading readiness language subtests change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

C-2 There are no significant differences in reading readiness language subtests change score performances when students are categorized by levels of pupil readiness status.

C-3 There is no significant difference in reading readiness language subtests change score performances when students are categorized by sex.

C-4 There is no significant interaction effect within language subtests change scores among methods of training and levels of pupil readiness status.

C-5 There is no significant interaction effect within language subtests change scores among methods of training and the category of sex.

Hypotheses Related to Perceptual Subtest Performance

The hypotheses to be tested in this area are stated in the null form as:

D-1 There are no significant differences among the reading readiness perceptual subtests change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

D-2 There are no significant differences in reading readiness perceptual subtests change score performances when students are categorized by levels of pupil readiness status.

D-3 There is no significant difference in reading readiness perceptual subtests change score performances when students are categorized by sex.

D-4 There is no significant interaction effect within perceptual subtests change scores among methods of training and levels of pupil readiness status.

D-5 There is no significant interaction effect within perceptual subtests change scores among methods of training and the category of sex.

Delimitations

Scope of the Study

This study presents an analysis of the effect of language and perceptual training upon the reading readiness performance of kindergarten children. The Metropolitan Readiness Test, Form A was administered and the test scores were categorized by sex and levels of pupil readiness status. The Metropolitan Readiness Test, Form B was administered after fourteen weeks of perceptual and language training. A pre- and post-test comparison was made to obtain the change in performance for each student. Multiple-classification analysis of variance technique was applied to the change scores grouped according to methods of training and levels of pupil readiness status and methods of training and the category of sex. This was an attempt to determine if significant differences in change in performance existed within the scores on the total test, the individual subtests, and language subtests, and the perceptual subtest.

Assumptions

1. It was assumed that reading readiness performances are measurable and pupil readiness status can be defined.
2. It was assumed that the uncontrolled variables are randomly assigned.

Controls

The term controls as here applied is defined as referring to restraints on experimental conditions.

1. All students had teachers who held college degrees and were certified by the State of Kansas.
2. In an attempt to control instruction, the teachers in each of the experimental groups used the same day-by-day lesson plans based upon the skill development prescribed in the manuals of the training instruments.

Limitations of the Study

1. This study is limited to first semester kindergarten children enrolled in ~~one midwestern school system~~ during the fall semester, 1969.
2. Due to the nature of the study, it was not administratively possible to move children from one kindergarten class to another; therefore, the design was limited to involving intact kindergarten classes.
3. Due to the nature of the study, it was not feasible to control instruction beyond a prescribed program of language and perceptual training with the experimental groups.

Due to the fact that this study is in the area of social science, it was impossible to control all the existing variables.

Significance of the Study

Since the major phase of the study was an investigation into the

effect of language and perceptual training upon the reading readiness performance of kindergarten children, the results should provide information about the readiness phase of the reading process. This should be of concern to the classroom teacher as well as those who supervise and administrate this phase of elementary education.

A major goal of modern day education has been an attempt to provide educational experiences that would be valuable to all children at all levels of ability. The results obtained from this study should provide answers to questions regarding the effect of language and perceptual training within specific levels of ability. This should be of noteworthy importance for those involved in early childhood education.

Educators have long been concerned with the possible differences in performances of boys and girls in our elementary schools. This study should provide information regarding these suspected differences during the readiness phase prior to the child's learning to read. In addition, it should provide understandings regarding the effect of language and perceptual training upon boys as well as girls.

Organization of the Study

Chapter I has introduced the problem to be studied. This chapter has included the definition of terms as used in the study, a statement of need for the study including the theoretical base of the study, the statement of the problem, and the delimitations of the study.

Chapter II will review the literature concerning the hypotheses to be tested.

Chapter III will describe the design of the study, the population, the selection of the sample, and the testing instruments. It will also describe the programs of training and the statistical methods used in treatment of the data collected to test the hypotheses of this study.

Chapter IV will contain a statistical analysis of the data. This chapter will indicate the degree to which the hypotheses are found to be correct within recognized limitations.

Chapter V will present a discussion of the results of this study and recommendations regarding future studies in this area.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The literature concerning perception and language development constitutes a formidable body of research. The studies included perception and language abilities as predictors of future reading success; the component skills and abilities that constitute perception and language development; and the effect of perceptual and language training upon the handicapped as well as the normal child. In keeping with the theoretical base and the hypotheses that were stated, the literature was discussed and divided into the following areas of interest: (1) studies which report the effect of perceptual training upon elementary school-age children, and (2) studies which report the effect of language training upon elementary school-age children. Those studies which deal with the factors of readiness and sex were grouped together within each section.

Studies Reporting the Effect of Perceptual Training Upon Elementary School-Age Children

In examining the research regarding perceptual training, major emphasis has been placed upon studies in this area during the past decade. In a study utilizing rigid research techniques, Goins (1958) attempted to measure the level of growth in visual perception of

first-grade children and the correlation of their perceptual abilities with their achievement in reading. In addition, the study attempted to determine the effect that training in recognition of visual forms would have on progress in learning to read.

The total population for the study was 120 first-grade pupils. With the advice of judges in both education and psychology, fourteen tests of visual perception were selected and administered to the six-year-old children. One form of the Chicago Reading Test, Test A was given at the beginning of the study for the purpose of measuring reading ability. The perceptual training program included visual form training using tachistoscopically exposed forms. The children were divided into two groups, equated on the basis of reading scores, intelligence quotients, and a combined score from the fourteen perceptual tests. After a ten-week training period all of the children were retested with another form of the Chicago Reading Test, Test A and the fourteen perceptual tests.

The results of the study indicated that the total perception scores obtained by the fourteen perceptual tests predicted reading success more accurately than did the intelligence test scores. It was found that a significant positive correlation existed between the child's perceptual abilities and his later achievement in reading. The effect of the perceptual training was measured in a pre- and post-test comparison of individual performance upon the fourteen perceptual tests. The results revealed erratic patterns of perceptual development. In general, the superior readers had the largest growth while non-readers showed no progress at all. The effect of perceptual training upon reading success at the end of the first grade was measured by

a comparison of the results of the two forms of the Chicago Reading Test. The results revealed no significant differences for those children who received the perceptual training.

In a similar study, Simpson (1960) devised a program of visual and kinesthetic training which was carried out by a first-grade teacher with one of two groups selected from a population of 312 first-graders who had been administered the Metropolitan Readiness Test and the Primary Mental Abilities Test. Forty-two children were selected to participate in the experiment. The children's scores on verbal reading readiness subtests were average or above, but the scores on perceptual subtests such as "matching," "numbers," and "copying" were low. Twenty-one of the forty-two children were randomly assigned to an experimental group and were given four months of visual and kinesthetic training. At the end of the training period, it was found that the experimental group had statistically significant gains in the perceptual skills as measured by the three subtests mentioned above, thus confirming the hypothesis that training could improve perceptual functioning.

Cox and Hambly (1961) attempted to determine the effect of visual perceptual training upon visual skills as well as upon academic performance. The population for the study was the second and third grades in six elementary schools in Canada. These children were tested with the Stanford Achievement Tests and The California Test of Mental Maturity. From their scores on these tests, the children were assigned an achievement quotient based upon a ratio of achievement age to mental age. Children with a quotient of 0.95 or lower were given a series of tests of perceptive-motor skills of visual space, namely: binocular

rotary pursuits; cheiroscope tracing, stereopsis, near point of convergence; and, children's visual achievement forms. Children failing any one of these tests were placed in the experimental or control group. An equal number of children, sixty-three, were placed in a control and experimental group. The researcher conducted daily training sessions for a period of three months. The purposes of the training were as follows: (1) developing perception of direction, (2) developing constancy of perception, and (3) developing perception of distance. Upon completion of the training all children were retested on the original battery of visual performance tests and two months later the subjects were retested on a different form of the Stanford Achievement Test. The results of the study indicated that the training did improve visual performances in the areas of cheiroscope tracing, stereopsis and near point of convergence. There was no evidence that the improvement of any other individual visual skill or any other combination of such skills had an effect upon reading achievement.

Lowder (1956) utilized 1500 children from the first three grades of the Winterhaven, Florida schools. The purpose of the study was to determine if outline form perception as measured by copying geometric figures is related to school achievement in the first three grades. An experimental teacher administered the copying of seven figures: circles, cross, square, triangle, divided rectangle, horizontal diamond, and vertical diamond. Based upon predetermined standards, a numerical score was obtained by a rating of the student's copies. School achievement was measured by the student's performance on the Metropolitan Achievement Test. Using an analysis of variance technique, it was found that a significant relationship between perceptual abilities and

school achievement existed for this sample.

A second formal study utilizing the Winterhaven students was initiated by Kagerer (1960) and it was completed by Martin and Harmon (1962). The purpose of this study was to determine the effect of systematic perceptual training with geometric forms upon reading readiness, intelligence, and school achievement. The design of this study was based upon the division of the first-grade classes into a control and experimental group with the experimental group receiving daily training in reproducing geometric forms. The experimental and control groups were tested by the Metropolitan Readiness Test, the Kuhlman-Anderson Intelligence Test, and the Goodenough "Draw-A-Man" Test. At the end of the second grade year, achievement was measured with the Stanford Achievement Tests, Primary Battery, Form J. The results at the end of the first year indicated there was no significant difference between the experimental and control group based upon performances on the readiness test and the Goodenough test. The results did indicate a significant difference in the intelligence quotients at the .05 level of confidence in favor of the control group on the Kuhlman-Anderson test. Administrative problems, reassignment of six research teachers, and too limited training for some of the experimental teachers resulted in a failure to accurately measure the effect of the perceptual training upon school achievement at the end of the second year.

Meyerson (1967) conducted a study to determine the effect of a Kephart-recommended perceptual training program on the reading readiness performance of perceptually handicapped kindergarten pupils who differed in visual acuity. The sample for the study was fifty-eight kindergarten children who were identified as perceptually handicapped

by their performance on the Frostig Developmental Test of Visual Perception. The sample was also classified according to socio-economic status and visual acuity. Half of the children received Kephart training fifteen minutes a day for eight weeks while the other half received no training. At the end of the eight-week training period, the Lee-Clark Readiness Test was administered. Multiple classification analysis of variance technique was used to examine the data categorized as to method of treatment, visual acuity and socio-economic status. The results did not support the hypothesis that training in large-muscle coordination and eye movements would result in a reading readiness advantage for perceptually handicapped children. Such children surpassed neither those with poor vision nor their equivalent control group. There was no substantiation for a supplementary hypothesis relating to socio-economic status.

Directly related to the training of reading readiness skills, McBeath (1966) conducted a study to determine the effectiveness of three programs of perceptual training for perceptually handicapped kindergarten children. The Frostig Developmental Test of Visual Perception was administered to 802 kindergarten children. Of these, 117 tested below the 25th percentile of the standardization norms and were designated as "perceptually handicapped." Twenty-four kindergarten classes were used as the population for the study. Teachers were randomly assigned to one of four groups. Group 1 had 15 minutes a day of training as prescribed by Kephart, which emphasized physical coordination activities such as the use of the walking beam and balance board. Group 2 received 15 minutes a day with the Frostig Program for the Development of Visual Perception, which consisted mainly of

kinesthetic and tactile training based upon worksheet exercises. Group 3 alternated the two above mentioned methods. Group 4 received no special training other than normal class activities. Training continued over a period of 64 days at the end of which the Lee-Clark Readiness Test was administered. The conclusions drawn from the results of the major part of the study were that trends existed in some of the directions predicted, but the hypotheses relating to the improvement of reading readiness skills could not be accepted.

Frognone (1966) conducted a study to determine the effect of visual perception and language training upon the perceptual and language skills of retarded children. The sample of the study was 83 mentally retarded children who were from seven to eleven years of age with intelligence quotients of not less than fifty nor more than eighty on the Stanford-Binet Intelligence Test. The Frostig Developmental Test of Visual Perception and the Illinois Test of Psycholinguistics Abilities were used to measure perceptual and linguistic abilities of the students and the same two instruments were used to measure growth in abilities. A program of perceptual training utilizing the Frostig Program of Perceptual Training and a program of language training utilizing the Peabody Language Kits, Level 1 were administered by the children's classroom teachers for a period of twelve weeks. The statistical analysis consisted of a pre-test and post-test comparison on mean scores utilizing a single classification of analysis of variance. The findings relating to the effects of visual perception training were that visual perceptual ability was significantly increased by training in visual perception and visual perception training did not significantly increase psycholinguistic abilities as measured by the

interaction effect. The findings related to the effects of language training were that psycholinguistic ability was not significantly increased by training in language development, and language training did not significantly increase visual perceptual abilities as measured by the interaction effect.

Faustman (1968) engaged in a study to determine if a formal program of perceptual training in kindergarten would contribute to the growth of perception in children at the end of the kindergarten year and contribute to success in reading at the end of the first-grade year. The sample used in this study was twenty-eight kindergarten classes in a large school district in California. During the kindergarten year, the total sample was administered the Winterhaven Perceptual Forms Test in September and again in May to determine growth in perception. The total sample was given one form of the Gates Primary Word Recognition Test in November and another form of the same test the last week of May during the first-grade year. The perceptual training for the control group of fourteen classes consisted of materials and methods advocated by Frostig, Strauss, and Kephart as well as the template training from the Winterhaven program. Training was administered three times per week during the kindergarten year. The remaining fourteen classes constituted the control group. Using chi square technique, test results showed significantly greater growth in both perceptual abilities and word recognition achievement in the experimental group. These differences favored the experimental group at the .01 level of significance.

The preceding literature has pointed out a certain amount of support regarding the hypotheses that training should improve perceptual

growth. While one study revealed erratic patterns regarding growth in perception, two studies confirmed that training would improve perceptual functioning.

From the literature, it appears a significant positive correlation exists between a child's perceptual abilities and later achievement in reading. The research regarding the effect of perceptual training upon reading success at the end of the first grade revealed mixed results. There is as much evidence to disprove the effect of perceptual training as there is to support its use for insuring success in reading. This created a need for additional research in this area.

To date, there is no firm evidence that perceptual training improves reading readiness skills. The majority of the studies reviewed did not support perceptual training as a means for improving readiness skills. Additional research is justified in this area.

Studies Reporting the Effect of Language Training Upon Elementary School-Age Children

The increasing volume of research in the areas of language development had its origin during the 1950's in the evaluation of a theoretical model of psycholinguistics by Osgood (1957). From the application of that model a diagnostic test, the Illinois Test of Psycholinguistic Abilities (Kirk and McCarthy, 1961), and an instructional program, the Peabody Language Development Kits (Dunn and Smith, 1962), have been developed. This review of related literature is primarily concerned with research regarding the instructional program; however, most research does not differentiate between the instructional program and the test.

Smith (1962) conducted a study designed to determine if the language age of young educable mentally retarded children could be significantly increased as a result of approximately three months of experimental treatment. The subjects in this experiment consisted of 16 matched pairs. They were matched on chronological age and language age obtained by pre-testing with the Illinois Test of Psycholinguistics. The children chosen for the study were between seven and ten years old and they had revised Binet intelligence quotients ranging from 50 to 80. The mean intelligence quotient for the group was 70. The children of the experimental group were removed from their special education classrooms three times weekly for three months for planned language development sessions of 45 minutes' duration. The differences in the mean scores obtained by the experimental group and the control group were analyzed for significance by the use of a t test for matched pairs. At the conclusion of the study, the experimental group was found to have a significant higher language age than the control group. Thirteen of the sixteen children in the experimental group showed language age gains greater than their matched control. These data confirmed the investigator's major hypothesis that a systematic language development program would significantly enhance the language age of educable mentally retarded children as measured by the Illinois Test of Psycholinguistics Abilities.

Two other closely related instructional programs are reported to have been stimulated by Smith's subsequent work. The first was a study of a language development program designed to improve the vocal encoding (verbal expressive ability) of retarded children by Blessing (1963). The second involved the administration of Smith's original language

development program to a group of trainable mentally retarded children by Blue (1963).

Blessing (1963) directed his efforts toward the remediation of a specific vocal encoding psycholinguistic deficit in educable mentally retarded children. Using the Illinois Test of Psycholinguistic Abilities profiles, he evaluated each child and selected those below ability for the sample. Two groups of 20 each, randomly assigned, were matched by group on variables of sex, sibling order and parental occupation. Each remedial group of three to five subjects received instruction in hourly sessions three times weekly over a period of four months from two language clinicians. The results of the study showed significant increases in vocal encoding as measured by increased vocal encoding scores and evaluation of verbalizations solicited in a controlled situation. In contrast to their control group, the experimental group equaled or exceeded mental age language expectancy levels.

Blue (1963) replicated Smith's earlier work but used trainable mentally retarded children. His subjects ranged in chronological age from eight years and four months to seventeen years and nine months, and they were matched for chronological age and total language age obtained from the Illinois Test of Psycholinguistic Abilities. The experimental group was subdivided into two groups on the basis of chronological age at the thirteen year and four month level. Training using the Peabody Language Development Kit, Level 1, involved three forty-five minute periods per week for eleven weeks. The results of the study indicated that statistical significance was not gained at the level desired. However, the observed gain of two months by which the experimental group (5.67 months gain) exceeded the control subjects

(3.67 months gain) was interpreted as supporting the value of such a language development program for trainable retardates.

Ensminger (1966) conducted a study using the Peabody Language Development Kit, Level 1, to determine the effect of language training upon change in language age and intelligence. In this study, two classes of slow learning children constituted the experimental group. Two other classes of slow learners served as the control group. All children in the study were six to ten years of age and they had I. Q. scores ranging from 70 to 90 with 84 as the mean I. Q. The training program included a daily lesson for the experimental group utilizing the Peabody Language Development Kit, Level 1, for the first seven months of the school year. The classes in the control group received their normal classroom instruction. Language change and intelligence change were measured by a pre- and post-test comparison of the Illinois Test of Psycholinguistics and the Stanford-Binet Individual Intelligence Test. Mean language age gain for the total experimental group was eight months as compared with five months for the control group; however, this was not statistically significant. Additional comparisons were made regarding the mental age of the students in the control and experimental groups. The lower mental age children, below 77 months, made significantly greater gains than their control counterparts, whereas the higher mental age, above 77 months, experimental subjects did not. There was no significant difference in intelligence change as measured by the Binet test.

