ABSTRACT

CHARACTERISTICS OF KINDERGARTEN CHILDREN AS PREDICTORS OF READING DIFFICULTIES IN FIRST GRADE

By

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Identification of kindergarten children who possess average or above-average intelligence but will experience difficulty learning to read in first grade is needed. After these kindergarten children are identified, appropriate training experiences may be prescribed. By using a combination of variables, it was proposed that identification could be made more accurately and more inclusively than by teachers' expectations alone.

All kindergarten children (127) in two suburban schools were administered measures of intelligence, visual perception, language, configuration-identification, and self-concept. Children who showed average or above-average intelligence scores were given a criterion reading achievement test the next year (in first grade). The variables of sex, social position, and teachers' predictions of reading success were also considered.

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A multiple-regression equation was derived by using variables and test scores from one randomly selected half of the group studied. The variables found to contribute most significantly to the prediction equation were perceptual quotient (from the Frostig test), teachers' expectations, sex, social position, and self-concept (a performance-adequacy factor).

The scores from the second half were used to cross-validate the prediction equation derived from the first half. A comparison of multiple-correlation coefficients for each of the groups and the criterion shows a small shrinkage indicating a relatively stable set of predictors. Predictions made by using the multiple-regression equation were found to be significantly better than predictions from teachers' expectations alone.

Early identification of potential reading difficulties can be made more accurately by using a combination of variables approach. Assuming that it is important to exercise caution not to "label" the children identified, the approach may be useful in schools.

CHARACTERISTICS OF KINDERGARTEN CHILDREN AS PREDICTORS OF READING DIFFICULTIES IN FIRST GRADE

By

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Dedicated to

my husband, Gordon,

and my sons, Bruce and Daniel,

for their encouragement, patience,

and understanding

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CHAPTER I

THE PROBLEM

In this chapter, the need for and the purpose of this study are described. The hypotheses to be tested and theory used as the basis for the study are also presented. An overview of the remaining chapters is delineated in the concluding section of the chapter.

Need for the Study

Children who possess average or above average intelligence but experience specific reading difficulties in school need to be identified early so that suitable training experiences may be prescribed. Very little actual identification of reading problems is made in many public schools until the child has trouble learning to read in first grade. Teacher observation has been the chief means of identifying the child in kindergarten who may have a reading problem. The child with average intelligence who will later show a reading difficulty may not be identified during kindergarten as having potential reading difficulty. At this level, immature social development is usually employed as a major indicator of impending difficulty in learning to read. If a child's social development is similar to his peers, he is not as likely to be selected by the teacher as potentially having reading difficulties.

In the process of identifying, diagnosing and treating deficiencies in learning, the staff of the Waterford Learning Improvement Center, Waterford Township, Michigan, became aware of the importance of and the problems involved in early identification of children who have reading difficulties. Observations of children receiving treatment revealed that the third grade children exhibit more frustration and poorer self-concepts than younger children. If identification can be made earlier, specific training can also be effected sooner so that the child may experience success in learning situations.

The terms <u>reading problem</u>, <u>reading difficulty</u> and <u>reading disability</u> are used interchangeably in this study in describing a child who does not progress as expected in reading and would be called a disabled reader by Bond and Tinker (1957). The authors describe a disabled reader as:

> One who has had an opportunity to learn to read, but who is not reading as well as could be expected by his aural verbal ability, his mental capacity, and his success in nonreading learnings. He is, in reality, the child who is at the lower end of the reading distribution when compared with other children of his general capability (p. 79-80).

The reading expectancy score used by Bond and Tinker (1957, p. 78-79) is calculated by using the number of years the child has been in school and multiplying that number by his intelligence quotient and then adding 1.0. The resulting figure is an expected grade score which can be compared with actual grade equivalent achievement scores. An actual grade equivalent score which is one-half year or .5 below the expected grade score indicates reading disability at the primary level.

Raw scores on the Stanford Achievement Test, the instrument selected to measure reading achievement in this study, can be translated to grade equivalents, percentile ranks and stanines. The five subtests which measure reading achievement need to be averaged to obtain a single criterion score. Grade equivalent scores on this test are not standard scores and cannot be averaged. Stanines, which have the same variability or standard deviation and thus can be averaged, are the most suitable as standard scores from which the criterion score can be computed. Consequently, the child who has average or above average capability, as measured by The Lorge-Thorndike Intelligence Test, but attains an averaged reading achievement score which falls in the lower three stanines on the Stanford Achievement Test is identified as having reading problems in this study.

Disabled readers, according to Bond and Tinker, may be classified in groups ranging from simple retardation to complex disability. The latter category includes children who have serious "deficiencies in basic reading abilities, complicated by their rejection of reading, accompanying personality problems, and frequently by sensory or physical handicaps (p. 83)." Children with complex disability in reading will require highly specialized and individualized instruction. The disabled reader who has less serious problems which can be corrected or prevented with a well-planned prereading instructional program is the target of this study. The complex reading disability case may also be identified as having reading problems by the instruments used in this study but will probably require further intensive diagnosis so that a specific instructional program may be prescribed.

DeHirsch (1966) stated that most schools do not provide special reading help for students who encounter reading difficulties until the end of third grade. The need for earlier identification and treatment of reading problems is expressed in the following:

> The basic perceptuomotor functions that underlie reading may be harder to train at the end of third grade than they are earlier, during "critical" developmental stages. By the end of the third grade, moreover, emotional problems and phobic responses resulting from continued failure may have so complicated the original difficulties that they may no longer be reversible (p. 91).

In today's society, an individual is handicapped in his acquisition of knowledge and in his attainment of gainful employment when he suffers from a reading disability. Since a reading disability is not as readily apparent as a malformed or malfunctioning part of the body, it often is neglected or not recognized. Anderson (1965) points to the need for early recognition of reading difficulties in these statements:

> A child with an uncorrected defect harbors the beginnings of further deviations, particularly in the sphere of emotional and behavioral problems. Therefore, in terms of the prevention of some of the later effects of a reading disability, the early recognition and appropriate treatment of such a basic defect assumes obvious importance (p. 145).

Chall's (1967) investigation of approaches used in early reading instruction includes a look at reading failures. In her conclusions she recommends the use of diagnostic techniques so that early identification may be followed by the special training required to spare the child "frustration and failure in later years of learning (p. 179)."

Identification of factors that show relationships to early reading will provide useful knowledge upon which curriculum planning may be based. Curriculum decisions concerning the development of experiences and activities to help prepare the kindergarten child for later school learning can be made more knowledgeably with an increased understanding of the deficiencies associated with early reading difficulties.

Purpose of the Study

Assuming that reading difficulty can be predicted from measures of visual perception abilities, language development, configuration-identification, and academic self-concept, the question is whether these four factors can be objectively assessed by kindergarten classroom teachers. The purpose of this study is to investigate the relationships between the following characteristics, ~~as measured~~ by instruments which teachers can administer and interpret, in children at the kindergarten level: (1) visual perception, (2) language development, (3) configuration-identification, and (4) academic self-concept -- and the reading achievement of the same children at the end of first grade to determine whether prediction of reading difficulties can be improved using these characteristics instead of, or in addition to, teacher observations. The characteristics to be studied have been selected on the basis of evidence that deficiencies in these characteristics are often noted in children experiencing reading difficulty.

Suitable instruments to measure each characteristic are sparse. Instruments that require any reading or even recognition of a few words are not usable at kindergarten level. Thus, instruments requiring responses to objects, pictures or symbols have been utilized. The child's response is made by circling a figure, by drawing a line as specified or by giving a verbal reply.

A major criterion considered in the selection of instruments for this study is that each instrument selected can be administered and interpreted by a classroom teacher. The selection of an instrument for teacher use depended upon the amount of special test-administration training needed, the group-testing suitability and the time demands. Highly specialized personnel are required to administer and interpret some instruments which could be used. Since trained personnel are usually not available for the testing needed in kindergarten to identify reading problems, instruments which can be successfully used by the classroom teacher are much more feasible.

The instruments selected for this study are The Marianne Frostig Developmental Test of Visual Perception (1963) as a measure of visual perception, the Vocal Encoding Subtest of The Illinois Test of Psycholinguistic Abilities (1961) as a measure of language, and The Heckerl Configuration Test (1967) as a measure of configuration-identification. The self-concept characteristic is measured by an adaptation of The Academic Self-Concept Test (1965), entitled "What Face Would You Wear?"

DeHirsch (1966) developed a predictive index using several of the characteristics involved in this study. The lengthy index must be administered individually and requires specialized examiners to administer some of the instruments, therefore, it would not be suitable for kindergarten classroom teachers to use.

Information gained from a combination of measures should serve as a supplement to a teacher's observations of children. By using test data and observations the judgments regarding children who may have learning difficulties could be made more accurately. In their discussion of kindergarten curriculum evaluation, Robison and Spodek (1965) discuss the desirability of making comparisons of test data and teacher observations as follows:

> When teachers have any correlative or comparative data about children's achievements or when they have studied all or most of the children to the point where they have formed some judgments about abilities and skills, they can immediately make comparisons between test results and such other information. Sometimes the test results offer surprises, indicating more ability and understanding, or less, than the teacher had supposed (p. 203).

Wilson and Robeck (1963), the authors of the Kindergarten Evaluation of Learning Potential (KELP), have developed an evaluation program to be used by the teacher throughout the kindergarten year. The devices were "designed to extend the observation skills of the kindergarten teachers (p. 14)." Wilson and Robeck contend that the two classes taught by each teacher, which contain fifty to eighty children who attend a relatively short period of time each day, present a monumental observation task for the teacher. They add that:

> Under the circumstances it is almost impossible to avoid overlooking some of the quiet ones or perhaps seeing the noisy ones only in terms of the disruption that they are causing (p. 14).

Kindergarten teachers are trained to use objective observational techniques by Haring and Ridgway (1967) to identify children with learning disabilities. From the data obtained in the study the authors concluded that:

> When provided with a structured guide to observation, kindergarten teachers can select children who have developmental retardation by specific areas of performance (p. 392).

The additional devices and techniques employed by Haring and Ridgway and by Wilson and Robeck support the proposition that use of supplemental information can improve the accuracy and quantity of predicted reading difficulties in kindergarten children.

The element of socioeconomic bias may affect teacher observations and judgments. Eash (1965) states that:

> Teacher judgment is significant when used with other criteria. Socioeconomic bias sometimes enters into teacher judgment of children. If unaware of their biases, teachers may judge pupils in terms of their own values rather than on the bases of an objective appraisal (p. 47).

By using objective measures of the characteristics investigated in addition to teacher observations, the subjectivity of predictions should be lessened. The quality of predictions should, conversely, be increased. An improved basis of early identification of potential reading problems would permit the introduction of appropriate curricular training programs to develop skills, experience and potential, at an earlier level in the child's educational experience.

Hypotheses to be Tested

1. The major hypothesis to be tested by this study is that prediction of reading difficulty in first grade can be improved by combining scores from several measures -- The Frostig Test of Visual Perception, the Vocal Encoding Test, The Heckerl Configuration Test and The Academic Self-Concept Test. The prediction may by use of a combination of these measures is expected to be more accurate and more inclusive than kindergarten teachers' expectations of reading difficulty. Use of the combined measures as a predictive index of reading difficulty is expected to reveal additional students in each kindergarten class who have not been identified by the teacher.

Additional hypotheses to be tested follow:

2. Positive relationship exists between visual perception of kindergarten children, as measured by The

Frostig Test of Visual Perception, and their reading achievement in first grade, as measured by the Stanford Achievement Test.

3. Positive relationship exists between language development of kindergarten children, as measured by the Vocal Encoding Subtest of The Illinois Test of Psycho-linguistic Abilities, and their reading achievement in first grade.

4. Positive relationship exists between configuration identification exhibited by kindergarten children, as measured by The Heckerl Configuration Test, and their reading achievement in first grade.

5. Positive relationship exists between the academic self-concept of kindergarten children, as measured by The Academic Self-Concept Test, and their reading achievement in first grade.

6. The proportion of students who show below-average reading achievement in first grade, as measured by the Stanford Achievement Test, differs from the proportion of students expected to show below-average reading achievement according to kindergarten teachers' predictions.

7. There is a significant difference between the mean perceptual quotient score, ascertained by The Frostig Test of Visual Perception, and the mean intelligence quotient score, determined by The Lorge-Thorndike

Intelligence Test, for kindergarten children who later show below-average reading achievement in first grade.

8. Positive relationship exists between the language development of kindergarten children, as measured by the Vocal Encoding Subtest, and the social position of the same children, determined from the Hollingshead Two Factor Index of Social Position (1957).

Theoretical Basis

The theoretical basis from which this study is derived is the dynamic theory of the reading process developed by Strang (1961). This psycho-physical process, cyclical in nature, involves many interrelated factors of intelligence and linguistic ability, vision and speech, character and personality, and a central mobilizer -- self-concept. The reader in this dynamic process interacts with the reading situation and makes a complex response. The response made depends upon the ability of the reader to successfully interrelate the factors involved in the reading process. If some of the factors are inadequately developed, the reader would be expected to have difficulty learning to read. Therefore, an investigation of pertinent factors involved in the reading process which may be related to initial reading difficulty and can be measured by instruments which kindergarten teachers can administer is proposed for study. The factors are intelligence, segments of linguistic ability, visual perception and academic self-concept.

Intelligence, as one factor involved in the reading process, is measured by The Lorge-Thorndike Intelligence Test so that students who possess below-average intelligence can be eliminated from the study because children who possess average or above-average intelligence are the focus of this study.

Two factors included in linguistic ability are language development and configuration identification. Language development is defined as the number of descriptive words used by the child in telling about familiar objects. Configuration is defined as the recognition of a series of letters as a logical pattern or word.

A vision factor is visual perception, expressed as a perceptual quotient and as subtest scale scores for five specific areas. Perceptual quotient is defined in the Administration and Scoring Manual of The Frostig Test of Visual Perception as a deviation score obtained from the sum of the subtest scale scores after correction for age variation. It is not a ratio but has been defined in terms of constant percentiles for each age group with a median of 100, and upper and lower quartiles of 110 and 90, respectively.

Visual perception is defined in terms of the overt responses to the stimulus situations provided by the five subtests. The first subtest, eye-hand coordination (I), explores a restricted area of motor skills. The figure-ground subtest (II) requires discriminating between intersecting figures and finding hidden figures. Perceptual constancy (III) concerns the ability to recognize what is perceived as belonging to a specific class regardless of the image on the retina. Position in space (IV) refers to the ability to see an object in relation to one's own body, and spatial relationships (V) refers to the ability to recognize the positions of objects or reference points in relation to each other.

Another factor, academic self-concept, is defined as a person's view or perception of himself in regard to his ability to attain success in the school situation.

Reading achievement in first grade, the criterion, is measured by the Stanford Achievement Test, Battery - Primary I. Scores in the stanine scale range of 1, 2, 3 are classed as below-average; 4, 5, 6 are average; 7, 8, 9 are classed above-average. The stanine scores from the five reading subtests are averaged to obtain the reading achievement stanine score.

Overview of the Study

The remaining chapters are devoted to further description of the procedures and findings. In Chapter II, the relevant literature pertaining to the theory and factors involved in the reading process is reviewed. The design of the study is specified in Chapter III. The sample, measures, statistical hypotheses and statistical techniques applied in analyzing the data are described. In Chapter IV, an analysis of the results is presented in written form and in tables as summaries of the findings. The final summary of conclusions, discussion and implications is given in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

In this chapter, the literature pertinent to the theory of the reading process and information processing is reviewed. Studies related to the specific reading process factors of visual perception, language, configuration and self-concept are considered separately. The findings of the studies reviewed are discussed in relation to the investigations undertaken in this study.

Factors Involved in the Reading Process

Strang's (1961) dynamic theory of the reading process, cyclical in nature, begins with the reader interacting with the reading situation and making a complex response. An impression is made on the nervous system by the response, which influences his perceptions of similar situations. The psycho-physical process involves many interrelated factors of intelligence and linguistic ability, vision and speech, character and personality, and a central mobilizer -- self-concept.

Studies at the Institute of Developmental Research are the basis for Deutsch's (1965) statement that the essential prerequisites to acquisition of scholastic skills are the development of language, concept formation and organization, visual discrimination, general orientation and self-concept. Bruner (1964) states that cognitive growth depends on the mastery of techniques which aid the child as he copes with his environment. He specifies three systems of information processing which the child may use to structure his world: action (motor acts), imagery (perceptions), and language.

