DETERMINING THE PREDICTIVE VALUE
OF SELECTED MEASURES FOR FIRST
GRADE READING SUCCESS

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF EDUCATION

By

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Denton, Texas
August, 1971
Black, Bob G., Determining the Predictive Value of Selected Measures for First Grade Reading Success. Doctor of Education (Elementary Education), August, 1971, 124 pp., 7 tables, 2 appendices, bibliography, 89 titles.

This study was undertaken to investigate the predictive value of certain tests in relationship to first grade reading success.

The following predictor tests were administered to seventy first grade students during the first two weeks of school: Metropolitan Readiness Test, Naming Letters Test, Light Response Test and Matching Symbol Test. The Teacher's Reading Readiness Rating Scale was filled out by each of the seven teachers at the end of the sixth week. The Wechsler Intelligence Scale for Children was administered to each child during the fall. The seventh predictor test was computed by finding the difference in individual scores of the Light Response Test and the Matching Symbol Test.

The Light Response Test and the Matching Symbol Test were readministered during the last four weeks of school. The criteria for measuring the effectiveness of the predictive tests were the Gray Oral Reading Paragraphs Test and the Gates-MacGinitie Reading Test. These tests were also administered to the students during the last four weeks of the school year.
The raw data were entered on North Texas State University Computer Center data sheets for computing the coefficients of Pearson product-moment correlation, multiple correlation, and the Fisher t-ratio. The Gray Oral Reading Paragraphs Test was eliminated from the study because the scores were not normally distributed. Sixty-five per cent of the pupils made test scores of zero. The mean was 6.70, with a standard deviation of 11.16. Only about one-half standard deviation was possible toward the zero score side of the mean.

The Metropolitan Readiness Test was the best single predictor of the study, with a correlation of .69. The second best single predictor was the Wechsler Intelligence Scale for Children, with a correlation of .66. The third best single predictor was the Naming Letters Test, with a correlation of .64. The letters used in this test were the following: capital X, N, H, W and V; lower case o, y, a, u and q. The highest three correlations, as shown above, had a multiple correlation of .76.

Analysis of data yielded information from which the following conclusions were drawn:

1. It can still be concluded that the Metropolitan Readiness Test is one of the best single predictors of first grade reading success.

2. It is concluded that tests that measure the specific aspects of the reading process (identifying,
naming and meaning) are the best predictors of first grade reading success.

3. Considering the amount of time needed to test, in relation to the efficiency of predicting first grade reading success, the Naming Letters Test is recommended.

4. Workbooks, of the matching symbol type, are not likely to improve first grade reading success, as the speed of matching symbols has a low negative correlation with reading.

5. The multiple correlation of the three best single correlations is the best predictor of first grade reading success.

6. Age is a significant factor in the speed of matching symbols at the age of six.

7. The naming of a selected group of letters, both capital letters and lower case letters as in this study, is a good predictor of first grade reading success.

The following recommendations are presented:

1. Other selected letters of the alphabet, as in the Naming Letters Test, should be investigated to determine their predictive value.

2. The Naming Letters Test should be further investigated with other approaches of teaching reading.

3. The Light Response Test and the Matching Symbol Test should be given at an earlier age in hope of finding the imprinting period of both tests.
4. The investigation begun by this study should be continued to determine the significance of correlations with a different approach to the teaching of reading.
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CHAPTER I

INTRODUCTION

Reading is one of the most important skills children learn in school, and much of their future education depends upon it. Thus, one of the most crucial problems confronting elementary teachers is that of providing a reading program which will meet the needs of all students. Research and careful study of reading have shown that practically every child of normal intelligence, providing that he has no unusual psychological or physical problems, can be taught to read, and that most children can be taught to read more effectively than they have been reading in the past (13, p. 3).

Predicting capacity to achieve in reading in the first grade has confronted teachers for years. This problem is present each time the teacher prepares a reading lesson plan.

In some primary grades, the child is promoted or retained on the basis of success in reading. Due to performance, if the student is in a fast achievement reading group, he passes; if he is in a slow reading group, there is a possibility that he may be retained.

At present, no single index is a sufficient predictor, as reading achievement is a rather complex matter, and we
must base our judgment on an understanding of numerous factors. The chief reason for predicting reading achievement is to help the teacher discover the gross instructional needs of each child. The teacher can then concentrate on overcoming the weaknesses and, in that way, can make the reading activities functionally useful (17, p. 35).

Obviously all children do not progress in reading at the same rate; this fact makes instruction more difficult. If the elements of a fundamental rate of achievement could be established early, children could be taught according to their ability in a more effective way. Learning tasks could be provided when the student has reached the maturity to deal successfully with them. This specialized approach would save time and effort in moving the students toward a more purposeful goal in reading. Many adjustment problems would be eliminated.

Statement of the Problem

The problem of this research was to determine the predictive value of selected visual-motor abilities, intelligence test scores, reading readiness test scores, naming letters test scores, and the teacher's reading readiness rating scale scores for first grade reading achievement.
Purposes of Study

The purposes of this study were to determine the singular and multiple relationships between first grade reading achievement and (1) speed in response to a light stimulus, (2) speed in matching symbols, (3) intelligence quotient, (4) reading readiness test scores, (5) naming letters test scores, and (6) the teacher's reading readiness rating scores.

Hypotheses

To carry out the purposes of this study, the following hypotheses were formulated.

1. There will be a significant negative relationship between the Light Response Test scores and the end of the year scores in the following:
   a. Silent reading
   b. Oral reading

2. There will be a significant negative relationship between the Matching Symbol Test and the end of the year scores in the following:
   a. Silent reading
   b. Oral reading
3. There will be a significant positive relationship between the Metropolitan Readiness Test and the end of the year scores in the following:
   a. Silent reading
   b. Oral reading

4. There will be a significant positive relationship between the Teacher's Reading Readiness Rating Scale and the end of the year scores in the following:
   a. Silent reading
   b. Oral reading

5. There will be a significant positive relationship between the Wechsler Intelligence Scale for Children and the end of the year scores in the following:
   a. Silent reading
   b. Oral reading

6. There will be a significant positive relationship between the Naming Letters Test and the end of the year scores in the following:
   a. Silent reading
   b. Oral reading

7. Students at the end of the first grade will require significantly less time to complete the Light Response Test than they did at the beginning of the first grade.
8. Students at the end of the first grade will require significantly less time to complete the Matching Symbol Test than they did at the beginning of the first grade.

9. Students who are 6 years 9 months or older will require significantly less time on the Light Response Test and the Matching Symbol Test than will students who are 6 years 3 months or younger.

10. Students who are 6 years 9 months or older will make significantly higher scores on the Naming Letters Test, Teacher's Reading Readiness Rating Scale, Metropolitan Readiness Test, and Wechsler Intelligence Scale for Children than will students who are 6 years 3 months or younger.

11. Students who are 6 years 3 months or younger, when they become 6 years 9 months or older and have had reading, will require significantly less time on the Matching Symbol Test than will students who were 6 years 9 months or older and have not had reading.

12. The differences in scores of the Light Response Test and the Matching Symbol Test will result in a significant negative relationship with the end of the year scores in the following:
   a. Silent reading
   b. Oral reading
13. The value of the multiple correlation coefficient, as determined by the three highest predictor variable correlation coefficients, will be significantly higher than each singular predictor variable correlation coefficient.

Background and Significance of the Study

Effective teaching is a goal cherished by most teachers. There are many factors needed to bring this goal about. One of these factors is the need to have a better understanding of the physical nature and abilities of the students.

Learning to read is probably one of the most important accomplishments that the child will achieve during his formal schooling (5, p. 29). This being the case, great effort should be exerted to see that the child becomes a competent reader.

In the beginning, reading is a process of learning written symbols which stand for concepts the child has learned through experiences with the world of people and things. Later, reading is thinking that results in concept formation. It is a relationship with the author. Many skills are used in comprehending the meaning, mood, and tone of the writer. The reader goes through a series of mental associations regarding the form of the word. In brief, he recognizes the symbols as having meaning. Thus, the reader
becomes engaged in word recognition, which is fundamental to reading at any level (4, p. 261).

In learning to read, a student must be able to recognize known words rapidly and with a minimum of analysis. The more extensive the previous experience with an object, the fewer cues needed to permit recognition (44, p. 105). Also, a mastered task can be performed more quickly than an unmastered task. This is what permits faster reading.

Sight words enable the child to begin reading in a meaningful manner. They furnish a foundation for future attack upon unknown words (5, p. 105).

In the general area of predicting reading achievement at the primary grade level, recent studies support the use of readiness measures. These studies indicate that a composite of measures as predictors resulted in correlations of about .72 (24, p. 10).

The visual skills are very significant factors in early reading success. Several basic facts relating to these skills are the following:

1. Discrimination of perception is derived from or based upon physical handling of objects. This discrimination is learned first with the mouth, then the hands, and later with the eyes (36, p. 40).

2. The response to light has a longer latent period than does sound or touch (44, p. 16).
3. It takes more light to see the two dots than one, and still more light as the number of dots is increased (44, p. 376).

4. The farther an object is from the fixation point of vision, the less clearly can its shape be perceived (44, p. 101).

5. After the neurons fire, there is a brief period during which the cell is incapable of being activated, regardless of strength (1, p. 257).

6. The retina increases its sensitivity a billion times after half an hour in darkness (44, p. 447).

7. Weber's constant in brightness is .016 (44, p. 278).

8. The brighter the object, the quicker the response is (35, p. 27).

9. Under normal circumstances, there is practically perfect transfer of a habit from the trained to the untrained eye (8, p. 471).

The faster a student reads, apparently the more he must concentrate, and, consequently, the more he will gain from his reading. Also, in rapid reading, the author's ideas reach the reader in quick succession, and the reader's grasp and understanding of them are thereby improved (40, p. 82). Slow reading may cut down comprehension and produce a lack of interest and poor concentration (37, p. 4). It should
be understood that increasing the speed of reading may not necessarily increase understanding, but the faster reader is more likely to possess the abilities essential to understanding (25, p. 111).

On the whole, an individual who reacts quickly to one stimulus reacts quickly to another; this quickness of response also runs parallel with acuity of vision (44, p. 16). Cattell found in his reaction time experiment that a familiar short word could be read as quickly as a single letter; it was clear that the words were not read by spelling them out. Cattell reasoned that it must be the total word picture. Familiar words even as long as 12 to 20 letters were correctly read from a single exposure of 100 ms. He inferred that the "general shape of the word" must be the primary cue for word recognition (44, p. 101).

Monroe (p. 131) suggested that in certain cases lack of precise motor control may be an important concomitant of reading disability. This phenomenon could exist because word perception skills begin with the spoken word.

Gates, in 1926, obtained a correlation of .30 between reading performance and the ability to note similarities and differences in geometrical figures, digits, and words (43, p. 20).

Petty, in 1939, obtained a correlation of .44 between reading achievement in the first grade and the ability to distinguish visually between symbols (31, p. 229).
Reading readiness is based on a combination of physical, mental, social and psychological factors. Research has shown that regardless of tests used, correlations between readiness tests and reading achievement usually range around .40. As a result, the tests might be used for diagnosis, but not for prediction (22, p. 360).