Gibson (1966) used a total population of 26 educable mentally retarded children between the age of six and one-half to nine and one-half years as the sample to evaluate the effectiveness of the Peabody

Language Development Kit in improving language ability. A secondary purpose was to investigate the value of using auditory and visual stimulation devices in isolation to elicit verbal language samples. These language samples were to be used as additional evaluative criteria of the effectiveness of the Peabody Language Development Kit, Level 1. From November, 1965 to May, 1965, a portion of the lessons from the language kit was presented to the experimental group as a supplement to their regular language instructional program. The control group did not receive any form of a supplemental language instructional program. A pre-post battery of tests was administered to the subjects in this study. To evaluate changes in language ability, Templin Structural Analysis procedure was used on verbalization produced from still pictures, conversation, sound effects and a silent movie; also used was the Illinois Test of Psycholinguistic Abilities. To measure the effect upon intelligence, the Peabody Picture Vocabulary Test, Form A and B, and the Weschler Intelligence Scale for Children were included. School progress made was tested by the Wide Range Achievement Test as expressed in reading and arithmetic achievement scores. The method of statistical analysis used in this study was the analysis of covariance technique. The results of the study indicated there was no significant difference between the oral language performance of the students in the control and experimental groups. There was no significant increase in the academic achievement between the students in the control and experimental groups.

A final conclusion which appeared valid was related to the magnitude of gain in language age by both the groups. A comparison of mean scores evidenced greater gains than one would have anticipated for

mentally retarded children.

In the past three years, two studies utilizing language training have been conducted with the children in normal classrooms. Milligan (1966) reported on a study to determine the effect of a group language development program upon the psycholinguistic abilities of normal kindergarten children. The sample for the Milligan study was the 97 children who comprised the four kindergarten classes of an elementary school system in Kansas. The four kindergarten classes were the responsibility of two kindergarten teachers; thus, one teacher's classes became the experimental group and the other teacher's classes became the control group. From the experimental group, a random sample of 30 students was drawn. The Illinois Test of Psycholinguistic Abilities and the Metropolitan Readiness Test were chosen as the criterion measures in this study. These two instruments were administered at the beginning of school and again after the 24 week training periods. A comparison of pre-post mean scores using a t test for unrelated samples was made. The results of the study indicated the following regarding the readiness skills measured by the readiness test: (1) there was no significant difference in the effectiveness of the two treatments in improving the abilities of the subject to recognize lower-case letters, number knowledge, and copying; (2) in the three remaining subtests of the Metropolitan, the control treatment was more effective than the experimental treatment in improving the abilities of the subjects to comprehend spoken language, comprehend phrases and words, and match figures, pictures, and letters.

In an extensive study, Dunn and Mueller (1965) initiated a three-year study with disadvantaged children in the Nashville, Tennessee

Public Schools. The subjects were 732 first-grade children with 630 in the experimental treatments and 102 in the control group. Ten experimental groups and a control group were established. These groups were designed to investigate the effectiveness of the Initial Teaching Alphabet (ITA), the ITA in combination with the Peabody Language Development Kit (PLDK), and reading in traditional orthography (T. O.) with PLDK. The experimental groups were:

1. Reading in ITA, without PLDK.
2. Reading in ITA, plus PLDK taught by the teacher to the total class as a group.
3. Reading in T. O., plus PLDK taught by the teacher to the total class as a group.
4. Reading in T. O., plus PLDK taught by the teacher to the class in two groups (first the fast and then the slow half of the class).
5. Reading in T. O., plus PLDK by a team teaching approach (regular teacher and a visiting teacher) to the total class as a group.
6. Reading in T. O., plus PLDK by a team teaching approach to the class in two groups.
7. Reading in T. O., plus PLDK by an itinerant teacher to the total class as a group.
8. Reading in T. O., plus PLDK by an itinerant teacher to the class in two groups.
9. Reading in T. O., plus PLDK by the regular teacher and a community volunteer to the total class as a group.

10. Reading in T. O., plus PLDK by the regular teacher and a community volunteer to the class in two groups.

A comparison of pre- and post-test performance was made by using the Stanford-Binet Intelligence Test, the Peabody Picture Vocabulary Test, and the Metropolitan Achievement Test. Analysis of variance was used to compare treatments among the groups, with t tests employed to contrast differences between sub-groups. The .95 level of confidence was used throughout. The results showed: (1) children learning to read in the ITA alone or in ITA plus PLDK did significantly better in school achievement than those using the traditional first grade program; (2) in terms of language development, the PDLK lessons increased over-all language functioning as measured by the Illinois Test of Psycholinguistic Abilities and the Peabody Language Production Inventory; but did not significantly affect hearing vocabulary as measured by the Peabody Picture Vocabulary Test; (3) in terms of intellectual growth, the PLDK groups made significantly greater gains in IQ than the non-PLDK groups; (5) there were no significant differences among the treatment conditions (team teaching, whole class as a group versus class in two groups, etc.) under which the PLDK was taught.

Dunn, Pochanart and Pfost (1967) reported on the second year of the study. The subjects for the second year were 384 second grade children with 343 experimentals and 41 control subjects who had been part of the previous year's study. During the second year, one-half of the classes which received PLDK Level 1 during the first year received a second year of oral language stimulation using the PLDK Level 2. This created the following additional groups for the second year of the study:

11. Reading in ITA, plus two years of PLDK taught by the teacher to the total class as a group.
12. Reading in T. O., plus two years of PLDK by the teacher to the total class as a group.
13. Reading in T. O., plus two years of PLDK by the teacher to the class in two groups.
14. Reading in T. O., plus two years of PLDK by a team teaching approach to the total class as a group.
15. Reading in T. O., plus two years of PLDK by a team teaching approach to the class in two groups.
16. Reading in T. O., plus two years of PLDK by the regular teacher and a community volunteer to the total class as a group.
17. Reading in T. O., plus two years of PLDK by the regular teacher and a community volunteer to the class in two groups.

Based upon the same testing instruments, a pre- and post-test comparison was made. Analysis of covariance (to control for IQ differences among groups) was used to contrast treatments, with t tests employed to contrast differences between sub-groups. The results of the analysis were as follows: (1) the most effective treatment for enhancing reading achievement was the combination of ITA plus two years PLDK; (2) in all cases girls excelled boys in reading achievement; (3) in terms of language development those children receiving either one or two years PLDK made greater gains than children not receiving PLDK; (4) children receiving PLDK for two years did better in reading than those receiving no PLDK or PLDK for one year; (5) two years of PLDK enhanced intellectual development in terms of MA growth and IQ

gains appreciably over no PLDK or one year of PLDK.

The reviewed literature concerning the effectiveness of programs of language development and training has been centered upon improving language functioning. A certain amount of support has been given to the hypothesis that training improves language functioning.

In the studies primarily concerned with improving language age, growth was evident by observed gains by the comparison of individual and mean performances; however, only one study reported a statistical significance.

The studies that involved measuring increases in psycholinguistic abilities as measured by the Illinois Test of Psycholinguistics Abilities were mixed in their findings. A number of studies involved the training of one specific psycholinguistic skill with little success. In the longitudinal study by Dunn and Mueller (1965) and Dunn, Pochanart, and Pfost (1967), the ability to improve psycholinguistic abilities was evidenced.

Studies regarding the effects of language training upon specific readiness skills were limited in number and findings. Additional research is justified in this area.

Summary

The reviewed literature has pointed out a certain amount of support regarding the assumption that language and perceptual training improve perceptual and language growth. While one study revealed erratic patterns regarding growth in perception, a number of studies confirmed that training would improve perceptual functioning.

In the studies primarily concerned with improving language age, growth was evident in a number of studies by observed gains when one compared individual and mean performance. Only one of these studies reported a statistical significance.

The literature did reveal a significant positive correlation existed between a child's perceptual abilities and later achievement in reading. Mixed findings were evidenced regarding the studies that attempted to measure the effect of perceptual training upon first-grade reading success. Such factors as length of training as well as types of perceptual training appeared to be important.

The studies that involved measuring increases in psycholinguistic abilities were not conclusive in their findings. A number of studies involved the training of one specific psycholinguistic skill with little success. In a longitudinal approach to improving psycholinguistic abilities, the studies involving disadvantaged children in the Nashville, Tennessee, schools evidenced the ability to improve language age as well as psycholinguistic abilities of their subjects.

Studies regarding the effect of language and perceptual training upon reading readiness skills were limited in findings. To date, there was no firm evidence that language and perceptual training improved reading readiness skills. The evidence available based upon the limited findings of existing studies indicated additional research was justified in this area.

CHAPTER III

METHODOLOGY AND DESIGN

A discussion of the procedures and instruments used in this study is presented in this chapter. The design of the study, the population, and the methods of selection of the subjects are given. A description of the instruments used in selection of subjects and the instrument used to measure reading readiness performance are presented. The descriptions and purposes of the training programs are also presented. Attention is drawn to the methods that were used to analyze the data.

Design of the Study

The basic purpose of this study was to determine the effect of perceptual and language training upon the reading readiness performance of kindergarten children. To accomplish this, all kindergarten students in this study were administered the screening instrument, the 1965 revision of the Metropolitan Readiness Test, Form A, during the second week of September, 1969. These kindergarten students were categorized as to levels of pupil readiness status by their performance on each of the six subtests, the perceptual subtests, the language subtests, and the total test. Additionally, they were classified by sex.

The total population consisted of twenty-four kindergarten classes with a total of twelve kindergarten teachers. It was possible to

establish two experimental groups of eight classes each and a control group of eight classes. The eight classes in one experimental group received fourteen weeks of language training while the eight classes in the other experimental group received fourteen weeks of perceptual training. The eight remaining classes were designated as the control group receiving their regular kindergarten instruction.

The Metropolitan Readiness Test, Form B was administered as the post-test following the completion of the training periods. Individual change scores were computed based upon the pre- and post-test administrations. Equal cell size was obtained through the use of a table of random numbers. Multiple-classification analysis of variance technique was applied to the data grouped according to methods of instruction and levels of pupil readiness status and methods of instruction and sex.

The Population

Five hundred ninety-two kindergarten students of a midwestern school system participated in this study. These kindergarten students attended school in twenty-four kindergarten classes, and they were the responsibility of twelve kindergarten teachers. Because of the necessity of not disturbing the administration of classes, the design of the study was limited to involving intact kindergarten classes. Random assignment of teachers eliminated the possiblity of interruptions or of providing more than one method of training within one classroom. Thus, the kindergarten teachers were randomly assigned to a group of four teachers, and random assignment of a method of training was made to the groups.

Table I shows the number of kindergarten classes (K) within each method of training. The table provides additional information regarding the total number of kindergarten children (n) within each method of training.

TABLE I

NUMBER OF CLASSES (K) AND TOTAL NUMBER OF STUDENTS (n) IN EACH METHOD OF TRAINING

	Methods of Training			
	Language	Perceptual	Control	Total
K =	8	8	8	24
n =	191	194	207	592

Selection of the Subjects

A preliminary screening of the population from which the sample was taken was completed in accordance with the following criteria:

1. Students must have taken the screening instrument, Metropolitan Readiness Test, Form A, during the second week of September, 1969 in the school system from which the sample was drawn.
2. Students must have successfully completed a hearing and vision screening.

The final screening of the students for the study was completed at the end of the fourteen weeks of training in accordance with the following criteria:

1. Students must have taken the post-test, the Metropolitan Readiness Test, Form B, during the second week of December, 1969.
2. Students who transferred from one kindergarten class to another during the school year were no longer considered as a part of the study.

Table II shows the number of students in the sample after the final screening. The table provides information regarding the number of kindergarten students (n) remaining within each method of training and the attrition (y) based upon the screening criteria.

TABLE II

NUMBERS OF STUDENTS (n) AND ATTRITION (y) IN EACH METHOD OF TRAINING AFTER SCREENING

	Methods of Training			
	Language	Perceptual	Control	Total
n =	161	153	164	478
y =	30	41	43	114

Based upon total test performance, the number of students in each method of training was reduced to 108 by the use of a table of random numbers (Popham, 1967, p. 381). This included an equal number of boys and girls with 54 from each sex. Each of the three levels of pupil readiness status contained 36 students with 18 belonging to each sex.

The individual subtest, language subtests, and the perceptual subtests were reduced to 96 by the use of the same table of random numbers. This included an equal number of boys and girls with 48 from each sex. Each of the three levels of pupil readiness status contained 32 students with 16 belonging to each sex.

Instruments Used and Their Application In This Study

Metropolitan Readiness Test, Form A and B (1965)

These tests were devised to measure the extent to which school beginners have developed in the skills and abilities which contribute to readiness for reading. It was designed to test pupils during the kindergarten year or the beginning of first grade. The purpose of the test was not to measure the effectiveness of kindergarten, but rather serve as a basis for classification of students. The six subtests which made up this test were:

Test 1. Word Meaning, a 16-item picture vocabulary test. The pupil selects from three pictures the one that illustrates the word the examiner names.

Test 2. Listening, a 16-item test of ability to comprehend phrases and sentences instead of individual words. The pupil selects from three pictures the one which portrays a situation or event the examiner describes briefly.

Test 3. Matching, a 14-item test of visual perception involving the recognition of similarities. The pupil marks one of three pictures which matches a given picture.

Test 4. Alphabet, a 16-item test of ability to recognize lower-case letters of the alphabet. The pupil chooses a letter named from four alternatives.

Test 5. Numbers, a 26-item test of number knowledge. The pupil selects from three pictures the one which denotes size, time, and other number concepts.

Test 6. Copying, a 14-item test which measures a combination of visual perception and motor control. The pupil reproduces a number of designs independently from a number of given designs.

(Harcourt, Brace & World, 1965, p. 3)

The normative population of the 1965 edition of the Metropolitan Readiness Test included a total of 12,231 students in 299 schools. Reliability testing using an alternate form (Form B) for retest produced a correlation of .91 in a study consisting of 546 kindergarten pupils.

The Metropolitan Readiness Test, Form A administered during the second week of September, 1969 was used as a screening instrument for categorizing the sample into levels of pupil readiness status. This categorization was based upon total test, language subtests, perceptual subtests, and individual subtests performances of the screening instrument. The Metropolitan Readiness Test, Form B was administered at the completion of the 14-week training periods. A pre- and post-test change score was computed, and it was used in the statistical analysis of the data.

Frostig Program for the Development of Visual Perception

This program of perceptual training is described by its authors as a program of prevention and correction. It was designed for use not only by specialists in the field of visual perception training, but also by regular primary-grade classroom teachers. The program contains 360 worksheets involving training in five areas of perception. Also included is a manual which presents the purpose and rationale for the program of perceptual training, directions for using each worksheet, and a suggested dialogue for introducing each worksheet. Each of the worksheets requires approximately ten minutes' teaching time.

Peabody Language Development Kit, Level 1

This language development kit is described as a tool to stimulate oral language and verbal intelligence. The kit contains 430 full-color stimuli cards, a supply of colored chips, two hand puppets, a tape recording, and six recorded fairy tales. Not included, but necessary for the presentation of the lessons, is a tape recorder. Also included in the kit is a manual which presents the purpose and rationale for the language program, directions for using the kit, and 180 detailed lesson plans. Each of these daily lesson plans contains two to four activities with each taking about 35 to 45 minutes to teach.

Additionally, information should be included regarding the instruments used for vision and hearing screening. The Keystone Ready-to-Read Test (1961) was used for the vision screening and the Beltone Portable Audiometer-Model C was used for the hearing screening in this study.

Training Programs and their Application in this Study

Two methods of training were utilized in this study, namely, perceptual and language training. A discussion of these programs and their application to the study are given below.

Perceptual Training

The perceptual program of training used in this study was the Frostig Program for the Development of Visual Perception (Frostig and Horne, 1964). This program of perceptual training included 360 worksheets designed to improve perceptual abilities in the following areas: (1) visual-motor coordination, (2) perceptual constancy, (3) figure-ground perception, (4) perception of position of space, (5) perception of spatial relationships.

Language Training

The language program of training used in this study was based upon a rationale of readiness skills developed in the Manual for the Readiness Record File (Ray and Rodenborn, 1969). The Peabody Language Development Kit, Level 1, published by the American Guidance Service Inc. was the instrument used for the development of these skills. This program of language training included sixty lessons designed to improve language abilities in the following areas: (1) receptive and expressive vocabulary, (2) listening comprehension, (3) oral comprehension and oral communication, and (4) audition development.

Application of the programs of training involved using materials unfamiliar to the kindergarten teachers in this study, thus creating

the necessity for providing instruction and training for the teachers who would administer the programs of training. During the last week of August, 1969, the kindergarten teachers as part of their orientation week prior to school attended a three-day workshop with the investigator and the project supervisor developing understandings regarding utilization of the programs of training. The workshop included developing an understanding regarding the basic skills involved in each of the programs of training and procedures for the utilization of the language and perceptual programs of training.

Both programs of training started on September 11, 1969 and continued until December 5, 1969, a period of fourteen weeks. During this time, training materials and counsel were provided by the project director who visited each teacher at least once a week during the fourteen-week period. The investigator was present for aid and assistance during the September and December testing sessions. Also, the investigator visited and counseled with each teacher using a program of training one day each week during the first three weeks of the study. During the last eleven weeks of training, visits were made based upon need for aid and assistance.

An attempt was made to maintain purity of instruction and presentation on the part of the kindergarten teachers using the training programs. The kindergarten teachers using the perceptual program of training had at their disposal a day-by-day lesson plan prepared by the investigator. Thirty minutes each day was the suggested time required for the completion of the prescribed worksheet exercises. In addition, each teacher using the perceptual program of training used the Manual for the Frostig Program for the Development of Visual Perception. This

manual provided uniformity of presentation through the use of a prescribed introductory dialogue for each lesson.

The kindergarten teachers using the language program of training also had at their disposal a day-by-day lesson plan prepared by the investigator. Thirty to forty-five minutes each day was the suggested time required for the completion of the prescribed exercises. In addition, each teacher using the language program of training used the Manual for the Peabody Language Kit, Level 1. This manual provided uniformity of presentation through the use of suggested activities and experiences for each lesson as well as definite procedures for developing each lesson.

Statistical Design

This section is concerned with the statistical techniques used in the study. It involved the statistical procedures used in the following areas: (1) the procedures for determining levels of pupil readiness status, (2) the rationale for the comparison of pre- and post-test performance, and (3) a rationale regarding procedures for the treatment of the data and the techniques used to accept or reject the hypotheses of the study.

For the purpose of this study, pupil readiness status was defined as being three levels of performance which were used to categorize the sample. It was further defined in relationship to the standard deviation levels obtained from the September administration of the Metropolitan Readiness Test. Above average status were those scores exceeding the .5 standard deviation level above the mean. Below average status were those scores below the .5 standard deviation level below the mean.

Average status was the portion of the sample between the .5 standard deviation levels above and below the mean. This classification of pupil readiness status was made on each of the subtests, the language subtests, the perceptual subtests, and the total test.