Another schema for structuring the factors associated with reading difficulty has been developed by Eisenberg (1966). He classifies the sources of reading difficulty as sociopsychological and psychophysiological. In the sociopsychological category are (1) quantitative and qualitative defects in teaching, (2) deficiencies in cognition stimulation and (3) deficiencies in motivation due to adult and peer expectations. In the psychophysiological category are general debility, sensory defects, intellectual defects, brain injury and specific reading disability. The sources listed by Eisenberg which can be examined in the kindergarten classroom prior to actual reading activity include deficiencies in cognition stimulation such as in the level of language development and configuration identification ability; deficiencies in motivation may be reflected in measures of the child's academic self-concept; sensory defects, such as inadequate visual perception, can be explored, and intellectual defects can be detected.

The characteristics investigated in the study, visual perception, language, configuration and self-concept, are factors involved in the dynamic theory of the reading process, are essential prerequisites to learning skills as stated by Deutsch, and are sources of reading difficulty when deficiencies exist, according to Eisenberg. Visual perception, configuration and language also are facets of Bruner's schema for information processing. Inadequate development of these factors in the young child would indicate that difficulty in reading can be expected when the child encounters early reading activities.

Visual Perception as Requisite to Reading

Visual perception is the process of recognition and integration of stimuli. The sensory impression is received by the eye but the interpretation takes place in the brain. Visual perception is involved in many every-day actions. The visual organ system has been described by Gesell (1953) as the most complex of all organ systems in that it links the sensory, motor, autonomic and synthetic functions. Gesell stated that visual behavior patterns follow a general ground plan manifested in five distinguishable areas: eye-hand coordination, postural orientation, fixation, projection and retinal response. He believed that it is possible to formulate developmental gradients in each of these areas with specific reference to the growth and learning of reading behavior.

Langman (1960) lists eight visual perception skills preliminary to reading. She states that "each skill named requires responses based on generalization and transfer which in turn require ability to select the most characteristic aspects of the sensory experience and/or those most suitable for response in a particular situational context (p. 20)." Reading is a complex process requiring appropriate responses to visual language forms. In this perceptual-motor skill, environmental stimuli initiate impulses which pass over the visual pathways to the brain. The eyes are the receptor organs which pick up the stimuli. Eames (1953) states that anything which interferes with the reception of stimuli or their transmission to the brain areas can be expected to interfere with reading.

Predicting Reading Difficulties from Visual Perception Abilities

DeHirsch (1963, b) feels that prediction of future reading performance can best be made in terms of developmental age rather than by intelligence quotients or mental age. Successful integration of the visual and spatial patterns on the printed page depends upon the degree of maturation of physiological functions required for reading, writing and spelling. Tests utilized by DeHirsch (1963, a) are designed to discover potential reading difficulties at the six-year level. Visual perceptions of a child who is ready to learn to read are described as the ability to differentiate small details, to use the relationship between parts and the whole, to orient himself in space, to see a figure stand out from its background, to perceive relationships as in sorting and categorizing, and the development of concepts of spatial relationships. She found that some children were unable to differentiate the "figure" from the "ground." Nothing on the printed page stood out for them, instead the page appeared as a meaningless design. Sometimes a child could recognize a word appearing in heavy black print on a white card, but failed to recognize the same word when embedded in a page. Inability to differentiate between a <u>t</u> and <u>f</u> or a <u>d</u> and <u>b</u>, where the only discriminating feature is orientation in space, has also been observed. She states that visuo-motor competence of poor readers is inferior to that of good readers.

DeHirsch (1966) has developed a predictive index for predicting reading failures which includes visual perception measures and a number of language measures. The index is very lengthy, includes some instruments which require specialized training to administer and interpret, and needs to be given to each child individually. Therefore, it would not be suitable for classroom teachers to use.

Correlation of Visual Perception and Reading

Goins (1958) administered visual perception tests to children at the beginning of first grade and found the test scores had a multiple correlation of +.827 with reading success at the end of first grade. In a study of 150 children with reading disability, Silver (1963) found that 92% of the children had specific problems in visual perception. The perceptual problems reported included visual-motor immaturity with specific difficulty in spatial orientation, marked difficulty in visual figure-background perception, and body image distortion.

Olson (1966) investigated the relationship between The Frostig Test of Visual Perception and reading achievement with third grade students. He found the correlation between the form constancy subtest and all reading skills and achievement subtests were significant at the 1% level. The total Frostig score also showed a significant correlation with all reading skills and achievement tests except spelling. The figure-ground subtest and the position in space subtest did not show significant correlations. Girls had higher correlations than boys in all the tests except hearing sounds in words. Olson concluded that The Frostig Test of Visual Perception is a better predictor for girls than boys and that the total test is a fair predictor of school achievement and specific reading skill ability.

The Frostig Test of Visual Perception purports to predict difficulties in early school learning. Marianne Frostig (1965) reports that her findings tend to show that in the normal child, perceptual development is the most important indicator of the child's general development between the ages of 3 and 7 years. The studies of beginning reading situations described by Frostig (1963) show a correlation coefficient of between .4 and .5 for the visual perception test and reading scores. In another study reported by Frostig (1963), Sprague found that 36% of the second semester first graders had perceptual quotients of 90 or less and that 70% of these students fell below the midpoint in the reading achievement test. In a study of 25 kindergarten children to whom The Frostig Test of Visual Perception was given, eight children had perceptual quotients of 90 or below. A prediction was made that the eight children would not learn to read even though exposed to reading material. The prediction proved to be highly accurate, however, the intervening time period was only three months in length.

The Frostig Test of Visual Perception was given to seventeen third grade students who attended summer Learning Improvement Center classes in 1966, and who had been identified and diagnosed as having reading disabilities. The I.Q.'s ranged from 80 to 125. Only one of the seventeen children had no difficulties in any of the subtests. Ten of the seventeen scored 90 or below (perceptual quotient). Frostig (1964) states that the correlation between visual perception ability and reading achievement is very slight at third grade level. The diminishing correlation can be accounted for by a late spurt in perceptual growth or by the use of cognitive abilities to master visual perception tasks, she believes. If the seventeen third grade children had experienced some late perceptual growth or had made compensations cognitively for their visual perception deficiencies, one wonders what level of perceptual development these children would have shown in kindergarten.

Visual Perception Abilities Measured by Frostig

The Frostig Test of Visual Perception consists of five subtests of visual perception. One subtest, eye-motor coordination, Frostig (1965) found predicts difficulty with printing, writing, pasting and copying designs. The other four subtests have been found to be more prognostic of reading ability. The child with disturbances in figure-ground perception has difficulty learning to read or spell because he is unable to perceive parts in their proper relations to wholes. Children who have difficulty reading a word that has been previously learned when the word is presented in different print or context show deficiencies in perceptual constancy. Reversals and rotations indicate an inability to perceive position in space, and difficulty with perception of spatial relationships is revealed by interposing letters in a word or in a sentence.

If the previous statements are valid, the kindergarten children who have deficient scores on subtest I of eye-motor coordination should experience difficulty with writing and printing in first grade. Deficiencies in the other four subtests should show a relationship to difficulty with reading in first grade. The total perceptual score including all subtests would be expected to show a positive relationship to reading difficulties. The perceptual scores should provide a basis for predicting success and difficulty in learning in the primary grades.

Visual Perception and Intelligence Difference

Although some tests of visual perception are included in intelligence tests such as the Wechsler Intelligence Scale for Children, The Frostig Test of Visual Perception should not be considered synonymous with intelligence tests. The child who has distorted visual perception may be very intelligent. The perceptual quotient would be expected to be lower than the intelligence quotient for the child who has difficulty learning to read.

Sex Differences in Visual Perception

Frostig discontinued studies of sex differences when no significant differences were found in correlations of kindergartners by sex with visual perception abilities. Interest in examining sex differences is supported by the fact that a high percent of the referrals to the Learning Improvement Center have been boys and that more than 75% of the third graders in summer classes were boys[1]. Since Olson (1966) found differences in sex and a large proportion of reading disability cases are boys, further study of the question of sex differences in relation to The Frostig Test of Visual Perception is pursued in this study.

Language as Requisite to Reading

Samples of oral language of elementary school children were accumulated by Loban (1963) using a taped interview technique. His language samples were carefully

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[1]J. Heckerl, personal communication, September 12, 1966.

classified and related to selected aspects of language achievement, including reading. A significant conclusion was that competence in spoken language appeared to be an essential basis for competence in reading. Hildreth (1964) reported that oral language with which a child is familiar provides the basis for his learning to recognize words. Strickland (1958) stressed the importance of oral language in reading readiness and reading achievement.

Jensen (1963) concludes from experiments with gifted, average and retarded children that:

> The habit of making verbal responses, either overtly or covertly, to events in the environment seems to be one of the major ingredients of the kind of intelligence that shows itself in school achievement and in performance on intelligence tests. Without this habit, even a child with a perfectly normal nervous system in terms of fundamental learning ability will appear to be retarded, and indeed is retarded so long as he does not use verbal mediators in learning (p. 138).

Haring and Ridgway (1967) found that general language was the only identifiable commonality among the kindergarten children they tested for learning disabilities. The accuracy of their tests as identifiers of children with actual learning disabilities is, as yet, indeterminable since the achievement of the children tested had not been ascertained.

These findings indicate that language development is positively related to reading achievement and could be expected to provide predictive information regarding children who will have difficulty in reading.

Relationship of Language and Social Class

Cazden (1966), in his review of differences in child language, categorizes language development according to the environmental influences of (1) context, or the non-verbal setting in which language occurs, (2) stimulation and (3) responses to the child's speech. John and Goldstein (1964) contend that the difficulty with words which was experienced by children on the Peabody Picture Vocabulary Test could be attributed to difficulty in fitting the label to the varying forms of action observed rather than a deficiency in experience with the referent. Receptive exposure to many examples is an inadequate technique of language development; helping the child encode experiences in words would be more beneficial. Deutsch (1963) and Bernstein (1962) have found that the stimulation and interaction conducive to language development is more limited for the culturally deprived child than for the middle class child.

The differences noted by these researchers suggest that a comparison of the language development of lower class and middle class children should be made in this study to determine whether similar differences exist in this population.

Assessing Language Development

Studies of oral language have examined vocabulary as one technique of assessing the level of language development. Lesser (1965) gave a vocabulary test of 60 items, one-half pictures and one-half words, to four ethnic groups of children. Templin (1957) used the Seashore-Eckerson Test, which contains a sampling of words from an unabridged dictionary. Questions of whether measures of vocabulary size denote differences in cultures or deficiencies remain unanswered by the research.

DeHirsch (1966) used the technique of counting the number of words used to tell a story. An adaptation of this technique is used in the Vocal Encoding Subtest of The Illinois Test of Psycholinguistic Abilities which requires the child to tell about objects such as a ball or a piece of chalk which he is shown and permitted to handle. The technique utilized by these studies offers promise as a language measure. The assessment of words used to tell about concrete objects should reveal the level of oral language development attained by a child.

Configuration-Identification in Early Reading

Russell and Fea (1963) state that the process of learning words may proceed without the multisensory approach to identification-recognition and meaning.

The organizing and integrating which leads to perception -- and thus to identification and recognition -- is not clearly understood. It is not a simple case of sensation plus past experience, but rather the result of sensory processes organizing themselves in some fashion in the cerebral cortex into an experience variable.

Vernon (1959) concludes that some aspect of a word and its letters must be perceived, if only in skeletal fashion, before the remainder of the word can be inferred. The research of Solomon and Postman (1952) indicates that the pattern of a word is the perceptual unit.

Configuration is frequently an initial technique utilized in basic reading programs to teach word recognition. If a child recognizes a series of letters in a logical pattern or configuration, he would be expected to achieve in reading, and conversely, if he fails to recognize the pattern, he would be expected to have difficulty with reading.

Self-Concept and Academic Performance

A theory of self-concept advanced by Combs (1965) is the Perceptual Basis of Behavior. According to this theory, behavior at any instant is the result of how a person sees himself, how he sees the situation in which he is involved, and the interrelations of these two.

The behavior of the child in school, based on this theory, depends on his view of himself in the school situation. Brookover, Thomas, and Patterson (1965) found a positive correlation between self-concept and performance in the academic role of seventh-grade students. Specific self-concepts of ability, which differ from general self-concept of ability, are better predictors of specific school achievement, they stated. Fink's (1965) study of ninth-grade students shows that adequate self-concept is related to high academic achievement and inadequate self-concept is related to low academic achievement.

Relationship of Self-Concept and Reading

Henderson, Long, and Ziller (1965) explored components of self-concept (differentiation, esteem, and individualism) as correlates of reading disability. No differences were found between control and experimental groups in differentiation and esteem on the author devised measures used. The significant differences ($p=.01$) found in the individualism measures led to conclusions that the dependency exhibited by children with reading disabilities would be disruptive to reading achievement as the various cognitive processes involved in the reading process are clearly an individual act.

Wattenberg and Clifford (1964) found that the self-concept of kindergartners was predictive of reading achievement in second grade. Measures of self-concept were obtained by taping and analyzing the remarks made by children while drawing a picture of their families and the responses made to devised incomplete sentences.

Strang (1967) described a study in process in which Schwyhart is attempting to explore the self-concepts of retarded ninth-grade readers. They hypothesize that an individual's reading process reflects the individual's self-concept, since affect is never entirely divorced from cognition.

The positive relationship between self-concept and achievement in these studies points to the probability that the self-concept of the school situation may be a potential predictor of reading achievement. Most studies have utilized older children, consequently, an investigation of the relationship between the self-concept of kindergartners and their reading achievement in first grade would contribute to the body of knowledge in this field.

Techniques Used to Measure Self-Concept

Three categories of techniques have been used by researchers to measure the self-concept, according to Gordon (1966). Each of the three techniques: (1) self-report, (2) inference based on the observation of behavior, and (3) inference based on projective techniques, has advantages and disadvantages, Gordon states. He recommends the self-report and inference based on observation of behavior as the most suitable techniques for classroom teachers. The truthfulness of a child's response to a self-report technique has been questioned. Gordon recommends: "Any technique used by the teacher must be based upon the expectation that the child can answer, and that his answer is truthful (p. 55)."

The inference technique based on observation of behavior is considered the most valid approach to measuring the self-concept by some researchers. A classroom teacher who is engaged in many other activities besides the observation of individual behavior may provide biased information. Gordon states:

> The typical behavior record kept by teachers suffers from the pitfall of what may be biased and selective sampling. Most teachers, after all, become aware of the behavior of the youngsters only when it is cognitively dissonant with the teacher (p. 63).

Observation techniques which yield the most "objective" information are often too cumbersome for the classroom teacher. The data gathering could be accomplished in a team-teaching or teacher-in-training situation, but the usual kindergarten classroom teacher would not have the opportunity to obtain the complete data needed to make inferences about each child's self-concept.

A single technique judged most valid and suitable as a measure of self-concept fails to emerge from the research. The kindergarten classroom teacher can most likely utilize a self-report technique more easily than the inference from behavior technique. The response format needs to be related to the child's experience so that he can readily understand and respond to questions or statements used in the measuring instrument.

Summary of Literature Review

The major findings concerning four factors involved in the reading process: visual perception, language, configuration and self-concept, are summarized in the final section of the literature review.

Factors in Reading Process

The dynamic theory of the reading process involves the factors of visual perception, language, configuration and self-concept, which are investigated in this study. These four factors have also been listed by Deutsch, as essential prerequisites to learning skills, and by Eisenberg, as sources of reading retardation when deficiencies exist. Bruner's schema for information processing uses three of the factors: visual perception, configuration and language. Inadequate development of the four factors at kindergarten level would signal that difficulty may likely lie ahead in learning to read.

Visual Perception and Reading

Studies investigating the relationship of visual perception to reading achievement have been reported by Goins, Silver, Olson and Frostig. In a study of first grade children by Goins, a multiple correlation of +.827 for visual perception tests with reading success was found. Predictive use of visual perception measures has been explored by DeHirsch, who has developed a Predictive Index for predicting reading failures. This index is not suitable as a technique for classroom teachers to employ, however.

The Frostig Test of Visual Perception, according to Frostig, provides perceptual information which can serve as an indicator of difficulties in early school learning. The eye-motor coordination subtest predicts writing difficulty, while the other four subtests -- figure-ground, perceptual constancy, position in space, and spatial relationships -- have been found more prognostic of reading ability.