If readiness tests have an advantage over teacher's estimates, it is that prediction can be obtained on the basis of the tests at the very beginning of first grade. Teachers could judge readiness if permitted several weeks of observation. This is a serious loss of time (39, p. 12).

Petty reported a correlation of .52 between mental age at time of entering school and marks given in first grade reading (31, p. 229).

Bond and Tinker, in 1959, pointed out that the correlation between intelligence and reading ability by the end of the first grade was .35 but had risen to .65 by the end of the sixth grade (35, p. 89).

An appreciable number of disabled readers exhibit poor motor co-ordination. This is manifested by awkwardness in walking, running, writing, and athletic activities. Tests of motor precision tend to yield better scores for superior readers than for nonreaders (4, p. 95).
Though certain body developments need to take place before a child can learn to read effectively, research data appear to be in agreement that mental age is more closely related to success in reading than is chronological age or intelligence quotient (19, p. 29).

Blair and Jones states that there is still a great need for research to determine the "best" time to begin various kinds of instruction in school (3, p. 1084).

Could the information gained from this study in determining the predictive value of selected measures help in the teaching of reading? The conclusion seems to be that better readers are faster readers; therefore, they must be able to recognize symbols faster. If quickness in discriminating is measurable, it should help distinguish between the potentially fast and slow readers. The multiple correlation of the best predictors should result in giving teachers a better method of predicting reading success.

Definition of Terms

Light response refers to pressing the appropriate switch after that switch becomes illuminated.

Matching association refers to pressing the appropriate switch that corresponds to the shown symbol.

Reading ability is that ability as determined by the Gates-MacGinitie Reading Test and Gray Oral Reading Paragraphs Test.
**Reading readiness** refers to the child's maturity level that is appropriate for the beginning of reading.

*Sight word* is a word learned through visual association with the printed symbol and recognized thereafter instantaneously by sight through sheer recall. This method of learning may also be referred to as the look-and-say method.

**Limitations**

This study was to determine the predictive value of certain measures in first grade reading success and was limited to the following measurements:

1. Light Response Test
2. Matching Symbol Test
3. Wechsler Intelligence Scale for Children
4. Metropolitan Readiness Test
5. Naming Letters Test
6. Teacher's Reading Readiness Rating Scale
7. Gates-MacGinitie Reading Test
8. Gray Oral Reading Paragraphs Test

The study was conducted in a large suburban area of North Texas. It was limited to a selected population in a large elementary school which had an enrollment of approximately 1,300 students. There were fifty teachers, with seven of them teaching first grade.
Basic Assumptions

It was assumed that the students and teachers would cooperate and provide honest, maximum effort on the tests.

It was assumed that the students had a measurable amount of symbol recognition ability by the age of six.

Since visual discrimination, realizing similarities and differences, is a factor in a child's learning, it seemed reasonable to assume that symbol recognition is a vital part of the reading process.

Procedures for Collecting and Treating Data

The following instruments were used to gather information:

1. Light Response Test
2. Matching Symbol Test
3. Wechsler Intelligence Scale for Children
4. Metropolitan Readiness Test
5. Naming Letters Test
6. Teacher's Reading Readiness Rating Scale
7. Gates-MacGinitie Reading Test
8. Gray Oral Reading Paragraphs Test

The information gained from these instruments was utilized to determine what relationships existed between the student's scores and his reading achievement.
The Light Response Test and Matching Symbol Test are sensory motor instruments that measure the amount of time needed for the student to make the correct sensory motor response. The reliability of both instruments has been established by a test-retest of fifty first grade students over a period of two weeks. The Light Response Test consists of six mounted switches that contain lights, an electric clock, and a control box. See Appendix A.

The Matching Symbol Test consists of six mounted switches, a screen, symbol changer (projector), electric clock, and control box. Each switch is labeled with one of the symbols 0, C, +, *, $, or $. Corresponding symbols are in the carousel of the projection changer.

The *Wechsler Intelligence Scale for Children* has been regarded as a highly successful test for nearly fifteen years. There are two parts, the verbal and performance scales. The correlation with the Stanford Binet is fairly high—.80 plus. The reliability coefficient for the whole test at age seven and one-half is .86, with the Verbal Scale section being .86 and the Performance Scale section being .92. The test provides equal means and standard deviations (100 and 15) at all ages (8, p. 476).

The *Metropolitan Readiness Test* was used to assess the student's readiness for reading. Of the tests available, this was one of the superior ones. It provides these
sub-scores: (1) word meaning, (2) listening, (3) matching, (4) alphabet, (5) number, (6) copying, and (7) total. The reliability of tests 1-4 is .83; the numbers test is .84; and the total score is .89. The corresponding standard errors of measurement are 3.7, 1.9 and 4.6 (7, p. 605).

The Naming Letters Test consists of the naming of five capital and five lower-case letters that range in progressive naming difficulty as determined by Alice Nicholson in 1958.

The five lower-case letters are o, y, a, u and q; they were ranked in the order of difficulty 1, 7, 13, 19 and 26. The capital letters are X, N, H, W and V; they were ranked in the order of difficulty 2, 8, 14, 20 and 26. This test is given with the idea that students who are able to name the letters at the first of the year will become better readers. It has a higher association with early reading success than do mental ability and other verbal ability tests (10, p. 148). The correlation between the letters and the learning rate of reading was .47 (29, p. 22).

Teacher's Reading Readiness Rating Scale (17, p. 34) serves as a useful guide in the evaluation of the child's readiness to read. In fact, there is no substitute for well-founded teacher judgment in determining readiness of initial reading instruction (2, p. 229). The real measure
of readiness is not a child's score on a test, but his behavior (23, p. 62). This direct observation of the child's reaction to various experiences can best be judged by the everyday contact of the teacher. In many studies, teachers have demonstrated their skill in differentiating between children who would succeed in reading and those who would not. In some cases, after only a few weeks, first grade teachers could predict the probable reading success of their pupils with about as much accuracy as a readiness test (38, p. 47).

The purpose of the rating scale is to direct attention toward factors that have a direct bearing on performance of reading.

The Gates Primary Reading Test, which for years was highly regarded by teachers and administrators, has been replaced by the Gates-MacGinitie Reading Test. This new test has two forms, with available norms which were standardized with a nationwide sample of approximately 40,000 pupils. Each form has two parts, the vocabulary and the comprehension. The reliabilities of the two sections are vocabulary .86 and comprehension .83. The average raw score for the vocabulary section had a mean of 20.7 and a standard deviation of 9.8. The average raw score for the comprehension section had a mean of 11.4 and a standard deviation of 6.1 (16, p. 7).

Gray Oral Reading Paragraphs Test measures from grade one to twelve. It has four forms: A, B, C and D. Each form
of the test contains thirteen reading passages, with three passages at the first grade level. Four questions are asked about each of the passages, although the comprehension is not included in the score. The test measures eight types of errors: aid on words, gross and partial mispronunciation, omissions, insertions, substitutions, repetitions, and inversions. Separate norms are given for boys and girls. The standard error of measurement for first grade is .4 to .5. The intercorrelation averages .98 (9, p. 1129).

Procedure for Collecting Data

This research was limited to the first grade students of a large suburban school situated in the North Texas area, for the school year 1970-1971. Permission was obtained from the Board of Education to conduct this study.

There were to be a minimum of fifty students in this study. Ten students were randomly selected from each of the seven first grades at a large elementary school.

The tests at the first of the year were given in the following order:

1. Naming Letters Test
2. Light Response Test
3. Matching Symbol Test
4. Metropolitan Readiness Test
5. Teacher's Reading Readiness Rating Scale
6. Wechsler Intelligence Scale for Children
The tests at the end of the year were given in the following order:

1. Light Response Test
2. Matching Symbol Test
3. Reading tests:
   a. Gates-MacGinitie Reading Test
   b. Gray Oral Reading Paragraphs Test

The Naming Letters Test was administered during the first two weeks of school.

The Light Response Test and the Matching Symbol Test was administered twice to each student. These tests were administered during the first two weeks and last four weeks of the school year. Each test consisted of three practice responses and fifteen timed responses.

The Light Response Test required the student to press whatever switch happened to light; a correct response would turn off the light. Then another switch was illuminated and the procedure repeated, until fifteen responses had been timed. This test helped determine the learned physical quickness of the student, a measure which also helped in grouping.

The Matching Symbol Test measured the time required for the student to press the appropriate switch when a symbol was projected on the screen. This test helped to establish the association time of the student.
The order of the presentation of the symbols $\varnothing$, $\oplus$, $\circ$, $\star$, and $\bullet$ for the student's eighteen responses was made by a limited random selection. Three of each of the six symbols were placed in a bowl. They were randomly drawn but not replaced in the bowl. The order of the symbols was the same for all students. The same random method was used to determine the order of the second testing at the end of the school year.

The difference in the scores of the Light Response Test and the Matching Symbol Test was carefully considered because of the similarity of the body functions required to perform the two tests. The common organs needed in these tests are eyes, brain, arm, and hand. The stimulus and response of both tests should have required the same physical factors of an individual except for the amount of decision time used.

The Teacher's Reading Readiness Rating Scale, by Albert Harris (p. 34), was completed before the results of the Metropolitan Readiness Test were known. The first grade teachers decided when both of these tests were to be given. The readiness test was usually given during the first six weeks of school.

The Wechsler Intelligence Scale for Children was given as soon as possible.
The reading tests were administered during the last four weeks of school. They were used to determine the student’s reading achievement.

At the conclusion of each test, the necessary data for each individual were recorded into the data blank for processing and analysis.

Additional data collected at the first of the school year about each student included the following:
1. Age in months
2. Sex
3. Hand used in writing

Procedures for Analysis of Data

After all tests had been scored, the data were punched into cards for automatic data processing. The hypotheses one, two, three, four, five, six, and twelve were tested by the "raw score" correlation. The significance of this correlation was then tested.

Hypotheses seven, eight, nine, ten, and eleven were tested by the use of "The Significance of the Difference Between Two Means". The t-ratio formula was used.

The hypothesis thirteen was computed by the coefficient of multiple correlation of the three best predictors. The F-ratio value was used to establish the significance of the multiple correlation coefficient.
The level of significance for which a hypothesis was to be rejected was set at the .05 level. Significance at the .01 level was also reported.
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CHAPTER II

REVIEW OF LITERATURE RELATED TO PREDICTION OF SUCCESS IN FIRST GRADE READING

In the prediction of first grade reading ability, there are many factors to be considered. For this study, they have been grouped in the following manner: readiness tests, intelligence scale, speed of response, visual discrimination, naming letters, teacher's readiness rating, age, sex, and handedness.

Reading is basically a coding system that is impossible to accomplish without perceptual and discriminative abilities. Learning to read is a process of associating a stimulus with a response which results in a learned performance.

Reading is thinking in a language. It is a series of word perceptions which is used to transmit ideas from one person to another by the use of symbols.

Both the writer and reader give meaning to the symbols used in communication, as the printed word possesses no meaning. It is given meaning and interpretation by the prior experiences of the individuals using the symbols.