The statistical technique used to determine levels of pupil readiness status involved calculating a standard deviation by the raw score method with ungrouped scores. The basic equation used for computation was reported in Runyon and Haber (1968, p. 65).

$$S = \sqrt{\frac{\sum X^2}{N} - \bar{X}^2}$$

In making a comparison of pre- and post-test performances, an inspection of the mean performances for the methods of training (Table III) revealed that all three methods of training had a noticeable increase in their reading readiness performance between the two administrations of the Metropolitan Readiness Test.

TABLE III

COMPARISON OF MEAN PERFORMANCES
PRE- AND POST-TEST

	Mean Performances	
Method of Training	Pre-Test	Post-Test
Language	28.4	43.9
Control	28.8	42.1
Perceptual	23.2	47.5

Bruning and Kintz (1968) warned that occasionally a researcher could be faced with a group of subjects who come from distinctly different populations. Thus, the results of the study could be biased because of these differences. In an attempt to control for possible bias, a comparison of pre- and post-test performance was made by the computing of a change score between the two administrations of the Metropolitan Readiness Test. These change scores were computed upon each individual's performance on each of the subtests, the language subtests, the perceptual subtests, and the total test. During the computation of change scores, minus values were obtained resulting from a student's performance decreasing instead of increasing. Minus values were eliminated by adding a constant of 10 to each of the individual scores on each of the subtests. For the same reason, a constant of 40 was added to each of the individual scores on the language subtests, the perceptual subtests, and the total test. When inspecting the mean change scores in the next chapter, one should remember these values contain the added constants.

In developing a rationale for the treatment of the data and the acception or rejection of the hypotheses, the attempt to control possible bias was an important contributing factor. Bruning and Kintz (1968) describe the multiple analysis of variance treatment-by-levels design as one that can be used when children are drawn from various schools that differ markedly in quality and location, creating the necessity to control for possible bias.

It was not administratively possible to move children from one kindergarten class to another; therefore, the design was limited to involving intact kindergarten classes. The kindergarten teachers were

randomly assigned to groups of four teachers, and a random assignment of training methods was made to groups. Thus, it was possible to meet the requirements for randomization required by the treatment-by-levels design.

Kerlinger (1964, p. 42) describes variables as being stimulative, organismic, and responsive in nature. The stimulus variable is any condition or manipulation by the experimenter of the environment that evokes a response in an organism. The stimulus variable in this study was the three methods of training with the response variables being the change score performances. Organismic variables are described as being characteristic of the subjects and are assigned for possible research manipulation. Sex and levels of pupil readiness status were the organismic variables of this study.

The research design was further limited because of the comparison of two highly correlated variables. This correlation between variables existed because the same instrument, Metropolitan Readiness Test, Form A, was used for classification of levels of pupil readiness status as well as the computation of change scores. This correlation between variables necessitated a dual comparison of the effect of language and perceptual training upon the change in reading readiness performance of kindergarten children.

The first comparison involved the use of the multiple analysis of variance treatment-by-levels technique (Bruning and Kintz, 1968, p. 36) with a stimulus variable (methods of training), an organismic variable (levels of pupil readiness status), and the response variable (the change score performance). The second comparison involved the use of the same analysis of variance technique with a stimulus variable

(methods of training), an organismic variable (sex), and the response variable (the change score performance). These comparisons were made upon total test, the individual subtests, the language subtests, and the perceptual subtests.

The basic equation from which all analysis of variance computations were derived was reported in Popham (1967, p. 185).

$$F = \frac{\text{Between group mean squares}}{\text{Within group mean squares}}$$

Having obtained an F value, it was interpreted for statistical significance in order to accept or reject the null hypotheses of the study. It was possible to determine whether the computed F value was significantly greater than the table value of F found in Popham (1967, p. 402).

The statistical technique used to make multiple comparisons of means after the F had been found to be significant was the Duncan Multiple-Range Test (Bruning and Kintz, 1968, p. 115). The computational procedure includes computing the standard error of the means by the equation listed below:

$$\text{Standard Error of Means} = \sqrt{\frac{\text{Within group mean square}}{\text{n (per group)}}}$$

The next step involved obtaining the significant studentized ranges from a Table of Duncan Multiple Ranges as found in Appendix I (Alpha = .05), Bruning and Kintz (1968, p. 238). This was done through use of the degrees of freedom of the within groups variance and the range (k) of the means. The range was a numeral which indicated the number of means included within the ranked group of the two means being compared. For example, a k of 2 would indicate that the means were

adjacent; a k of 4 shows that the means being compared were separated by two other group means.

The critical or minimum mean difference (R) for each comparison was derived by multiplying the tabled value obtained in the previous step by the standard error of the means.

The process of testing the differences between the various means for significance involved first ranking the means from the smallest to the largest to facilitate the determination of the magnitude of difference and the range between the means. If the difference between the means being compared was larger than the minimum for that range as shown by the computed R value, it was considered significant.

Summary

This chapter was concerned with providing information regarding the design of the study. Five hundred ninety-two kindergarten students of a midwestern school system participated in this study. The criteria were presented for the selection of the subjects in the study. After the final screening, four hundred seventy-eight students remained as the sample.

A discussion of the instruments used in testing and training was included. This involved a description of the Metropolitan Readiness Test as well as its uses in the study. The Frostig Program for the Development of Visual Perception and the Peabody Language Development Kit, Level 1, were the instruments used as a part of the training programs. Mention was made of the instruments used for vision and hearing screening.

Description of the perceptual and language programs of training were included in this chapter. The procedures used in applying these programs of training were also included.

The statistical procedures used in this study were as follows: (1) the procedures for determining levels of pupil readiness status, (2) the rationale for the comparison of pre- and post-test performance, and (3) a rationale regarding procedures for the treatment of the data.

CHAPTER IV

PRESENTATION AND TREATMENT OF THE DATA

The purpose of this chapter was to present a detailed description of the statistical treatment of the data and a statement of the results.

The major purpose of the study was concerned with the effect of perceptual and language training upon kindergarten children's reading readiness performances. It was an attempt to determine significant differences in performance attributable to the methods of instruction and the factors of levels of pupil readiness status and sex. Analysis of the data was based upon the change in readiness performance between the pre- and post-test administrations of the Metropolitan Readiness Test, Form A and B.

The chapter has been divided to facilitate discussion under the following headings: (1) an analysis of the performance of students on the total test when the students were categorized by methods of training and levels of pupil readiness status and methods of training and the category of sex; (2) an analysis of the performance of students on the individual subtests when the students were categorized by methods of training and levels of pupil readiness status and methods of training and the category of sex; and (3) an analysis of the performance of students upon the perceptual subtests and language subtests when students were categorized by methods of training and levels of pupil readiness status and methods of training and the category of sex.

Analysis of the Performance of Students On the Total Test

Analysis by Methods of Training and Levels of Pupil Readiness Status

An analysis of variance was applied to the change scores of the students based upon the total test performance of the students to test a number of hypotheses regarding methods of training and levels of pupil readiness status.

A-1 There are no significant differences among the reading readiness total test change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

The computed analysis of variance yielded an F ratio of 14.3 (Table IV) regarding methods of training. Rejection of the null hypothesis at the .01 level of confidence with 2 and 315 degrees of freedom[1] called for an F ratio greater than 4.71. The result was a rejection of the null hypothesis.

An inspection of the total test mean change scores by the Duncan Multiple Range Test found in Table V provided information regarding significance among methods of training. A comparison of means found the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the language method of training and the control group. There was no significant difference between the change in performance of the students in the language method of training and that of the control group.

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[1]The F ratio for these degrees of freedom was not presented in available tables. Therefore, the next lower degree of freedom was used for the critical point.

TABLE IV

ANALYSIS OF VARIANCE OF METHODS OF TRAINING
AND LEVELS OF PUPIL READINESS STATUS
ON TOTAL TEST PERFORMANCE

Source	SS	DF	MS	F Ratio
Levels	4,078.54	2	2,039.27	16.92 **
Methods	3,436.02	2	1,718.01	14.27 **
Levels X Methods	306.35	4	76.59	.64
Within	37,953.64	315	120.49	
Total	45,774.55	323		

**p < 01

TABLE V

COMPARISON OF THE MEAN CHANGE SCORES FOR METHODS
OF TRAINING ON TOTAL TEST PERFORMANCE

Group Means		Critical Values	Difference
1. Language	56.12	S.E. = 1.06	1 vs. 2 = 6.20 *
2. Perceptual	62.32	R_2 = 3.00	2 vs. 3 = 7.44 *
3. Control	54.88	R_3 = 3.15	1 vs. 3 = 1.24

* Denotes significance at .05 level.

A-2 There are no significant differences in reading readiness total test change score performances when students are categorized by levels of pupil readiness status.

The same analysis of variance yielded an F ratio of 16.9 (Table IV) regarding levels of pupil readiness status. Rejection of the null hypothesis at the .01 level of confidence with 2 and 315 degrees of freedom called for an F ratio greater than 4.71. The result was a rejection of the null hypothesis.

An inspection of the total test mean change scores by the Duncan Multiple Range Test found in Table VI provided information regarding the significance among levels of pupil readiness status. A comparison of means found the change in performance of the students in the below average level of pupil readiness status significantly surpassed that of the students in the average and above average level of pupil readiness status. An additional comparison of means found the change in performance of the students in the average level of status significantly surpassed that of the students in the above average level.

A-4 There is no significant interaction effect within total test change scores among methods of training and levels of pupil readiness status.

The analysis of variance yielded an F ratio of 0.6 (Table IV) regarding the interaction effect among methods of training and levels of pupil readiness status. Rejection of the null hypothesis at the .05 level of confidence with 4 and 315 degrees of freedom called for an F ratio greater than 2.41. The result was the acceptance of the null hypothesis. There was no interaction effect among methods of training and levels of pupil readiness status.

TABLE VI

COMPARISON OF MEAN CHANGE SCORES FOR LEVELS OF PUPIL READINESS STATUS ON TOTAL TEST PERFORMANCE

Group Means		Critical Values	Difference
1. Above Average Status	53.34	S.E. = 1.06	1 vs. 2 = 4.61 *
2. Average Status	57.95	R_2 = 3.00	2 vs. 3 = 4.07 *
3. Below Average Status	62.02	R_3 = 3.15	1 vs. 3 = 8.68 *

* Denotes significance at .05 level.

Analysis by Methods of Training and The Category of Sex

An analysis of variance was applied to the change scores of the students based on total test performance to test for significance among the methods of training. The computed analysis of variance yielded an F ratio of 13.3 (Table VII) regarding methods of training. Rejection of the null hypothesis at the .01 level of confidence called for an F ratio greater than 4.71. The result was the rejection of the null hypothesis. This supported the findings of the previous analysis regarding methods of training that resulted in the rejection of the hypothesis A-1.

A comparison of means by the Duncan Multiple Range Test (Table VIII) found the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the language method of training and the control group. There was no

TABLE VII

ANALYSIS OF VARIANCE OF METHODS OF TRAINING AND SEX ON TOTAL TEST PERFORMANCE

Source	SS	DF	MS	F Ratio
Sex	756.70	1	756.7	5.86 *
Methods	3,436.47	2	1,718.2	13.32 **
Sex X Methods	525.40	2	262.7	2.03
Within	41,055.98	318	129.1	
Total	45,774.55	323		

*p <.05
**p <.01

TABLE VIII

COMPARISON OF MEAN SCORES FOR METHODS OF TRAINING ON TOTAL TEST PERFORMANCE

Group Means		Critical Values	Difference
1. Language	56.12	S.E. = 1.09	1 vs. 2 = 6.20 *
2. Perceptual	62.32	R_2 = 3.08	2 vs. 3 = 7.44 *
3. Control	54.88	R_3 = 3.24	1 vs. 3 = 1.24

* Denotes significance at .05 level.

significant difference between the change in performance of the students in the language method of training and that of the control group. Again these findings were the same as the previous analysis by methods of training and levels of pupil readiness status.

A-3 There is no significant difference in reading readiness total test change score performance when students are categorized by sex.

The analysis of variance yielded an F ratio of 5.8 (Table VII) regarding the category of sex. Rejection of the null hypothesis at the .05 level of confidence with 1 and 318 degrees of freedom called for an F ratio of 3.89. The result was a rejection of the null hypothesis.

The total test mean change scores for boys and girls were as follows: Boys = 63.3; and Girls = 66.7. An inspection of the two mean change scores indicated that the girls surpassed the boys on total test performance.

A-5 There is no significant interaction effect within total test change scores among methods of training and the category of sex.

The analysis of variance yielded an F ratio of 2.0 (Table VII) regarding the interaction effect among methods of training and the category of sex. Rejection of the null hypothesis at the .05 level of confidence with 2 and 318 degrees of freedom called for an F ratio greater than 4.71. The result was the acceptance of the null hypothesis. There was no significant interaction effect among methods of training and the category of sex.

Analysis of the Performance of Students On the Individual Subtests

Analysis by Methods of Training and Levels of Pupil Readiness Status

An analysis of variance was applied to the change scores of the students based upon the individual subtest performances to test a number of hypotheses regarding methods of training and levels of pupil readiness status.

B-1 There are no significant differences among the reading readiness individual subtest change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

An inspection of Table IX regarding methods of training and levels of pupil readiness status based upon individual subtest change score performances indicated that Word Meaning, Matching and Copying were significant at the .01 level of confidence. Listening and Numbers were significant at the .05 level of confidence. All but one of the subtests, Alphabet, reached the .05 level of confidence. This indicated that the majority of the subtests showed a significant difference regarding methods of training. The result was a rejection of the null hypothesis.

An inspection of Table IX regarding the individual subtest performance yielded the following information related to the levels of pupil readiness status. It was an attempt to test the following hypothesis:

B-2 There are no significant differences in reading readiness individual subtest change score performances when students are categorized by levels of pupil readiness status.

TABLE IX

ANALYSES OF VARIANCE OF METHODS OF TRAINING AND LEVELS OF PUPIL READINESS STATUS ON INDIVIDUAL SUBTEST PERFORMANCES

Subtest	Source of Variation	df	Sum of Squares	Mean Squares	F Ratio
Word Meaning	Levels	2	984.69	492.35	75.93 **
	Methods	2	88.05	44.03	22.01 **
	Methods X Levels	4	84.24	21.06	3.24 *
	Within	279	1,809.00	6.48	
	Total	287	2,965.98		
Listening	Levels	2	905.22	452.61	51.10 **
	Methods	2	58.84	29.42	3.32 *
	Methods X Levels	4	127.51	31.88	3.60 *
	Within	279	2,471.34	8.86	
	Total	287	3,562.91		
Matching	Levels	2	244.64	122.32	14.37 **
	Methods	2	135.18	67.59	7.94 **
	Methods X Levels	4	8.92	2.23	.63
	Within	279	2,375.23	8.51	
	Total	287	2,763.97		
Alphabet	Levels	2	215.30	107.65	8.25 **
	Methods	2	10.55	5.27	.40
	Methods X Levels	4	71.41	17.85	1.37
	Within	279	3,641.06	13.05	
	Total	287	3,938.32		
Numbers	Levels	2	544.38	272.19	24.34 **
	Methods	2	80.92	40.46	3.62 *
	Methods X Levels	4	17.14	4.28	.38
	Within	279	3,119.88	11.18	
	Total	287	3,762.32		
Copying	Levels	2	210.44	105.22	12.71 **
	Methods	2	426.33	213.17	25.74 **
	Methods X Levels	4	11.23	2.81	.34
	Within	279	2,310.47	8.28	
	Total	289	2,958.47		

*$p < .05$
**$p < .01$

The F values found in Table IX regarding the levels of pupil readiness status were all significant at the .01 level of confidence. This indicated that a significant difference did exist regarding change in the student's performances among the levels of pupil readiness status. The result was a rejection of the null hypothesis.

A further breakdown of Table IX yielded the following information regarding the individual subtest performances related to the interaction effect among methods of training and levels of pupil readiness status. It was an attempt to test the following hypothesis:

B-4 There is no significant interaction effect within individual subtest scores among methods of training and levels of pupil readiness status.

An inspection of the F values found in Table IX regarding interaction effect indicated the subtests, Word Meaning and Listening, were significant at the .05 level of confidence which indicated an interaction effect did exist. The result was a rejection of the null hypothesis. This rejection of the three null hypotheses regarding methods of training and levels of pupil readiness status generated the need for an additional analysis of the data regarding each individual subtest to provide additional information regarding the effect of language and perceptual training upon specific readiness skills.

An analysis of the data as presented in Table X regarding significance among the methods of training provided additional information regarding the individual subtests. This involved a comparison of mean change scores on five of the six subtests by the Duncan Multiple Range Test.

A comparison of means found on all five subtests that the change in performance of the students in the perceptual method of training

TABLE X

COMPARISON OF MEAN SCORES BY THE DUNCAN MULTIPLE RANGE TEST FOR METHODS OF TRAINING ON THE INDIVIDUAL SUBTESTS

Significant Subtests	Methods of Training		
	Language	Perceptual	Control
Word Meaning			
Group Means	11.73	13.02	12.76
Critical Values	S.E. = .24	R_2 = .68	R_3 = .71
Difference	1 vs. 2 = 1.29*	2 vs. 3 = .26	1 vs. 3 = 1.03*
Listening			
Group Means	12.39	13.42	13.12
Critical Values	S.E. = .30	R_2 = .85	R_3 = .89
Difference	1 vs. 2 = 1.03*	2 vs. 3 = .30	1 vs. 3 = .73
Matching			
Group Means	13.04	14.47	13.01
Critical Values	S.E. = .28	R_2 = .79	R_3 = .83
Difference	1 vs. 2 = 1.43*	2 vs. 3 = 1.46*	1 vs. 3 = .03
Numbers			
Group Means	11.59	12.88	12.12
Critical Values	S.E. = .33	R_2 = .93	R_3 = .98
Difference	1 vs. 2 = 1.29*	2 vs. 3 = .76	1 vs. 3 = .53
Copying			
Group Means	12.44	13.61	10.65
Critical Values	S.E. = .38	R_2 = .79	R_3 = .83
Difference	1 vs. 2 = 1.17*	2 vs. 3 = 2.96*	1 vs. 3 = 1.79*
Alphabet - A significant difference regarding methods of training was not obtained on this subtest.			

*Denotes significance at .05 level.

significantly surpassed that of the students in the language method of training. Additionally, the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the control group on the Matching and Copying subtests. There was no significant difference between the change in performance of the students in the perceptual method of training and that of the control group on the Word Meaning, Listening and Numbers subtest.