Language and Reading

Language as a factor closely related to reading achievement has been considered by Loban, Hildreth, Strickland, Jenson and Haring and Ridgway. The findings of these investigators indicate that measures of language development could be expected to provide predictive information about children who will have difficulty in reading.

Differences in language between the culturally deprived and the middle class child have been noted by Cazden, John and Goldstein, Deutsch and Bernstein. A comparison of the language development of the middle and lower class children is made in this study.

Language development has been measured by vocabulary test techniques by Lesser and Templin. DeHirsch counted the number of words used to tell a story. One technique utilized to measure language in The Illinois Test of Psycholinguistic Abilities involves assessing the words used to describe concrete objects. The latter technique is used in this study.

Configuration-Identification and Reading

The perception involved in learning a word has been considered by Russell and Fea, Vernon, and Solomon and Postman. The process by which a skeletal form or pattern becomes organized into a word with meaning for the individual is not clearly understood. The child who is unable to recognize a logical pattern or series of letters is expected to have difficulty in reading.

Self-Concept and Reading

The self-concept of the child, based on Combs' theory, has shown positive relationship to academic achievement in studies by Brookover, Thomas and Patterson and by Fink. Self-concepts of kindergartners were predictive of reading achievement in a study reported by Wattenberg and Clifford.

Two techniques for measuring self-concept that Gordon proposes as suitable for classroom teachers are self-report and inference based on observation of behavior. Due to constant demands on their time and energy, most kindergarten teachers would be unable to gather sufficient data from which reliable inferences could be made. The self-report, even though questionable as to objectivity, appears to be the most feasible technique.

Predicting Reading Difficulties

Each of the four characteristics, as factors involved in learning to read, is expected to contribute information indicative of the child's future learning experiences. Deficiencies detected in combined measures of the characteristics are expected to be predictive of reading problems in first grade.

CHAPTER III

METHODS AND PROCEDURES

The research was conducted in Waterford Township, Michigan, under the auspices of the Learning Improvement Center, a Title I project[2]. The Learning Improvement Center's program focuses on children who have problems in learning at the primary level, kindergarten through third grade. A corrective, compensatory program is geared toward early identification, diagnosis, and treatment of the anomalies that affect the learning process with particular emphasis on the language arts. An ultimate goal is prevention of learning difficulties. This study was conducted to investigate some characteristics of kindergarten children through procedures that can be administered and interpreted by classroom teachers and that will contribute to the early identification phase of the program. The early identification is a step toward the particular objective, prevention of reading problems.

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[2]"Title I" refers to the Elementary and Secondary Education Act of 1965. Projects under Title I are given financial assistance to provide special educational programs in areas having high concentrations of low-income families.

The procedures involved in the selection of the sample, selection of instruments, collection of data and analyses are described in the sections following. The rationale for the procedures is indicated in each section.

The following terms are used consistently: sample, all kindergarten children in two schools; restricted sample, all the kindergarten children remaining when children with I.Q.'s below 84 were removed; Group A, one random half of the restricted sample; and Group B, the other random half of the restricted sample.

Selection of the Sample

All kindergarten children in two suburban schools of Waterford Township constitute the sample. The two schools had been identified as Title I (ESEA) schools based on the number of low-income families represented in the school population. Each school had one morning and one afternoon class, therefore, a total of four classes are included.

Since a variety of methods of teaching reading in first grade is used in the Title I elementary schools, only schools where a basal reader approach was used were considered for selection in an effort to avoid contamination due to the variable of different reading programs. In some of the schools, an experimental perceptual-motor program was underway in the early grades. These schools were excluded to avoid contamination due to specialized perceptual training. The two schools selected met the aforementioned conditions the most adequately.

Restriction of Sample

Children who scored below 84, one standard deviation below the mean, on the Lorge-Thorndike Intelligence Test were separated from the sample so that the remaining restricted sample of average and above-average students could be studied. Since intelligence quotients and reading achievement are closely related, the child with a below-average I.Q. would be expected to show below-average school achievement regardless of his perceptual development, language development, configuration-identification ability and self-concept. Therefore, it follows that these would not be appropriate subjects for a study of reading handicaps that are other than intelligence-based. Eight percent of the total sample falls in the "below-average" I.Q. group, as defined above. Thus, the restricted sample consists of 92 percent of the total sample.

The number of students in kindergarten classes and first grade classes are shown in Table 3:1. The children who moved out of the school attendance area are listed as "lost from the sample." In addition, the children who were separated from the sample because of "below-average intelligence" are shown. The total number in the restricted sample studied is 103 children, 57 boys and 46 girls.

TABLE 3:1

Summary of Sample: Children Studied in Kindergarten and Children Remaining in First Grade

	School A	School B	Total
Children in Kindergarten			
Boys	31	36	67
Girls	32	28	60
Total	63	64	127
Children Lost from Sample	7	8	15
Children Remaining in First Grade	56	56	112
Boys (IQ below 84)	0	4	4
Girls (IQ below 84)	1	4	5
Boys (IQ 84 and above)*	30	27	57
Girls (IQ 84 and above)*	25	21	46
Total Number of Children Studied	55	48	103

*These sets constitute the restricted sample.

Social Position of Sample

The social position of the individuals in the sample has been calculated from The Two Factor Index of Social Position developed by Hollingshead (1957).

The index is premised upon the following three assumptions: (1) a status structure exists in society; (2) a few commonly accepted characteristics are the main determinants of positions in the structure; and (3) the symbolic characteristics, when scaled and combined statistically, provide a reliable and meaningful stratification of the population under study.

The two factors used to determine social position are occupation and education. Occupations are scaled on the assumption that members of society attach different values to various occupations. The scale of seven values ranges from low for unskilled manual labor to high for the most prestigious, creative and controlling occupations. The education level attained is presumed to reflect knowledge and cultural tastes. Education levels are also scaled on a seven-value scale. The scale ranges from the lowest value, assigned to individuals who complete less than seven years of school, to the highest value, attached to completion of graduate professional training.

The social position score is obtained by combining weighted scores from the scale positions of occupation and education. The occupational scale position is multiplied by seven and the education scale position is multiplied by four. The two figures are then added together to compute a social position score.

The social position scores obtained range from 11, the highest ranking score, to 77, the lowest possible score. The scores can be divided into five groups and assigned a social class position from I to V, high to low, respectively.

The information concerning the occupation and education of the head of the household is found in most school records. In the few cases where incomplete records were found, school personnel procured the needed information from parents.

Computations show that no children in the sample fall in the highest social class, I, and that the largest percentage (59%) are found in Social Class IV. Eighty-three percent of the sample population is positioned in the lower two classes. A breakdown of numbers of children found in each social class stratified by schools is shown in Table 3:2.

The social class of the children who were separated from the sample because their intelligence quotient scores were less than 84 is shown in Table 3:3. Three social classes are represented by these students.

TABLE 3:2

Social Class of First Grade Total Sample

Social Class	Range of Computed Scores	Number of Children School A	Number of Children School B	Percent of Total
I	11-14	0	0	0%
II	15-27	1	5	5%
III	28-43	6	7	12%
IV	44-60	34	32	59%
V	61-77	15	12	24%
Totals		56	56	100%

TABLE 3:3

Social Class of First Grade Children
with IQ Scores Below 84

Social Class	Range of Computed Scores	Number of Children School A	Number of Children School B	Total Number
I	11-14	0	0	0
II	15-27	0	2	2
III	28-43	0	0	0
IV	44-60	0	2	2
V	61-77	1	4	5
			Total	9

Selection of Instruments

Seven instruments are used to gather data about teacher expectations of reading achievement, intelligence, the four factors involved in reading and the criterion, reading achievement.

Teacher Expectations

Teachers of the kindergarten children were asked to indicate the level of reading achievement -- above-average, average, below-average -- which they expected each child to attain in first grade. A recording sheet for each child with the child's name inserted was given to each teacher so she could make the rating. A sample recording sheet is shown in Figure 3:1.

Child's Name ______________________________

Teacher ____________________ Date __________

School ____________________ a.m. ____ p.m.____

In light of your observations of this child, how would you expect him to progress in reading in first grade? (Please check your choice)

__________ Below Average   __________ Average   __________ Above Average

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FIGURE 3:1

Form Used to Record Teachers' Expectations of Reading Achievement in First Grade

Intelligence

The Lorge-Thorndike Intelligence Tests, Level I, was chosen as a non-verbal measure of I.Q. Freeman and Milholland, reviewers in the Fifth Mental Measurements Yearbook (1959), agreed that this test was among the best group intelligence tests available. The reliability of alternate forms was reported as .79 for Level I, and the reliability of split-halves was above .90. The correlation of concurrent validity with Stanford-Binet and WISC, based on first grade children, was .63 and .56, respectively. Freeman stated that more studies of predictive validity are needed. Another reviewer, Pidgeon, pointed out that the tests reliably measure verbal reasoning and non-verbal reasoning, but that no assumptions should be made about their measuring mental capacity. The manual states that the non-verbal battery gives an estimate of scholastic aptitude. As a non-verbal group intelligence measure, the Lorge-Thorndike was selected for use with kindergarten children.

Visual Perception

The Marianne Frostig Developmental Test of Visual Perception, Third Edition, was selected as a measure of visual perception. Austin, in her review of The Frostig Test in the Sixth Mental Measurements Yearbook (1965), expressed enthusiasm in the statements: "The Frostig test appears to be a significant one. It has proved useful as a screening tool with groups of nursery school, kindergarten, and first grade children, primarily because it permits identification of those children who need special perceptual training in five important areas of visual perception." Test-retest reliability of the perceptual quotient is reported as .80. Subtest scale score test-retest correlations range from .42 to .80. Split-half reliability correlations range from .78 to .89. Validity correlations between scaled scores and teacher ratings of classroom adjustment were .44; motor coordination, .50; intellectual functioning, .50. Correlations between the Frostig and Goodenough scores range from .32 to .46. Both reviewers, Anderson and Austin, questioned the adequacy of the standardization population. Anderson stated that the present primary use of the Frostig test would be to predict learning success in the primary grades. The Frostig Test offered promise as a predictor of reading problems when administered by classroom teachers to kindergarten children. It was, therefore, selected as the measure of visual perception.

Language Development

The Vocal Encoding Subtest of The Illinois Test of Psycholinguistic Abilities, Experimental Edition, was selected as the measure of language development. The test authors, McCarthy and Kirk (1961), describe vocal encoding as the ability to express one's ideas in spoken words. Vocal encoding is assessed by asking the student to describe simple objects such as a block or ball. The descriptive terms used by the student are tallied to obtain the raw score. Reliability of the difference between test and retest scores, over a period of three months, has been determined by comparing the ranges obtained by using the standard error of measurement for the raw scores on both the test and the retest. If the range of one standard error of measurement on the retest overlaps the range of one standard error of measurement on the original test, no reliable difference between scores is inferred. If the ranges do not overlap, a reliable difference in scores is inferred. The standard error for the raw scores reported on the Vocal Encoding Subtest for ages five years three months to five years nine months is ± 2.45, for ages five years nine months to six years three months is ± 1.92, and for ages six years three months to six years six months is ± 2.59.

Weener, Barritt and Semmel (1967) evaluated The Illinois Test of Psycholinguistic Abilities and reported a range of internal consistency coefficients for the Vocal Encoding Subtest from .54 to .82 with a median coefficient of .75. The split-half reliability coefficient ranges for age groups from .48 to .84 with a median of .72. The test-retest stability coefficient reported for the Vocal Encoding Subtest ranged from -.25 to +.48 with a median of -.17 for a twelve-month interval between testing periods. The internal consistency measures are moderately high but the test-retest stabilities are quite low, according to the evaluators' judgments.

Validity studies conducted by Weener, Barritt and Semmel using 86 children showed a median concurrent validity coefficient for the test battery of .15; the median predictive coefficient was .23. Results for the subtests were not reported.

Although the validity and reliability of the test battery and subtests are questioned due to an inadequate standardization sample, The Illinois Test of Psycholinguistic Abilities is considered a fruitful beginning as a diagnostic measure of the psycholinguistic abilities. The Vocal Encoding Subtest which measures the spoken descriptive language was chosen as a measure of language development.

Configuration-Identification

The Heckerl Configuration Test, which requires the child to identify the word which goes with a picture, was selected as a measure of configuration-identification. This test, which can be administered to a small group, is based on the assumption that children recognize a series of letters in a logical sequence before reading instruction is begun. Since this test was developed by Heckerl (Learning Improvement Center Director, Waterford) specifically for inclusion in this study, no validity or reliability data had been established. The test was administered to several kindergarten students not in the current study prior to using it with the sample children. A range of correct responses from one to ten was found. In general, the children who achieved the higher scores on the test were considered the most nearly ready for reading by their kindergarten teachers.

Ten items preceded by two trial items constitute the test. Pictures of items that are generally familiar to most children are used as the stimuli. The child responds by drawing a line around the group of letters he selects to go with the picture. In each case, only one group of letters forms a word. A copy of the test is found in Appendix A.

<u>Academic Self-Concept</u>

An adaptation of The Academic Self-Concept Test, entitled "What Face Would You Wear?", developed by Dudzinski, Farrah, Milchus and Reitz (1965), was selected as a measure of academic self-concept. The student responds to questions by circling the facial expression which represents his feelings at the time he answers. The facial expressions range from "very sad" to "very happy." The questions originally developed by the authors to use with the facial expressions had been administered to groups of children in grades one through ten in the suburban Detroit area. Many of the original questions were not suitable for kindergarten children as they made reference to their feelings when engaged in reading activities and number work which are not a part of the kindergarten experiences in the sample schools. Permission was granted by Farrah to construct a set of twenty-four questions specifically designed for kindergarten children to use with the test booklets. Whenever possible, the questions designed for kindergarten were constructed to closely parallel the original questions. The set of questions constructed for kindergarten children is found in Appendix B.

Two weeks after the Academic Self-Concept Test was administered to all the sample children, one-third of the children were randomly selected, using a table of random numbers, for a retest. The test-retest correlation computed was .53. The internal consistency of the test items was computed using the Hoyt Test for Reliability. The coefficient of reliability obtained using the Hoyt test was .77. The item scores and total score for each student are found in Appendix C.

Farrah, et al, divided the original test items into four parts, each representing a factor involved in self-concept. The twenty-four items developed for kindergarten children were factor analyzed to determine which questions formed factorial groups and which questions were unrelated to any factor. Three factors were found using factor analysis.

One factor, labeled Factor A, includes eight questions which concern the feelings of satisfaction a child has about the school and learning situation. The following questions make up Factor A:

1. What face do you wear when you look at your drawings?

2. . . . when you are showing a toy you brought from home in show and tell?

3. . . . when you are coming to school?

4. . . . most of the time in school?

5. . . . when it's your turn to answer a question in school?

6. . . . when you think about learning to read?

7. . . . when the teacher scolds you?

8. . . . when you think of how well you know your numbers?

Factor A resembles the Goal Needs Factor, from the original test questions, defined as the positive regard with which a student perceives the intrinsic and extrinsic rewards of learning in school.

A second factor, labeled Factor B, involves four questions which deal with the expectations of significant others and how the child perceives his role in fulfilling those expectations. The four questions contributing to Factor B are:

1. What face do you wear when the teacher wants to talk to you by yourself?

2. . . . when you have to tell your mother what you did in school?

3. . . . when the teacher asks a question?

4. . . . if you have to tell your parents that you have lost your coat?

Factor B appears to be similar to the Role Expectations Factor in the original test. Role Expectation is defined as the positive acceptance of the aspirations and demands that the student thinks significant others expect of him.

The third factor, labeled Factor C, includes six questions which reflect how adequately the child feels he can perform in the school situation. The six questions in Factor C follow:

1. What face do you wear when you are asked to count?

2. . . . when the boys and girls are asked to choose someone to tell a story about a pciture?

3. . . . when you are drawing a picture?

4. . . . when the teacher says the smartest children can go out and play?

5. . . . when the boys and girls in class have to pick the best paper to put on the bulletin board?

6. . . . when the teacher gives you some school work to do?

Factor C closely parallels the original Self-Adequacy Factor which is defined as the positive regard with which a student views his present and future probabilities of success. A high Self-Adequacy Factor was expected for the high achiever, but a high Self-Adequacy Factor was also found for some underachievers who attempted to defensively deny reality.

The three factors identified in the questions constructed for kindergarten children appear to resemble three of the factors found in the original questions.

The three factors seem to indicate that three segments of academic self-concept are measured by the constructed items.