Reading is bringing meaning to the printed page, not from it. Thus, the most important characteristic of reading is that it is a perception of graphic symbols that included more than mere recognition of words.
Research Related to Predicting First Grade Reading Success by the Use of Readiness Tests

There are a number of tests available which are designed specifically to measure readiness for reading. These tests diagnose the individual's strengths and weaknesses in specific areas related to reading.

The purpose of readiness tests is to distinguish between those students who have acquired the development needed to learn to read and those who have not. These tests are used to help screen the pupils that would almost certainly fail if they undertook the work at that time because most of the instructions and materials for farther learning would be skipped over (not learned) before the student would be ready to learn.

The readiness period may be described as that period of time when the student may acquire the skill with greater ease, when the organism matures enough to make the responses required for learning. As Dechant points out, the teachable moment is when the teaching of reading should begin (5, p. 162). The child is ready to begin a specific reading program only when he has reached a certain stage of physical and mental maturity and has acquired an adequate background of experiences.
Readiness tests are generally administered to groups of children about two or three weeks after school starts. The items that may be included in the tests are the following (13, p. 25):

1. Associating pictured objects with the spoken word for that object
2. Visual discrimination
3. Sentence comprehension
4. Drawing a human figure
5. Ability to count and to write numbers
6. Word recognition
7. Copying a model
8. Auditory discrimination

Barrett found that the subtest, letter and word matching, seemed to be related more to reading growth (1, p. 117).

Russell points out that readiness tests may be used in predicting early progress in reading (21, p. 124).

Heilman states that these standardized instruments are designed to assess the child's ability to profit from formal instruction in reading. The scores made on the test are indicative of what can be expected in reading during the first year or two of formal reading instruction (13, p. 24). Specke found that usually the correlation of readiness test and later reading success is between .5 and .6 (24, p. 66).
Readiness tests are based upon the principle that yesterday's learning provides a basis for predicting future learning. That is, the greater the number of experiences the child has had, the more likely is his chance of relating to the readiness test and thereby achieving a high score.

The teacher should not group children for reading instruction solely by the reading readiness test; a good score does not necessarily mean that the pupil is ready for reading (5, p. 196). These tests measure only selected factors which are related to reading. There are many other factors, such as attitude and instruction, that affect reading progress. The teacher can use this predictive test to get an idea of the range of maturity and, in that way, can have a better idea of how to instruct the child.

The use of readiness tests in this study is one of the means of predicting reading success. Such testing provides the teacher with a guide by which to measure some of the student's abilities that are needed in reading. This study sought to evaluate the predictive value of this type of test in relationship to reading, and thereby to help teachers in determining the best teachable moment of reading.
Prediction of Reading by the Use of an Intelligence Scale

Intelligence is an important determiner of reading success, especially in the later grades (5, p. 50). That is, children with high scores tend to learn reading much more effectively than do children with low scores. Knowing this fact, the teacher can gain insight into the potential learning of each child and do a better job in directing the student's instruction.

Intelligence tests give insight into the potential of learning by measuring certain areas already learned. It is understood that, if the organism cannot organize the stimuli from past experiences or form habit linkages, there is little hope that perception will reach a level adequate for thinking (5, p. 552).

Intelligence tests cannot possibly measure all of a child's knowledge. They only spot check certain performances that can be measured. This method is good, for intelligence quotients do not usually improve substantially with age (10, p. 227).

Heilman states that mental age is more closely related to success in reading than is chronological age or I.Q. (13, p. 29). To obtain this measure of mental ability which is an indirect measure of the child's mental capacity
uninfluenced by emotional and social factors, it is best to use an individual intelligence test.

Harris points out that in comparative studies, group tests have sometimes shown a higher correlation with achievement, in the first grade, than individual tests have. This is probably because the child's ability to conform to the group situation influences both his classroom learning and his score on the group test (10, p. 43).

The relationship of the intelligence quotient to reading was displayed very nicely by Bond and Tinker, who compared reading groups with I.Q.'s (3, p. 70).

<table>
<thead>
<tr>
<th>Reading Groups</th>
<th>I.Q. Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>55-94</td>
</tr>
<tr>
<td>High</td>
<td>3</td>
</tr>
<tr>
<td>Middle</td>
<td>24</td>
</tr>
<tr>
<td>Low</td>
<td>73</td>
</tr>
</tbody>
</table>

Studies have universally shown that bright children underachieve and dull children overscore in comparison to their mental ages (3, p. 77). This factor may be due to a cultural habit of the slow trying to keep up with the fast, or it could be that the highly intelligent children are not started reading when ready.
Smith gives the reading limits of the extremely low intellectual children. Those children below 25 I.Q. will never learn to read. The children between 25 and 50 I.Q. will have great difficulty in reading. Children between 50 and 70 I.Q. will learn to read to about the fourth-grade level (22, p. 88).

Authorities do not agree on the sex differences in intelligence. Some conclude that there is no difference, that the difference is non-existent (5, p. 100). Other educators point out that intelligence is more variable among boys than among girls (22, p. 94). That is, more boys than girls are at the extremes. This phenomenon could be due to our culture.

In this study the intelligence test was used as a measure of the child's mental ability and therefore a predictor of first grade reading success. By establishing the relationship of I.Q. to reading, the teacher may better understand the limits of the child's reading ability. This knowledge could result in determining whether the child is working to capacity.

Speed of Response in Predicting Reading Ability

Reading is a response; whatever affects the ability to respond will similarly affect reading. This factor requires the reader to acquire knowledge of the language which
results in an interlocking action of reading, speaking, writing, and listening.

To read, the child must be able to make a quick, accurate discrimination which is noting similarities and differences. The more quickly and easily he can do this, the better his chances of learning to read will be, for if a child cannot recognize the word, he cannot bring meaning to it.

Past experiences influence the reactions of the present, for each time an impulse crosses a synapse, it becomes increasingly easier for later impulses to accomplish that crossing (22, p. 25). Learning that is repeated or reinforced comes more easily and is more permanent. Measuring these past learned responses that are related to reading should result in an index that will indicate the child's ability to begin reading.

The speed at which one can perceive words influences the rate of reading. This speed depends on the size of the chunks of information that one can decode. This rate of perception and the rate of comprehension affect the speed of understanding, because the main limiting factor is the ability with which the mind works. Thus, students who excel in the rate of thinking also tend to be high in the rate of comprehension.

The reading rate is inevitably slowed when the reader does not instantly recognize words or groups of words. In addition, many poor reading habits will develop as a result
of inadequate word perception. Faulty visual perceptions may be the cause of words being misinterpreted. This fault can cause regression and inaccuracy. These errors are rare among good readers (12, p. 37).

As the speed of reading increases, there seems to be a comprehension loss for the amount of material read. But this loss is more than offset by the additional material that can be covered in a given length of time because of the increase in rate.

The ability to read rapidly with comprehension depends upon establishing a large repertoire of word stimuli which is based on the child's previous learned repertoire. The larger the base, the more stimuli he has for meaningful responses to reading. This base develops gradually without specific pressure. These words become grouped into phrases and larger thought units.

The speed of reading is dependent to a great extent upon such factors as concept formation, organizational ability, and general vocabulary. These items are governed to a great extent by mental ability, experience, and type of reading material.

This study measures the relationship of the speed of response to first grade reading, a measure which should indicate the child's ability to perceive. By establishing this relationship (speed of response and first grade reading
success), a teacher may better understand and direct a child in reading, as faulty visual perceptions may be the cause of poor reading.

The Nature of Reading in Relation to Visual Discrimination

Reading is first and foremost a visual task for the beginning reader and almost impossible for him to accomplish without perceptual and discriminative abilities. Thus, the most important skill needed for reading is the ability visually to analyze and synthesize printed words. The pupil must be able to sort out the differences between words and to conceptualize their meaning. As yet, little is known about the possible relationships of speed and the precision of the eyes to reading ability (10, p. 233).

Spache explains that visual-tactual learning begins first with reaching and grasping by the infant. These activities grow into visual perception, which develops into visualization of symbol manipulation. These experiences are multitudinous and require four to six years for development to the levels which will enable the child to read (24, pp. 197-198).

Studies indicate that, under normal development, the eyes of six-year-olds are still too far-sighted to see clearly such small objects as the printed words. The child
must reach the age of eight before one can be reasonably certain that his eyes are ready for reading (22, p. 122; 5, p. 54).

To read, the eyes must make these four major types of adjustment (10, p. 231):

1. There is an automatic reflex adjustment in the size of the pupillary opening (pupillary reflex).

2. There is an automatic reflex adjustment in the shape of the lens to the distance of the object being looked at (accommodation reflex).

3. There is an automatic reflex control of the degree to which the eyes turn so that both focus on the same spot (convergence reflex).

4. The eyes must be aimed so that the object viewed will remain in the center of the visual field, where acuity is greatest (saccadic movements).

Taylor reports that a survey of some 2,000 children with academic difficulties showed that 95 per cent of them lacked sufficient coordination and had difficulties with fusion (25, p. 10).

If a child is to learn to read well, he must be able to make quick, accurate distinctions of the twenty-six letters. No child will ever read if he cannot distinguish one word from another; this inability would result in all the words looking alike. Perhaps this visual task is more demanding than any other that the pupil has previously experienced.
Since discrimination is so vital to reading success, it seems reasonable to believe that, the better a student can discriminate, the more easily he will learn to read.

To do well in beginning reading, the child must have sufficient power of visual discrimination to distinguish readily between the printed words (16, p. 146). This awareness is built only through discriminating differences in stimuli. Thus, the child must learn to respond consistently to "was" as "was" and not as "saw."

Some letters are more readily distinguished from each other, for example, "x" and "o." Other letters are not so easily distinguished, and children may have a tendency to confuse "b" and "d," "p" and "b," "p" and "d," "p" and "q," and "u" and "n." Visual discrimination of words may also come in many other forms, such as recognizing that a word looks funny, long, short, low, square, or little; seeing that a word has high spots; or perceiving that one word resembles another word. Words so discriminated are usually learned as sight words.

As of yet, vision discrimination has not shown to be a great predictor of reading ability, even though a great majority of the reading readiness books center their attention on distinguishing geometric figures. McKee indicates that these books are a waste of time since the discriminatory powers of most children have advanced beyond this stage by
the time they enter school (16, p. 147). The method used in this study to measure the child's speed of discrimination is different from that used by reading readiness books.

This study measured the relationship of reading to the speed of visual discrimination, a relationship which could be important in predicting reading success. The knowledge gained was hoped to indicate to a degree children's ability to recognize words. By understanding the importance of discrimination speed, the teacher may better direct the visual reading task. The study also sought to determine if reading has an effect on the speed of visual discrimination. This finding was expected to indicate whether the speed of visual discrimination is affected by reading practice.

**Naming Letters as a Predictor of First Grade Reading**

Reading requires the student to have the ability to distinguish each word from every other word. A pupil must be relatively more skillful in noting differences among words than in noting similarities (5, p. 186).

Barrett found that the ability to discriminate, recognize and name letters and numbers was the best single predictor of first grade reading (2, p. 276).

Wheelock and Silvaroli indicated in their study that the ability to make instant responses of recognition to
capital letters can be taught, and that children from the lower socio-economic continuum seem to profit most from this training (26, p. 120).