A final comparison of means on Table X found on the Word Meaning subtest that the change in performance of the students in the control group significantly surpassed that of the control group. There was no significant difference between the change in performance of the students in the language method of training and that of the control group on the Listening, Matching, and Numbers subtests. On the Copying subtests, the change in performance of the students in the language method of training significantly surpassed that of the students in the control group.

An analysis of the data as presented in Table XI regarding significance among the levels of pupil readiness status provided additional information regarding the students' performances on the individual subtests. This involved a comparison of mean change scores for the six subtests by the Duncan Multiple Range Test.

A comparison of means found on all six of the subtests that the change in performance of the students in the average level of pupil readiness status significantly surpassed the change in performance of the students in the above average level. On the Word Meaning, Listening, and Numbers subtests, the change in performance of the students in the below average level of pupil readiness status significantly

TABLE XI

COMPARISON OF MEAN SCORES BY THE DUNCAN MULTIPLE RANGE TEST FOR LEVELS OF PUPIL READINESS STATUS ON INDIVIDUAL SUBTESTS

	Levels of Pupil Readiness Status		
Subtests	Above Average	Average	Below Average
Word Meaning			
Group Means	10.16	12.66	14.68
Critical Values	S.E. = .24	R_2 = .68	R_3 = .71
Difference	1 vs. 2 = 2.50*	2 vs. 3 = 2.02*	1 vs. 3 = 4.52*
Listening			
Group Means	10.86	12.37	15.14
Critical Values	S.E. = .30	R_2 = .85	R_3 = .89
Difference	1 vs. 2 = 1.51*	2 vs. 3 = 2.77*	1 vs. 3 = 4.28*
Matching			
Group Means	12.27	13.78	14.47
Critical Values	S.E. = .28	R_2 = .79	R_3 = .83
Difference	1 vs. 2 = 1.51*	2 vs. 3 = .69	1 vs. 3 = 2.20*
Alphabet			
Group Means	12.40	13.85	14.46
Critical Values	S.E. = .36	R_2 = 1.02	R_3 = 1.07
Difference	1 vs. 2 = 1.45*	2 vs. 3 = .61	1 vs. 3 = 2.06*
Numbers			
Group Means	10.69	11.88	14.02
Critical Values	S.E. = .33	R_2 = .93	R_3 = .98
Difference	1 vs. 2 = 1.19*	2 vs. 3 = 2.14*	1 vs. 3 = 3.13*
Copying			
Group Means	11.03	12.87	12.81
Critical Values	S.E. = .28	R_2 = .79	R_3 = .83
Difference	1 vs. 2 = 1.84*	2 vs. 3 = .06	1 vs. 3 = 1.78*

*Denotes significance at .05 level.

surpassed that of the students in the average level of status. On the Matching, Alphabet, and Copying, there was no significant difference between the change in performance of the students in the below average level and that of the average level of pupil readiness status. The change in performance of the students in the below average level of pupil readiness status significantly surpassed that of the students in the above average level on the six of the subtests.

An inspection of the mean change scores in Table XII provided information about the interaction effect on the Word Meaning subtest. Utilization of the Duncan Multiple Range Test made it possible to locate the sources of the significant interaction between methods of training and levels of pupil readiness status.

TABLE XII

COMPARISON OF THE MEAN CHANGE SCORES FOR INTERACTION EFFECT ON THE WORD MEANING SUBTEST

Levels	Language	Perceptual	Control
Above Average	9.62	9.81	11.06
Average	11.28	13.86	12.75
Below Average	14.31	15.28	14.46

A review of the findings with respect to significances found the students in the perceptual method of training change in performance surpassed that of the students in the language method of training and the control group. Additionally, the students in the control group change in performance surpassed that of the language method of training. There were significances among the three levels of pupil readiness status.

A comparison of means in the above average level of pupil readiness status found the means of the students in the above average level of the control group was significantly high while the means of the students in the above average level of the perceptual method of training was significantly low. Also, a comparison of means in the perceptual method of training found the difference between the above average and average level of pupil readiness status to be significant. The two comparisons when combined resulted in a significant interaction effect.

The mean change scores have been provided in Table XIII for the purpose of examining the interaction effect on the Listening subtest. Utilization of the Duncan Multiple Range Test made it possible to locate the sources of the significant interaction between methods of training and levels of pupil readiness status.

A review of the findings with respect to significance found the students in the perceptual method of training change in performance surpassed that of the students in the language method of training. There were significances among the three levels of pupil readiness status.

A comparison of means in the perceptual method of training found the difference between the means of the average level and the below

average level of pupil readiness status to be significant. This difference was of such a magnitude that it resulted in a significant interaction effect.

TABLE XIII

COMPARISON OF THE MEAN CHANGE SCORES FOR INTERACTION EFFECT ON THE LISTENING SUBTEST

Levels	Language	Perceptual	Control
Above Average	10.75	11.06	10.75
Average	12.71	12.25	12.15
Below Average	13.68	16.96	14.78

Analysis by Methods of Training and The Category of Sex

An analysis of variance was applied to the change scores of the students based upon the individual subtest performances to test for significance among the methods of training. An inspection of Table XIV regarding methods of training based upon individual subtest change score performances indicated that Matching and Copying were significant at the .01 level of confidence. Word Meaning and Numbers were significant at the .05 level of confidence. All but two of the subtests, Listening and Alphabet, reached the .05 level of confidence which

TABLE XIV

ANALYSES OF VARIANCE OF METHODS OF TRAINING AND CATEGORY OF SEX ON INDIVIDUAL SUBTEST PERFORMANCE

Subtest	Source of Variation	df	Sum of Squares	Mean Squares	F Ratio
Word Meaning	Sex	1	8.68	8.68	.85
	Methods	2	88.05	44.02	4.33 *
	Methods X Sex	2	2.13	1.07	.10
	Within	282	2,867.12	10.17	
	Total	287	2,965.99		
Listening	Sex	1	17.50	17.50	1.41
	Methods	2	58.84	29.42	2.38
	Methods X Sex	2	3.55	1.77	.14
	Within	282	3,483.02	12.35	
	Total	287	3,562.91		
Matching	Sex	1	20.59	17.50	2.24
	Methods	2	135.19	67.59	7.34 **
	Methods X Sex	2	11.55	5.88	.14
	Within	282	2,596.65	9.21	
	Total	287	2,763.98		
Alphabet	Sex	1	34.72	34.72	2.54
	Methods	2	10.55	5.28	.39
	Methods X Levels	2	46.13	23.06	1.69
	Within	282	3,846.92	13.64	
	Total	287	3,938.32		
Numbers	Sex	1	70.02	70.02	5.48 **
	Methods	2	80.92	40.46	3.16 *
	Methods X Sex	2	7.38	3.69	.29
	Within	282	3,604.00	12.78	
	Total	287	3,762.32		
Copying	Sex	1	.003	.003	.00
	Methods	2	426.33	213.17	24.31 **
	Methods X Levels	2	58.86	29.43	3.36 *
	Within	282	2,473.27		
	Total	287	2,958.47		

*$p < .05$
**$p < .01$

indicated that a majority of the subtests revealed a significant difference in methods of training at this level. With the exceptions of the Listening subtest, the findings were the same as the analysis that resulted in the rejection of the null hypothesis B-1.

A further inspection of Table XIV yielded the following information regarding the individual subtest performances related to the category of sex. It was an attempt to test the following hypothesis:

B-3 There is no significant difference in reading readiness individual subtest change score performances when students are categorized by sex.

The F values found in Table XIV regarding the category of sex indicated that the Numbers subtest was significant at the .01 level of confidence. All of the remaining subtests failed to reach the .05 level of confidence. The result was a rejection of the null hypothesis. This indicated that a significant difference did exist regarding change in student performances within the category of sex.

A further breakdown of Table XIV yielded the following regarding the individual subtest performances related to the interaction effect among methods of training and the category of sex. It was an attempt to test the following hypothesis:

B-5 There is no significant interaction effect within individual subtest scores among methods of training and the category of sex.

A final inspection of the F values found in Table XIV regarding interaction effect indicated that the Copying subtest was significant at the .05 level of confidence. All of the remaining subtests failed to reach the .05 level of confidence. The result was a rejection of the null hypothesis. This indicated that a significant interaction did exist among methods of training and the category of sex.

The rejection of the hypotheses regarding methods of training and category of sex generated the need for an additional analysis of the data regarding each individual subtest. Also, this should provide additional information regarding the effect of language and perceptual training upon specific readiness skills.

An analysis of the data as presented in Table XV indicated regarding significance among the methods of training provided additional information regarding the individual subtests. This involved a comparison of mean change scores on four of the six subtests by the Duncan Multiple Range Test.

A comparison of means found the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the language method of training on four of the six subtests. On the Matching and Copying subtests, the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the control group. There was no significant difference between the change in performance of the students in the perceptual method of training and that of the control group on the Word Meaning and Numbers subtests.

A final comparison of means found the change in performance of the students in the control group significantly surpassed that of the students in the language method of training on the Word Meaning subtest. While on the Copying subtest, the change in performance of the students in the language method of training significantly surpassed that of the students in the control group. There was no significant difference between the change in performance of the students in the language method of training and that of the control group on the Numbers and

TABLE XV

COMPARISON OF MEAN SCORES BY THE DUNCAN MULTIPLE RANGE TEST FOR METHODS OF TRAINING AND SEX ON THE INDIVIDUAL SUBTESTS

Significant Subtests	Methods of Training		
	Language	Perceptual	Control
Word Meaning			
Group Means	11.73	13.02	12.76
Critical Values	S.E. = .31	R_2 = .88	R_3 = .92
Difference	1 vs. 2 = 1.29*	2 vs. 3 = .26	1 vs. 3 = 1.03*
Matching			
Group Means	13.04	14.47	13.01
Critical Values	S.E. = .30	R_2 = .85	R_3 = .89
Difference	1 vs. 2 = 1.43*	2 vs. 3 = 1.46*	1 vs. 3 = .03
Numbers			
Group Means	11.59	12.88	12.12
Critical Values	S.E. = .36	R_2 = 1.02	R_3 = 1.07
Difference	1 vs. 2 = 1.29*	2 vs. 3 = .76	1 vs. 3 = .53
Copying			
Group Means	12.44	13.61	10.65
Critical Values	S.E. = .30	R_2 = .85	R_3 = .89
Difference	1 vs. 2 = 1.17*	2 vs. 3 = 2.96*	1 vs. 3 = 1.79*
Listening and Alphabet - A significant difference regarding methods of training was not obtained on these subtests.			

*Denotes significance at .05 level.

Matching subtests.

An analysis of the data regarding the category of sex found the Numbers subtests significant. The mean change scores for the Numbers subtest for boys and girls were as follows: Boys, 11.72; Girls, 12.74. An inspection of the two means indicated the girls surpassed the boys' change in performance on this subtest.

The mean change scores have been provided in Table XVI for the purpose of examining the interaction effect on the Copying subtest. Utilization of the Duncan Multiple Range Test made it possible to locate the sources of the significant interaction between methods of training and the category of sex.

TABLE XVI

COMPARISON OF THE MEAN CHANGE SCORES FOR INTERACTION EFFECT ON THE COPYING SUBTEST

	Methods of Training		
Sex	Language	Perceptual	Control
Boys	13.02	13.08	10.60
Girls	11.78	14.14	10.70

A review of the findings with respect to significances found the change in performance of the students in the perceptual method of training surpassed that of the language method of training and the control

group. The change in performance of the students in the language method of training surpassed that of the students in the control group. There was no significant difference in the category of sex.

A comparison of means for the perceptual method of training and the control group found no significant differences. A comparison of the means in the language method of training found the boys' means was significant to the girls' means. The difference was of such a magnitude that it resulted in a significant interaction effect.

Analysis of the Performance of Students on the Language and Perceptual Subtests

Analysis by Methods of Training and Levels of Pupil Readiness Status on Language Subtests

An analysis of variance was applied to the change scores of the students based upon the language subtests performances to test a number of hypotheses regarding methods of training and levels of pupil readiness status.

C-1 There are no significant differences between the reading readiness language subtests change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

The computed analysis of variance yielded an F ratio of 9.08 (Table XVII) regarding methods of training. Rejection of the null hypothesis at the .01 level of confidence with 2 and 279 degrees of freedom called for an F ratio greater than 4.71. The result was a rejection of the null hypothesis.

An inspection of the mean change scores for the total language subtests by the Duncan Multiple Range Test found in Table XVIII provided information regarding significance among the methods of training.

TABLE XVII

ANALYSIS OF VARIANCE OF METHODS OF TRAINING AND LEVELS OF PUPIL READINESS STATUS ON LANGUAGE SUBTESTS PERFORMANCE

Source	SS	DF	MS	F Ratio
Levels	1,684.80	2	842.40	31.67 **
Methods	483.04	2	241.52	9.08 **
Levels X Methods	324.18	4	81.05	3.05 *
Within	7,420.63	279	26.60	
Total	9,912.65	287		

*$p < .05$
**$p < .01$

TABLE XVIII

COMPARISON OF MEAN CHANGE SCORES FOR METHODS OF TRAINING ON LANGUAGE SUBTESTS

Group Means		Critical Values	Difference
1. Language	44.30	S.E. = .51	1 vs. 2 = 2.81 *
2. Perceptual	47.11	R_2 = 1.44	2 vs. 3 = 2.68 *
3. Control	44.43	R_3 = 1.52	1 vs. 3 = .13

* Denotes significance at .05 level.

A comparison of means found the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the language method of training and the control group. There was no significant difference between the change in performance of the students in the language method of training and that of the control group.

C-2 There are no significant differences in reading readiness language subtests change score performances when students are categorized by levels of pupil readiness status.

The same analysis of variance yielded an F ratio of 31.67 (Table XVII) regarding levels of pupil readiness status. Rejection of the null hypothesis at the .01 level of confidence with 2 and 279 degrees of freedom called for an F ratio greater than 4.71. The result was a rejection of the null hypothesis.

An inspection of the mean change scores for the total language subtests by the Duncan Multiple Range Test found in Table XIX provided information regarding the significance among the levels of pupil readiness status. A comparison of means found that the change in performance of the students in the below average level of status significantly surpassed that of the students in the above average and the average level of status. The change in performance of the students in the average level of status significantly surpassed that of the students in the above average level of status.

C-4 There is no significant interaction effect within language subtests change scores among methods of training and levels of pupil readiness status.

The analysis of variance yielded an F ratio of 3.05 (Table XVII). Rejection of the null hypothesis at the .05 level of confidence with 4

and 279 degrees of freedom called for an F ratio greater than 2.41. The result was the rejection of the null hypothesis.

TABLE XIX

COMPARISON OF MEAN CHANGE SCORES FOR LEVELS OF PUPIL READINESS STATUS ON LANGUAGE SUBTESTS

Group Means		Critical Values	Difference
1. Above Average Status	42.14	S.E. = .51	1 vs. 2 = 3.53 *
2. Average Status	45.67	R_2 = 1.44	2 vs. 3 = 2.36 *
3. Below Average Status	48.03	R_3 = 1.52	1 vs. 3 = 5.89 *

* Denotes significance at .05 level.

The mean change scores have been provided in Table XX for the purpose of examining the interaction effect on the language subtests. Utilization of the Duncan Multiple Range Test made it possible to locate the sources of the significant interaction between methods of training and levels of pupil readiness status.

A review of the findings with respect to significances found the change in performance of the students in the perceptual method of training surpassed that of the students in the language method of training and the control group. There were significances among the three levels of pupil readiness status.

TABLE XX

COMPARISON OF THE MEAN CHANGE SCORES FOR INTERACTION EFFECT ON THE LANGUAGE SUBTESTS

Levels	Methods of Training		
	Language	Perceptual	Control
Above Average	41.09	42.40	42.93
Average	44.59	49.12	43.31
Below Average	47.21	49.81	47.06

A comparison of means in the perceptual method of training found the difference between the means of the average and above average levels of pupil readiness status to be significant. This difference was of such a magnitude that it resulted in a significant interaction effect.

Analysis by Methods of Training and the Category of Sex on Language Subtests

An analysis of variance was applied to the change scores of the students based upon the language subtests performances to test for significance among the methods of training. The computed analysis of variance yielded an F ratio of 7.41 (Table XXI) regarding methods of training. Rejection of the null hypothesis at the .01 level of confidence with 2 and 282 degrees of freedom called for an F ratio greater than 4.71. This supported the findings of the previous analysis

regarding methods of training that resulted in the rejection of the null hypothesis C-1.

TABLE XXI

ANALYSIS OF VARIANCE ON METHODS OF TRAINING AND SEX ON LANGUAGE SUBTESTS PERFORMANCE

Source	SS	DF	MS	F Ratio
Sex	45.12	1	45.12	1.38
Methods	483.05	2	241.52	7.41 **
Methods X Sex	192.02	2	96.01	2.94
Within	9,192.46	282	32.60	
Total	9,912.65	287		

** $p < .01$

An inspection of the mean change scores for the total perceptual subtests by the Duncan Multiple Range Test found in Table XXII provided information regarding significance among the methods of training. A comparison of means found the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the language method of training and the control group. The change in performance of the students in the language method of training significantly surpassed that of the students in the control group level.

TABLE XXII

COMPARISON OF MEAN CHANGE SCORES FOR METHODS OF TRAINING ON LANGUAGE SUBTESTS

Group Means		Critical Values	Difference
1. Language	44.30	S.E. = .57	1 vs. 2 = 2.81 *
2. Perceptual	47.11	R_2 = 1.61	2 vs. 3 = 2.68 *
3. Control	44.43	R_3 = 1.70	1 vs. 3 = .13

* Denotes significance at .05 level.

C-3 There is no significant difference in reading readiness language subtests change score performance when students are categorized by sex.

The same analysis of variance yielded an F ratio of 1.38 (Table XXI) regarding the category of sex. Rejection of the null hypothesis at the .05 level of confidence with 1 and 279 degrees of freedom called for an F ratio greater than 3.89. The result was an acceptance of the null hypothesis. There was no significant difference in the change in performance favoring boys or girls on the language subtests.

C-5 There is no significant interaction effect within language subtests scores among methods of training and the category of sex.

An inspection of the analysis of variance yielded an F ratio of 2.94 (Table XXI) regarding the interaction effect among methods of training and the category of sex. Rejection of the null hypothesis at the .05 level of confidence with 2 and 282 degrees of freedom called for an F ratio greater than 3.04. The result was the acceptance of the

null hypothesis. There was no interaction effect among methods of training and the category of sex on the language subtests.

Analysis by Methods of Training and Levels of Pupil Readiness Status on Perceptual Subtests

An analysis of variance was applied to the change scores of the students based upon the perceptual subtests performances to test a number of hypotheses regarding methods of training and the category of sex.