Reading Achievement

The Stanford Achievement Test, 1964 Revision, Primary I Battery, was selected as a measure to evaluate the reading achievement of children in first grade. The five subtests in the battery which measure reading achievement are word reading, paragraph meaning, vocabulary, spelling, and word study skills. Bryan, in her review in the Sixth Mental Measurements Yearbook (1965), rates the 1964 edition high among standardized achievement test batteries designed for use at the elementary school level. Reliability data reported for the five tests of the Primary I Battery in the Directions for Administering, includes odd-even split-half coefficients ranging from .79 to .92, Kuder-Richardson coefficients from .83 to .93 and standard errors of measurement in terms of grade scores ranging from .5 to 2.5. No specific validity data is reported. Reviewers Stake and Hastings as well as Bryan express a need for a technical manual to supply more detailed information regarding standardization of the sample, reliability, validity and equivalence of forms. The reviews, however, substantiate the assumption that the Standord Achievement Battery adequately measures reading achievement at first grade level.

Collection of Data

Before any testing began, each of the two kindergarten teachers was contacted individually. The purpose of the study was explained and the cooperation of the teacher was sought. The teachers were then asked to make responses regarding the reading achievement level they expected each kindergarten child to attain in first grade. All identifying data such as school, child's name and teacher's name had been inserted by the investigator. The teacher was only requested to check the appropriate blank indicating her response. Every effort was made to make a minimum of additional demands on the teacher's time and energy.

Tester Training

Three test administrators were trained by the investigator prior to the kindergarten testing period. A familiarizing session was held initially to observe the format, directions, and materials needed for each test. A demonstration administration to kindergarten children not in the study permitted the testers to observe procedures and to assist as proctors when small groups were used. Each tester then administered each test four or five times to non-sample children. The practice tests were scored so that any questions regarding administration or scoring procedures could be resolved.

All three testers had previously taught primary or pre-school age children and were able to readily establish rapport with kindergarten children. The testers proceeded with the test administration as they coped with complications of limited availability of testing space, absences and kindergarten field trips. The principals of each school assisted by scheduling special testing space, when possible, and by attempting to locate other suitable areas when this space was in use. The principal's office was used on a few occasions when an individual or small-group test was to be administered and no other space was available.

Kindergarten Testing

The battery of tests administered to the kindergarten children included The Lorge-Thorndike Intelligence Test, The Frostig Test of Visual Perception, The Heckerl Configuration Test, The Vocal Encoding Subtest and The Academic Self-Conept Test.

The Lorge-Thorndike Intelligence Test was administered to small groups of six or eight kindergarten children in mid-April.

The Frostig test, the Heckerl test and The Academic Self-Concept Test were administered to small groups of five to ten kindergarten children during late April and the first part of May. A randomly selected one-third of the sample were retested in small groups on The Academic Self-Concept Test two weeks after the first administration of the test. By spring of the kindergarten year, the children have had school experiences in following directions which help prepare them for a group testing situation. The size of the group varied according to available space. If ten children were tested simultaneously, two testers worked together, one giving the directions and the other assisting as a proctor.

The Vocal Encoding Subtest was administered individually to each kindergarten child in May. Since an individual verbal response from the child was needed on this test, the test was placed last in the battery so that rapport could be established by the tester in previous group testing situations where non-verbal responses were elicited. Only a few children appeared reluctant to respond verbally by the time The Vocal Encoding Subtest was administered.

No scores on any measures were revealed to teachers or administrators after the kindergarten testing in an effort to avoid the categorization or differential treatment of these students in first grade which might result from knowledge of student performance on the tests.

First Grade Testing

One year later, in first grade, the subjects were given the Stanford Achievement Test in classroom groups. One of the testers who had given the kindergarten battery administered the criterion test in May to all of the sample children who were located in seven first-grade classrooms. One classroom group was in a third elementary building due to school boundary changes. Test scores were released to the first grade teachers and building administrators following the testing period. The chart in Figure 3:2 shows the data collection schedule. The raw scores for the data collected are found in Appendix D.

Analyses of Data

All tests were scored by the test administrators and checked by the investigator to increase the accuracy of the scoring. The figure-ground subtest of The Frostig Test of Visual Perception had not been accurately scored by the test administrators in many cases. Judgmental decisions are required and the scoring manual instructions are inadequate. A former member of the Frostig Center Staff assisted the investigator in making scoring decisions which would be in accord with Frostig's intentions. In a few cases, errors in addition or in translating raw scores to scale scores and standard scores were found. Other than the figure-ground subtest, the

FIRST DATA COLLECTION PERIOD

Sample Children in Kindergarten

Time	Event
Before Testing Period	Kindergarten teachers indicate expectations of reading achievement. Train test administrators.
In mid-April	Administer Lorge-Thorndike Intelligence Test to small groups
In late April and early May	Administer to small groups: Frostig Test Heckerl Test Self-Concept Test Administer individually the Vocal Encoding Test Retest random sample on Self-Concept Test

SECOND DATA COLLECTION PERIOD, ONE YEAR LATER

Sample Children in First Grade

In May	Administer Stanford Achievement Test to classroom groups.

FIGURE 3:2

Data Collection Schedule

scoring by test administrators was reasonably accurate and required only minor corrections.

Predicting Reading Difficulty

The major hypothesis that prediction of reading difficulty could be improved by using a combination of variables was tested by employing the following procedures.

The restricted sample was randomly divided into two halves using a table of random numbers. The means and standard deviations were computed for each of the following variables for the first half of the restricted sample (Group A): intelligence, visual perception abilities (six scores), language, self-concept (total score and factors), configuration, and reading achievement. Product-moment correlation coefficients were computed for Group A for each of the variables -- perceptual quotient, eye-motor coordination, figure-ground discrimination, form constancy, position in space, spatial relationships, language, configuration, self-concept total score and three self-concept factors, sex, social position, and teacher ratings -- and the criterion measure, reading achievement. Correlations among the variables and the significance level of the correlation coefficients were also determined. Negative correlations are expected between reading achievement and the variables of social position and teacher's expectations because the scoring of these two variables has been reversed. High numerical scores are assigned to lowest levels of social position and teachers' expectations.

Several combinations of variables were submitted to the least squares equation routine to determine which variables seemed to contribute significantly to the prediction of reading achievement. A multiple-regression equation was established by submitting the most promising variables to a stepwise deletion of variables from the least squares equation procedure. Variables were deleted, one at a time, until all remaining variables were significant contributors to the prediction equation at the .05 level. A multiple correlation coefficient was computed for the multiple-regression equation and reading achievement. From the multiple-regression equation, each child's score on the criterion was predicted.

To cross-validate the predictions from the multiple-regression equation, the second half of the restricted sample (Group B) was used. Means and standard deviations were computed for each variable and compared with the ranges in Group A to determine the comparability of the two groups. Product-moment correlation coefficients were computed for the variables and reading achievement for Group B. The correlation coefficients among the variables and the significance levels of these correlation coefficients were also determined for Group B.

A multiple-correlation coefficient was computed using the multiple-regression equation derived from Group A scores and reading achievement. A smaller multiple-correlation coefficient was expected for Group B due to the differences of the correlations with reading achievement and among the variables. A small shrinkage in the multiple-correlation coefficient computed for Group B, when compared with the multiple-correlation coefficient computed for Group A, would indicate that the set of predictors is relatively stable, while a large shrinkage would indicate an unstable set of predictors.

A reading achievement score was predicted for each child in Group B using the multiple-regression equation derived from Group A scores. The resulting predictions were compared with criterion scores and with teachers' expectations. The McNemar test for the significance of changes was used to test the probability of incorrect predictions by the multiple-regression equation and by teachers' expectations. The McNemar test was chosen because the predictions are related and nominal, classificatory data are used.

Reading Process Factors and Reading Achievement

The entire restricted sample of 103 children was used to determine whether significant relationships existed between each of the factors involved in the reading process and reading achievement.

Product-moment correlation coefficients were computed for reading achievement and each of the factors -- six visual perception abilities, language, configuration and four self-concept scores. Bivariate normal distributions were assumed for each pair of variables. The .05 level of significance was accepted as the basis of rejecting or not rejecting each hypothesis.

Teacher Expectations and Reading Achievement

The proportion of students who will show below-average reading achievement, according to kindergarten teachers' predictions, was hypothesized to be less than the proportion of students showing below-average reading achievement on the criterion tests.

The McNemar test of significance of changes was chosen to test the hypothesis because related samples of the before-and-after type and nominal data are involved. The data were cast into a fourfold table and a chi-square value was computed. The .05 significance level was accepted as the basis for rejecting or not rejecting the hypothesis.

Perceptual Quotients and Intelligence Quotients

The mean intelligence quotient and mean perceptual quotient of the students who show below-average reading achievement were compared to determine whether a true difference exists between the numerical scores for these students. The mean intelligence quotient score and median perceptual quotient score are reported as 100 for standardization groups. An F test was computed to determine whether the variances of the two tests differed. The students were assumed to be randomly drawn from the population of first grade children with I.Q.'s of 84 and above who show below-average reading achievement.

The test for difference between means when data are correlated was used because both sets of scores were obtained from the same individuals and are considered correlated. The .05 significance level was accepted as the basis for rejecting or not rejecting the hypothesis.

Language and Social Position

The restricted sample of 103 children was used to test the hypothesis that a significant relationship existed between language and social position. Bivariate normal distributions were assumed for the variables.

A product-moment correlation coefficient was computed for the two variables. A negative correlation was expected because the scoring for social position has been reversed. A negative sign can thus be disregarded. A .05 significance level was accepted as the basis for rejecting or not rejecting the hypothesis.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The data collected and analyzed by the procedures described in Chapter III are presented in this chapter. Each hypothesis is presented along with the data gathered to test it.

Predicting Reading Difficulty

The major hypothesis tested follows:

1. Null hypothesis: The probability of incorrectly predicting below-average reading achievement in the first grade will be the same for predictions made on the basis of a combination of variables obtained in kindergarten and predictions based on kindergarten teachers' expectations.

Alternate hypothesis: The probability of incorrectly predicting below-average reading achievement in the first grade will be less for predictions made on the basis of a combination of variables than for predictions based on kindergarten teachers' expectations.

The variables investigated included sex, social position, teachers' expectations and scores on The Frostig Test of Visual Perception, The Vocal Encoding Test, The

Heckerl Configuration Test and The Academic Self-Concept Test. The criterion measure of reading achievement was the averaged stanine score from the five reading subtests of the Stanford Achievement Test.

The restricted sample used to test this hypothesis excluded the nine students with I.Q.'s below 84. Only students (103) who showed an I.Q. of 84 or above on The Lorge-Thorndike Intelligence Test were used.

The first step taken in testing the hypothesis was a random division of the sample using a table of random numbers. One half of the sample scores (Group A) was subjected to the analysis procedures to establish the most suitable combination of measures and variables for prediction purposes. The other half of the sample scores (Group B) was used to cross-validate the prediction. The following procedures were used with the first half of the sample (Group A).

<u>Derivation of the Prediction Equation</u>

The means and standard deviations were computed for all variables in Group A. The data are shown in Table 4:1.

The correlation of each variable with the criterion, reading achievement, and the correlations among all the variables were computed. The resulting correlation coefficients are recorded in Table 4:2.

TABLE 4:1

Means and Standard Deviations: Group A
N = 52

Variable	Mean	Standard Deviation
Perceptual Quotient (Frostig)	97.35	12.22
Frostig Subtests		
I. Eye-motor coordination	9.67	1.72
II. Figure-ground	8.50	1.51
III. Form Constancy	9.40	2.51
IV. Position in Space	10.50	2.12
V. Spatial Relationships	10.62	1.87
Language (Vocal Encoding)	15.06	5.23
Configuration (Heckerl)	4.31	1.93
Self-Concept Total Score	88.98	9.52
Self-Concept Factors		
A. Satisfaction in School	32.48	4.20
B. Fulfillment of Expectations	11.27	2.47
C. Performance-Adequacy	23.44	3.85
Sex	1.50	0.50
Social Position	51.81	12.29
Teachers' Expectations	1.87	0.71
Reading Achievement	4.90	1.97
IQ (Lorge-Thorndike)	104.38	10.27

TABLE 4:2

Correlations of Each Variable with the Criterion, Reading Achievement
and Correlations Among All Variables: Group A
N = 52

Variables	Perceptual Quotient	Frostig - Subtest I	Frostig - Subtest II	Frostig - Subtest III	Frostig - Subtest IV	Frostig - Subtest V	Language	Configuration	Self-Concept - Total	Self-Concept Factor A	Self-Concept Factor B	Self-Concept Factor C	IQ	Sex	Social Position	Teacher Expectations	Reading Achievement (Criterion)
Perceptual Quotient (Frostig)	1.00																
Frostig - Subtest I	.64	1.00															
Frostig - Subtest II	.70	.25	1.00														
Frostig - Subtest III	.64	.33	.33	1.00													
Frostig - Subtest IV	.68	.36	.41	.36	1.00												
Frostig - Subtest V	.80	.31	.60	.31	.55	1.00											
Language	.28	.00	.18	.29	.23	.28	1.00										
Configuration	.26	.23	.12	.04	.23	.20	.18	1.00									
Self-Concept - Total	.04	-.07	.03	.00	.03	-.02	-.05	.09	1.00								
Self-Concept Factor A	.15	-.11	.01	.07	.14	.21	.12	.14	.73	1.00							
Self-Concept Factor B	-.06	-.06	-.08	.14	-.11	-.10	-.02	-.12	.59	.25	1.00						
Self-Concept Factor C	-.11	-.03	.05	-.18	-.08	-.21	-.15	.11	.73	.25	.26	1.00					
IQ	.43	.24	.11	.31	.24	.45	.50	.33	.00	.12	-.04	-.06	1.00				
Sex	.13	.21	.08	-.13	.18	.19	-.23	.18	.28	.26	-.02	.16	.09	1.00			
Social Position	-.28	.02	-.17	-.23	-.13	-.34	-.32	-.14	-.28	-.29	-.10	-.21	-.39	-.05	1.00		
Teacher Expectations	-.52	-.37	-.37	-.25	-.41	-.49	-.41	-.30	-.19	-.20	-.25	.04	-.46	-.19	.16	1.00	
Reading Achievement (Criterion)	.57	.34	.38	.25	.55	.61	.19	.32	.02	.20	-.11	-.18	.47	.33	-.32	-.57	1.00

Significance: .44+ —.001
.35-.43—.01
.32-.34—.02
.27-.31—.05

Several combinations of variables were submitted to a least squares equation routine. The most significant contributing variables were resubmitted to a stepwise deletion of variables from a least squares equation routine. One variable at a time was deleted from the equation until all remaining variables were significant contributors at the .05 level or less. The variables remaining were sex, perceptual quotient (from the Frostig test), self-concept Factor C (Performance-Adequacy), social position and teachers' expectations. The regression coefficient and level of significance for each of the five variables is shown in Table 4:3

The following equation was used to compute the predicted reading achievement scores:

$$Y' = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

α = constant

X_1 = sex; β_1 = regression coefficient for sex

X_2 = perceptual quotient; β_2 = regression coefficient for perceptual quotient

X_3 = self-concept Factor C; β_3 = regression coefficient for self-concept Factor C

X_4 = social position; β_4 = regression coefficient for social position

X_5 = teacher expectations; β_5 = regression coefficient for teacher expectations

TABLE 4:3

Regression Coefficients and Significance Level for the Five Variables and the Constant in the Multiple-Regression Equation

Variable	Regression Coefficient	Significance Level
Sex	1.00533819	0.016
Perceptual Quotient	0.04452342	0.028
Self-Concept Factor C	-0.11321101	0.041
Social Position	-0.03647383	0.039
Teacher Expectations	-0.91794477	0.007
Constant	5.30983597	0.096

A multiple-correlation coefficient was computed using the least squares analysis of variance procedure. The multiple-correlation coefficient between the weighted combination of variables and the criterion, reading achievement, was .74. The square of the multiple-correlation which indicates the proportion of the total variance which can be predicted from the weighted combination of variables was .55. The analysis of variance for the overall regression showed an F of 59.9179 which is significant at the $<$.0005 level. The analysis of variance data is shown in Table 4:4.

The reading achievement score for each student in Group A was predicted using the multiple-regression equation. The predicted score, the criterion reading achievement score and the teachers' expectation for each student are shown in Table 4:5.

Any criterion score or predicted score below 4.0 is considered below-average. Twenty-two criterion scores are below-average. Thirteen of the below-average criterion scores were predicted by using the multiple-regression equation. Nine of the below-average criterion scores were predicted by the teacher.