Research indicates that the child who has knowledge of letters and sounds has a good guarantee of learning to read. If he is interested in and can recognize some printed words at the beginning of first grade, he will do better in beginning reading, regardless of what method of instruction is being used at school (4, p. 38).

Words suggest rather than transmitting meaning. The written symbol is a visible sign which represents something. Just what it represents depends on the interpretation it is given. This interpretation will be as various as are the qualities of sensory organs and the experiential backgrounds of the users.

This study measured the relationship of the naming of a selected group of ten letters to the success of first grade reading. The characteristics in this activity of naming letters are the same as in reading. That is, they both require the identifying and naming of symbols.

Teacher's Reading Readiness Rating Scale as a Predictor of First Grade Reading

Teachers have always tended to form judgments about the students they teach, such as the rate of progress each pupil makes.
Russell states that probably the best way of determining whether or not a child is ready to read is by direct observation of the child's behavior in various situations in the classroom and on the playground (21, p. 176). His reactions to various experiences can best be judged by the teacher, for there is no substitute for well-founded teacher judgment.

Most experienced first grade teachers can size up most of their children fairly well after two or three weeks. As the year progresses and the teacher has more observations to base judgments on, the accuracy of the teacher tends to improve (9, p. 32).

Spache states that teachers have demonstrated in many studies their ability to predict reading success with as much accuracy as a readiness test (23, p. 47).

Observation and judgment of the teacher can be improved by using an appropriate rating scale that directs attention to the child's day-to-day behavior and performance (9, p. 35). This study measured the relationship of the Teacher's Reading Readiness Rating Scale to success in first grade reading.

**Age and Sex as a Predictor of First Grade Reading Success**

The child's chronological age alone has very little significance in determining reading readiness or subsequent success in reading achievement (24, p. 4).
As the age goes down, so does the speed of progress in reading. A younger child will make less progress than an older one of the same intelligence when both are exposed to the same program (5, p. 51). This result could be due to the fact that the older child has more experiences to assist in the task.

When determining when a child should begin reading, his nervous system must be mature enough to carry signals to the brain. The brain must be able to sort out, make sense out of and remember what it receives.

Mabel Morphett and C. Washburne, in 1931, at Winnethe, Illinois, concluded that a mental age of six and one-half years was probably the best age to start formal reading instruction (18, p. 496).

Harris stated that it is futile to start children on a systematic reading instruction program before they reach a mental age of six years (10, p. 226). The fact that children with a mental age of five can be taught to read does not prove that it should be done (10, p. 29).

Arthur Gates, in 1937, pointed out that children with a mental age as low as five years could cope successfully with first grade reading (7, p. 497).

The difference between these ideas is in the judgment of what constitutes failure. The belief that a certain given mental age must be achieved by a pupil before beginning
reading is misleading, as children below the mental age of six can perform successfully if the instruction is designed for their needs.

Girls as a group achieve better than boys in reading. More girls learn to read at an early age, and fewer of them become reading disability cases. Heilman reported on nine studies regarding remedial reading cases. The boys outnumbered the girls by six to one (13, p. 356).

Reported as Remedial Reading Cases

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Cases Boys</th>
<th>Cases Girls</th>
<th>Per Cent Boys</th>
<th>Per Cent Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blanchard</td>
<td>1936</td>
<td>63</td>
<td>10</td>
<td>86</td>
<td>14</td>
</tr>
<tr>
<td>Young</td>
<td>1938</td>
<td>37</td>
<td>4</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>Preston</td>
<td>1940</td>
<td>72</td>
<td>28</td>
<td>72</td>
<td>28</td>
</tr>
<tr>
<td>Missildine</td>
<td>1946</td>
<td>25</td>
<td>5</td>
<td>83</td>
<td>17</td>
</tr>
<tr>
<td>McCollum &amp; Shapiro</td>
<td>1947</td>
<td>31</td>
<td>9</td>
<td>76</td>
<td>24</td>
</tr>
<tr>
<td>Axline</td>
<td>1947</td>
<td>28</td>
<td>9</td>
<td>76</td>
<td>24</td>
</tr>
<tr>
<td>Vorhaus</td>
<td>1952</td>
<td>178</td>
<td>47</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>Johnson</td>
<td>1955</td>
<td>23</td>
<td>11</td>
<td>67</td>
<td>33</td>
</tr>
<tr>
<td>Fry</td>
<td>1959</td>
<td>163</td>
<td>39</td>
<td>81</td>
<td>19</td>
</tr>
</tbody>
</table>

There are several factors that may be the cause of girls surpassing boys as a group in reading achievement in the elementary grades. They are the following:

1. Girls tend to be better in visual discrimination (5, p. 74).
2. Girls tend to mature earlier.
3. There are more female teachers than male in the elementary grades.
4. Girls spend more time in sedentary activities than do boys (10, p. 27).

5. Boys tend to spend more time on large-muscle activities than do girls (10, p. 27).

6. The nature of our culture favors girls (22, p. 91). Gates points out that the available research is not clear about whether left-handed children have more difficulty in reading. It seems that both groups can equally establish the left-to-right orientation required in reading and writing (6, p. 305). Fewer girls are left-handed (22, p. 445). More boys are ambidextrous (5, p. 74).

This study sought to determine whether age has an effect on the speed of response and the speed of matching symbols. Also, the mean and standard deviation of each test was reported on the basis of sex.

Summary

In reading, which is a thinking process, the individual uses the experiences from his whole body. This does not mean that the hand learns to read, but that the sensory experiences which the hand encounters are used in reading. That is, the reader is interpreting the printed symbol by the use of past experiences.

Readiness is the moment that is most favorable to begin teaching the child a skill such as reading. At present,
no single device is best in determining this period. Research does show that readiness tests, intelligence tests, teacher's evaluation, and naming letters tests are effective to some degree in predicting success in beginning reading. This study has determined the relationship of these tests as predictors of reading success. The three best predictors were used in a multiple correlation in hope of finding a better predictor of reading success. The study assessed the relationship between reading skills and the difference in the Light Response Test and the Matching Symbol Test. Also, the effect of first grade reading experience on the Matching Symbol Test has been determined.
CHAPTER BIBLIOGRAPHY


2. Barrett, Thomas C., "Visual Discrimination Tasks as Predictors of First Grade Reading Achievement," The Reading Teacher, 18 (January, 1965) 276-282.


CHAPTER III

PROCEDURE

There are many instruments available for the prediction of reading success in the first grade. Of the instruments available, only one from each of the following areas was selected: intelligence scale, reading readiness test, teacher's reading readiness rating scale, and naming letters test.

Because of the nature of reading, two other tests were added, the Light Response Test and the Matching Symbol Test. It was hoped that these tests would produce additional predictive values which have not previously been available.

Description of Subjects

The students used in the study were first grade children enrolled in a public elementary school with an approximate enrollment of 1,300 students. The first grade pupils were randomly grouped into seven classes at the first of the school year. All seven first grade teachers cooperated in the study. A group of ten students was selected at random at the first of the school year from each of the seven first grades, giving a total of seventy students.

After six weeks of schooling, all the children in the first grade were regrouped on the basis of reading. The
American Book Company Reading Test was used to determine the grouping. The students were only roughly grouped by reading ability. The moving depended on how close the student came to fitting the group he was already in. The age of the students was expressed in months (to the nearest month) as of September 1, 1970.

Description of the Reading Program

The reading program in the seven first grade classrooms was essentially phonetic oriented. A basal reading series was the nucleus of the program, with little grouping being done in each classroom, because of the overall grouping of the whole group. Many supplementary materials were available to the teachers to use at their discretion.

The children were permitted to progress through the reading levels at their own rate. The classrooms were of the self-contained type, with a flexible overall grouping. All teachers participating in the study had a minimum of two years' teaching experience.

Orientation of Teachers

The purpose of the study was explained to all school personnel involved in the study. Other than this orientation, no special instructions were given, because all testing was done by the investigator.
Description and Administration of the Predictor Tests

The predictor tests, other than the two perception tests, were chosen on the basis of their relationships to reading success. The tests selected were those that are regarded by authorities as being related to future reading success. Most of the tests were of the individual type rather than of the group type.

All of the tests were administered by the investigator except the Teacher's Reading Readiness Rating Scale. A description of the various predictor tests used in the study is given below.

**Wechsler Intelligence Scale for Children**

Children succeed in school work generally in accordance with their mental maturity. This level of development is greatly influenced by hereditary factors which are roughly measured by intelligence tests. There is a positive relationship between mental maturity and performance in reading (8, p. 19).

The **Wechsler Intelligence Scale for Children** is designed for children between the ages of five and fifteen years. The tests have a reliability coefficient of .88 at the age of seven and one half (6, p. 476).

The intelligence quotients were obtained by comparing each subject's test performance with the scores earned by individuals in a single age group (8, p. 48).
The test was divided into two sections (verbal and performance) with six parts each. The test required that only five parts of each section be given, with the sixth being an alternate in case one of the others was spoiled. The scoring method used was based on converting the raw score on each section into a scaled score to determine the intelligence quotient of each section. The total raw score was also converted into an intelligence quotient for the whole test.

This test was used in determining the predictive value of the intelligence quotient to reading, thus testing hypothesis five. The Pearson product-moment correlation was used, with a .05 level of significance.

**Metropolitan Readiness Test**

Buros states that the Metropolitan Readiness Test is among the superior readiness tests now available. The reliability of the total scores is .89 (5, p. 605).

Karlin studied over one hundred first grade children. He found a correlation of .36 between scores on the Metropolitan Readiness Test administered in September and achievement on the Gates Primary Reading Test administered at the end of the school year (26, p. 321).

The Metropolitan Readiness Test was administered to all children in the study during the school day. The children
were divided into three groups. Two groups were tested in the morning, with the third group being tested in the afternoon.

The test was administered in three sessions, with a change of activity between the sessions. Each session was made up of two sections of the test in the following order:

1. Word meaning
2. Listening
3. Matching
4. Alphabet
5. Numbers
6. Copying

This test was evaluated to determine its predictive value of reading, thus seeking to test hypothesis three. The Pearson product-moment correlation was used with a .05 level of significance. The method of scoring was based on the total raw score.

Teacher's Reading Readiness Rating Scale

Each child in the study was rated by his teacher after six weeks of school. A rating scale composed by Albert Harris was used by the teacher. The scale had a number rating span of five points. The number span ranged from -2 to +2, with zero being average. The teacher's rating of students was converted to a scale of one hundred, with fifty being the mean. This conversion was done to eliminate the
minus scores. The total raw score was used in the study. See Appendix B.

There were six sections in the scale with subdivisions under each. The six divisions of the rating were the following:

1. Intellectual development
2. Language development
3. Physical development
4. Home background
5. Emotional and social development
6. Interest development

This test was evaluated to determine its predictive value of reading, thus measuring the validity of hypothesis four. The Pearson product-moment correlation was used with a .05 level of significance.

Naming Letters

Durrell and Nicholson, in 1958, stated that knowledge of letters rather than mental age best indicates the learning rate of reading (40, p. 101). This phenomenon could be due to the fact that children who have learned to associate the name with the appropriate letter have already learned a basic reading skill—they have learned to discriminate between graphic symbols and to associate sounds with these symbols.