D-1 There are no significant differences between the reading readiness perceptual subtests change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

The computed analysis of variance yielded an F ratio of 28.3 (Table XXIII) regarding methods of training. Rejection of the null hypothesis at the .01 level of confidence with 2 and 279 degrees of freedom called for an F ratio greater than 4.71. The result was a rejection of the null hypothesis.

An inspection of the mean change scores for the total perceptual subtests by the Duncan Multiple Range Test found in Table XXIV provided information regarding significance among the methods of training. A comparison of means found the change in performance of the students in the perceptual method of training significantly surpassed that of the students in the language method of training and the control group. Additionally, the change in performance of the students in the language method of training significantly surpassed that of the control group.

D-2 There are no significant differences in reading readiness perceptual subtests change score performances when students are categorized by levels of pupil readiness status.

TABLE XXIII

ANALYSIS OF VARIANCE ON METHODS OF TRAINING AND SEX ON PERCEPTUAL SUBTESTS PERFORMANCE

Source	SS	DF	MS	F Ratio
Levels	1,213.44	2	606.72	7.59 **
Methods	4,528.13	2	2,264.07	28.34 **
Levels X Methods	278.99	4	69.75	.88
Within	22,289.85	279	79.89	
Total	28,310.41	287		

** $p < .01$

TABLE XXIV

COMPARISON OF MEAN CHANGE SCORES FOR METHODS OF TRAINING ON PERCEPTUAL SUBTESTS

Group Means		Critical Values	Difference
1. Language	51.54	S.E. = .93	1 vs. 2 = 5.41 *
2. Perceptual	56.95	R_2 = 2.63	2 vs. 3 = 9.69 *
3. Control	47.26	R_3 = 2.77	1 vs. 3 = 4.28 *

* Denotes significance at .05 level.

The analysis of variance yielded an F ratio of 7.59 (Table XXIII) regarding levels of pupil readiness status. Rejection of the null hypothesis at the .01 level of confidence with 2 and 279 degrees of freedom called for an F ratio greater than 4.71. The result was a rejection of the null hypothesis.

An inspection of the mean change scores for the total perceptual subtests by the Duncan Multiple Range Test found in Table XXV provided information regarding the levels of pupil readiness status. A comparison of means found that the change in performance of the students in the average and below average level of status significantly surpassed the change in performance of the students in the above average level. The change in performance of the students in the below average level failed to significantly surpass that of the students in the average level of status.

TABLE XXV

COMPARISON OF MEAN CHANGE SCORES FOR LEVELS OF PUPIL READINESS STATUS ON PERCEPTUAL SUBTESTS

Group Means		Critical Values	Difference
1. Above Average Status	49.05	S.E. = .93	1 vs. 2 = 4.80 *
2. Average Status	53.85	R_2 = 2.63	2 vs. 3 = .43
3. Below Average Status	53.42	R_3 = 2.77	1 vs. 3 = 4.37 *

* Denotes significance at .05 level.

D-4 There is no significant interaction effect within perceptual subtests change scores among methods of training and levels of pupil readiness status.

The analysis of variance yielded an F ratio of .88 (Table XXIII) regarding the interaction effect among methods of training and levels of pupil readiness status. Rejection of the null hypothesis at the .05 level of confidence with 4 and 279 degrees of freedom called for an F ratio greater than 2.41. The result was the acceptance of the null hypothesis. There was no interaction effect among methods of training and levels of pupil readiness status on the perceptual subtests.

Analysis by Methods of Training and the Category of Sex on Perceptual Subtests

An analysis of variance was applied to the change scores of the students based upon the perceptual subtests performance to test for significance among methods of training. The computed analysis of variance yielded an F ratio of 27.98 (Table XXVI) regarding methods of training. Rejection of the null hypothesis at the .01 level of confidence with 2 and 282 degrees of freedom called for an F ratio greater than 4.71. This supported the findings of the previous analysis regarding methods of training that resulted in the rejection of the null hypothesis D-1.

An inspection of the mean change scores for the total perceptual subtests by the Duncan Multiple Range Test found in Table XXVII provided information regarding significance among the methods of training. A comparison of means found the change in performance of the students in perceptual method of training significantly surpassed that of the students in the language method of training and the control group.

TABLE XXVI

ANALYSIS OF VARIANCE ON METHODS OF TRAINING AND SEX ON PERCEPTUAL SUBTESTS PERFORMANCE

Source	SS	DF	MS	F Ratio
Sex	236.53	1	236.53	2.92
Methods	4,528.13	2	2,264.07	27.98 **
Methods X Sex	723.52	2	361.76	4.47 **
Within	22,822.23	282	80.93	
Total	28,310.41	287		

** $p < .01$

TABLE XXVII

COMPARISON OF MEAN CHANGE SCORES FOR METHODS OF TRAINING ON PERCEPTUAL SUBTESTS

Group Means		Critical Values	Difference
1. Language	51.54	S.E. = .91	1 vs. 2 = 5.41 *
2. Perceptual	56.95	R_2 = 2.57	2 vs. 3 = 9.69 *
3. Control	47.26	R_3 = 2.71	1 vs. 3 = 4.28 *

* Denotes significance at .05 level.

D-3 There is no significant difference in reading readiness perceptual subtests change score performances when students are categorized by sex.

The analysis of variance yielded an F ratio of 2.92 (Table XXVI) regarding the category of sex. Rejection of the null hypothesis at the .05 level of confidence with 2 and 282 degrees of freedom called for an F ratio greater than 3.04. The result was the acceptance of the null hypothesis. There was no significant difference in the change in performance favoring boys or girls on the perceptual subtests.

D-5 There is no significant interaction effect within perceptual subtests scores among methods of training and the category of sex.

An additional inspection of the analysis of variance yielded an F ratio of 4.47 (Table XXVI) regarding the interaction effect among methods of training and sex. Rejection of the null hypothesis at the .01 level of confidence with 2 and 282 degrees of freedom called for an F ratio greater than 3.41. The result was a rejection of the null hypothesis.

An inspection of the mean change scores in Table XXVIII provided information about the interaction effect on the perceptual subtests. Utilization of the Duncan Multiple Range Test made it possible to locate the sources of significant interaction between methods of training and the category of sex.

A review of the findings with respect to significances found the students in the perceptual and language methods of training change in performance surpassed that of the students in the control group. In addition, the change in performance of the students in the perceptual method of training surpassed the language method of training. There was no significant difference in the category of sex.

TABLE XXVIII

COMPARISON OF THE MEAN CHANGE SCORES FOR INTERACTION EFFECT ON THE PERCEPTUAL SUBTESTS

	Methods of Training		
Sex	Language	Perceptual	Control
Boys	52.12	53.83	47.18
Girls	51.16	60.08	47.33

A comparison of means in the language method of training and the control group found no significant differences. A comparison of the means in the perceptual method of training found the girls' mean was significant to the boys' mean. The difference between the two means was of such a magnitude that it resulted in a significant interaction effect.

Summary

This chapter has presented the statistical results from the treatment of the data. Multiple classification analysis of variance techniques was used to test a number of hypotheses regarding the methods of training. The result was the rejection of the four hypotheses regarding the methods of training. The same statistical technique was used to test a number of hypotheses regarding the levels of pupil readiness status. Again, the four hypotheses were rejected regarding levels of pupil readiness status.

Analysis of the data regarding the category of sex found a significance on the total test and the Numbers subtest. There was no significant difference in the change in performance favoring boys or girls on the remaining subtests, the perceptual subtests, or the language subtests. A significant interaction effect was found on five of the individual subtests.

An additional investigation into the significance was made by the Duncan Multiple Range Test. These analyses will be discussed in more detail in Chapter V.

CHAPTER V

SUMMARY AND CONCLUSIONS

General Summary of the Investigation

This study presented an analysis of the effect of language and perceptual training upon the reading readiness performance of kindergarten children. All subjects in this study attended kindergarten classes in a midwestern school system during the fall semester, 1969. The students were administered the Metropolitan Readiness Test, Form A during the second week of September. Each of the student's performances on the six subtests, the language subtests, the perceptual subtests, and the total test was categorized according to levels of pupil readiness status. Additionally, the sample was categorized according to sex.

The subjects attended school in twenty-four kindergarten classes under the supervision of twelve kindergarten teachers. Random assignment of teachers made it possible to establish two experimental groups of eight classes each and a control group of eight classes. The eight classes in one experimental group received fourteen weeks of perceptual training, while the eight classes in the other experimental group received fourteen weeks of language training. The eight remaining classes were designated as the control group receiving their regular kindergarten instruction.

The Metropolitan Readiness Test, Form B was administered as the post-test during the second week of December. A pre- and post-test comparison of performance was made by the computation of individual change scores.

Multiple-classification analysis of variance technique was applied to the change scores grouped according to methods of training and levels of pupil readiness status. An additional comparison was made regarding methods of training and the category of sex utilizing the same statistical technique.

This chapter has been divided under the following headings: (1) the results of the performance of students on the total test; (2) the results of the performance of students on the individual subtests; (3) the results of the performance of the students upon the language subtests; and (4) the results of the performance of the students on the perceptual subtests.

Results of the Performance of Students On the Total Test

Two analyses of variance were applied to the change scores of the students based upon the total test performance of the students to test a number of hypotheses. They were as follows:

A-1 There are no significant differences between the reading readiness total test change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

A-2 There are no significant differences in reading readiness total test change score performance when students are categorized by levels of pupil readiness status.

A-3 There is no significant difference in reading readiness total test change score performance when students are categorized by sex.

A-4 There is no significant interaction effect within total test change scores among methods of training and levels of pupil readiness status.

A-5 There is no significant interaction effect within total test change scores among methods of training and the category of sex.

The results of the analyses indicated significant differences among methods of training, levels of pupil readiness status, and the category of sex. The null hypotheses A-1, A-2, and A-3 were rejected. There were no significant interaction effects among methods of training and levels of pupil readiness status and methods of training and the category of sex. The null hypotheses A-4 and A-5 were accepted.

It can be determined from the data presented in Table XXIX that the students in the perceptual method of training benefited from this experience and that the perceptual training program improved total readiness performance. Additionally, perceptual training was more beneficial than language training. It was that the students in the language method of training did not receive the same benefits from their experiences as the students in the perceptual method of training.

An evaluation of the results obtained with respect to levels of pupil readiness status should be made with the knowledge of regression to the mean (Weinberg and Schumaker, 1962, p. 18). In addition, many of the students in the above average level of pupil readiness status had mastered the skills being taught and the opportunity for additional improvement was somewhat limited. With these limitations in mind, it was found that the students in the below average level of pupil readiness status benefited the most from their kindergarten experiences. This was evidenced by greater gains in their total test change scores. Similar increases in total test change scores were found for the

students in the average level of pupil readiness status. Although improvement in total test change scores was evidenced for the students in the above average level of pupil readiness status, the amount was not statistically significant in comparison to the other levels of pupil readiness status.

TABLE XXIX

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND LEVELS OF PUPIL READINESS STATUS ON TOTAL TEST PERFORMANCE

	Group 1 Language	Group 2 Perceptual	Group 3 Control
Group means	56.12	62.32	54.88
Comparisons	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Differences	6.20 *	7.44 *	1.24
	Group 1 Above Average Status	Group 2 Average Status	Group 3 Below Average Status
Group means	53.34	57.95	62.02
Comparisons	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Differences	4.61 *	4.07 *	8.68 *

* Denotes significance at .05 level.

It can be determined from the data presented in Table XXX that the girls' total readiness performance exceeded that of the boys. It can be concluded that the girls benefited more than the boys from their kindergarten experiences as evidenced by their improved total readiness performance.

TABLE XXX

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND THE CATEGORY OF SEX ON TOTAL TEST PERFORMANCE

	Group 1 Language	Group 2 Perceptual	Group 3 Control
Group means	56.12	62.32	54.88
Comparisons	1 vs. 3 =	2 vs. 3 =	1 vs. 3 =
Differences	6.20 *	7.44 *	1.24

	Boys	Girls
Group means	63.3	66.7
Comparison	66.7 - 63.3 =	
Difference	3.4 *	

* Denotes significance at .05 level.

Results of the Performance of Students On the Individual Subtests

Two analyses of variance were applied to the change scores of the students based upon the individual subtest performances of the students to test a number of hypotheses. They were as follows:

B-1 There are no significant differences between the reading readiness subtest change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

B-2 There are no significant differences in reading readiness subtest change score performances when students are Categorized by levels of pupil readiness status.

B-3 There is no significant difference in reading readiness subtest change score performances when students are categorized by sex.

B-4 There is no significant interaction effect within subtest scores among methods of training and levels of pupil readiness status.

B-5 There is no significant interaction effect within subtest scores among methods of training and the category of sex.

The results of the analyses indicated significance differences among methods of training, levels of pupil readiness status, the category of sex, and the two interaction effects. The five null hypotheses stated above were rejected.

The mean change scores were presented in Table XXXI and Table XXXII as a review of the significances found among methods of training, levels of pupil readiness status, and the category of sex. The findings have been reported and conclusions drawn regarding each of the subtests.

TABLE XXXI

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND LEVELS OF PUPIL READINESS STATUS ON INDIVIDUAL SUBTESTS

Significant Subtests	Group 1 Language 1 vs. 2	Group 2 Perceptual 2 vs. 3	Group 3 Control 1 vs. 3
Word Meaning			
Group means	11.73	13.02	12.76
Difference	1.29 *	.26	1.03 *
Listening			
Group means	12.39	13.42	13.12
Difference	1.03 *	.30	.73
Matching			
Group means	13.04	14.47	13.01
Difference	1.43 *	1.46 *	.03
Numbers			
Group means	11.59	12.88	12.12
Difference	1.29 *	.76	.53
Copying			
Group means	12.44	13.61	10.65
Difference	1.17 *	2.96 *	1.79 *
Alphabet Test was not significant among methods of training.			

Significant Subtests	Group 1 Above Average Status 1 vs. 2	Group 2 Average Status 2 vs. 3	Group 3 Below Average Status 1 vs. 3
Word Meaning			
Group means	10.16	12.66	14.68
Difference	2.50 *	2.02 *	4.52 *
Listening			
Group means	10.86	12.37	15.15
Difference	1.51 *	2.77 *	4.28 *
Matching			
Group means	12.27	13.78	14.47
Difference	1.51 *	.69	2.20 *
Numbers			
Group means	10.69	11.88	14.02
Difference	1.19 *	2.14 *	3.13 *
Copying			
Group means	11.03	12.87	12.81
Difference	1.84 *	.06	1.78 *
Alphabet			
Group means	12.40	13.85	14.46
Difference	1.45 *	.61	2.06 *

* Denotes significance at .05 level.

TABLE XXXII

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND THE CATEGORY OF SEX ON INDIVIDUAL SUBTESTS

Significant Subtests	Group 1 Language 1 vs. 2	Group 2 Perceptual 2 vs. 3	Group 3 Control 1 vs. 3
Word Meaning			
Group means	11.73	13.02	12.76
Difference	1.29 *	.26	1.03 *
Matching			
Group means	13.04	14.47	13.01
Difference	1.43 *	1.46 *	.03
Numbers			
Group means	11.59	12.88	12.12
Difference	1.29 *	.76	.53
Copying			
Group means	12.44	13.61	10.65
Difference	1.17 *	2.96 *	1.79 *

	Boys	Girls
Numbers		
Group means	11.72	12.74
Comparison	12.74 - 11.72 =	
Difference	1.02 *	

* Denotes significance at .05 level.

It can be determined from the data presented in the two tables regarding the individual subtests performance that the change in performance of the students in the perceptual method of training surpassed that of the students in the language method of training on five of the

six subtests. This indicated that perceptual training was more beneficial than language training in the improving of individual readiness skills. The one exception was the lack of significance found on the Alphabet test.[1]

Since the skills found in the Matching and Copying subtests were defined as perceptual tasks, the significances found on these subtests indicated that perceptual training improved perceptual functioning. The change in performance of the students on these two subtests was greater than that of the students in the control group.

On the Word Meaning, Listening and Numbers subtests, the change in performance of the students in the perceptual method of training did not surpass the control group. This indicated that the perceptual training was not beneficial in improving the individual readiness skills presented in these subtests.

The individual subtests revealed two other significances. The control group's change in performance was greater than that of the students in the language method of training, while the change in performance of the students in the language method of training surpassed that of the students in the control group on the Copying subtest.

The significances found with respect to levels of pupil readiness status were evident in definite patterns resulting in a number of conclusions. It appeared that the students in the below average and average levels of pupil readiness status benefited from their kindergarten experiences more than the students in the above average level of

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[1]It should be noted that Alphabet and Listening subtests were not significant as found in the data presented in Table XXXII.

pupil readiness status. The change in performance of the students in the below average and average levels of pupil readiness status surpassed that of the students in the above average level of pupil readiness status on all of the subtests.

The change in performance of the students in the below average level of pupil readiness status was greater than that of the students in the average level of pupil readiness status on the language tasks of Word Meaning and Listening as well as the Numbers subtest. Conversely, there was no difference in change in performance of the students in the below average and average level of pupil readiness status on the perceptual tasks of Matching, Copying, and Alphabet.

It was evident that boys and girls performed equally well on five of the six subtests. This conclusion was based upon the lack of significance between the change in performance of boys and girls on all of the subtests except Numbers. The girls demonstrated a proficiency on the Numbers subtest not evident for the boys.

Results of the Performance of Students On the Language Subtests

Two analyses of variance were applied to the change scores of the students based upon the language subtests performances of the students to test a number of hypotheses. They were as follows:

C-1 There are no significant differences between the reading readiness language subtests change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

C-2 There are no significant differences in reading readiness language subtest change score performances when students are categorized by levels of pupil readiness status.

C-3 There is no significant difference in reading readiness language subtests change score performances when students are categorized by sex.

C-4 There is no significant interaction effect within language subtests among methods of training and levels of pupil readiness status.

C-5 There is no significant interaction effect within language subtest scores among methods of training and the category of sex.

The results of the analyses indicated significant difference among methods of training and levels of pupil readiness status. There was also a significant interaction effect among methods of training and levels of pupil readiness status. The null hypotheses, C-1, C-2, and C-4, were rejected. There was no significant difference between the change in performance of boys and girls on the language subtests. Additionally, there was no significant interaction among methods of training and the category of sex. The result was the acceptance of the null hypotheses, C-3 and C-4.

It can be determined from the data presented in Tables XXXIII and XXXIV regarding the language subtest that the change in performance of the students in the perceptual method of training was greater than that of the students in the language method of training and the control group. On the language subtests, it was evident that perceptual training was more beneficial than language training.