Two scores, incorrectly predicted as below-average by the weighted combination of variables equation, were correctly predicted by the teacher. Six scores, correctly predicted as below-average by the multiple-regression

TABLE 4:4

Analysis of Variance for Overall Regression: Group A
N = 52

Dependent Variable -- Reading Achievement
Independent Variable -- Multiple-Regression Equation

	Sums of Squares	Degrees of Freedom	Mean Square	F	Significance Level
Regression (about mean)	107.99781178	1	107.99781178	59.9179	.0005
Error	90.12141899	50	1.80242838		
Total (about mean)	198.11923077	51			

Multiple-Correlation Coefficient (R) --- .74
R^2 --------- .55

TABLE 4:5

Predicted Scores Using the Multiple-Regression Equation, Criterion Reading Achievement Scores, and Teachers' Expectations: Group A
N = 52

Student	Predicted Score*	Criterion Score*	Teacher Expectations
1	4.3	2.2	Average
2	5.0	4.6	Average
3	3.8	2.2	Below-average
4	2.3	2.0	Below-average
5	5.9	7.8	Above-average
6	7.0	5.4	Above-average
7	1.9	2.6	Below-average
8	4.8	3.4	Average
9	3.6	3.2	Average
10	4.8	5.0	Average
11	4.2	5.8	Average
12	4.2	5.6	Average
13	6.2	7.4	Above-average
14	5.8	6.0	Average
15	6.9	7.2	Above-average
16	2.8	4.2	Below-average
17	6.1	3.8	Above-average
18	6.8	7.4	Average
19	6.2	3.2	Above-average
20	5.0	8.2	Above-average

*in terms of stanines

TABLE 4:5 (cont'd.)

Student	Predicted Score*	Criterion Score*	Teacher Expectations
21	4.4	4.0	Above-average
22	6.1	3.6	Above-average
23	4.3	3.2	Above-average
24	5.4	4.6	Average
25	6.8	6.8	Above-average
26	6.5	5.2	Above-average
27	4.0	3.2	Below-average
28	3.3	3.6	Average
29	5.4	4.2	Average
30	6.4	6.6	Average
31	3.9	2.0	Average
32	6.6	8.0	Above-average
33	3.7	3.0	Below-average
34	2.3	2.6	Below-average
35	2.6	3.2	Below-average
36	5.6	7.2	Average
37	4.2	5.4	Average
38	3.7	3.2	Average
39	6.3	8.4	Average
40	5.2	5.6	Average
41	3.9	3.6	Average
42	4.9	5.2	Average

*in terms of stanines

TABLE 4:5 (cont'd.)

Student	Predicted Score*	Criterion Score*	Teacher Expectations
43	4.0	3.6	Below-average
44	6.6	8.0	Above-average
45	3.7	6.0	Average
46	3.2	2.8	Below-average
47	5.9	5.6	Above-average
48	4.7	3.6	Average
49	3.1	3.0	Average
50	7.0	8.8	Above-average
51	5.2	5.2	Average
52	8.1	8.4	Above-average

*in terms of stanines

equation, were incorrectly predicted by the teacher. Seven below-average criterion scores were not predicted by either the multiple-regression equation or the teacher, and seven scores were correctly predicted by both. A summary of the predictions for below-average criterion scores is found in Table 4:6.

A summary of the predictions at 4.0 and above criterion scores is found in Table 4:7. The data shows that the multiple-regression equation predictions and the teachers' predictions are both very accurate for students

TABLE 4:6

Multiple-Regression and Teachers' Predictions for Students Below 4.0 on the Criterion, Reading Achievement: Group A
N = 22

		Predicted by Multiple-Regression Equation		
		correct	incorrect	totals
Predicted by Teachers' Expectations	correct	7 A	2 B	9
	incorrect	6 C	7 D	13
	totals	13	9	22

TABLE 4:7

Multiple-Regression and Teachers' Predictions for Students at or above 4.0 on Criterion: Group A
N = 30

		Predicted by Multiple-Regression Equation		
		correct	incorrect	totals
Predicted by Teachers' Expectations	correct	28	1	29
	incorrect	0	1	1
	totals	28	2	30

who show average and above-average reading achievement criterion scores.

Cross-Validation

The multiple-regression equation computed from the scores of Group A students was used with Group B student scores to test the weighted equation's power of prediction. Testing the predictive power by using the multiple-regression equation with a new sample of individuals is the cross-validation procedure.

The same analysis procedures were followed with Group B as with Group A. The means and standard deviations were computed for all variables for Group B and found comparable to the means and standard deviations for Group A. The means and standard deviations for Group B are shown in Table 4:8.

The correlation of each variable with the criterion, reading achievement, and the correlations among all the variables were computed for Group B. The correlation coefficients are recorded in Table 4:9.

The reading achievement score for each student in Group B was predicted using the multiple-regression equation established from Group A scores. The predicted scores, criterion scores and teachers' expectations for Group B are shown in Table 4:10.

TABLE 4:8

Means and Standard Deviations: Group B
N = 51

Variable	Mean	Standard Deviation
Perceptual Quotient (Frostig)	96.31	11.85
Frostig Subtests		
I. Eye-motor coordination	9.52	1.92
II. Figure-ground	8.49	1.63
III. Form Constancy	8.86	2.77
IV. Position in Space	10.20	2.16
V. Spatial Relationship	10.47	1.71
Language (Vocal Encoding)	13.73	3.93
Configuration (Heckerl)	3.49	1.59
Self-Concept Total Score	88.37	10.12
Self-Concept Factors		
A. Satisfaction in School	32.29	4.47
B. Fulfillment of Expectations	11.45	3.28
C. Performance-Adequacy	22.73	4.22
Sex	1.39	.49
Social Position	53.29	10.91
Teachers' Expectations	1.94	.65
Reading Achievement	3.93	1.33
IQ (Lorge-Thorndike)	102.06	10.34

TABLE 4:9

Correlations of Each Variable with the Criterion, Reading Achievement and Correlations Among All Variables: Group B
N = 51

Variables	Perceptual Quotient	Frostig - Subtest I	Frostig - Subtest II	Frostig - Subtest III	Frostig - Subtest IV	Frostig - Subtest V	Language	Configuration	Self-Concept - Total	Self-Concept Factor A	Self-Concept Factor B	Self-Concept Factor C	IQ	Sex	Social Position	Teacher Expectations	Reading Achievement (Criterion)
Perceptual Quotient (Frostig)	1.00																
Frostig - Subtest I	.51	1.00															
Frostig - Subtest II	.75	.23	1.00														
Frostig - Subtest III	.65	.03	.49	1.00													
Frostig - Subtest IV	.73	.36	.39	.29	1.00												
Frostig - Subtest V	.61	.45	.37	.25	.24	1.00											
Language	-.15	-.10	.01	.08	-.01	-.31	1.00										
Configuration	-.18	.02	-.09	-.05	-.14	-.24	.18	1.00									
Self-Concept - Total	.07	-.04	.06	.14	.19	-.26	.03	.16	1.00								
Self-Concept Factor A	.08	.02	.05	.20	.17	-.22	.13	.29	.77	1.00							
Self-Concept Factor B	-.14	-.11	-.06	-.16	.02	-.24	-.08	.01	.55	.20	1.00						
Self-Concept Factor C	.16	.07	.12	.16	.17	-.10	.00	.04	.70	.32	.20	1.00					
IQ	.46	.08	.42	.47	.23	.26	.18	-.10	.07	.14	-.21	.09	1.00				
Sex	.17	.09	.18	-.08	.23	.11	-.06	.01	-.06	-.09	.08	-.01	.03	1.00			
Social Position	-.25	.01	-.26	-.25	-.14	-.22	-.18	-.19	.10	-.01	.31	-.07	-.10	-.04	1.00		
Teacher Expectations	-.21	-.20	-.26	-.17	.09	-.35	-.19	-.17	.11	.17	.22	-.20	-.40	-.11	.29	1.00	
Reading Achievement (Criterion)	.40	.11	.41	.38	.11	.42	.12	.17	-.04	.01	-.24	-.00	.35	.33	-.38	-.47	1.00

Significance: .44+ —.001
.35-.43—.01
.32-.34—.02
.27-.31—.05

TABLE 4:10

Predicted Scores Using the Multiple-Regression Equation, Criterion Reading Achievement Scores, and Teachers' Expectations: Group B
N = 51

Student	Predicted Score*	Criterion Score*	Teacher Expectations
1	3.7	4.2	Average
2	3.5	3.0	Average
3	5.1	4.8	Above-average
4	4.9	4.4	Above-average
5	2.4	3.2	Below-average
6	3.5	2.0	Average
7	4.7	4.2	Above-average
8	4.0	4.2	Above-average
9	4.1	2.8	Average
10	5.5	6.6	Average
11	3.6	3.0	Below-average
12	3.6	2.4	Average
13	3.2	2.2	Below-average
14	4.4	4.8	Average
15	4.3	2.0	Average
16	3.6	3.8	Average
17	3.1	3.4	Above-average
18	4.5	5.2	Average
19	4.5	4.4	Above-average
20	3.7	3.4	Above-average

*in terms of stanines

TABLE 4:10 (cont'd.)

Student	Predicted Score*	Criterion Score*	Teacher Expectations
21	4.4	5.6	Above-average
22	3.8	2.0	Average
23	4.2	3.4	Average
24	3.9	3.2	Average
25	4.8	5.2	Average
26	3.6	3.8	Average
27	4.7	4.4	Above-average
28	3.0	2.8	Average
29	3.5	5.0	Average
30	2.4	2.0	Below-average
31	3.7	4.6	Average
32	2.9	3.2	Below-average
33	5.1	4.4	Above-average
34	3.5	3.6	Average
35	5.8	6.4	Above-average
36	3.5	3.8	Below-average
37	3.6	3.2	Average
38	3.5	4.6	Average
39	4.4	3.0	Average
40	2.9	2.8	Below-average
41	3.5	3.6	Average
42	4.9	4.6	Average

*in terms of stanines

TABLE 4:10 (cont'd.)

Student	Predicted Score*	Criterion Score*	Teacher Expectations
43	3.4	6.4	Average
44	2.8	2.6	Below-average
45	3.5	4.2	Average
46	3.7	3.4	Below-average
47	3.8	2.8	Average
48	5.3	4.0	Average
49	5.9	8.4	Above-average
50	4.0	6.0	Average
51	2.4	3.2	Average

*in terms of stanines

The multiple-correlation coefficient between the multiple-regression equation derived from Group A scores and the criterion, reading achievement, was .63 for Group B. The square of the multiple-correlation coefficient was .40. The analysis of variance for the overall regression showed an F of 32.3001 which is significant at the $<.0005$ level. The analysis of variance data is shown in Table 4:11.

In Group B, twenty-eight criterion scores fall below 4.0, which is considered below-average. Twenty-four of the below-average criterion scores were predicted by using the multiple-regression equation. Nine of the below-average criterion scores were predicted by the teacher.

TABLE 4:11

Analysis of Variance for Overall Regression: Group B
N = 51

Dependent Variable -- Reading Achievement
Independent Variable -- Multiple-Regression Equation Derived from Group A Scores

	Sums of Squares	Degrees of Freedom	Mean Square	F	Significance Level
Regression (about mean)	35.18315449	1	35.18315449	32.3001	.0005
Error	53.37370825	49	1.08925935		
Total (about mean)	88.55686274	50			

Multiple Correlation Coefficient (R) -- .63
R^2 -------- .40

Summary comparisons of predictions from the multiple-regression equation and from teachers' expectations for students in Group B who show below 4.0 criterion scores are given in Table 4:12.

The statistical hypothesis tested was:

H_0: Pr (Incorrect MR) = Pr (Incorrect T)

Pr (Incorrect MR) = Probability of incorrect predictions from the combination of variables in the multiple-regression equation

Pr (Incorrect T) = Probability of incorrect predictions from the kindergarten teachers' expectations

H_1: Pr (Incorrect MR) $<$ Pr (Incorrect T)

The McNemar test for the significance of changes was used to compare the proportion of incorrect teacher predictions with the proportion of incorrect multiple-regression equation predictions of students who show below 4.0 criterion scores. The McNemar test was chosen because related samples of the before-and-after type and nominal data are involved. The decision rule at $\alpha \leq .05$ was to reject H_0 if $\chi^2 \geq 2.71$. The χ^2 value obtained was 13.07 for which $p < .0005$. Since the χ^2 was greater than 2.71, the null hypothesis was rejected for the cross validation using Group B.

TABLE 4:12

Multiple-Regression and Teachers' Predictions for Students Below 4.0 on the Criterion, Reading Achievement: Group B

		Predicted by Multiple-Regression Equation: correct	incorrect	totals
Predicted by Teachers' Expectations	correct	9	0	9
	incorrect	15	4	19
	totals	24	4	28

$p < .0005$

TABLE 4:13

Multiple-Regression and Teachers' Predictions for Students at or above 4.0 on Criterion: Group B

		Predicted by Multiple-Regression Equation: correct	incorrect	totals
Predicted by Teachers' Expectations	correct	17	6	23
	incorrect	0	0	0
	totals	17	6	23

$p < .016$

Summary comparisons of predictions for students in Group B who show 4.0 or above criterion scores are given in Table 4:13. Since one-half the sum of the incorrect cell frequencies in Table 4:13, $\frac{1}{2}(6+0)$, was less than five, the binomial test was used to compare the incorrect predictions from the multiple-regression equation with the incorrect teacher predictions for Group B students who show 4.0 or above criterion scores. The probability obtained was $p < .016$. Therefore, the incorrect predictions from the multiple-regression equation are significantly greater than the incorrect teacher predictions for Group B students who show a 4.0 or above criterion score.

Relationships of Reading Process Factors and Reading Achievement

The hypotheses which follow (2, 3, 4, 5) test the relationship between reading achievement and the four factors involved in the reading process -- visual perception, language, configuration and self-concept.

Visual Perception and Reading Achievement

2. Null hypothesis: There is no significant relationship between each of the six visual perception abilities measured by The Frostig Test of Visual Perception and reading achievement as measured by the Stanford Achievement Test.

H_{o_1}: $\rho = 0$ — ρ- relationship between perceptual quotient and reading achievement

H_{o_2}: $\rho_1 = 0$ — ρ_1- relationship between eye-motor coordination and reading achievement

H_{o_3}: $\rho_2 = 0$ — ρ_2- relationship between figure-ground and reading achievement

H_{o_4}: $\rho_3 = 0$ — ρ_3- relationship between form constancy and reading achievement

H_{o_5}: $\rho_4 = 0$ — ρ_4- relationship between position in space and reading achievement

H_{o_6}: $\rho_5 = 0$ — ρ_5- relationship between spatial relationships and reading achievement

Alternate hypothesis: There is a positive relationship between each of the six visual perception abilities as measured by The Frostig Test of Visual Perception and reading achievement as measured by the Stanford Achievement Test.

H_1: $\rho > 0$ — ρ- relationship between perceptual quotient and reading achievement

H_2: $\rho_1 > 0$ — ρ_1- relationship between eye-motor coordination and reading achievement

H_3: $\rho_2 > 0$ — ρ_2- relationship between figure-ground and reading achievement

H_4: $\rho_3 > 0$ ρ_3 - relationship between form constancy and reading achievement

H_5: $\rho_4 > 0$ ρ_4 - relationship between position in space and reading achievement

H_6: $\rho_5 > 0$ ρ_5 - relationship between spatial relationships and reading achievement

The means and standard deviations were computed for each variable. The restricted sample of 103 students was used and assumed to represent a bivariate normal distribution. The data showing the means and standard deviations is shown in Table 4:14.

Product-moment correlation coefficients were computed for each of the visual perception abilities measured by the Frostig test and reading achievement measured by the Stanford Achievement Test. The decision rule was to reject H_0 if the correlation coefficients were significant at $\alpha \leq .05$. The resulting correlation coefficients are shown in Table 4:15.

All correlation coefficients were significant at or above the .05 level. Therefore, all of the null hypotheses were rejected. A significant positive relationship existed between reading achievement and each of the following perceptual abilities: perceptual quotient, eye-motor coordination, figure-ground, form constancy, position in space and spatial relationships.