Nicholson points out that, if reading is the ability of the child to learn and retain a sight vocabulary, many
first grade children are ready to read by the second week of the first grade (34, p. 10).

She explains that age provides a very poor basis for predicting word background knowledge, while naming of letters provides the greatest assurance of learning to read (34, p. 20).

The following list by Nicholson indicates the difficulty of naming each letter. The degree of difficulty is determined by the number of misses.

<table>
<thead>
<tr>
<th>Letters</th>
<th>Capital</th>
<th>Lower</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>42</td>
<td>41</td>
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<tr>
<td>X</td>
<td>69</td>
<td>64</td>
</tr>
<tr>
<td>S</td>
<td>91</td>
<td>97</td>
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<tr>
<td>C</td>
<td>111</td>
<td>114</td>
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<tr>
<td>T</td>
<td>114</td>
<td>116</td>
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<tr>
<td>P</td>
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<td>Y</td>
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<td>V</td>
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<td>D</td>
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</tr>
<tr>
<td>L</td>
<td>115</td>
<td>177</td>
</tr>
<tr>
<td>Q</td>
<td>143</td>
<td>189</td>
</tr>
</tbody>
</table>

For the purpose of this research, five letters of both capital and lower case were selected. The five capital
letters chosen on the basis of difficulty were ranked as follows: X, 2; N, 8; H, 14; W, 20; and V, 26. The five lower case letters chosen on the basis of difficulty were ranked as follows: o, 1; y, 7; a, 13; u, 19; and q, 26.

The ten letters, five capital and five of lower case, were shown to the children individually by the investigator. Each student was to name the letter when it was shown. The capital and lower case letters were mixed and arranged in the order of difficulty beginning with the easiest, according to Alice Nicholson. The order and rank were o, 1; X, 2; y, 7; N, 8; a, 13; H, 14; u, 19; W, 20; q, 26; and V, 26.

This test was evaluated to determine its predictive value of reading, a measure of hypothesis six. The Pearson product-moment correlation was used with a .05 level of significance. The score used for each student was the total number of letters he named correctly.

Light Response Test

Sensitivity is fundamentally a matter of energy change which goes hand in hand with visual discrimination. Through differentiation, an individual is able to determine his perceptual field; this enables him to become aware of an object. This factor greatly influences his ability to learn.

The failure of discrimination due to perceptual deficiency can be improved by training. Research findings indicate that visual and auditory discrimination may be more
significant than mental age in successfully accomplishing the developmental task of learning to read (40, p. 438). This discrimination of words is also more closely related to the primary reading vocabulary than is mental age (40, p. 99). The problem of visual discrimination increases in proportion to the rate of the introduction of new words (21, p. 116).

Each child was given two individual Light Response Tests of fifteen responses each. The first test was given during the first two weeks of school. The second test was given during the last four weeks of the school year. The instrument contained six switches that would light when desired. The lighted switch could be turned off only by pressing the appropriate switch. The test consisted of measuring the total length of time it took the student to press the lighted switch for each of the fifteen responses. The student was given three practice responses before each test.

The order of turning the switch light on was selected randomly for each test by drawing. Since there were eighteen responses, each switch number was placed in the bowl three times each.

The order of the switches drawn, numbering from left to right, for the first test was 1, 4, 5, 1, 6, 3, 2, 5, 6, 2, 4, 5, 3, 4, 1, 3, 6 and 2. The order of the switches drawn for the second test was 5, 2, 1, 6, 4, 3, 6, 2, 5, 4, 1, 5, 3, 1, 2, 6, 3 and 4.
In a pilot study, the reliability of the Light Response Test was .83, indicating a rather high consistency. The average range of scores on the two Light Response Tests was from 14.13 to 24.72, which was a span of 10.59 seconds. The average response was 1.26 of a second. The average standard deviation was 2.70, with a quartile deviation of 2.10. The mean was 18.91, with a median of 19.04. The scores seem to cluster around 19, resulting in a bell shaped curve. See Appendix A.

This test was evaluated to determine its predictive value of first grade reading success, thus testing hypothesis one. The Pearson product-moment correlation was used with a .05 level of significance. The score used for each student was the total length of time for the fifteen responses.

Symbol Response Test

For a child to read symbols, he must be able to distinguish between the symbols. The complexity of this perception will be in part a function of how long the individual needs to perceive and interpret the stimulus. Thus, the speed of differentiation is a factor in learning to read. Gates found that the perceptive abilities necessary for noting differences between similar figures are more highly related to reading ability than is intelligence (37, p. 36).
The threshold level of the individual could be a factor in time response. The more quickly a child can see relationships and respond, the more quickly he can learn. This ability to see relationships is intelligence.

The speed of word perception and speed of association of ideas with words influence the rate of reading (45, p. 29). The slow learner needs a longer period of time to gain a framework of understanding and to become aware of the relationships or belongingness of the words.

For the child to learn to read, he must be able to make quick, accurate discrimination of words, as no child will ever read if he cannot distinguish one word from another. If he cannot, all the words will look alike. Perhaps this visual task is more demanding than any other that the pupil has previously experienced. Since discrimination is so vital to reading success, it seems reasonable to believe that, the better a student can discriminate, the more easily he will learn to read.

In the study, each child was given two individual Matching Symbol Tests of fifteen responses each. The first test was given during the first two weeks of school. The second test was given during the last four weeks of school.

The instrument contained six switches that were matched individually with six symbols. The test consisted of measuring the total length of time (fifteen responses)
needed for the student to press the switch that matched the symbol shown. The student was given three practice responses before each test. The symbols were shown in the same order as in the Light Response Tests. The order of the symbols, including the three practice responses, was the following:

<table>
<thead>
<tr>
<th>First Test</th>
<th>Second Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>*</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>*</td>
<td>⊗</td>
</tr>
<tr>
<td>U</td>
<td>+</td>
</tr>
<tr>
<td>*</td>
<td>+</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>+</td>
<td>C</td>
</tr>
<tr>
<td>C</td>
<td>*</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>C</td>
<td>+</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>C</td>
<td>+</td>
</tr>
</tbody>
</table>
In a pilot study, the reliability of the Symbol Response Test was .75. The average range of scores was from 15.84 to 45.04, with a span of 19.20 seconds. The mean was 26.76. There was a significant difference of 7.66 in the means of the Light Response Test and the means of the Symbol Response Test. This was more than sufficient to be significant at the .001 level. See Appendix A.

This test was evaluated in the present research to determine its predictive value of first grade reading success, a measure of the validity of hypothesis two. The difference in individual scores made on the Light Response Test and the Matching Symbol Test was correlated with reading as set forth in hypothesis twelve. The Pearson product-moment correlation was used for both with a .05 level of significance. The scores used for the symbol tests were the total lengths of time for the fifteen responses. The scores used to measure the difference between both symbol tests were the same total lengths of time.

Age

Hypotheses seven and eight are based on age as a determining factor in the speed of response. This part of the investigation is to see if age affects the speed of response. The t-ratio was used with a .05 level of significance. Hypothesis seven compares the means of the
two Light Response Tests (one taken at the beginning of the year, with the other taken at the end of the year). Hypothesis eight compares the means of the two Matching Symbol Tests (one taken at the beginning of the year, with the other taken at the end of the year).

The hypotheses nine, ten and eleven are based on age as a determining factor of success on the predictor tests. The t-ratio was used with a .05 level of significance.

Hypotheses nine and ten are concerned with all the predictor tests. For each test, a comparison of mean scores was made between the extremes. That is, children who were six years three months or younger were compared with children who were six years nine months or older.

Hypothesis eleven compares the mean scores of the children six years three months or younger on both of the Matching Symbol Tests. This comparison is to determine the amount of improvement made between the test periods.

Comparing the tests results of the children six years nine months and older on the first Matching Symbol Test with the results of the children six years three months and younger on the second Matching Symbol Test should have indicated whether the first grade experience had affected the speed of symbol matching.
Description and Administration of the Criterion Test

The criterion variables in this study for measuring reading ability were the Gates-MacGinitie Reading Test and the Gray Oral Reading Paragraphs Test. These tests were administered during the last four weeks of school, approximately eight months after the predictor tests were administered.

The Gates-MacGinitie Reading Test contains two parts: vocabulary and comprehension. The vocabulary section, which has a fifteen-minute time limit, was designed to sample the child's ability to give meaning to words of the primary vocabulary level. The reliability for this section by the split-half method was .91 (16, p. 3). The comprehension section, which has a twenty-five-minute time limit, was designed to sample the child's ability to understand words in a sentence structure. The reliability for this section by the split-half method was .94 (16, p. 3).

The test was administered to the children in two sections with a five-minute rest period in between. The students were divided into three groups, with two groups being tested in the morning and one group being tested in the afternoon. The raw score was used as the student's true score. The test was utilized, as previously explained, in hypotheses one, two, three, four, five, six, twelve, and thirteen.
The Gray Oral Reading Paragraphs Test is composed of twelve paragraphs arranged in order of difficulty beginning with the easiest. Form A of the four available forms was used. The inter-correlation averages .98. The standard error of measurement for grade scores is about .4 to .5 at first grade (7, p. 1129).

Only the first six paragraphs were utilized in the testing. The student’s score was the sum of points made on each paragraph. A sliding scale composed of errors made and the time required to read each paragraph was used to measure the child’s reading ability. Each student was permitted to continue reading until seven errors were made in each of two paragraphs. The test was given individually in a private room that was free from distraction. The test was utilized, as previously explained, in hypotheses one, two, three, four, five, six, twelve and thirteen.

Computation and Organization of Raw Data

Following the scoring of the various tests, all scores were recorded on data processing sheets. The children were listed alphabetically with the scores entered in the appropriate columns to the left of the subject’s name. Those pupils who had not completed all tests were deleted from the study. There were seven pupils deleted as a result of this process, leaving a total of sixty-three pupils.
The information recorded on data sheets was punched on IBM data cards. The cards were utilized in the machine computation of statistical data needed for the study. The multiple correlation, which is hypothesis thirteen, was computed after the other correlations were figured. The three best predictive correlations were used in a multiple correlation with reading. The .05 level of significance was used.
CHAPTER BIBLIOGRAPHY


37. Robinson, Francis P., The Role of Eye Movements in Reading with an Evaluation of Techniques for Their Improvement, University of Iowa, Iowa City, 1933.


CHAPTER IV
ANALYSIS OF DATA

The procedures used for obtaining the statistical data pertinent to this study were the Pearson product-moment correlation, multiple correlation, and the Fisher's t-ratio. The statistical information necessary for each predictor was the mean and standard deviation to be used in the correlations, t-ratio, and level of significance.

Correlations were determined between the predictor variables and the criterion variables for hypotheses one, two, three, four, five, six, and twelve. After obtaining the correlation information, the three highest Pearson product-moment correlations were used in a multiple correlation. The t-ratio, which is a comparison of means, was used in hypotheses seven, eight, nine, ten, and eleven. The .05 level of significance was used.