Significance existed among levels of pupil readiness status as evidenced by the data in Table XXXIII. The readiness experiences as measured by the students' performance on the language subtests were more profitable for the students in the below average and average level of pupil readiness status. It was evident that the students in these two levels of pupil readiness status benefited more from their

kindergarten experiences than the students in the above average level of pupil readiness status.

TABLE XXXIII

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND LEVELS OF PUPIL READINESS STATUS ON LANGUAGE SUBTESTS

	Group 1 Language	Group 2 Perceptual	Group 3 Control
Group means	44.30	47.11	44.43
Comparison	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Difference	2.81 *	2.68 *	.13
	Group 1 Above Average Status	Group 2 Average Status	Group 3 Below Average Status
Group means	42.14	45.67	48.03
Comparison	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Difference	3.53 *	2.36 *	5.89 *

* Denotes significance at .05 level.

From the data presented in Table XXXIV regarding the category of sex, it was evident that the boys and girls performed equally as well on the language subtests. This conclusion was based upon the lack of

significance between the change in performance of boys and girls on the language subtests.

TABLE XXXIV

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND THE CATEGORY OF SEX* ON LANGUAGE SUBTESTS

	Group 1 Language	Group 2 Perceptual	Group 3 Control
Group means	44.30	47.11	44.43
Comparison	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Difference	2.81**	2.68**	.13

*The category of sex showed no significant differences.
**Denotes significance at the .05 level.

Results of the Performance of the Students On the Perceptual Subtests

Two analyses of variance were applied to the change scores of the students based upon the perceptual subtest performances of the students to test a number of hypotheses. They were as follows:

D-1 There are no significant differences between the reading readiness perceptual subtest change score performances of kindergarten children receiving language training, perceptual training, and those not receiving training.

D-2 There are no significant differences in reading readiness perceptual subtest change score performances when students are categorized according to levels of pupil readiness status.

D-3 There is no significant difference in reading readiness perceptual subtests change score performances when students are categorized by sex.

D-4 There is no significant interaction effect within perceptual subtest change scores among methods of training and levels of pupil readiness status.

D-5 There is no significant effect within perceptual subtests scores among methods of training and the category of sex.

The results of the analyses indicated significant differences among methods of training and levels of pupil readiness status. There was also a significant interaction effect among methods of training and the category of sex. The null hypotheses, D-1, D-2, and D-5, were rejected. There was no significant difference between the change in performance of boys and girls on the perceptual subtests. Additionally, there was no significant interaction effect among methods of training and levels of pupil readiness status on the perceptual subtests. The result was the acceptance of the null hypotheses, D-3 and D-4.

It can be determined from the data presented in Table XXXV and Table XXXVI regarding the perceptual subtests that students in the perceptual method of training benefited more from their training than the students in the language method of training. The change in performance of the students in the perceptual method of training was greater than that of the students in the control group. On the perceptual subtests, it was evident that language training was beneficial as the change in performance of the students in the language method of training surpassed that of the students in the control group.

TABLE XXXV

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND LEVELS OF PUPIL READINESS STATUS ON PERCEPTUAL SUBTESTS

	Group 1 Language	Group 2 Perceptual	Group 3 Control
Group means	51.54	56.95	47.26
Comparison	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Difference	5.41 *	9.69 *	4.28 *

	Group 1 Above Average Status	Group 2 Average Status	Group 3 Below Average Status
Group means	49.05	53.85	53.42
Comparison	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Difference	4.80 *	.43	4.37 *

* Denotes significance at .05 level.

The significances found in Table XXXV regarding the levels of pupil readiness status indicated no significant differences between the change in performance of the students in the average and below average levels of pupil readiness status. It was evident that the students in the below average and average levels of pupil readiness status profited the same from their kindergarten experience; however, they benefited more than the students in the above average level of pupil readiness status.

TABLE XXXVI

RESULTS OF COMPARISONS OF MEAN CHANGE SCORES FOR SIGNIFICANCE AMONG METHODS OF TRAINING AND THE CATEGORY OF SEX* ON PERCEPTUAL SUBTESTS

	Group 1 Language	Group 2 Perceptual	Group 3 Control
Group means	51.54	56.95	47.26
Comparison	1 vs. 2 =	2 vs. 3 =	1 vs. 3 =
Difference	5.41**	9.69**	4.28**

*No significant differences were found in the category of sex on perceptual subtests.

**Denotes significance at .05 level.

It was evident that boys and girls performed equally well on the perceptual tasks presented in the perceptual subtests. This conclusion was based upon the lack of significance between the change in performance of boys and girls on the perceptual subtests.

Summary of Conclusions

This study was based upon the premise that physical structure and functions were largely genetic but may be modified by environment, that behavioral patterns may be genetic in origin but are highly modifiable; that knowledge and skills result from experience and training within the environment, but learning may be limited by genetic structure.

The major purpose of the study was to determine the effect of language and perceptual training upon kindergarten children's reading readiness performance. Additionally, the data were categorized according to sex and levels of pupil readiness status. An evaluation of the results of the study should be made with the purposes of the study in mind.

In this study, it was evident that the students in the perceptual method of training benefited more from their training than the students in the language method of training. This conclusion was based upon the knowledge that the change in performance of the students in the perceptual method of training surpassed that of the students in the control group on the perceptual subtests. This would also indicate that training would improve perceptual functioning as related to certain readiness skills. The results support the premise upon which the study was based.

Conversely, the students in the language method of training did not benefit from the additional knowledge or skills presented. The result of their experiences was a non-significant performance; in fact, they were on occasion surpassed by their control counterparts.

From the results obtained with respect to levels of pupil readiness status, it was evident that definite conclusive patterns developed. It appeared that the change in performance of the students in the below average and average levels of pupil readiness status exceeded that of the students in the above average level of pupil readiness status. The kindergarten experiences were more beneficial for the students in the below average and average levels of pupil readiness status than for the students in the above average level of pupil readiness status.

The change in performance of the students in the below average level of pupil readiness status was greater than that of the students in average level of pupil readiness status on the language tasks found in the Word Meaning and Listening subtests. While on the perceptual tasks, it was evident that there was no significant difference in the change in performance of the students in the below average and average levels of pupil readiness status.

The last phase of the study was concerned with the change in performance related to the category of sex. One contribution should be the limited amount of difference in change in performance between boys and girls. Educators have long assumed that a significant difference would exist at this age level (Smith and Dechant, 1961). Girls did surpass the boys' change in performance on the total test and the Numbers subtest. However, there appeared to be no marked difference in the change in performances of boys and girls on the other subtests.

Recommendations

In any research endeavor, a number of aspects are identified which could relate to the study but are not specifically considered in the design. These aspects then become recommendations for guiding future research. The following are some aspects related to reading readiness and the training of the skills related to readiness which might deserve analysis.

1. Directly related to the sample of this study, additional research in the form of constructed growth curves should be used for studying development of readiness skills within kindergarten children.

2. Directly related to the sample of this study, additional research at the end of the first-grade year should provide

additional information regarding the effect of language and perceptual training on first-grade reading performance.

3. Additional research in the area of visual perception and language training utilizing kindergarten children receiving both forms of training as compared to those receiving only language or perceptual training.

4. Additional research in the area of language development based upon an extended longitudinal study for the purpose of providing information regarding this area.

5. Additional research in the area of language development regarding the development of psycholinguistic abilities during their formative stages.

A SELECTED BIBLIOGRAPHY

Akers, James C. "A Predictive Validity Study of the Metropolitan Readiness Tests." (unpublished Doctor's dissertation, Oklahoma State University, 1969).

Betts, Emmert A. Foundations of Reading Instruction. New York: American Book Co., 1946.

Blessing, Kenneth R. "An Investigation of a Psycholinguistic Defect in Educable Mentally Retarded Children, Detection, Remediation and Related Variables." (unpublished Doctor's dissertation, University of Wisconsin, 1964).

Blue, C. M. "The Effectiveness of a Group Language Program with Trainable Mental Retards." (unpublished Master's report, Appalachian State Teachers College, 1963).

Bruning, James L., and B. L. Kintz. Computational Handbook of Statistics. Glenview, Illinois: Scott, Foresman and Co., 1968.

Cox, Brian J., and Lionel R. Hambly. "Guided Development of Perceptual Skill of Visual Space as a Factor in the Achievement of Primary Grade Children." American Journal of Optometry and Archives of American Academy of Optometry, XXI (August, 1961), 433-444.

Dunn, Lloyd M., and Max Mueller. The Effectiveness of the Peabody Language Development Kits and the Initial Teaching Alphabet with Disadvantaged Children in the Primary Grades: After One Year. Nashville: IMRID Monograph #2, Peabody College, 1966.

Dunn, Lloyd M., Prayot Pochanart, and Philip Pfost. The Effectiveness of the Peabody Language Development Kits and the Initial Teaching Alphabet with Disadvantaged Children in the Primary Grades: After Two Years. Nashville: IMRID Monograph #6, Peabody College, 1967.

Dunn, Lloyd M., and James O. Smith. Manual for the Peabody Language Development Kits, Level 1. Circle Pines, Minnesota: American Guidance Service, Inc., 1966.

Durrell, Donald C. and Alice K. Nicholson. "Preschool and Kindergarten Experience." Readings in Reading. Ed. Delwyn G. Schubert and Theodore L. Torgenson. New York: Thomas Y. Crowell Co., 1968.

Ensminger, E. Eugene. "The Effects of a Classroom Language Development Program on Psycholinguistic Abilities and Intellectual Functioning in Slow-Learning and Borderline Retarded Children." (unpublished Doctor's dissertation, University of Kansas, 1965).

Faustman, Marion N. "Some Effects of Perceptual Training in Kindergarten on First-Grade Children." (unpublished Doctor's dissertation, University of California, Berkeley, 1966).

Feldman, Shirley C. "Visual Perception Skills of Children and Their Relation to Reading." (unpublished Doctor's dissertation, Columbia University, 1963).

Frognone, Charles. "Effect of Visual Perception and Language Training Upon Certain Abilities of Retarded Children." (unpublished Doctor's dissertation, George Peabody College, 1966).

Frostig, Marianne, and David Horne. Manual for the Frostig Program for the Development of Visual Perception. Chicago: Follett Educational Corporation, 1964.

Gates, Arthur I. The Improvement of Reading. New York: The MacMillian Company, 1937.

Gibson, Robert C. "Effectiveness of a Supplemental Language Development Program with Educable Mentally Retarded Children." (unpublished Doctor's dissertation, 1966).

Goins, Jeal L. Visual Perceptual Abilities and Early Reading Progress. Supplementary Educational Monographs, No. 87. Chicago: University of Chicago Press, 1958.

Harris, Albert J. How To Increase Reading Ability. New York: David McKay Co., Inc., 1961.

Hildreth, Gertrude H., Nellie L. Griffiths, and Mary E. McGauvran. Manual for the Metropolitan Readiness Test. New York: Harcourt, Brace and World, Inc., 1965.

Kagerer, Rudolph L. The Relationship of Visual Perception Performance in Early Grade to Reading Level in Grade Four. Lafayette, Indiana: Purdue Research Foundation, 1960.

Kephart, Newell C. The Slow Learner in the Classroom. Columbus: Charles E. Merrill Books, Inc., 1960.

Kerlinger, Fred M. Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc., 1964.

Keystone View Company. Manual of Instruction for Use with the Keystone Visual Survey Service. Meadville, Pennsylvania, 1965.

Lowder, Robert G. "Perceptual Ability and School Achievement." (unpublished Doctor's dissertation, Purdue University, 1956).

Martin, Roe M., and Darrell B. Harmon. A Preliminary Report - Winter Haven Study of Perceptual Learning. Winter Haven, Florida: Winter Haven Lions Research Foundation, 1962.

McBeath, Pearl M. "The Effectiveness of Three Reading Preparedness Programs for Perceptually Handicapped Kindergartners." (unpublished Doctor's dissertation, Stanford University, 1966).

McCarthy, James J., and Samuel A. Kirk. Examiners Manual for the Illinois Test of Psycholinguistic Abilities. Urbana, Illinois: Institute for Research on Exceptional Children, 1961.

Meyerson, Daniel W. A Reading Readiness Training Program for Perceptually Handicapped Kindergarten Pupils of Normal Vision. Stanford, California: ERIC Project No. 6-8724, Stanford University, 1967.

Milligan, Jerry L. "A Study of the Effects of a Group Language Development Program Upon the Psycholinguistic Abilities of Normal Kindergarten Children." (unpublished Doctor's dissertation, University of Kansas, 1966).

Oklahoma State University. Thesis Writing Manual. Stillwater, 1967.

Osgood, C. E. Motivational Dynamics of Language Behavior. Lincoln, Nebraska: University of Nebraska Press, 1957.

Popham, W. James. Educational Statistics, Use and Interpretation. New York: Harper & Row Publishers, 1967.

Ray, Darrel D., and Leo V. Rodenborn. Manual for the Readiness Record File. Stillwater, Oklahoma: Diagnostic Publishing Company, 1969.

Runyon, Richard P., and Audrey Haber. Fundamentals of Behavioral Statistics. Reading: Addison-Wesley Publishing Co., 1968.

Simpson, Dorothy. "Perceptual Readiness and Beginning Reading." (unpublished Doctor's dissertation, Purdue University, 1960).

Smith, Henry, and Emerald V. Dechant. Psychology in Teaching Reading. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1961.

Smith, James O. Effects of a Language Development Program Upon the Psycholinguistic Abilities of Educable Mental Retards. Nashville: Peabody College Special Education Research Monograph Series, 1962.

Spache, George, and Evelyn Spache. Reading in the Elementary School. Boston: Allyn and Bacon, Inc., 1969.

Strauss, Adolph, and L. Lehtinen. Psychopathology and Education of the Brain-Injured Child. New York: Grune and Stratton, Inc., 1947.

Turabian, Kate L. A Manual for Writers of Term Papers, Theses, and Dissertations. Chicago: The University of Chicago Press, 1955.

Vernon, M. D. Backwardness in Reading. Cambridge: Cambridge University Press, 1957.

Weinberg, George H., and John A. Schumaker. Statistics, An Intuitive Approach. Belemont, California: Wadsworth Publishing Company, Inc., 1962.

APPENDIX

RAW SCORE DATA FOR SUBJECTS

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Metropolitan Post-Test 1	2	3	4	5	6	T
001	L	F	5	5	0	0	0	3	13	4	5	9	6	9	5	38
002	L	F	8	10	4	11	11	2	46	7	9	11	15	11	10	63
003	L	F	4	7	3	7	6	0	27	7	12	4	4	6	7	40
004	L	F	5	8	5	5	12	6	41	8	7	11	10	13	9	58
005	L	F	8	8	4	3	10	2	35	7	9	7	7	9	4	43
006	L	F	7	10	3	8	7	6	41	10	11	7	7	7	7	49
007	L	F	6	5	5	4	7	7	34	7	12	9	7	12	11	58
008	L	F	3	9	4	4	6	5	31	8	9	9	4	10	8	48
009	L	F	7	9	4	8	6	6	40	8	12	10	11	12	11	64
010	L	F	8	9	4	4	5	3	33	7	11	5	3	12	7	45
011	L	F	7	6	8	5	8	1	25	7	9	5	7	11	6	35
012	L	F	9	7	4	4	3	3	30	6	8	3	6	9	0	32
013	L	F	3	10	4	5	5	3	30	5	10	10	11	11	3	50
014	L	F	7	8	4	2	6	5	32	5	13	5	5	8	7	43
015	L	F	5	4	9	7	9	3	37	10	9	10	14	15	11	69
016	L	F	5	6	4	4	5	5	29	5	6	5	10	9	3	38
017	L	F	9	7	4	11	7	3	41	9	13	6	13	10	2	53
018	L	F	5	11	4	5	8	3	36	5	10	8	8	8	4	42
019	L	F	5	8	6	9	8	7	43	10	9	8	16	12	12	67
020	L	F	5	4	6	3	5	0	23	7	6	8	3	7	1	32
021	L	F	8	8	7	5	7	2	37	6	10	12	7	4	7	46
022	L	F	5	8	4	2	2	2	23	9	9	7	14	11	2	52
023	L	F	8	8	5	5	9	2	37	11	14	4	4	6	4	42
024	L	F	6	10	5	1	5	1	28	7	10	5	4	5	1	32
025	L	F	8	10	6	9	9	3	45	7	10	8	15	13	3	56
026	L	F	10	9	10	10	15	14	68	13	14	12	14	14	11	78
027	L	F	12	9	4	6	6	0	37	12	13	10	6	8	5	54
028	L	F	14	10	8	8	16	11	67	13	11	14	11	13	13	75
029	L	F	8	10	1	3	6	5	33	11	6	7	12	9	8	53
030	L	F	6	9	3	5	6	2	31	8	10	4	4	5	5	36

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
031	L	F	6	8	6	2	7	3	32	9	10	8	6	7	4	44
032	L	F	11	11	4	8	12	7	53	11	14	14	9	8	11	67
033	L	F	8	12	6	5	6	1	38	10	9	9	5	11	1	45
034	L	F	9	11	7	3	12	5	47	10	10	12	5	12	3	52
035	L	F	9	11	4	5	7	5	41	5	11	11	3	12	7	49
036	L	F	9	11	2	6	15	8	51	12	14	10	14	13	9	72
037	L	F	6	5	4	1	5	0	21	7	7	1	4	6	0	25
038	L	F	7	7	6	3	6	2	31	9	11	7	7	8	5	47
039	L	F	8	13	5	8	10	7	41	10	11	10	8	12	11	62
040	L	F	6	7	0	1	4	1	19	8	9	8	6	9	7	47
041	L	F	7	4	3	3	5	0	22	9	8	3	0	1	0	21
042	L	F	8	11	5	5	6	4	39	10	9	13	6	5	7	50
043	L	F	9	6	2	3	5	0	25	6	5	3	1	8	5	28
044	L	F	3	6	1	0	2	0	13	6	4	2	5	5	4	26
045	L	F	2	3	0	0	1	0	6	2	3	0	3	2	0	10
046	L	F	4	5	2	2	4	0	17	7	6	3	4	8	0	28
047	L	F	2	8	1	1	4	0	16	6	7	3	4	6	1	27
048	L	F	3	4	1	2	6	0	16	8	9	6	2	13	7	45
049	L	F	3	4	2	1	7	7	24	7	5	3	2	8	2	27
050	L	F	4	5	1	2	4	0	16	10	10	3	15	10	2	50
051	L	F	3	4	2	3	4	0	16	9	10	2	2	6	1	30
052	L	F	13	11	5	7	9	0	45	11	14	8	10	15	4	62
053	L	F	3	8	1	3	3	1	19	7	9	5	6	8	2	37
054	L	F	8	8	4	5	7	13	45	9	13	8	11	8	5	54
055	L	F	3	2	1	0	2	0	8	7	12	1	5	8	5	38
056	L	F	3	10	4	0	8	10	35	7	10	14	8	12	9	60
057	L	F	3	9	2	0	5	0	19	9	3	4	4	5	5	30
058	L	F	3	6	0	1	6	0	16	9	13	10	5	8	5	50
059	L	F	5	12	1	2	8	5	33	10	13	6	7	8	7	51
060	L	F	6	12	1	0	6	0	25	8	10	3	3	7	2	33
061	L	F	5	7	9	3	11	7	42	9	9	8	3	8	5	42
062	L	F	7	14	1	8	10	4	44	7	9	6	11	9	4	46
063	L	F	6	2	2	0	5	6	21	9	8	4	7	5	5	38
064	L	F	5	3	1	3	7	1	20	7	4	5	8	7	4	35
065	L	F	5	7	3	0	4	4	23	0	6	1	1	0	2	10
066	L	F	4	6	4	0	6	1	21	8	11	7	10	10	2	48
067	L	F	4	7	5	0	4	7	27	3	7	8	8	5	4	35
068	L	F	0	4	0	1	2	0	7	1	2	3	0	4	3	13
069	L	F	4	8	0	0	7	3	22	8	7	5	5	7	3	37
070	L	F	4	1	2	0	7	2	16	5	6	3	3	4	8	29