TABLE 4:14

Means and Standard Deviations: Restricted Sample
N = 103

Variable	Mean	Standard Deviation
Perceptual Quotient	96.83	11.99
Eye-motor Coordination	9.60	1.82
Figure-ground	8.50	1.56
Form Constancy	9.14	2.64
Position in Space	10.35	2.14
Spatial Relationships	10.54	1.79
Reading Achievement	4.42	1.75
Language - Vocal Encoding	14.40	4.66
Configuration - Identification	3.90	1.81
Self-concept	88.68	9.78
Social Position	52.54	11.60

TABLE 4:15

Correlation Coefficients for Variables and Reading Achievement: Restricted Sample
N = 103

	Reading Achievement
Perceptual Abilities from Frostig Test	
Perceptual Quotient	.49**
Eye-motor Coordination	.24X
Figure-ground	.37**
Form Constancy	.31*
Position in Space	.37**
Spatial Relationships	.52**
Language (Vocal Encoding Test)	.20+
Configuration - Identification	.31*
Self-concept Total	.00NS
Factor A - Satisfaction in School	.12NS
Factor B - Fulfillment of Expectations	-.16NS
Factor C - Performance-Adequacy	-.07NS

**Significant at the .001 level ($p<.001$)

*Significant at the .01 level ($p<.01$)

XSignificant at the .02 level ($p<.02$)

+Significant at the .05 level ($p<.05$)

NSNot Significant

<u>Language Development and Reading Achievement</u>

3. Null hypothesis: There is no significant relationship between language development as measured by the Vocal Encoding Subtest of The Illinois Test of Psycholinguistic Abilities and reading achievement as measured by the Stanford Achievement Test.

H_0: $\rho = 0$ ρ - relationship between language development and reading achievement

Alternate hypothesis: A positive relationship exists between language development as measured by the Vocal Encoding Subtest of The Illinois Test of Psycholinguistic Abilities and reading achievement as measured by the Stanford Achievement Test.

H_1: $\rho > 0$ ρ - relationship between language development and reading achievement

Test scores from the restricted sample of 103 students with an assumed bivariate normal distribution were used to test the hypothesis. The means and standard deviations computed for the two variables are shown in Table 4:14. A product-moment correlation coefficient was computed for the two variables. The decision rule was to reject H_0 if the correlation coefficient was significant at $\alpha \leq .05$.

A correlation coefficient of .20 was found which is significant at the .05 level. Therefore, the null hypothesis was rejected. A positive relationship existed between language development as measured by the Vocal Encoding Subtest and reading achievement as measured by the Stanford Achievement Test. The correlation coefficient and significance level is included in Table 4:15.

Configuration-Identification and Reading Achievement

4. Null hypothesis: There is no significant relationship between configuration-identification as measured by The Heckerl Configuration Test and reading achievement as measured by the Stanford Achievement Test.

H_0: $\rho = 0$ ρ - relationship between configuration-identification and reading achievement

Alternate hypothesis: A positive relationship exists between configuration-identification as measured by The Heckerl Configuration Test and reading achievement as measured by the Stanford Achievement Test.

H_1: $\rho > 0$ ρ - relationship between configuration-identification and reading achievement

Test scores from the restricted sample of 103 students with an assumed bivariate normal distribution were used to test the hypothesis. Means and standard deviations for the two variables are shown in Table 4:14. A product-moment correlation coefficient was computed for the two variables. The decision rule was to reject H_0 if the correlation coefficient was significant at $\alpha \leq .05$.

The correlation coefficient computed was .31 which is significant at the .01 level. Therefore, the null hypothesis was rejected. A positive relationship existed between configuration-identification as measured by The Heckerl Configuration Test and reading achievement as measured by the Stanford Achievement Test. The correlation coefficient and significance level are included in Table 4:15.

Academic Self-Concept and Reading Achievement

5. Null hypothesis: There is no relationship between each of the four academic self-concept scores, as measured by The Academic Self-Concept Test, and reading achievement as measured by the Stanford Achievement Test.

H_0: $\rho = 0$ — ρ - relationship between total academic self-concept score and reading achievement

H_{o_1}: $\rho = 0$ — ρ - relationship between satisfaction in school (Factor A) and reading achievement

H_{o_2}: $\rho = 0$ — ρ - relationship between fulfillment of expectations (Factor B) and reading achievement

H_{o_3}: $\rho = 0$ — ρ - relationship between performance-adequacy (Factor C) and reading achievement

Alternate hypothesis: A positive relationship exists between each of the four academic self-concept scores, as measured by The Academic Self-Concept Test, and reading achievement as measured by the Stanford Achievement Test.

H_1:	$\rho > 0$	ρ - relationship between total academic self-concept score and reading achievement
H_2:	$\rho > 0$	ρ - relationship between satisfaction in school (Factor A) and reading achievement
H_3:	$\rho > 0$	ρ - relationship between fulfillment of expectations (Factor B) and reading achievement
H_4:	$\rho > 0$	ρ - relationship between performance-adequacy (Factor C) and reading achievement

Test scores from the restricted sample of 103 students which were assumed to have a bivariate normal distribution were used to test the hypothesis. Means and standard deviations were computed for each variable. The data are included in Table 4:14. A product-moment correlation coefficient was computed for each of the self-concept scores and reading achievement. The decision rule was to reject H_0 if the correlation coefficients were significant at $\alpha \leq .05$.

None of the correlation coefficients for the self-concept scores and reading achievement were significant at the .05 level. The null hypotheses were not rejected. There is no significant relationship between the academic self-concept total score and reading achievement. Likewise, no significant relationships exist between the three self-concept factors and reading achievement. The correlation coefficient and significance level data are found in Table 4:15.

Difference between Teacher Expectations and Reading Achievement

6. Null hypothesis: The proportion of students who show below-average reading achievement on the Stanford Achievement Test in first grade equals the proportion of students who, according to teachers' expectations at kindergarten level, will show below-average reading achievement in first grade.

H_o: $Pr_1 = Pr_2$

Pr_1 - proportion of below 4.0 reading scores incorrectly predicted by the teacher

Pr_2 - proportion of 4.0 and above reading scores incorrectly predicted by the teacher

Alternate hypothesis: The proportion of students who show below-average reading achievement on the Stanford Achievement Test in first grade is greater than the proportion of students who, according to teachers' expectations at kindergarten level, will show below-average reading achievement.

H_1: $Pr_1 > Pr_2$

Pr_1 - proportion of below 4.0 reading scores incorrectly predicted by the teacher

Pr_2 - proportion of 4.0 and above reading scores incorrectly predicted by the teacher

The reading test scores and teacher expectations for the 103 children who had an I.Q. of 84 and above were used to test the hypothesis. The McNemar test for the significance of changes was chosen because related samples of the before-and-after type and nominal data are involved. The data was cast into a fourfold table as shown in Table 4:16. The decision rule was to reject the null hypothesis if the χ^2 value with one degree of freedom at $\alpha \leq .05$ was equal to or greater than 2.71.

The χ^2 value obtained was 27.27 which has a significance of $P < .0005$. Therefore, the null hypothesis was rejected. The proportion of students who show below-average reading achievement in first grade was greater than the proportion of students that the kindergarten teacher expected to show below-average reading achievement.

TABLE 4:16

Teachers' Expectations Compared with Actual Reading Achievement
N = 103

		Teachers' Expectations of Reading Achievement Level		
		Average and Above-Average	Below-Average	
Reading Achievement Scores on Stanford Achievement Test	Average and Above-average	52	1 Pr_2	53
	Below-Average	32 Pr_1	18	50
		84	19	103

$p < .005$

Difference between Perceptual Quotients and Intelligence Quotients

7. Null hypothesis: There is no significant difference between the mean intelligence quotient scores on The Lorge-Thorndike Intelligence Test and the mean perceptual quotient scores on The Frostig Test of Visual Perception for the students who show below-average reading achievement on the Stanford Achievement Test.

H_0: $\mu_1 = \mu_2$

μ_1 - mean intelligence quotient score for students who show below 4.0 reading achievement scores

μ_2 - mean perceptual quotient score for students who show below 4.0 reading achievement scores

Alternate hypothesis: There is a significant difference between the mean intelligence quotient score and the mean perceptual quotient score for the students who show below-average reading achievement.

H_1: $\mu_1 \neq \mu_2$

μ_1 - mean intelligence quotient score for students who show below 4.0 reading achievement scores

μ_2- mean perceptual quotient score for students who show below 4.0 reading achievement scores

Fifty students scored less than 4.0 on the averaged reading scores of the Stanford Achievement Test. The intelligence quotients and the perceptual quotients of those fifty students were used to test the hypothesis. The test for difference between means when data are correlated was used because both sets of scores were obtained from the same individuals and thus were considered correlated. The assumption was made that the fifty students were randomly drawn from the population of first grade children who show below-average reading achievement. An F test was computed to determine whether the variances of the scores on the two tests differ. The F of 1.11 was not significant at the .01 level, therefore, the assumption was made that no difference existed between variances of the scores on the two tests. The decision rule was to reject H_0 if the t value at $\alpha = .05$ was greater than 2.021.

The t value obtained was 4.89 which is significant at the .001 level. Therefore, the null hypothesis was rejected. There was a significant difference between the mean intelligence quotient score and the mean perceptual quotient score for the students who show below-average reading achievement.

Relationship between Language Development and Social Position

8. Null hypothesis: There is no relationship between the language development, as measured by the Vocal Encoding Subtest of The Illinois Test of Psycholinguistic Abilities and the social position, according to the Hollingshead Two Factor Index of Social Position, of kindergarten children.

H_0: $\rho = 0$ ρ - relationship between language score and social position score

Alternate hypothesis: A positive relationship exists between language development and social position of kindergarten children.

H_1: $\rho > 0$ ρ - relationship between language score and social position

The language and social position scores from the restricted sample of 103 children were used to test the hypothesis. The distribution of the sample was assumed to be a bivariate normal distribution. The means and standard deviations were computed for the two variables. The means and standard deviations data are found in

Table 4:14. The product-moment correlation coefficient was then computed for language development and social position. The decision rule was to reject H_o if the correlation coefficient was significant at the .05 level.

The correlation coefficient obtained was -.27 which was significant at the .01 level. The negative correlation is explained by the scores assigned to social position. The lowest numerical value is assigned to the highest social position. Consequently, the negative sign is disregarded. The null hypothesis was rejected. There is a significant relationship between the language, as measured by the Vocal Encoding Subtest of The Illinois Test of Psycholinguistic Abilities, and the social position, according to the Hollingshead Two Factor Index of Social Position, of kindergarten children.

Summary of Analyses

A summary of the hypotheses tested, significance level found and an indication of whether the hypothesis was rejected or not rejected is given in the following tabular form.

Null Hypotheses Tested	Significance Level		Hypothesis Rejected or Not Rejected
1. Predictions from a combination of variables do not differ from kindergarten teachers' expectations of below-average reading achievement.	.0005		Rejected
2. No significant relationship exists between each of the six visual perception abilities and reading achievement.	H_{o_1}	.001	Rejected
	H_{o_2}	.02	Rejected
	H_{o_3}	.001	Rejected
	H_{o_4}	.01	Rejected
	H_{o_5}	.001	Rejected
	H_{o_6}	.001	Rejected
3. No significant relationship exists between language and reading achievement.	.05		Rejected
4. No significant relationship exists between configuration-identification and reading achievement.	.01		Rejected

5. No significant relationship exists between each of the four academic self-concept scores and reading achievement.	H_o	NS	Not Rejected
	H_{o_1}	NS	Not Rejected
	H_{o_2}	NS	Not Rejected
	H_{o_3}	NS	Not Rejected
6. Kindergarten teacher expectations of below-average reading achievement does not differ from below-average reading achievement scores in first grade.		.0005	Rejected
7. No significant difference exists between mean intelligence quotient scores and mean perceptual quotient scores for students who show below-average reading achievement.		.001	Rejected
8. No significant relationship exists between language development and social position.		.01	Rejected

CHAPTER V

CONCLUSIONS, DISCUSSION AND IMPLICATIONS

The results of the study are summarized and discussed in this final chapter. The implications of the findings for curriculum planning are included in the latter part of the chapter.

Conclusions

The following conclusions have been drawn from the findings:

1. A larger number of students who show below-average reading achievement in first grade were predicted by using the multiple-regression equation than by teachers' expectations.

2. The five variables that contributed most significantly to the prediction equation were sex, social position, perceptual quotient (from the Frostig test), teachers' expectations and self-concept (performance-adequacy factor).

3. Significant positive relationships were found between reading achievement and each of the following variables: perceptual quotient, eye-motor coordination, figure-ground, form

constancy, position in space, spatial relationships, language and configuration-identification.

4. Many students who show below-average reading achievement in first grade are not predicted by the kindergarten teachers' expectations of below-average reading achievement.

5. A significant relationship exists between language development and social position.

6. No significant relationships were found between reading achievement and the self-concept variables: total self-concept score, satisfaction in school (Factor A), fulfillment of expectations (Factor B), and performance-adequacy (Factor C).

7. Intelligence quotient scores and perceptual quotient scores differ for children who show below-average reading achievement.

Discussion

The multiple-regression equation was successfully used to predict below-average reading achievement in the cross-validation sample. Twenty-four of the twenty-eight below-average criterion reading achievement scores (86%) were correctly predicted by using the combination of variables. In comparison, only nine of twenty-eight below-average reading achievement criterion scores (32%) were correctly predicted by the teachers' expectations of below-average reading achievement. These comparisons are graphically shown in Figure 5:1. For the cross-validation sample, the proportion of incorrect teacher predictions of below-average reading achievement was significantly greater than the proportion of incorrect predictions made using the multiple-regression equation.

The predictions of below-average reading achievement made by using the multiple-regression equation included six underpredictions. The six criterion scores for these underpredictions were found in the average or above-average group.

The results indicate that kindergarten teachers rather consistently tend to overestimate the future performance of their students. The multiple-regression equation predictions, on the other hand, include more below-average criterion scores but also include a few average or above-average criterion scores.

The multiple-regression equation was developed from Group A scores on the five selected variables. One of the five variables included in the equation was teachers' expectations. Predictions from this one variable alone, teachers' expectations, are compared with predictions from a group of five variables.

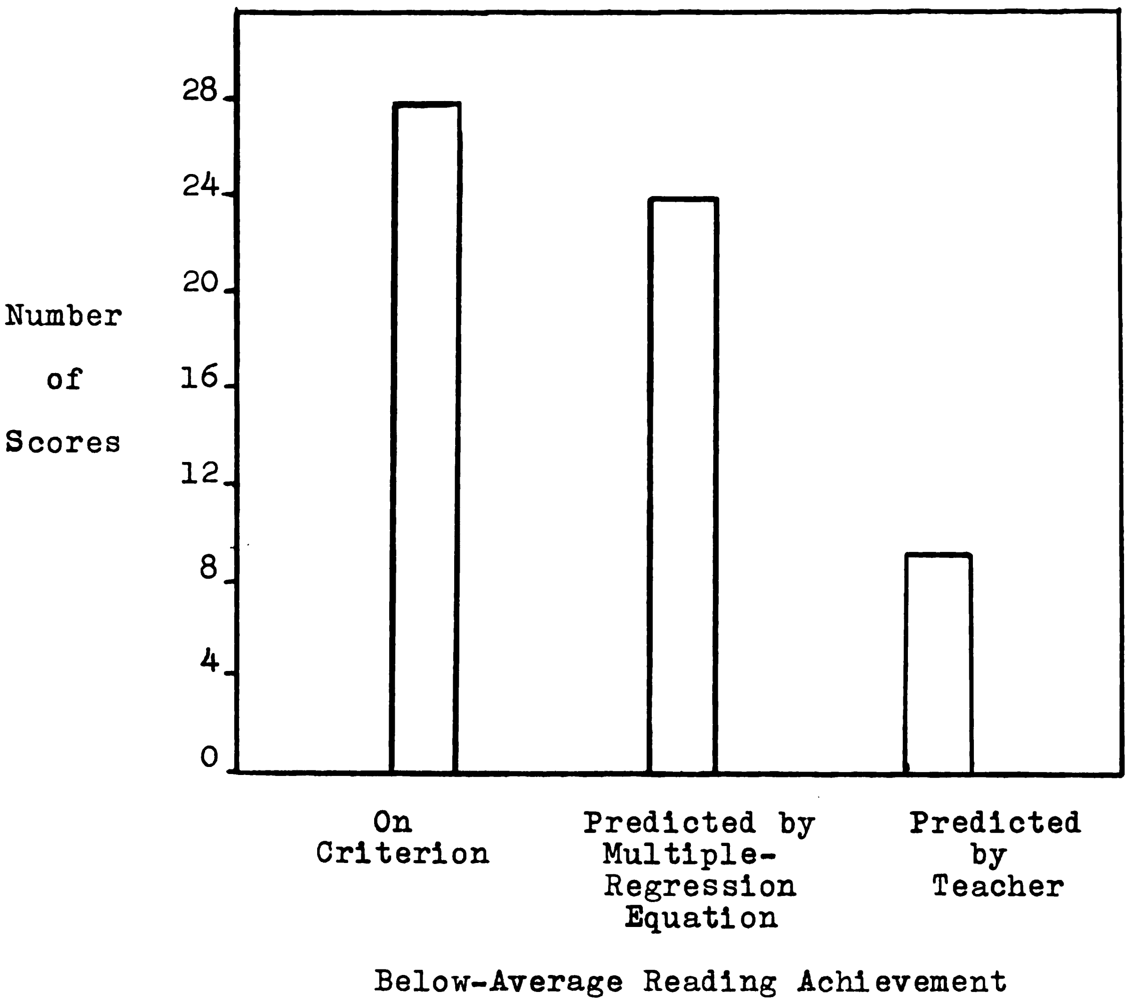

FIGURE 5:1

Comparison of Below-Average Reading Achievement Scores on the Criterion, Predicted by the Multiple-Regression Equation, and Predicted by the Teacher: Group B

Teachers' expectations was also one of the five variables. As a result, teachers' expectations as a single predictor are compared with teachers' expectations in combination with four other variables as a predictor. Since the same variable, teachers' expectations, was included in both predictors, an interdependence existed between the predictors. Consequently, a number of agreeing predictions from the two predictors, teachers' expectations alone and the combination of variables, are found.