All data were summarized and presented in tables. In Table I, the means and standard deviations were given for boys, for girls, and for the total of all predictor and criterion variables. In Table II, the correlations were given between the predictor tests and the criterion. Table III compared the two Light Response Tests. Table IV compared the two Matching Symbol Tests. Table V compared
the age extremes of the predictor tests. Table VI ranked the correlations that had a significant level of .05 or above. Table VII ranked the predictor tests by averaging their correlations.

In the **Gray Oral Reading Paragraphs Test**, the scores were not normally distributed, as forty-one students, or sixty-five per cent of the group, made test scores of zero. Because of this, according to Spence (p. 125), the **Gray Oral Reading Paragraphs Test** could not be used. The significant level in testing the correlations was not correct.

To explain farther, the **Gray Oral Reading Paragraphs Test** for the total group had a mean of 6.70 and a standard deviation of 11.16. The mean for the boys was 6.68, with a standard deviation of 10.83. The mean for the girls was 6.72, with a standard deviation of 11.65. These conditions showed that the scores on the **Gray Oral Reading Paragraphs Test** were not normally distributed, as one standard deviation from the mean on this test in both directions is impossible. The lowest possible score is zero, which is only about one-half deviation from the mean. As a result, the **Gray Oral Reading Paragraphs Test** could not be used as a criterion test. It will no longer be reported in this study, but will be reported in the tables. See Tables I and II.

In the thirty-six possible correlations between the predictor tests and the **Gates-MacGinitie Reading Test**, ...
eighteen, or one-half, of the correlations were positive; the other half were negative. Twenty-eight correlations were significant at the .05 level, and twenty-three were significant at the .01 level. Eight of the correlations did not reach the .05 level of significance.

**Wechsler Intelligence Scale for Children**

*as a Predictor of First Grade Reading Success*

Hypothesis five points out that there is a significant positive relationship between the **Wechsler Intelligence Scale for Children** and the **Gates-MacGinitie Reading Test**. This hypothesis was accepted, as there was a significant positive relationship at the .01 level or better between all scores of the **Wechsler Intelligence Scale for Children** and the **Gates-MacGinitie Reading Test**. One of the three highest predictors of the study which was used in the multiple correlation was the **Wechsler Intelligence Scale for Children**. See Table II.

The **Wechsler Intelligence Scale for Children** in this study showed an average intelligence quotient for the total group of 104.95, with a standard deviation of 14.95. The average intelligence quotient for the boys was 107.00, with a standard deviation of 13.78. The average intelligence quotient for the girls was 102.97, with a standard deviation of 15.96. See Table I. The average intelligence quotient...
<table>
<thead>
<tr>
<th>Predictor</th>
<th>Boys N=31 Mean</th>
<th>S.D.</th>
<th>Girls N=32 Mean</th>
<th>S.D.</th>
<th>Totals N=63 Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Response I</td>
<td>17.30</td>
<td>2.18</td>
<td>16.69</td>
<td>2.52</td>
<td>16.99</td>
<td>2.36</td>
</tr>
<tr>
<td>Matching Symbol I</td>
<td>33.34</td>
<td>6.53</td>
<td>32.80</td>
<td>9.54</td>
<td>33.06</td>
<td>8.14</td>
</tr>
<tr>
<td>Difference I</td>
<td>15.88</td>
<td>6.52</td>
<td>16.11</td>
<td>8.53</td>
<td>16.00</td>
<td>7.55</td>
</tr>
<tr>
<td>Teacher's Rating</td>
<td>53.35</td>
<td>13.00</td>
<td>54.47</td>
<td>17.50</td>
<td>53.92</td>
<td>15.34</td>
</tr>
<tr>
<td>Naming Letters</td>
<td>4.65</td>
<td>3.24</td>
<td>4.66</td>
<td>3.12</td>
<td>4.65</td>
<td>3.15</td>
</tr>
<tr>
<td>Metropolitan</td>
<td>62.48</td>
<td>17.00</td>
<td>61.59</td>
<td>21.30</td>
<td>62.03</td>
<td>19.15</td>
</tr>
<tr>
<td>Verbal Wisc</td>
<td>106.52</td>
<td>14.77</td>
<td>102.66</td>
<td>16.56</td>
<td>104.56</td>
<td>15.70</td>
</tr>
<tr>
<td>Performance Wisc</td>
<td>106.23</td>
<td>12.74</td>
<td>102.78</td>
<td>15.46</td>
<td>104.48</td>
<td>14.18</td>
</tr>
<tr>
<td>Total Wisc</td>
<td>107.00</td>
<td>13.78</td>
<td>102.97</td>
<td>15.96</td>
<td>104.95</td>
<td>14.95</td>
</tr>
<tr>
<td>Light Response II</td>
<td>15.67</td>
<td>1.78</td>
<td>15.96</td>
<td>2.68</td>
<td>15.81</td>
<td>2.27</td>
</tr>
<tr>
<td>Matching Symbol II</td>
<td>31.50</td>
<td>5.85</td>
<td>31.18</td>
<td>7.47</td>
<td>31.34</td>
<td>6.67</td>
</tr>
<tr>
<td>Difference II</td>
<td>15.84</td>
<td>5.43</td>
<td>15.22</td>
<td>6.54</td>
<td>15.53</td>
<td>5.98</td>
</tr>
<tr>
<td>Gray Oral</td>
<td>6.68</td>
<td>10.83</td>
<td>6.72</td>
<td>11.65</td>
<td>6.70</td>
<td>11.16</td>
</tr>
<tr>
<td>Vocabulary Gates</td>
<td>34.97</td>
<td>8.23</td>
<td>33.66</td>
<td>8.76</td>
<td>34.30</td>
<td>8.46</td>
</tr>
<tr>
<td>Composition Gates</td>
<td>21.45</td>
<td>8.83</td>
<td>19.81</td>
<td>6.57</td>
<td>20.62</td>
<td>7.74</td>
</tr>
<tr>
<td>Total Gates</td>
<td>56.45</td>
<td>15.72</td>
<td>53.47</td>
<td>14.74</td>
<td>54.94</td>
<td>15.18</td>
</tr>
</tbody>
</table>
TABLE II
PEARSON PRODUCT-MOMENT CORRELATIONS BETWEEN PREDICTOR AND CRITERION VARIABLES
N=63

<table>
<thead>
<tr>
<th></th>
<th>Gray Oral</th>
<th>Voc. Gates</th>
<th>Comp. Gates</th>
<th>Total Gates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Response I</td>
<td>-.0287</td>
<td>-.2942</td>
<td>-.3681</td>
<td>-.3524</td>
</tr>
<tr>
<td>Matching Symbol I</td>
<td>-.1030</td>
<td>-.3049</td>
<td>-.1750</td>
<td>-.2595</td>
</tr>
<tr>
<td>Difference I</td>
<td>-.0954</td>
<td>-.2323</td>
<td>-.0657</td>
<td>-.1631</td>
</tr>
<tr>
<td>Teacher's Rating</td>
<td>.2087</td>
<td>.5982</td>
<td>.4648</td>
<td>.5707</td>
</tr>
<tr>
<td>Naming Letters</td>
<td>.3710</td>
<td>.6403</td>
<td>.5665</td>
<td>.6472</td>
</tr>
<tr>
<td>Metropolitan</td>
<td>.3352</td>
<td>.7034</td>
<td>.5855</td>
<td>.6911</td>
</tr>
<tr>
<td>Verbal Wisc</td>
<td>.2369</td>
<td>.6395</td>
<td>.5913</td>
<td>.6582</td>
</tr>
<tr>
<td>Performance Wisc</td>
<td>.1989</td>
<td>.5463</td>
<td>.4207</td>
<td>.5200</td>
</tr>
<tr>
<td>Total Wisc</td>
<td>.2331</td>
<td>.6662</td>
<td>.5694</td>
<td>.6624</td>
</tr>
<tr>
<td>Light Response II</td>
<td>-.0288</td>
<td>-.4032</td>
<td>-.3077</td>
<td>-.3813</td>
</tr>
<tr>
<td>Matching Symbol II</td>
<td>-.1412</td>
<td>-.3304</td>
<td>-.1688</td>
<td>-.2706</td>
</tr>
<tr>
<td>Difference II</td>
<td>-.1685</td>
<td>-.2157</td>
<td>-.0714</td>
<td>-.1571</td>
</tr>
</tbody>
</table>

Significant Level       | .05 = .250 | .01 = .325 |
### TABLE III
COMPARING MEANS OF THE LIGHT RESPONSE TESTS

<table>
<thead>
<tr>
<th>Light Response I Fall</th>
<th>Light Response II Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Total N=63</td>
<td>16.99</td>
</tr>
<tr>
<td>75 down N=18</td>
<td>17.63</td>
</tr>
</tbody>
</table>

### TABLE IV
COMPARING MEANS OF THE MATCHING SYMBOL TESTS

<table>
<thead>
<tr>
<th>Matching Symbol I Fall</th>
<th>Matching Symbol II Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Total N=63</td>
<td>33.06</td>
</tr>
<tr>
<td>75 down N=18</td>
<td>38.33</td>
</tr>
</tbody>
</table>
TABLE V

COMPARING EXTREMES ON THE BASIS OF AGE

<table>
<thead>
<tr>
<th></th>
<th>75 months down</th>
<th>31 months up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Light Response I</td>
<td>17.63</td>
<td>2.28</td>
</tr>
<tr>
<td>Matching Symbol I</td>
<td>38.33</td>
<td>11.50</td>
</tr>
<tr>
<td>Naming Letters</td>
<td>5.06</td>
<td>2.96</td>
</tr>
<tr>
<td>Teacher's Rating</td>
<td>51.61</td>
<td>15.89</td>
</tr>
<tr>
<td>Metropolitan</td>
<td>56.72</td>
<td>22.77</td>
</tr>
<tr>
<td>Verbal Wisc</td>
<td>106.33</td>
<td>16.72</td>
</tr>
<tr>
<td>Performance Wisc</td>
<td>104.83</td>
<td>15.87</td>
</tr>
<tr>
<td>Total Wisc</td>
<td>106.33</td>
<td>16.83</td>
</tr>
</tbody>
</table>

Significant Level .05 = 1.96  .01 = 2.62  .001 = 3.37
TABLE VI

The correlations between the predictor tests and Gates-MacGinitie Reading Test that were significant at the .05 level are listed below in order.