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
071	L	F	8	9	8	0	11	7	43	7	11	12	13	13	12	68
072	L	F	7	6	4	2	8	1	28	3	10	8	8	10	0	39
073	L	F	6	9	3	6	5	6	35	9	10	6	9	10	7	51
074	L	F	1	2	3	3	6	2	17	11	10	3	13	4	12	53
075	L	F	6	10	6	6	11	10	49	9	7	4	7	13	11	51
076	L	F	5	8	4	5	6	5	33	5	7	10	12	8	13	55
077	L	F	6	13	0	2	7	2	30	12	11	1	13	10	6	53
078	L	F	4	3	5	2	7	1	22	12	10	2	11	9	2	46
079	L	F	1	2	3	1	2	5	14	10	11	5	14	6	8	54
080	L	F	12	8	8	8	13	8	57	7	12	10	15	9	11	64
081	L	F	3	1	2	3	4	0	13	10	9	6	4	8	1	38
082	L	F	2	4	0	3	6	5	20	3	2	5	9	11	7	37
083	L	F	4	12	4	1	10	4	35	11	13	6	11	7	6	54
084	L	M	7	10	4	4	6	1	32	7	6	9	6	8	5	41
085	L	M	7	6	6	7	12	7	45	8	8	6	9	10	6	57
086	L	M	8	6	4	4	6	3	31	7	12	7	7	10	9	52
087	L	M	7	11	5	3	5	1	32	8	10	5	4	8	4	39
088	L	M	4	11	4	5	6	0	30	3	5	2	2	4	4	20
089	L	M	6	8	5	5	7	7	38	4	13	12	9	11	11	60
090	L	M	8	8	4	4	4	5	33	5	8	5	8	12	9	47
091	L	M	5	5	5	5	5	3	28	9	16	7	4	10	6	52
092	L	M	6	11	6	5	9	1	38	7	7	9	5	8	2	38
093	L	M	9	7	7	3	9	3	38	7	16	8	6	10	9	56
094	L	M	5	7	5	2	7	1	27	8	8	8	6	5	6	41
095	L	M	7	10	4	4	3	0	28	5	8	5	3	4	2	27
096	L	M	6	11	10	3	10	6	46	9	9	11	7	13	13	60
097	L	M	10	9	6	4	9	3	41	6	10	5	4	8	8	41
098	L	M	5	6	5	6	4	0	26	5	8	6	1	7	4	31
099	L	M	5	8	3	5	7	1	29	6	5	5	9	6	5	36
100	L	M	6	5	5	1	6	1	24	8	11	8	8	8	8	51
101	L	M	3	2	0	1	4	0	10	7	5	1	5	5	0	23
102	L	M	6	12	2	8	4	5	37	10	13	5	13	11	6	58
103	L	M	2	4	1	1	5	0	13	7	4	1	2	3	0	17
104	L	M	11	12	5	4	10	5	47	11	11	6	6	10	7	51
105	L	M	10	11	0	3	3	2	29	11	12	8	11	11	4	57
106	L	M	7	11	5	7	4	2	36	9	8	7	5	8	4	41
107	L	M	11	10	4	2	6	3	36	11	13	10	9	10	5	58
108	L	M	11	13	7	12	7	5	55	7	8	8	15	14	7	59
109	L	M	12	8	2	2	5	0	29	12	13	9	8	8	7	57
110	L	M	6	7	5	1	10	2	31	11	11	11	13	13	9	68

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
111	L	M	4	7	5	2	8	0	26	10	10	7	12	7	3	49
112	L	M	9	11	2	6	12	3	43	7	11	3	7	11	5	44
113	L	M	11	11	0	5	9	1	37	10	13	11	10	13	3	60
114	L	M	5	9	0	0	4	0	18	10	6	5	4	12	1	38
115	L	M	9	10	3	0	3	0	25	8	10	8	6	9	4	45
116	L	M	12	12	6	6	14	3	53	10	12	9	10	14	9	63
117	L	M	8	11	1	4	7	1	32	10	11	6	9	15	3	54
118	L	M	7	8	2	7	7	1	32	8	11	10	0	6	5	40
119	L	M	9	12	3	7	11	7	49	10	11	10	9	13	7	60
120	L	M	7	7	7	1	8	2	32	8	12	9	0	8	6	43
121	L	M	4	5	1	0	5	0	15	4	7	6	6	3	9	35
122	L	M	12	8	6	3	6	1	36	10	12	9	1	8	5	45
123	L	M	12	13	6	4	7	4	46	9	13	6	13	16	10	67
124	L	M	3	10	10	2	6	5	36	10	10	9	12	12	5	58
125	L	M	1	7	4	6	9	10	37	10	9	7	8	10	9	53
126	L	M	2	0	0	0	0	0	2	0	1	0	2	2	2	7
127	L	M	6	6	2	3	9	0	26	9	13	8	5	8	3	46
128	L	M	0	4	2	1	6	2	15	7	9	2	4	5	1	28
129	L	M	10	11	7	7	8	7	50	10	11	11	14	11	9	66
130	L	M	3	4	5	0	8	3	22	8	12	9	6	9	7	51
131	L	M	8	8	6	8	6	7	43	11	16	12	15	9	6	69
132	L	M	10	13	6	4	7	8	48	9	10	10	3	12	11	55
133	L	M	1	4	0	0	4	2	11	5	5	0	9	8	3	30
134	L	M	8	7	7	3	8	9	42	7	10	10	2	8	10	47
135	L	M	4	5	1	0	3	0	13	6	6	4	7	12	3	38
136	L	M	4	3	0	0	2	7	16	3	5	6	4	7	9	34
137	L	M	3	2	1	0	3	2	11	7	9	8	4	8	4	40
138	L	M	3	3	2	0	1	0	9	8	13	3	4	10	1	39
139	L	M	0	0	1	1	2	0	4	4	1	2	10	3	0	20
140	L	M	4	6	0	0	8	0	18	7	10	2	1	3	1	24
141	L	M	1	4	0	0	3	1	9	5	3	1	2	1	0	12
142	L	M	3	8	0	0	5	1	17	5	13	7	5	7	1	38
143	L	M	2	3	1	0	3	0	9	6	6	3	5	4	6	30
144	L	M	2	5	0	0	5	1	13	4	10	5	9	7	8	43
145	L	M	1	3	2	0	0	0	6	4	3	1	3	4	0	15
146	L	M	6	7	2	2	4	0	21	10	12	2	6	7	1	38
147	L	M	9	9	2	9	7	5	41	11	11	7	9	14	4	56
148	L	M	4	2	0	0	2	0	8	7	8	2	1	2	1	21
149	L	M	5	3	1	1	3	0	13	5	8	1	5	6	0	25
150	L	M	5	10	1	6	9	4	35	8	16	7	5	15	8	59

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
151	L	M	2	2	0	2	2	0	8	8	7	1	5	7	0	28
152	L	M	4	4	0	1	3	0	12	8	7	1	6	6	4	32
153	L	M	4	5	0	0	0	0	9	4	7	1	5	8	3	28
154	L	M	4	7	0	0	2	0	13	10	10	2	2	8	5	37
155	L	M	7	9	5	6	6	5	38	8	9	6	8	8	9	48
156	L	M	6	9	4	4	5	1	29	9	7	6	7	7	4	40
157	L	M	8	8	6	7	14	11	54	10	12	5	9	13	12	61
158	L	M	11	9	6	5	13	12	55	11	10	9	4	14	13	61
159	L	M	6	9	3	3	4	0	25	7	10	3	5	8	4	37
160	L	M	10	2	1	0	2	0	15	7	6	3	2	6	3	27
161	L	M	6	2	1	8	2	0	19	8	8	3	1	5	0	25
162	P	F	7	10	6	5	5	7	40	12	9	11	10	15	14	71
163	P	F	10	9	10	5	9	5	48	7	10	13	11	14	8	63
164	P	F	11	7	5	4	10	1	38	10	13	12	8	6	8	57
165	P	F	8	10	3	2	2	1	26	9	8	6	13	13	5	54
166	P	F	11	13	7	12	11	7	61	11	13	12	15	14	11	76
167	P	F	9	8	7	6	11	1	42	10	13	9	11	10	8	61
168	P	F	9	8	6	5	5	6	39	9	10	9	14	11	9	62
169	P	F	9	8	3	2	7	1	30	9	9	10	7	13	7	55
170	P	F	7	12	6	4	6	1	36	5	6	7	5	7	6	36
171	P	F	11	10	7	2	7	5	42	11	13	13	6	14	11	68
172	P	F	7	10	4	2	4	0	27	6	8	6	6	12	4	42
173	P	F	8	8	0	0	2	0	18	8	10	5	5	7	3	38
174	P	F	14	12	11	6	14	10	67	10	11	12	9	18	12	72
175	P	F	10	9	9	5	11	5	49	9	12	13	11	16	9	70
176	P	F	10	11	6	3	9	5	44	11	10	12	8	10	10	61
177	P	F	5	9	9	4	4	12	43	10	11	11	7	8	12	59
178	P	F	7	13	1	2	6	6	35	13	14	8	6	10	11	55
179	P	F	6	5	0	2	10	2	25	6	10	13	5	14	9	57
180	P	F	4	5	2	0	7	1	19	7	7	9	1	9	3	36
181	P	F	8	10	5	4	13	7	47	13	15	10	8	15	11	72
182	P	F	0	0	0	0	2	3	5	4	7	9	3	6	9	38
183	P	F	2	7	1	5	4	5	24	12	10	14	10	11	12	69
184	P	F	5	3	0	0	0	1	9	7	11	7	4	7	3	39
185	P	G	7	6	0	5	7	3	28	10	10	10	14	5	7	56
186	P	F	4	7	0	1	4	0	16	7	5	7	3	4	2	29
187	P	F	7	13	7	10	8	7	52	13	11	10	13	14	11	72
188	P	F	4	9	3	2	7	1	26	7	10	9	7	9	7	49
189	P	F	2	4	2	2	3	0	13	4	10	5	0	6	0	25
190	P	F	2	4	0	0	5	3	14	7	9	12	7	8	9	52

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
191	P	F	3	8	3	4	6	0	24	6	9	8	7	7	5	42
192	P	F	0	3	0	0	1	1	5	4	4	4	2	5	3	22
193	P	F	7	9	3	2	8	1	30	13	11	9	6	8	4	51
194	P	F	10	9	2	2	13	2	38	16	13	13	6	19	12	79
195	P	F	5	6	0	0	1	1	13	14	14	6	13	11	1	59
196	P	F	7	8	1	0	3	4	23	12	14	10	0	9	10	55
197	P	F	6	7	0	0	1	0	14	11	13	8	5	11	4	52
198	P	F	3	8	0	3	7	1	22	15	13	9	5	9	8	59
199	P	F	0	1	0	0	4	1	6	10	12	2	5	8	3	40
200	P	F	7	7	1	2	3	2	22	14	12	2	9	0	0	37
201	P	F	7	7	4	0	5	1	25	13	4	8	8	17	7	57
202	P	F	7	6	1	0	0	1	15	15	13	7	1	0	0	36
203	P	F	4	3	0	0	5	0	12	10	14	9	4	15	6	58
204	P	F	7	10	2	2	6	2	29	13	11	3	8	10	6	51
205	P	F	5	10	1	2	9	1	28	15	14	10	9	17	2	67
206	P	F	5	7	1	0	1	2	16	11	13	13	8	14	10	69
207	P	F	4	3	2	0	2	1	12	11	13	11	7	11	6	59
208	P	F	5	7	0	0	4	2	18	11	15	13	4	15	14	72
209	P	F	6	4	1	0	1	2	14	12	14	13	10	14	7	70
210	P	F	2	0	0	0	1	0	3	4	6	3	6	8	6	33
211	P	F	7	4	3	0	7	3	24	9	10	9	7	7	3	45
212	P	F	4	5	4	4	9	4	30	9	6	6	13	17	8	59
213	P	F	0	0	0	0	2	1	3	9	6	6	8	15	5	49
214	P	F	3	2	3	0	3	3	14	7	10	5	4	6	5	37
215	P	F	5	2	1	3	4	1	16	7	6	4	2	10	5	34
216	P	F	6	1	0	0	1	0	8	10	5	8	5	9	4	41
217	P	F	2	3	6	0	0	0	11	6	12	3	8	10	7	46
218	P	F	9	6	3	5	10	5	38	7	8	8	12	11	12	58
219	P	F	4	3	1	0	1	8	17	5	11	3	3	8	7	37
220	P	F	1	0	0	0	3	0	4	2	4	0	10	3	10	29
221	P	F	5	4	2	4	6	8	29	13	9	12	13	15	11	73
222	P	F	0	0	0	2	3	1	6	7	8	4	9	5	3	36
223	P	F	0	0	0	0	7	1	8	4	8	4	3	6	7	32
224	P	F	4	4	1	1	8	7	25	8	12	9	2	11	6	48
225	P	F	5	4	0	1	5	1	16	8	9	3	6	6	3	35
226	P	F	4	4	3	5	7	8	31	7	10	13	12	9	9	60
227	P	F	1	4	1	1	3	4	14	8	13	7	8	8	4	48
228	P	M	0	1	0	0	0	0	1	1	3	1	4	3	2	14
229	P	M	6	8	4	6	7	1	32	0	11	6	5	10	3	35
230	P	M	12	8	5	3	7	5	40	10	13	8	6	12	7	56

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
231	P	M	8	7	5	2	2	0	24	7	7	5	2	5	6	32
232	P	M	7	9	3	3	6	0	28	6	6	0	0	3	1	16
233	P	M	11	11	3	6	8	2	41	6	12	7	2	6	3	36
234	P	M	3	8	3	5	7	1	27	7	7	7	9	13	5	48
235	P	M	8	8	6	3	5	1	31	11	7	6	7	9	11	51
236	P	M	8	7	4	7	8	3	37	8	11	9	13	10	4	55
237	P	M	3	6	0	4	7	0	20	0	3	0	2	6	0	11
238	P	M	11	11	5	2	18	1	48	8	9	6	6	13	9	51
239	P	M	4	6	3	3	3	2	21	6	8	3	2	9	6	34
240	P	M	5	6	7	7	10	6	41	5	9	7	10	10	10	51
241	P	M	8	5	6	2	12	0	33	10	8	13	14	7	0	52
242	P	M	6	11	6	5	8	4	40	4	11	5	6	6	8	40
243	P	M	11	12	10	6	14	6	59	13	13	12	10	20	8	76
244	P	M	11	7	4	7	8	0	37	10	11	7	4	7	1	41
245	P	M	5	2	4	2	6	0	19	7	9	1	9	5	2	33
246	P	M	12	11	2	3	10	6	44	10	8	7	6	7	6	44
247	P	M	8	12	4	4	7	1	36	11	9	14	4	8	11	57
248	P	M	8	12	6	3	10	3	42	7	15	12	11	14	10	69
249	P	M	9	11	5	4	11	4	44	12	12	10	13	9	12	68
250	P	M	6	11	7	1	11	2	38	8	9	7	9	13	7	53
251	P	M	7	10	4	4	9	4	38	11	11	6	5	9	6	48
252	P	M	8	11	7	4	10	2	42	9	15	8	7	13	4	56
253	P	M	11	11	4	4	7	3	40	6	11	10	10	11	7	55
254	P	M	8	12	10	8	21	8	67	12	12	12	8	7	0	51
255	P	M	5	11	2	3	7	3	31	9	14	14	5	11	14	67
256	P	M	2	7	0	4	0	0	13	6	5	0	0	6	0	17
257	P	M	1	5	1	0	2	0	9	4	9	0	0	5	6	24
258	P	M	0	0	0	3	12	3	18	7	7	10	11	13	11	59
259	P	M	4	11	4	5	7	10	41	7	13	10	8	12	12	62
260	P	M	4	8	6	3	8	2	31	6	11	9	3	9	5	43
261	P	M	2	6	3	7	4	6	28	8	9	4	11	8	9	49
262	P	M	2	5	1	0	0	0	8	1	5	6	0	4	6	22
263	P	M	3	4	0	2	3	5	17	8	10	6	7	8	4	43
264	P	M	3	4	0	0	2	1	10	9	9	3	6	6	2	35
265	P	M	5	3	1	3	3	0	15	9	10	8	3	7	0	34
266	P	M	4	2	1	0	3	0	10	9	6	7	0	6	2	30
267	P	M	5	7	2	0	1	1	16	12	10	10	8	11	2	53
268	P	M	1	10	1	3	6	1	22	8	10	1	7	8	4	38
269	P	M	6	2	0	0	4	0	12	9	10	5	6	6	0	36
270	P	M	5	1	1	8	5	0	20	5	5	10	13	5	0	38