The predictions made by using the multiple-regression equation included a combination of objective measures, such as the perceptual quotient and sex, plus one subjective judgment: kindergarten teachers' predictions of success in reading. The combination is compared with the subjective expectations of teachers alone. The judgments made by the teachers had no specific criteria other than each teacher's idea of what constitutes below-average, average, and above-average reading achievement. One teacher may tend to expect that most children will show average reading achievement and that a very small number of the children will be represented in each of the above-average and below-average categories. Another teacher may divide the class into groups of some arbitrary size, such as approximating thirds in the course of rationalizing the question. Consequently, the bases for making judgments varies among teachers in this study.

Arbitrary specification of the meaning of "average," "below-average," and "above-average" was deliberately not given to the teachers. Kindergarten teachers are often asked to make these sorts of ill-defined judgments based only upon their subjective observations. Thus, a comparison of objective predictions from the multiple-regression equation with subjective predictions by teachers has been made in this study in order to test a more precise procedure against a common one. Teachers' predictions could have been structured somewhat by asking for a specified percentage of children in each reading achievement category or a rank ordering of the children in each class.

The multiple-correlation coefficient for the multiple-regression equation scores and the criterion scores for Group A was .74. When the multiple-regression equation derived from Group A scores was used for Group B, the multiple-correlation coefficient between the scores predicted by the multiple-regression equation and the criterion scores was .63. The shrinkage of the multiple-correlation is comparatively small which gives evidence of a relatively stable set of predictors.

Three of the regression coefficients used in the multiple-regression equation had negative values. Two of the negative values, social position and teachers' expectations, can be explained by the use of reversed scoring.

The higher ratings were assigned the lower numerical scores. The third regression coefficient, for the performance-adequacy self-concept factor, cannot be explained in quite the same way. One explanation might be that underachievers tend to overestimate their adequacy in performance in school, while the higher achievers are more conservative in their estimates. Since a negative correlation coefficient is observed as the correlation of the self-concept factor with reading achievement, the explanation seems feasible. Children who are underachievers may be denying reality be responding optimistically to questions regarding their feelings of adequacy in performance in school.

A second explanation might be that the self-concept factor may be functioning in the multiple-regression equation as a suppressor variable. However, in Darlington's (1968) discussion of suppressor variables, he assumed that suppressor variables have positive correlations with the criterion but receive a negative weight in the regression equation to improve prediction. Both of these conditions are not met for the self-concept factor in that a negative correlation with the criterion was found. Consequently, the suppressor variable explanation appears to be less feasible.

Another variable included in the prediction equation is sex. More boys than girls showed below-average reading achievement on the criterion. Consequently, sex proved a useful predictor in the multiple-regression equation.

The relationship between social position and reading achievement was significant. Below-average reading achievement was related to lower social position. The social position factor was retained as a significant predictor in the multiple-regression equation.

The statistical analysis leading to the multiple-regression equation called for exclusion of the intelligence quotient factor. When the deletion routine was applied, intelligence quotient was one of the variables deleted because its contribution to the prediction equation was not significant at the .05 level. The correlation coefficient for intelligence and reading achievement shows that a positive significant relationship exists between the two variables. The deletion of the intelligence quotient variable suggests that some of the abilities measured by the intelligence test may also be measured by another variable remaining in the prediction equation. The other variable, in this case, is probably the perceptual quotient.

If only single variables were selected as predictors of reading achievement, intelligence quotient would constitute one of the better predictors. This judgment is based on the correlation coefficients obtained for intelligence quotient and reading achievement (.47 for Group A and .35 for Group B).

Although all teachers were using a "basal reader" approach, the probability exists that competence and style differences affected differentially the success and failure of the students in the sample. Teacher competence differences in teaching reading may, in fact, be reflected in the criterion reading achievement scores. Since the children were located in seven first grade classrooms, the influence of a single teacher's input was combined with the influence of six other teachers. As a result, the combined reading achievement scores may reflect a range of teacher effectiveness in teaching reading. A more thorough study of the influence of the teacher and method on the criterion score should be made in order to test the possibility that differences in method and teacher may be an important determinant.

Reading Process Factors

Three of the four factors involved in the reading process showed significant positive relationships to reading achievement. Visual perception, language and configuration are confirmed as contributing to the reading process. Self-concept, the central mobilizer in Strang's theory, does not show a significant relationship to reading achievement.

One explanation might be that the self-concept technique used to measure self-concept may not be a valid approach for this age level. A child's response may be very closely related to very recent happenings. For example, a happy experience immediately preceding the test may affect his responses. A larger number of happy faces may be circled, as a result.

Although significant positive relationships were found between reading achievement and two of the factors -- language and configuation -- neither factor was retained in the multiple-regression equation as a significant predictor. In contrast, one of the self-concept factors, performance-adequacy, showed a negative correlation with reading achievement but was retained as a significant predictor in the multiple-regression equation. A significant positive correlation of a variable with the criterion is not sufficient evidence that the variable will be a contributing predictor in the multiple-regression equation. Conversely, the variable which is not significantly correlated with the criterion may be a contributing predictor in the combination of variables equation.

Since three of the factors -- visual perception, language and configuration -- show positive significant relationships to reading achievement, and the fourth factor -- self-concept -- is in part retained as a predictor of reading achievement, all factors appear to show evidence of involvement in the complex reading process.

Language and Social Position

The significant relationship found between language and social position supports the results of previous studies reported in the literature. The reverse scoring on social position accounts for the negative correlation coefficient.

Intelligence Quotients and Perceptual Quotients

A true difference was found between the intelligence quotients and the perceptual quotients obtained by the children who showed below-average reading achievement on the criterion. Frostig (1964) contends that perceptual quotients are lower for these children, and that perceptual quotients should not be considered the same as intelligence scores. The findings support her contentions.

Implications

A large percentage of the children who show below-average reading achievement on the criterion measure in first grade can be identified by using the combination of variables approach. Some cautions need to be exercised in using this identification procedure. Teachers and other school personnel should be aware that several children may be selected by the combination of variables prediction who will <u>not</u> show below-average reading achievement in first grade. Instead, these children may show average or above-average reading achievement.

The children identified by using this procedure should not be "labeled" as underachievers, as having reading problems or as even having potential reading difficulty. Very often "labels" may be applied erroneously, but the label has an affect on the treatment the child receives. Rosenthal and Jacobson (1968) found "that teachers' expectations can significantly affect their pupils' performance (p. 179)." They report a study where teachers of preschool children were teaching the meaning of a series of symbols. The teachers who expected "good symbol learning" put forth more teaching effort and were able to teach more symbols, while the teachers who expected "poor symbol learning" did not expend as much effort in teaching and taught only a few symbols. The expectations held became self-fulfilling.

The combination of variables identification procedure, when used with an awareness of the potential problems involved, can be effectively employed to identify children who would benefit most from specific curricular activities. Even though some additional children are selected, appropriate activities would not be harmful for these children.

Planning Training Procedures

Identification is merely a first step toward prevention of reading difficulties. Appropriate training procedures to compensate for some of the weaknesses or deficiencies detected in identification should be implemented. Determining what the appropriate training procedures are could be investigated in future studies.

Since one of the variables used in the combination of variables was perceptual quotient, the training procedures developed by Frostig (1964) could be given consideration as one aspect of a training program. For children at early kindergarten level, the manipulative activities suggested would seem most appropriate. Sometimes only the paper and pencil worksheets or workbooks are given to children as training activities. Bruner (1964) contends that information may be processed in three ways: by actions, by representations and by symbols. If the young child is to gain maximally from training procedures, according to Bruner's schema, he should begin with manipulative activities, progress to the representational levels using pictures and worksheets and finally add the language to help him integrate the information.

Training Teachers

Since a number of children who actually showed below-average reading achievement in first grade were not selected by teachers' expectations, some in-service training may be appropriate. An in-service program could emphasize the development of an increased awareness of the characteristics which may serve as indicators of potential reading problems. Presentation of more objective observation techniques could result in improved predictions of below-average achievement in the future.

Pre-service teachers could also benefit from training that focuses on the symptoms of reading difficulty which can be detected in kindergarten. Practical experiences in identifying symptoms in actual classrooms or by using video-tapes should enable the student to be more alert, as a teacher, to the various potential deficiencies which may be found.

An advance is made in the direction of the ultimate goal, prevention of reading difficulties, by making early identification of potential problems so that appropriate curricular programs can also be implemented early. The combination of variables approach was used to make a more inclusive and more accurate identification in this study. This approach may be useful in schools where caution is exercised so that "labels" are not attached to the children identified by the procedure.

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APPENDICES

APPENDIX A

APPENDIX A

THE HECKERL CONFIGURATION TEST

This test is based on the assumption that children recognize a series of letters in a logical sequence before formal reading instruction is begun. The English orthography is based on a rather consistent relationship of one letter to another. For example, if a word begins with the letter 's' it is very likely the next letter will be 't', but very improbable that the next letter would be a 'b' or 'z'. This letter relationship frequency constitutes a familiar configuration or pattern which looks familiar to children although they may have no idea what the patterns of letters represent.

Directions

Say - We are going to play a game with words. It is a kind of guessing game. Do you know what a word is? (Ask a child his name and print it on the board.) This is a word. These letters say (child's name). Now look at the picture of the fish. There are 3 boxes below the fish. I will put them on the board. Look at the first box. Is this a word in the first box? No. Is this a word in the last box? No. This is a word in the middle box. It goes with the picture of the fish. Let's put an X on the middle box like this.

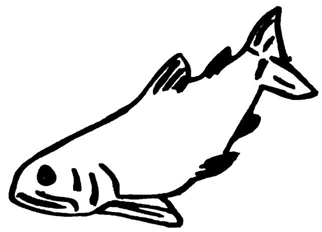
Do you see a picture of a top? Look at the three boxes below the top. One box has a word that goes with top. Look at the first box. No, that doesn't go with top. Look at the second box. No, that doesn't go with top. Look at the last box. Yes, that goes with top. Put an X on the last box.

Now, turn to the next page. Find the picture of the cat. Now look carefully at all three green boxes below the cat. Put an X on the green box that you think goes with the cat. That's right, put an X on the word that you think says 'cat."

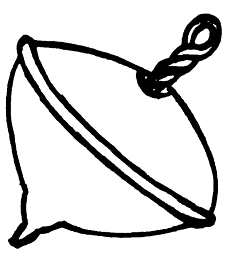
Repeat for remaining nine items.

dog (red)	pipe (red)	seal (red)
box (blue)	horse (blue)	basket (blue)
bird (green)	ball (green)	leaf (black)

THE HECKERL CONFIGURATION TEST



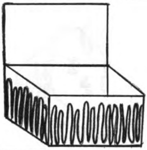
1234	fish	==++



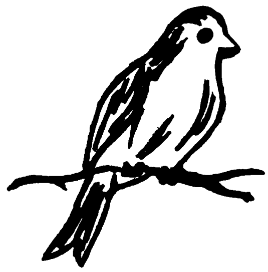
abab	rrrr	top

cat | aaa | ovj

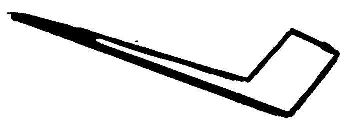
ptm | fef | dog



zts | box | mncqo

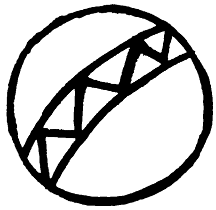


bird	rrnn	tpzl

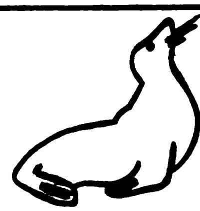


ddnm	pipe	htsa

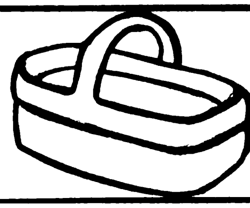
horse	wppse	hssrv



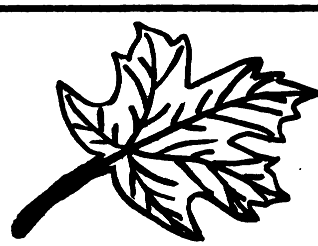
ziee	nocl	ball



seal	zzssp	ototo



pmolti	basket	ahoccb



leaf	cdll	mnqt

APPENDIX B

APPENDIX B

QUESTIONS USED FOR THE ACADEMIC SELF-CONCEPT TEST

Children responded to these questions by circling the appropriate facial expression in the "What Face Would You Wear?" answer booklet produced by Dudzinski, Farrah, Milchus and Reitz (1965).

1. What face do you wear when you look at your drawings?
2. What face do you wear when the teacher is looking at your school work?
3. What face do you wear when the teacher is talking to your mother?
4. What face do you wear when you are showing a toy you brought from home in show and tell?
5. What face do you wear when you are coming to school?
6. What face do you wear when you are writing your name?
7. What face do you wear when you are asked to tell a story in show and tell about something that has happened to you.
8. What face do you wear most of the time that you are in school?
9. What face do you wear when it's your turn to answer a question in school?
10. What face do you wear when you think about learning to read?
11. What face do you wear when you are asked to count?

12. What face do you wear when the boys and girls are asked to choose someone to tell a story about a picture?
13. What face do you wear when the teacher wants to talk to you by yourself?
14. What face do you wear when all the children in your room are busy?
15. What face do you wear when you are drawing a picture?
16. What face do you wear when the teacher scolds you?
17. What face do you wear when you have to tell your mother what you did in school?
18. What face do you wear when the teacher says the smartest children can go out and play?
19. What face do you wear when the boys and girls in class have to pick the best paper to put on the bulletin board?
20. What face do you wear when you think of how well you know your numbers?
21. What face do you wear when the teacher asks a question?
22. What face do you wear when the teacher gives you some school work to do?
23. What face do you wear if you have to tell your parents that you have lost your coat? (This item was scored in reverse.)
24. What face do you wear if your parents said you couldn't come to school today?