1. Metropolitan Readiness Test
   Vocabulary section (Gates)  .7034
2. Metropolitan Readiness Test
   Total score (Gates)  .6911
3. Total score (Wechsler)
   Vocabulary section (Gates)  .6662
4. Total score (Wechsler)
   Total score (Gates)  .6624
5. Verbal section (Wechsler)
   Total score (Gates)  .6582
6. Naming Letters Tests
   Total score (Gates)  .6472
7. Naming Letters Test
   Vocabulary section (Gates)  .6403
8. Verbal section (Wechsler)
   Vocabulary section (Gates)  .6395
9. Teacher's Reading Readiness
   Rating Scale
   Vocabulary section  .5982
10. Verbal section (Wechsler)
    Comprehension section (Gates)  .5913
11. Metropolitan Readiness Test
    Comprehension section (Gates)  .5855
12. Teacher's Reading Readiness
    Rating Scale
    Total score (Gates)  .5707
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>Total score (Wechsler) Comprehension section (Gates)</td>
<td>.5694</td>
</tr>
<tr>
<td>14.</td>
<td>Naming Letters Test Comprehension section (Gates)</td>
<td>.5665</td>
</tr>
<tr>
<td>15.</td>
<td>Performance section (Wechsler) Vocabulary section (Gates)</td>
<td>.5463</td>
</tr>
<tr>
<td>16.</td>
<td>Performance section (Wechsler) Total score (Gates)</td>
<td>.5200</td>
</tr>
<tr>
<td>17.</td>
<td>Teacher's Reading Readiness Rating Scale Comprehension section (Gates)</td>
<td>.4648</td>
</tr>
<tr>
<td>18.</td>
<td>Performance section (Wechsler) Comprehension section (Gates)</td>
<td>.4207</td>
</tr>
<tr>
<td>19.</td>
<td>Light Response Test II Vocabulary section (Gates)</td>
<td>-0.4032</td>
</tr>
<tr>
<td>20.</td>
<td>Light Response Test II Total score (Gates)</td>
<td>-0.3813</td>
</tr>
<tr>
<td>21.</td>
<td>Light Response Test I Comprehension section (Gates)</td>
<td>-0.3681</td>
</tr>
<tr>
<td>22.</td>
<td>Light Response Test I Total score (Gates)</td>
<td>-0.3524</td>
</tr>
<tr>
<td>23.</td>
<td>Matching Symbol Test II Vocabulary section (Gates)</td>
<td>-0.3304</td>
</tr>
<tr>
<td>24.</td>
<td>Light Response Test II Comprehension section (Gates)</td>
<td>-0.3077</td>
</tr>
<tr>
<td>25.</td>
<td>Matching Symbol Test I Vocabulary section (Gates)</td>
<td>-0.3049</td>
</tr>
<tr>
<td>26.</td>
<td>Light Response Test I Vocabulary section (Gates)</td>
<td>-0.2942</td>
</tr>
<tr>
<td>27.</td>
<td>Matching Symbol Test II Total score (Gates)</td>
<td>-0.2706</td>
</tr>
<tr>
<td>28.</td>
<td>Matching Symbol Test I Total score (Gates)</td>
<td>-0.2595</td>
</tr>
</tbody>
</table>
### TABLE VII

**RANKING OF PREDICTOR VARIABLES BY AVERAGING THE SIGNIFICANT CORRELATIONS**

<table>
<thead>
<tr>
<th></th>
<th>Average Rank</th>
<th>Average Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Metropolitan Readiness Test</td>
<td>24.3</td>
<td>.6592</td>
</tr>
<tr>
<td>2. Naming Letters Test</td>
<td>20.0</td>
<td>.6184</td>
</tr>
<tr>
<td>3. Wechsler Intelligence Scale for Children</td>
<td>18.8</td>
<td>.5882</td>
</tr>
<tr>
<td>4. Teacher's Reading Readiness Rating Scale</td>
<td>16.3</td>
<td>.5445</td>
</tr>
<tr>
<td>5. Light Response Test</td>
<td>7.0</td>
<td>-.3511</td>
</tr>
<tr>
<td>6. Matching Symbol Test</td>
<td>3.3</td>
<td>-.2913</td>
</tr>
<tr>
<td>7. Difference</td>
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</table>
of the children 75 months and younger was 106.33, with a standard deviation of 16.83. The average intelligence quotient for the children 81 months and older was 101.11, with a standard deviation of 16.94. See Table V.

There were three scores for the Wechsler Intelligence Scale for Children to be correlated with the three scores of the Gates-MacGinitie Reading Test; these comparisons resulted in a combination of nine possible correlations. There was a total of twenty-eight significant correlations between all of the predictor tests and the Gates-MacGinitie Reading Test. The Wechsler Intelligence Scale for Children had a high prediction value in relationship to the other predictor tests. They ranked third, fourth, fifth, eighth, tenth, thirteenth, fifteenth, sixteenth, and eighteenth.

The section of the Wechsler Intelligence Scale for Children that correlated highest with the Gates-MacGinitie Reading Test was the total score (Wisc) with the vocabulary section (Gates). They had a correlation of .6662. The second highest correlation for this predictor test was between the total score (Wisc) and the total score (Gates), which ranked fourth in the group and had a correlation of .6624. The third highest correlation of this group, which ranked fifth in the total group, was the verbal section (Wisc) with the total score (Gates), which had a correlation of .6582.
The other six correlations were scattered in rank as previously described. The lowest correlation, which ranked eighteenth, was the performance section (Wisc) and the comprehension section (Gates), with a correlation of .4207. See Table VI.

Metropolitan Readiness Test as a Predictor of First Grade Reading Success

Hypothesis three points out that there is a significant positive relationship between the Metropolitan Readiness Test and the Gates-MacGinitie Reading Test. This hypothesis was accepted, as there was a significant positive relationship at the .01 level or better between the Metropolitan Readiness Test and all scores of the Gates-MacGinitie Reading Test. The two highest correlations in this study were with this predictor test. It was also one of the three used in the multiple correlation. See Table II.

The Metropolitan Readiness Test in this study had a mean for the total group of 62.03 and a standard deviation of 19.15. The mean for the boys was 62.48, with a standard deviation of 17.00. The mean for the girls was 61.59, with a standard deviation of 21.30. See Table I. The mean for the children 75 months and younger was 56.72, with a standard deviation of 22.77. The mean for the children 81 months and older was 62.11, with a standard deviation of 19.63. See Table V.
The Metropolitan Readiness Test had one score to be correlated with three scores of the Gates-MacGinitie Reading Test. This comparison resulted in three correlations. They ranked first, second and eleventh in a group of twenty-eight correlations that were significant at the .05 level.

The highest correlation of the study was between the Metropolitan Readiness Test and the vocabulary section (Gates); this correlation was .7034. The second highest correlation of this study was between the Metropolitan Readiness Test and the total score (Gates); this correlation was .69111. The third highest correlation of this predictor test, which ranked eleventh, was between the Metropolitan Readiness Test and the comprehension section (Gates); this correlation was .5855. See Table VI.

Teacher's Reading Readiness Rating Scale as a Predictor of First Grade Reading Success

Hypothesis four points out that there is a significant positive relationship between the Teacher's Reading Readiness Rating Scale and the Gates-MacGinitie Reading Test. This hypothesis was accepted, as there was a significant positive relationship at the .01 level or better between the Teacher's Reading Readiness Rating Scale and all scores of the Gates-MacGinitie Reading Test. See Table II.

The Teacher's Reading Readiness Rating Scale in this study had a mean for the total group of 53.92 and a standard
deviation of 15.34. The mean for the boys was 53.35, with a standard deviation of 13.00. The mean for the girls was 54.47, with a standard deviation of 17.50. See Table I. The mean for the children 75 months and younger was 51.61, with a standard deviation of 15.89. The mean for the children 81 months and older was 54.79, with a standard deviation of 20.39. See Table V.

The Teacher's Reading Readiness Rating Scale had only one score to be correlated with the three scores of the Gates-MacGinitie Reading Test. This comparison resulted in three correlations that ranked ninth, twelfth and seventeenth. The highest of these three correlations ranked ninth in the group. It showed a correlation of .5982 with the vocabulary section (Gates). The second of the three correlations ranked twelfth in the group. It was correlated with the total score (Gates) with a result of .5707. The third and last correlation ranked seventeenth in the total group of significant correlations. It was correlated with the comprehension section (Gates) with a result of .4648. See Table VI.

Naming Letters Test as a Predictor of First Grade Reading Success

Hypothesis six points out that there is a significant positive relationship between the Naming Letters Test and the Gates-MacGinitie Reading Test. This hypothesis was accepted,
as there was a significant positive relationship at the .01 level or better between the Naming Letters Test and all scores of the Gates-MacGinitie Reading Test. This predictor test was one of the three used in the multiple correlation. See Table II.

The Naming Letters Test in this study had a mean for the total group of 4.65 and a standard deviation of 3.15. The mean for the boys was 4.65, with a standard deviation of 3.24. The mean for the girls was 4.66, with a standard deviation of 3.12. See Table I. The mean for the children 75 months and younger was 5.06, with a standard deviation of 2.96. The mean for the children 81 months and older was 4.68, with a standard deviation of 3.40. See Table V.

The Naming Letters Test had one score to be correlated with three scores of the Gates-MacGinitie Reading Test. This comparison resulted in three correlations that ranked sixth, seventh and fourteenth. The highest of these three correlations ranked sixth in the group of significant correlations. It was correlated with the total score (Gates) with a result of .6472. The second highest of the three correlations ranked seventh in the group. It was correlated with the vocabulary section (Gates) with a result of .6403. The third and lowest correlation ranked fourteenth in the total group of significant correlations. It was correlated with the comprehension section (Gates) with a result of .5665. See Table VI.
Hypothesis one points out that there is a significant negative relationship between the Light Response Test and the Gates-MacGinitie Reading Test. This hypothesis was accepted, as there was a significant negative relationship at the .05 level or better between both Light Response Tests and all scores of the Gates-MacGinitie Reading Test. There was a significant negative relationship at the .01 level or better for four of the six correlations. See Table II.

Hypothesis seven compared the mean score of the first Light Response Test with the mean score of the second Light Response Test. There was significantly less time needed to complete the Light Response Test at the end of the school year than at the beginning of the school year. The difference between the means was 1.17556. The Fisher t-ratio score was 4.15494. It was significant at the .00026 level. As a result, hypothesis seven was accepted. See Table III.

The Light Response Test was given twice, once at the first of the school year and again at the end of the school year. In the first test, the mean for the total group was 16.99, with a standard deviation of 2.36. The mean for the boys was 17.30, with a standard deviation of 2.18. The mean for the girls was 16.69, with a standard deviation of 2.52. See Table I. The mean for the children 75 months and younger was 17.63, with a standard deviation of 2.28.
The mean for the children 81 months and older was 16.55, with a standard deviation of 2.66. See Table V.

In the second test, the mean for the total group was 15.81, with a standard deviation of 2.27. The mean for the boys was 15.67, with a standard deviation of 1.78. The mean for the girls was 15.96, with a standard deviation of 2.68. See Table I.

The Light Response Test had one score for each test to be correlated with the three scores of the Gates-MacGinitie Reading Test. This comparison resulted in six negative correlations.

The correlations of the first Light Response Test that was given at the first of the school year ranked twenty-first, twenty-second and twenty-sixth in the group of significant correlations. The highest of these correlations, which ranked twenty-first, was related to the total score (Gates) with a correlation of -.3681. The second highest of the three correlations for the first test was ranked twenty-second. It was related to the total score (Gates) with a correlation of -.3524. The lowest of the three correlations of the first Light Response Test ranked twenty-sixth. It was related to the vocabulary section (Gates) with a correlation of -.2942.