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
271	P	M	2	6	1	1	3	0	13	7	8	9	6	9	1	40
272	P	M	1	2	2	4	1	0	10	6	4	1	3	3	1	18
273	P	M	4	1	0	0	3	0	8	3	8	5	0	3	7	26
274	P	M	6	10	1	2	3	0	22	13	13	5	8	6	4	49
275	P	M	7	10	0	0	9	0	26	12	11	3	4	6	1	37
276	P	M	2	0	0	0	2	0	4	6	4	1	0	0	0	11
277	P	M	8	10	2	0	4	2	26	13	12	8	9	10	6	58
278	P	M	11	9	0	2	6	1	29	11	14	7	8	13	7	60
279	P	M	8	10	2	0	4	2	26	13	12	5	12	16	9	67
280	P	M	6	4	0	0	5	3	18	11	13	7	8	10	3	52
281	P	M	10	4	0	1	2	2	19	16	13	3	2	8	3	45
282	P	M	10	6	0	0	3	1	20	13	16	8	6	12	7	62
283	P	M	4	6	0	0	4	1	15	9	8	8	2	6	2	35
284	P	M	7	12	2	5	8	1	35	14	12	10	13	10	2	61
285	P	M	5	6	1	0	2	0	14	10	13	10	7	8	3	51
286	P	M	12	9	5	6	6	3	41	14	14	11	8	13	5	65
287	P	M	0	5	0	0	1	0	6	6	8	3	1	2	1	21
288	P	M	5	8	1	0	2	1	17	8	9	3	0	6	4	30
289	P	M	6	9	1	0	2	1	19	9	11	6	3	6	2	37
290	P	M	5	8	4	2	1	0	20	11	6	7	8	3	0	35
291	P	M	10	4	0	0	3	0	17	10	13	2	9	12	4	50
292	P	M	1	2	0	0	0	0	3	6	10	6	6	8	4	40
293	P	M	4	4	0	2	7	4	21	11	10	7	5	6	10	49
294	P	M	1	0	0	0	1	0	2	10	6	9	12	13	7	57
295	P	M	0	1	0	0	1	0	2	4	5	1	2	3	0	15
296	P	M	10	8	0	4	7	3	32	12	12	7	13	10	5	59
297	P	M	4	5	0	2	4	1	16	12	13	6	7	15	5	58
298	P	M	2	5	1	1	4	6	19	12	8	6	8	8	5	47
299	P	M	0	2	0	0	7	0	9	8	7	5	6	5	3	34
300	P	M	0	1	0	0	1	0	2	5	7	0	3	5	4	24
301	P	M	1	5	0	0	2	1	9	5	7	3	6	3	5	29
302	P	M	5	2	0	0	3	0	10	8	8	7	2	4	2	31
303	P	M	3	4	0	0	2	0	9	7	9	5	1	4	8	34
304	P	M	5	2	0	2	3	3	15	9	11	7	4	9	9	49
305	P	M	13	11	10	14	15	14	77	11	13	14	16	23	14	91
306	P	M	6	5	1	0	5	1	18	7	8	6	1	8	5	35
307	P	M	3	4	1	0	2	2	12	9	8	11	3	9	8	48
308	P	M	6	2	0	0	4	4	16	8	10	7	6	12	8	51
309	P	M	4	7	2	3	11	9	36	9	11	7	15	14	11	67
310	P	M	3	2	0	1	5	0	11	6	9	7	7	12	2	43

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
311	P	M	5	4	0	0	2	0	11	5	7	8	8	5	9	42
312	P	M	13	6	0	3	7	4	33	14	11	12	12	16	10	75
313	P	M	12	6	0	0	10	3	31	10	13	10	4	10	10	57
314	P	M	5	1	1	0	7	7	21	9	11	11	11	10	13	65
315	C	F	11	13	11	10	18	10	73	12	13	10	14	18	7	74
316	C	F	9	14	11	7	21	11	73	12	12	10	12	18	9	73
317	C	F	7	3	1	1	3	1	16	8	12	7	7	7	1	42
318	C	F	8	10	7	8	13	13	59	10	11	5	5	5	5	41
319	C	F	7	12	8	7	10	8	52	12	12	12	11	11	8	66
320	C	F	7	12	8	8	13	8	56	10	10	9	11	14	4	58
321	C	F	6	10	3	9	14	5	47	9	9	11	9	9	4	51
322	C	F	7	11	5	10	14	8	55	10	14	14	15	14	6	73
323	C	F	11	13	9	4	16	11	64	13	13	11	4	13	11	65
324	C	F	5	0	0	2	6	4	17	7	10	5	6	8	3	39
325	C	F	6	0	3	5	8	3	25	11	11	12	14	12	2	62
326	C	F	6	9	6	2	9	4	36	10	11	3	9	12	5	50
327	C	F	5	13	8	11	15	11	63	10	10	12	14	12	11	69
328	C	F	13	10	8	13	14	9	67	10	12	5	5	15	5	52
329	C	F	7	4	6	5	9	5	36	11	12	11	9	15	8	66
330	C	F	7	4	3	5	6	3	28	9	7	5	8	6	4	39
331	C	F	7	7	2	0	6	0	22	5	5	3	1	5	1	20
332	C	F	5	10	3	2	8	2	30	12	11	6	6	9	3	47
333	C	F	8	12	3	3	7	1	34	9	12	11	10	10	5	57
334	C	F	5	6	5	6	10	2	34	11	15	10	13	10	5	64
335	C	F	6	11	4	2	4	1	28	10	12	4	11	11	4	52
336	C	F	11	8	10	4	12	3	45	12	14	12	10	16	5	69
337	C	F	7	8	6	7	8	6	42	11	9	13	4	9	3	49
338	C	F	7	8	6	5	4	0	30	10	10	7	14	9	3	53
339	C	F	7	7	1	4	10	4	33	10	10	10	14	11	5	60
340	C	F	9	9	4	5	4	2	33	11	9	11	6	3	3	43
341	C	F	4	4	0	0	3	1	12	6	8	2	5	7	0	28
342	C	F	6	11	2	13	13	6	51	9	10	12	15	21	6	73
343	C	F	5	10	1	0	4	7	27	9	10	7	6	8	4	44
344	C	F	5	7	1	6	8	4	31	11	9	7	5	12	6	50
345	C	F	1	6	0	4	4	1	16	7	7	0	2	0	0	16
346	C	F	13	10	1	5	12	3	44	9	10	3	5	12	5	44
347	C	F	4	6	0	1	3	3	17	5	2	2	5	11	13	38
348	C	F	5	10	0	4	10	2	31	6	7	2	9	10	1	35
349	C	F	6	8	1	3	4	5	27	7	10	4	3	6	2	32
350	C	F	7	10	1	11	15	4	48	12	11	11	14	19	10	77

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
351	C	F	9	11	1	6	14	5	56	11	12	2	12	12	7	56
352	C	F	4	10	0	0	1	0	15	1	5	0	4	6	2	18
353	C	F	2	6	0	0	1	4	13	7	5	2	3	4	0	21
354	C	F	0	0	0	0	3	5	8	12	12	6	9	10	2	51
355	C	F	6	2	0	6	6	7	27	5	11	9	9	17	9	60
356	C	F	1	4	0	0	2	0	7	5	7	6	4	6	1	29
357	C	F	1	5	0	3	6	2	17	7	10	8	5	9	8	47
358	C	F	1	0	0	0	0	1	2	6	10	5	4	10	4	39
359	C	F	2	0	0	1	2	1	6	5	8	2	0	1	0	16
360	C	F	1	3	1	0	0	0	5	5	8	0	1	3	1	18
361	C	F	2	2	1	2	6	1	14	7	9	4	7	11	1	39
362	C	F	7	5	0	0	0	0	12	12	10	4	3	5	2	36
363	C	F	3	3	2	0	0	0	8	6	1	0	1	3	0	10
364	C	F	3	10	0	0	9	7	29	14	11	2	15	12	10	64
365	C	F	4	7	0	2	1	1	15	5	6	3	1	4	2	21
366	C	F	3	4	0	0	1	0	8	6	6	4	0	4	3	23
367	C	F	4	12	6	3	8	7	40	11	12	6	7	10	3	49
368	C	F	6	8	5	3	9	10	41	12	10	12	6	9	7	56
369	C	F	0	2	1	3	1	0	7	6	6	0	0	2	0	14
370	C	F	1	3	0	0	0	0	4	4	5	3	6	6	2	26
371	C	F	6	7	1	3	7	6	30	7	11	6	4	7	6	41
372	C	F	5	6	7	3	9	7	37	10	10	8	8	10	7	53
373	C	F	5	4	0	1	2	0	12	7	9	4	5	11	2	38
374	C	F	4	8	0	4	6	6	28	6	7	5	6	11	4	39
375	C	F	2	9	0	7	5	0	23	6	8	6	5	4	8	37
376	C	F	7	1	1	0	2	0	11	7	4	2	5	9	0	27
377	C	F	2	6	5	6	8	7	34	7	10	0	11	8	3	39
378	C	F	4	5	2	5	10	2	28	11	7	7	11	11	2	49
379	C	F	10	10	0	8	8	0	36	11	10	4	5	12	2	44
380	C	F	3	9	0	5	10	3	30	6	10	3	5	10	3	37
381	C	F	5	7	4	3	4	2	25	8	11	9	4	7	3	42
382	C	F	3	9	4	4	6	4	30	11	5	10	5	10	6	47
383	C	F	8	10	9	6	11	9	53	9	13	12	11	11	12	68
384	C	F	5	14	5	5	12	2	43	10	13	8	7	9	2	49
385	C	F	7	7	5	3	5	0	27	5	4	4	12	7	2	34
386	C	F	6	11	3	3	10	4	37	8	9	6	8	5	1	37
387	C	F	5	4	3	0	1	2	15	10	1	4	0	3	0	18
388	C	F	5	8	4	2	5	0	24	9	8	4	5	6	2	34
389	C	F	5	10	4	3	3	2	27	8	8	7	4	8	5	40
390	C	F	4	7	7	14	6	4	42	10	5	7	11	13	4	50

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
391	C	F	5	7	7	3	8	4	34	7	9	13	8	8	10	55
392	C	F	5	8	7	9	10	2	41	7	9	9	13	10	2	50
393	C	F	3	5	5	4	3	5	25	6	8	7	3	6	4	34
394	C	F	10	10	10	14	11	8	63	8	10	12	13	12	6	61
395	C	F	8	8	6	2	4	2	30	6	5	3	10	9	1	34
396	C	F	7	11	6	4	4	3	35	8	9	8	2	9	8	44
397	C	F	6	8	4	4	6	1	29	6	9	6	7	9	2	39
398	C	F	10	7	6	7	7	4	41	9	9	8	7	8	5	46
399	C	F	5	10	6	3	6	1	31	6	12	6	5	5	2	36
400	C	F	9	8	4	1	8	2	32	14	12	4	9	8	1	48
401	C	F	4	6	3	2	7	1	23	5	8	4	4	9	1	31
402	C	F	6	7	3	2	6	1	25	12	10	2	4	4	5	37
403	C	F	5	7	7	5	8	3	35	7	8	10	7	9	5	46
404	C	M	8	0	2	3	7	1	21	5	5	5	5	7	2	29
405	C	M	10	11	8	1	8	4	42	12	11	8	6	12	3	52
406	C	M	12	13	8	1	8	5	47	11	13	11	13	12	2	62
407	C	M	10	7	4	3	6	7	37	11	12	11	13	13	9	69
408	C	M	9	11	7	12	13	11	63	12	12	12	14	14	7	71
409	C	M	10	8	5	1	6	6	36	13	14	14	12	11	11	75
410	C	M	12	9	14	16	14	9	74	11	13	13	16	14	10	77
411	C	M	5	5	2	1	3	0	16	8	6	9	5	4	5	37
412	C	M	9	6	12	0	4	7	38	11	13	12	10	11	9	66
413	C	M	8	9	1	5	5	0	28	13	14	10	7	7	1	52
414	C	M	5	10	7	10	8	3	43	10	12	11	12	11	4	60
415	C	M	6	1	2	5	4	0	18	5	5	7	8	11	0	36
416	C	M	8	0	6	14	11	8	47	9	12	8	15	12	6	62
417	C	M	8	4	8	9	5	6	40	8	8	4	6	5	6	37
418	C	M	6	8	8	4	8	0	34	12	12	11	10	11	1	57
419	C	M	5	5	1	2	6	1	20	10	12	10	13	15	6	66
420	C	M	12	10	10	10	14	12	68	11	12	13	15	17	7	75
421	C	M	11	9	12	13	19	13	77	9	11	11	14	15	12	72
422	C	M	6	3	1	1	6	1	18	5	5	8	4	10	2	34
423	C	M	4	4	3	2	6	4	23	7	7	2	8	5	2	31
424	C	M	8	8	12	11	17	8	64	13	13	11	15	17	11	80
425	C	M	10	9	6	9	12	12	58	11	12	10	14	14	12	73
426	C	M	2	0	0	0	4	0	6	5	8	2	5	4	0	24
427	C	M	11	10	7	4	13	4	49	12	14	7	8	10	4	55
428	C	M	12	12	7	6	14	7	58	12	15	10	11	16	12	76
429	C	M	5	7	4	1	5	1	23	9	10	5	6	5	5	40
430	C	M	7	11	3	6	10	1	38	7	14	8	13	12	5	59

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
431	C	M	5	6	1	3	5	1	21	7	10	0	9	6	4	36
432	C	M	0	2	0	0	0	1	3	6	5	0	0	4	0	15
433	C	M	4	9	0	1	5	0	19	9	12	1	2	4	0	28
434	C	M	1	0	0	0	0	0	1	4	6	1	5	5	0	21
435	C	M	1	0	0	0	0	0	1	2	3	3	2	2	1	13
436	C	M	2	6	1	0	3	0	12	6	8	6	3	4	2	29
437	C	M	1	5	1	1	2	2	12	8	11	9	5	11	3	47
438	C	M	0	0	0	0	0	0	0	1	3	1	0	1	0	6
439	C	M	5	3	0	0	4	4	16	9	13	6	14	15	1	58
440	C	M	0	6	0	0	2	0	8	6	9	3	2	8	0	28
441	C	M	2	2	0	0	0	1	5	6	7	0	1	5	0	19
442	C	M	7	10	0	3	6	1	27	9	12	9	8	11	8	57
443	C	M	7	11	0	4	3	0	25	10	9	2	3	7	1	32
444	C	M	6	10	0	8	7	7	38	10	11	5	1	12	7	46
445	C	M	7	5	0	1	4	6	23	9	5	6	10	10	2	42
446	C	M	6	9	1	2	8	1	27	9	11	8	3	11	1	43
447	C	M	4	6	1	6	8	1	26	7	11	3	6	8	4	39
448	C	M	5	1	0	0	0	0	6	1	1	4	0	2	0	8
449	C	M	4	8	0	4	3	3	22	9	6	4	6	4	3	32
450	C	M	4	10	2	3	4	2	25	10	10	6	5	6	0	37
451	C	M	2	4	0	2	6	1	15	8	3	3	2	4	0	20
452	C	M	6	7	1	4	2	0	20	6	10	3	5	6	2	32
453	C	M	5	5	0	1	9	4	24	7	7	4	4	4	4	30
454	C	M	2	7	0	0	2	0	11	5	7	2	5	7	2	28
455	C	M	2	5	0	0	6	0	13	4	7	2	2	4	4	23
456	C	M	5	6	0	2	4	0	17	9	7	7	3	6	0	32
457	C	M	0	3	1	2	6	0	12	7	8	6	6	4	1	32
458	C	M	4	9	3	4	7	4	31	10	13	5	7	14	4	53
459	C	M	4	3	0	0	2	1	10	8	10	0	2	7	1	28
460	C	M	2	7	5	2	2	2	20	7	9	0	5	8	3	32
461	C	M	4	3	5	3	4	0	19	7	10	1	5	5	0	28
462	C	M	3	2	0	3	6	0	11	6	8	5	5	7	4	35
463	C	M	9	10	5	7	6	2	39	12	12	4	8	12	2	50
464	C	M	9	10	7	13	11	8	58	2	4	3	3	7	11	30
465	C	M	6	5	0	5	4	1	21	5	4	5	3	9	1	27
466	C	M	4	8	2	5	3	1	23	4	6	3	7	5	0	23
467	C	M	4	8	5	5	7	1	30	5	6	8	9	13	5	46
468	C	M	4	4	3	1	5	1	18	5	5	6	6	4	3	29
469	C	M	5	7	3	3	4	1	23	9	7	8	6	7	6	43
470	C	M	1	6	6	4	3	0	20	4	10	7	5	4	3	33

Subject Number	Group	Sex	Metropolitan Pre-Test 1	2	3	4	5	6	T	Post-Test 1	2	3	4	5	6	T
471	C	M	5	6	8	12	17	8	56	9	10	10	15	13	14	71
472	C	M	7	10	3	4	7	4	35	8	13	9	5	12	6	53
473	C	M	0	8	4	2	6	3	23	7	7	5	6	5	3	33
474	C	M	4	7	3	3	4	3	24	5	6	7	4	9	5	36
475	C	M	5	13	8	5	13	5	49	9	12	9	6	16	13	65
476	C	M	2	5	3	3	5	0	18	8	10	4	4	8	3	37
477	C	M	1	6	6	3	6	1	23	9	11	3	6	4	0	33
478	C	M	4	8	6	1	3	1	23	8	9	5	5	9	2	38

VITA

3

Darrell Dean Bentz

Candidate for the Degree of

Doctor of Education

Thesis: A STUDY OF THE EFFECT OF LANGUAGE AND PERCEPTUAL TRAINING UPON KINDERGARTEN CHILDREN'S READING READINESS PERFORMANCE

Major Field: Elementary Education

Biographical:

Personal Data: Born in Milford, Kansas, December 15, 1928, the son of Raymond W. Bentz and Mary Mildred Butler Bentz.

Education: Attended grade and high school in Milford, Kansas. Graduated from Milford Rural High School in 1946; received Bachelor of Science degree in business education from Kansas State University, Manhattan, Kansas; received Master of Science degree from Kansas State University, Manhattan, Kansas in 1957; completed requirements for the Doctor of Education degree in Elementary Education from Oklahoma State University at Stillwater, Oklahoma in May, 1970.

Professional Experience: Principal and sixth grade teacher at Leonardville Grade School, Leonardville, Kansas, 1949-1951; served in the United States Army as a Counter Intelligence Corps special agent from August, 1951 to August, 1954; principal and sixth grade teacher at Keats Grade School, Keats, Kansas, 1954-1955; principal and sixth grade teacher at Minneapolis Grade School, Minneapolis, Kansas, 1955-1957; elementary school principal at Oakdale School, Salina, Kansas, 1957-1966; assistant professor of education and Director of Student Teaching, Kansas Wesleyan University, Salina, Kansas, 1966-1968; served as a graduate assistant in the Reading Center at Oklahoma State University, 1968-1969, teaching in the College Reading Improvement Program and working as a clinician in the Reading Clinic; served as Supervisor of the College Reading Improvement Program and a Reading Consultant for Bacone Junior College, Muskogee, Oklahoma during the fall, 1969-1970; served as an Instructor, Educational Extension, Oklahoma State University during the spring semester, 1970.