APPENDIX C

APPENDIX C

SELF-CONCEPT ITEM AND TOTAL SCORES

School / Student / Sex / Sch. or D.m. / Card Set	Self-Concept Test: Item Scores, Total	Self-Concept Retest: Item Scores, Total
1001111	442245553354455543554323092	351554123345125322223344074
1002111	433445453443234234414425087	433444344434244222444324081
1003111	323523124545155225421211070	531234423541134315334212069
1004211	241453455455513521235525086	452544354542145312554514087
1005111	333534355333435553553421084	433543534444533453454421089
1006211	343553533334135525333315079	345443433333333555443341408 4
1007211	534543245345343414543325088	453534253452143215234211074
1008211	352434354435514515542425086	451433144543453315544514087
1009111	123314312331223355454524071	514215414131152215534125066
1010111	554555554554555525553545111	5555555555555555555555552117
1011111	532453254532423232333315071	1524533243335332353553335083
1012211	525452544343424424454414088	453445244444234424344424087
1013221	345343235543533425545215086	354433134435433525554315087
1014221	433453244354144415453325085	343454345343243415433334076
1015121	324554254445445454543515099	454454435455435425545425100
1016221	324453545245244515454214087	442525345543244115243232079
1017121	132253235255235525534524083	532353253545355325522224085
1018121	352534213234534311533115070	525313345153323234345332075
1019221	354533454333442511252115078	345213115532333511433335072
1020121	3333331332223333511233111059	334553133235233312253315073
1021221	345535454543325525553324094	435553353344334425535323087
1022221	543545454345355525454425100	545445343543543425454325095
1023221	432454134432543413355135081	534512122122124325135125064
1024221	153544554555455412555513096	545545545554445412355514099
2025111	533333334453345324435335086	335332333533314323334115072
2026111	352543213234534525343325081	532453233323455155533334084
2027111	5353553534533533515333321086	535425434552234433353315082
2028111	352554354545335541555345098	454453354544354515545525099
2029111	3343333333333333333333255076	353424333334122222222224065
2030111	333335555551151511555515086	213335331233354311351525070
2031211	553453453345232524454223087	432453543255245324454225087
2032111	4115555555555555512555555104	455555555555555511555521104
2033111	453545434554433425444324093	443543321323324325433424076
2034211	455533555345533415555524099	555555555555555525555524113
2035221	344544544544434435554432096	454543345454345443344322091
2036121	543354243455344422535425090	554354545544555322535521096
2037221	4444444444444444423343351088	443443434443333434444343086
2038121	453424453331332514451454083	435233434533254535434314085
2039221	525555555555555552555524110	555555454545454554255555524108
2040221	533135450345455454543515091	534542543543545513543513091
2041221	5434342544554554215444 14091	323443333434344243433314077
2042221	451111111111111111112115036	515545555113555151555150 95
2043121	515554145215455515555114092	5154151155155554515543514086
2044121	143353543434433424434432082	434334343434433434344432083

44 CARDS

01 PAGES

Self-Concept Test

School	Subject	Sex	[illegible]	Card no.	Item Scores	Total
1	045	1	1	1	434352443445324424543333	085
1	046	1	1	1	545555454555255515555521	103
1	047	2	1	1	435434435344243414443511	080
1	048	1	1	1	534353432354234325553514	086
1	049	2	1	1	543453455545234524455335	103
1	050	2	1	1	541253141235525454235455	085
1	051	1	1	1	554543345544433454454555	102
1	052	2	1	1	333333333333333333333333	072
1	053	2	1	1	543445434352415215453314	084
1	054	1	1	1	333444445555435524454425	096
1	055	1	1	1	354545444455555355555534	107
1	056	2	1	1	353455435515435525544323	093
1	057	1	1	1	544445444444454444455451	099
1	058	2	1	1	334333334454243324443224	079
1	059	2	1	1	352534242545253034554514	085
1	060	2	1	1	335533443554353525254421	083
1	061	1	1	1	534354354355333111332515	080
1	062	1	1	1	333233333333333323333333	070
1	063	1	1	1	345342135352415115443515	079
1	064	2	1	1	553435435554333323343334	088
1	065	1	2	1	354445343544444534434434	094
1	066	2	2	1	541341512253225515523524	077
1	067	2	2	1	345433534335333425443433	086
1	068	1	2	1	435543245452234523555325	090
1	069	1	2	1	354453454534432534324525	091
1	070	2	2	1	545533255543335525455321	092
1	071	2	2	1	554555555545444512555444	105
1	072	1	2	1	454434333434343425454524	089
1	073	1	2	1	554532152341254215454535	085
1	074	1	2	1	532534335545112513123115	073
1	075	2	2	1	543555455555545533555224	104
1	076	1	2	1	453454345342345425454323	090
1	077	2	2	1	535555455454455522454324	100
1	078	2	2	1	545435555435435522555535	100
1	079	2	2	1	353453153353334422353225	081
1	080	2	2	1	435353454542345525255524	094
1	081	1	2	1	434532153343233532453223	077
1	082	1	2	1	353534534534534524555524	096
1	083	1	2	1	432553343255243415232515	081
2	084	2	1	1	332533335244253215333214	074
2	085	2	1	1	154532251144115115551525	073
2	086	1	1	1	542555552525225515552225	091
2	087	1	1	1	535455545543524534543524	100

43 CARDS

01 PAGES

Self-Concept Test

School	Subject	Sex	d.m. or p.m.	card set	Item Scores	Total
2	088	1	1	1	515551353515155545553114	088
2	089	1	1	1	433544444333353423434333	084
2	090	2	1	1	352415422454545553545512	090
2	091	2	1	1	354455454544545543555543	105
2	092	1	1	1	533414234251434123132235	070
2	093	1	1	1	533453443343152325333254	082
2	094	2	1	1	154545245254245515554515	093
2	095	2	1	1	343543454344334433444214	085
2	096	1	1	1	535435354354445325543444	096
2	097	1	1	1	453354355533433521552524	089
2	098	2	1	1	555555125555555525555521	103
2	099	1	1	1	450435435345453435453314	089
2	100	1	1	1	422454423345433314453434	083
2	101	2	1	1	553455333542432335533335	089
2	102	2	1	1	554454454444455425454324	099
2	103	1	1	1	545454454455544535455543	106
2	104	1	1	1	545545455544435525553321	098
2	105	2	1	1	312353154442443333332334	075
2	106	2	2	1	444454454445454525544421	096
2	107	1	2	1	532545553545355501255211	086
2	108	1	2	1	543532445543135415445325	089
2	109	1	2	1	532535252535254515554514	091
2	110	1	2	1	535554555555255525555515	107
2	111	1	2	1	544555155555135515551511	092
2	112	1	2	1	521545141252125115142215	067
2	113	1	2	1	554545554455445432454441	100
2	114	2	2	1	534434245314334515543525	087
2	115	2	2	1	551555454455555511555050	095
2	116	1	2	1	153544454443553521555515	094
2	117	1	2	1	543453332530532521255521	078
2	118	2	2	1	543534134353453425543324	087
2	119	1	2	1	535535535545433542255211	090
2	120	2	2	1	523543453345435424543214	087
2	121	1	2	1	554543454443455522253521	091
2	122	2	2	1	355554553555545155555554	109
2	123	2	2	1	434333335443343325343324	081
2	124	2	2	1	454543554345555425545323	099
2	125	2	2	1	544544142531423115232403	072
2	126	2	2	1	534543453541524513252215	083
2	127	1	2	1	545535454545545454545543	107

40 CARDS

01 PAGES

APPENDIX D

APPENDIX D

RAW SCORES FOR ALL DATA COLLECTED

School / Student / sex / a.m. or p.m. / card set	Lorge-Thorndike	Frostig: Subtest I / Subtest II / Subtest III / Subtest IV / Subtest V / Perceptual Quotient	Vocal Encoding	Self-Concept I / Self-Concept II*	Configuration	Teachers' Expectations	Group	Social Position	Reading Achievement: 1 2 3 4 5 Total	Self-Concept Factors: A B C
1001112	110	10091 11011102	13	09270	03	2	2	51	1242222	311425
1002112	108	0910091111102	16	08764	01	2	1	55	4454442	301123
1003112	093	1008090810090	16	07055	02	2	1	44	4242330	250525
1004212	101	1009090613096	08	08668	04	1	1	51	3376548	331421
1006212	121	0908130709094	20	07958	03	1	1	55	4465344	300721
1007212	102	0908080811091	12	08867	05	2	2	51	4455546	340924
1008212	100	1108110907094	14	08666	04	3	2	55	1241322	301026
1009112	085	0708070608072	07	07153	02	3	2	58	2222220	191321
1010112	100	0709121007094	14	11182	07	3	1	58	3343332	391429
1011112	098	1009051110094	11	07153	04	2	1	73	1232220	280817
1012212	121	1304071111094	13	08868	06	1	2	58	9959778	341123
1013222	105	1209080811096	20	08664	04	1	2	40	5557554	311320
1014222	097	0907080810083	10	08565	06	1	1	40	3364542	330725
1015122	093	1209111110104	14	09977	07	1	1	58	4364442	351428
1017122	112	0908070910087	19	08366	04	3	2	58	1343226	261030
1018122	108	0807090913094	06	07449	01	2	1	52	3242328	231016
1019222	093	1109071111102	11	07853	05	2	1	44	7847766	330812
1020122	110	1008061011092	21	05945	03	2	2	65	4352334	250812
1021222	084	0807090908082	11	09470	04	2	2	73	3362232	351025
1022222	114	0507051209077	23	10074	08	2	2	30	4466550	361127
1023222	099	1009070810089	15	08162	03	3	1	73	3333330	331415
1024222	072	1113091011112	06	09671	02	3	2	69	2263332	331127
2026112	094	1008151610098	15	08161	03	2	2	59	8457558	271222
2027112	099	1107060811085	23	08666	03	2	1	51	1243224	351120
2029112	085	1007050910087	10	07655	02	3	1	51	1233222	241417
2030112	097	0809101111102	18	08660	02	2	1	44	6454548	340818
2031212	099	0909071110094	13	08766	04	2	1	55	1123320	351021
2032112	091	0807101109092	19	10482	06	2	1	37	4255338	391627
2033112	116	0805090808076	22	09369	03	1	1	69	3244434	331224
2034212	097	0807060910079	17	09974	02	2	2	48	7546656	341327
2035222	117	0711121310110	10	09674	02	2	1	51	5456652	341426
2036122	099	0908091113102	09	09068	02	1	1	44	4364544	311225
2037222	083	1109081009098	07	08867	03	2	1	65	1231218	321421
2038122	106	1011111013108	14	08360	06	1	2	51	8867874	311019
2039222	105	0810091113104	11	11084	03	2	2	26	8744760	401430
2040222	072	0807050709076	13	09166	01	3	1	77	1121214	251328
2041222	114	1012111513116	23	09169	04	1	2	51	7768872	331125

37 CARDS

01 PAGES

* These data were not used.

School / Student / sex / a.m. or p.m. / card set	Lorge-Thorndike	Frostig: Subtest I / II / III / IV / V / Perceptual Quotient	Vocal Encoding	Self-Concept I / Self-Concept II	Configuration	Teachers' Expectations	Group	Social Position	Reading Achievement: 1 2 3 4 5 Total	Self-Concept Factors: A B C
2043122	100	0906090908083	14	09272	04	3	2	55	4257342	391122
1045112	104	1311131312118	22	08567	05	1	2	47	4282338	311125
1046112	119	1010051010095	17	10379	03	1	1	51	2262534	391030
1047212	104	1309111314118	12	08059	06	2	2	40	8978574	300722
1048112	117	1309111013113	08	08665	03	1	1	51	6467556	290828
1050212	094	0908051011091	11	08569	03	2	1	65	1232220	262023
1051112	097	1008141110104	23	10279	04	1	2	30	3253332	371824
1053212	097	1008101312110	10	08463	01	2	1	69	1443534	300924
1054112	119	1008100910096	22	09674	09	1	2	44	7989882	351227
1055112	113	1009100910100	20	10780	06	1	2	55	3354540	341630
1056212	123	1008091013100	17	09370	07	1	2	55	2355336	341224
1057112	101	0808091110092	10	09976	03	1	2	69	4243332	341824
1058212	108	0808041210087	15	07958	02	2	1	59	2353332	270922
1059212	112	1008091211100	10	08563	05	2	2	44	3258546	271026
1060212	113	1309081314115	09	08867	05	2	1	55	4556652	331123
1061112	106	0809071009091	15	08058	04	2	1	51	2374338	290722
1062112	100	0610130811096	17	07052	04	1	1	47	4364544	231118
1063112	090	1106040710080	11	07961	04	2	1	48	2423328	260926
1064212	096	0804040908070	19	08864	06	2	1	58	4466550	321121
1065122	087	0906071008081	15	09469	03	3	1	58	2321220	311424
1067222	119	1209121412116	14	08663	08	1	2	55	4797768	281124
1068122	124	0908160910103	28	09069	05	1	2	26	4474752	361122
1069122	118	1007141112106	12	09167	03	2	1	69	4266546	331321
1072122	115	1208121010108	17	08965	05	3	2	44	3262332	301124
1073122	097	1108081108092	17	08563	03	2	2	73	5143536	301023
1074122	114	0809121014110	24	07355	03	2	2	58	1274742	330616
1075222	099	1008091008091	10	10480	03	3	1	73	3253332	401525
1076122	117	1611111213116	14	09068	04	1	1	40	3284544	341123
1077222	101	0910101414116	18	10074	06	2	2	44	8648766	391223
1078222	089	1108090809090	10	10073	02	2	2	73	1222320	341326
1079222	108	1210091211107	13	08161	10	1	2	66	9977880	321019
1080222	094	1007081010090	06	09471	05	3	2	62	2352330	361223
1081122	100	0707070808074	11	07761	04	3	2	69	2153226	331018
1082122	119	0710110910096	16	09672	06	2	1	51	3245436	331425
1083122	099	0708070808077	13	08161	03	3	2	44	2272332	300625
2084212	099	1312121213116	20	07454	06	1	1	44	7566864	260721
2086112	103	1109151414118	11	09168	01	3	1	55	3254538	370724
2087112	105	0809090909092	15	10075	04	2	1	44	3242532	371325

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School / Student / sex / d.m. or p.m. / card set	Lorge-Thorndike	Frostig: Subtest I, Subtest II, Subtest III, Subtest IV, Subtest V, Perceptual Quotient	Vocal Encoding	Self-Concept I / Self-Concept II	Configuration	Teachers' Expectations	Group	Social Position	Reading Achievement: 1, 2, 3, 4, 5, Total	Self-Concept Factors: A, B, C
2088112	060	060506060807 0	09	08869	03	3	1	22	2242326	380922
2089112	108	110809111210 6	14	08462	02	2	2	40	6696972	311219
2090212	086	100907100809 3	11	09068	02	2	1	69	4446546	251627
2091212	094	100908111010 0	12	10580	03	2	1	44	4143230	361826
2092112	105	080610100908 5	15	07050	02	2	2	63	5458554	231116
2093112	092	100808091109 3	10	08260	02	3	1	66	3252228	301119
2094212	092	100905100909 1	11	09368	03	2	2	69	3343332	310829
2095212	117	101216101311 6	12	08564	04	2	2	55	9978984	321121
2096112	083	081108120809 4	09	09672	01	2	2	18	8448558	311328
2097112	094	110606111008 7	14	08967	07	2	1	55	4353336	371020
2098212	122	100809091009 2	14	10381	03	2	2	26	7466556	371430
2099112	100	070908091008 9	17	08966	04	2	2	51	3353436	311124
2100112	091	101107111310 6	19	08364	07	2	2	44	5266752	291124
2101212	089	090710090708 8	09	08965	04	3	2	59	3364236	311321
2102212	109	121110141211 6	09	09973	04	1	2	58	8997780	361225
2103112	082	090910100809 4	20	10682	02	3	2	48	3252228	371728
2104112	099	080908121109 6	19	09876	05	2	2	58	6485760	391126
2105212	082	161010120911 6	16	07560	03	3	1	73	1131114	301218
2106222	108	131112151111 8	18	09674	02	2	1	41	4436646	351227
2107122	096	070809051007 7	15	08675	04	2	1	51	7548864	370919
2108122	087	060709070908 1	08	08968	04	3	1	41	3223326	350924
2109122	087	100809111009 6	04	09170	06	3	2	44	1342428	350827
2110122	117	101113121011 4	13	10780	03	2	1	59	4345542	401030
2111122	082	080809080908 3	10	09274	03	3	1	51	1241118	400430
2114222	102	090906111009 2	12	08766	05	1	2	51	5457756	330924
2115222	096	080708081108 5	13	09575	03	2	2	59	3453336	381621
2116122	093	100908090909 4	12	09470	01	2	2	66	4252230	301228
2117122	110	090809120809 4	18	07861	04	3	1	51	3453234	341413
2118222	103	111009111210 4	11	08766	03	1	2	37	9989988	311124
2119122	106	100909111010 0	09	09068	03	2	1	65	2253228	361418
2120222	105	090912161011 4	17	08768	03	2	1	26	3345540	331025
2121122	108	080810111210 2	12	09169	01	2	2	40	7446552	371121
2123222	122	081212101310 8	17	08160	03	1	1	33	8898984	291021
2124222	101	090806111309 6	13	09974	04	2	1	51	6655860	331427
2125222	077	080604060907 1	15	07254	04	3	2	65	2223222	290718
2126222	115	111012161411 8	26	08362	03	1	2	47	9979884	370916
2127122	086	090806091008 3	15	10782	02	2	1	73	3244332	351928

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