The second Light Response Test had a higher average correlation than the first Light Response Test. The correlations were ranked nineteenth, twentieth and twenty-fourth.
in the group of significant correlations. The highest of these three, which ranked nineteenth, was related to the vocabulary section (Gates) with a correlation of -.4032. The second highest of the three correlations, which ranked twentieth, was related to the total score (Gates) with a correlation of -.3813. The lowest of the three correlations of the second Light Response Test ranked twenty-fourth. It was correlated with the comprehension section (Gates) with a result of -.3077. See Table II.

Matching Symbol Test as a Predictor of First Grade Reading Success

Hypothesis two points out that there is a significant negative relationship between the Matching Symbol Test and the Gates-MacGinitie Reading Test. The hypothesis was accepted, as there was a significant negative relationship at the .05 level or better between both Matching Symbol Tests and the total score of the Gates-MacGinitie Reading Test. Four of the six correlations were significant at the .05 level. There was only one correlation significant at the .01 level. It was the correlation between the second Matching Symbol Test and the vocabulary section (Gates). See Table II.

Hypothesis eight compared the mean score of the first Matching Symbol Test with the mean score of the second Matching Symbol Test. There was significantly less time
needed to complete the Matching Symbol Test at the end of the school year than there had been at the beginning of the school year. The difference between the means was 1.72556. The Fisher t-ratio score was 2.29734, a figure significant at the .02353 level. As a result, hypothesis eight was accepted. See Table IV.

The Matching Symbol Test was given twice, first at the first of the school year and again at the end of the school year. In the first test, the mean for the total group was 33.06, with a standard deviation of 8.14. The mean for the boys was 33.34, with a standard deviation of 6.53. The mean for the girls was 32.80, with a standard deviation of 9.54. See Table I. The mean for the children 75 months and younger was 38.33, with a standard deviation of 11.50. The mean for the children 81 months and older was 28.89, with a standard deviation of 5.09. See Table V.

In the second test, the mean for the total group was 31.34, with a standard deviation of 6.67. The mean for the boys was 31.50, with a standard deviation of 5.85. The mean for the girls was 31.18, with a standard deviation of 7.47. See Table I.

The Matching Symbol Test had one score for each test to be correlated with the three scores of the Gates-MacGinitie Reading Test. This comparison resulted in six negative correlations.
There were two significant correlations for the Matching Symbol Test that was given at the first of the school year. These two ranked twenty-fifth and twenty-eighth among the significant correlations. The third correlation was not significant at the .05 level.

The highest of the two significant correlations, which ranked twenty-fifth, was related to the vocabulary section (Gates) with a correlation of -.3049. The other significant correlation ranked twenty-eighth, or last. It was related to the total score (Gates) with a correlation of -.2595.

The second Matching Symbol Test had two significant correlations, which ranked twenty-third and twenty-seventh. The third was not significant at the .05 level. The highest of the two significant correlations, which ranked twenty-third, was related to the vocabulary section (Gates) with a correlation of -.3304. The other significant correlation, which ranked twenty-seventh, was related to the total score (Gates) with a correlation of -.2706. See Table II.

The difference in the individual scores made on the Light Response Test and the Matching Symbol Test was used as a predictor test. This difference in scores was correlated with the Gates-MacGinitie Reading Test as stated in hypothesis twelve. There were six negative correlations, but none of them was significant at the .05 level. As a result, hypothesis twelve was rejected. See Table II.
Age as a Predictor of First Grade Reading Success

Hypotheses nine and ten are concerned with age as a predictor of first grade reading success. These were tested by comparing the scores of the younger children (75 months and younger) with those of the older children (81 months and older) on each predictor test. There were eighteen students in the younger group and nineteen in the older group.

To test hypothesis nine, the first Light Response Test and the first Matching Symbol Test were used. Age extremes were compared on each of these tests. In the comparison of the means, the age extremes of the first Light Response Test were not found significant at the .05 level, as the Fisher t-ratio test was 1.32. As a result, the Light Response Test section of hypothesis nine was rejected. In the first Matching Symbol Test, there was a significant difference in the means of the age extremes. The Fisher t-ratio test was 3.2596, with a significant level of .001. As a result, the Matching Symbol Test section of hypothesis nine was accepted. See Table V.

Hypothesis ten compares the age extremes of the following predictor tests: Wechsler Intelligence Scale for Children, Metropolitan Readiness Test, Teacher's Reading Readiness Rating Scale, and Naming Letters Test. The Fisher t-ratio test was used to compare the mean scores of the
younger children with those of the older children for each test. None of the differences between the means of each test was significant at the .05 level. As a result, hypothesis ten was rejected. See Table V.

Hypothesis eleven is a comparison between children of the same age that have had reading with those that have not had reading. The results were not significant. In fact, the results were just the opposite of what might have been expected. Children who had had reading made a slower mean score on the Matching Symbol Test than did children who had not had reading. On the average, the non-reading students were faster on the Matching Symbol Test than were the reading students. The mean score for children who had had reading was 33.7283. The mean score for children who had not had reading was 28.8879. There was a difference in the means of 4.8404, with a t-ratio score of 1.95, a result which was close to the .05 level of significance. This result is completely opposite to hypothesis eleven, which states that reading ability should increase the speed of matching symbols. As a result, hypothesis eleven was rejected. See Tables IV and V.

Multiple Correlation as a Predictor of First Grade Reading Success

Hypothesis thirteen states that the correlation coefficient of the multiple correlation will be significantly higher than each single predictor variable correlation
coefficient. The multiple correlation coefficient was .7596, significantly higher than each of the singular predictor variable correlation coefficients. The F value was 6.9316, more than enough to be significant at the .01 level. As a result, hypothesis thirteen was accepted.

The three highest correlations used in the multiple correlation were on the Metropolitan Readiness Test, the Wechsler Intelligence Scale for Children and the Naming Letters Test. The correlation between the Metropolitan Readiness Test and the Gates-MacGinitie Reading Test was .6911. When the second correlation, the Wechsler Intelligence Scale for Children, was added, the correlation with the two highest predictor variables and the Gates-MacGinitie Reading Test was .7312. When the third correlation, the Naming Letters Test, was added, the correlation with the three highest predictor variables and the Gates-MacGinitie Reading Test was .7596. This was the highest correlation of the study.

Summary

With regard to the correlations of the predictor tests with the Gates-MacGinitie Reading Test, the following relationships were found:

1. Hypotheses one, two, three, four, five, and six were accepted, as they all reached the .05 level of
significance. All of these except hypothesis two reached the .01 level of significance.

2. The multiple correlation hypothesis thirteen was accepted, as there was a .0685 increase over the highest Pearson product-moment correlation. This was significant at the .01 level.

3. Hypothesis twelve was rejected, as it did not reach the .05 level of significance.

With regard to the Fisher t-ratio, which is the comparing of means, the following relationships were found:

1. Hypotheses seven and eight were accepted, as they both reached the .05 level of significance. They also reached the .01 level of significance.

2. Hypotheses ten and eleven were rejected, as they did not reach the .05 level of significance.

3. Hypothesis nine was half accepted and half rejected. The Matching Symbol Test section was accepted, as it reached the .01 level of significance. The Light Response Test section was rejected, as it did not reach the .05 level of significance.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purposes of this chapter are to summarize the findings of this study, to draw conclusions based on those findings, and to make recommendations pertinent to the problem of reading success in the first grade.

Summary

This study was undertaken to investigate the predictive value of certain tests in relationship to first grade reading success. The purpose was to determine which predictor tests had the highest correlation in predicting first grade reading success. The thirteen hypotheses were formulated and investigated by statistical analysis which consisted of the Pearson product-moment correlation, multiple correlation, and Fisher t-ratio. The predictor variables were described, and all pertinent information, such as the mean and standard deviation, was reported. The available literature dealing with the study was reviewed.

The subjects included in this study were first grade children enrolled in a public school of North Texas. The school had seven first grades. There were approximately 1,300 students in the school during the school year of 1970-1971. Ten students from each of the seven first grades
used in this study were randomly selected. Of the seventy students selected, thirty-five were boys, and thirty-five were girls. There were seven students who did not complete all the tests, for various reasons. These students were dropped from the study, leaving a total of sixty-three students in the study.

Four predictor tests of first grade reading success were administered to the students during the first two weeks of school. These predictor tests were the Metropolitan Readiness Test, Naming Letters Test, Light Response Test, and Matching Symbol Test.

The Teacher's Reading Readiness Rating Scale was filled out by each of the seven teachers at the end of the sixth week. The Wechsler Intelligence Scale for Children was administered to each child during the fall. The seventh predictor test was computed by finding the difference in individual scores of the Light Response Test and the Matching Symbol Test.

The Light Response Test and the Matching Symbol Test were readministered in the spring during the last four weeks of school. The criteria for measuring the effectiveness of the predictive tests were the Gray Oral Reading Paragraphs Test and the Gates-MacGinitie Reading Test. These tests were administered to the students during the last four weeks of the school year.
The raw data were entered on data sheets for computing the coefficients of Pearson's product-moment correlation, multiple correlation, and the Fisher t-ratio. The North Texas State University Computing Center was used in computing the statistics needed in this study.

The Gray Oral Reading Paragraphs Test was eliminated from the study because the scores were not normally distributed. Sixty-five per cent of the group made test scores of zero. The mean was 6.70, with a standard deviation of 11.16. These conditions showed that the scores on the Gray Oral Reading Paragraphs Test were not normally distributed, as only about one-half standard deviation was possible toward the zero score side of the mean. A comparison between the left and right writing hand was not made, as there were only six left-handed writing students in the study.

With regard to the correlations of the predictor tests with the Gates-MacGinitie Reading Test, the following relationships were found:

1. In hypothesis five, the Wechsler Intelligence Scale for Children had a positive relationship with the Gates-MacGinitie Reading Test. The correlation of the totals was .662, a figure which was significant at the .01 level. The hypothesis was accepted. This correlation was one of the three used in the multiple correlation.
2. In hypothesis three, the Metropolitan Readiness Test had a positive relationship with the Gates-MacGinitie Reading Test. The correlation with the total (Gates) was .691, a figure which was significant at the .01 level. The hypothesis was accepted. This correlation was one of the three used in the multiple correlation.

3. In hypothesis four, the Teacher's Reading Readiness Rating Scale had a positive relationship with the Gates-MacGinitie Reading Test. The correlation with the total (Gates) was .571, a figure which was significant at the .01 level. The hypothesis was accepted. This correlation ranked fourth among the significant correlations; thus, it was not used in the multiple correlation.

4. In hypothesis six, the Naming Letters Test had a positive relationship with the Gates-MacGinitie Reading Test. The correlation with the total (Gates) was .647, a figure which was significant at the .01 level. The hypothesis was accepted. This correlation was one of the three used in the multiple correlation.

5. In hypothesis one, both Light Response Tests had a negative relationship with the Gates-MacGinitie Reading Test. The correlation of the first test with the total (Gates) was -.352, a figure which was significant at the .01 level. The correlation of the second test with the total (Gates) was -.381, a figure which was significant at the .01 level.
The hypothesis was accepted. These two correlations ranked next to last in the group in significance of correlation. See Table VII.

6. In hypothesis two, both Matching Symbol Tests had a negative relationship with the Gates-MacGinitie Reading Test. The correlation of the first test with the total (Gates) was -0.260, a figure which was significant at the .05 level. The correlation of the second test with the total (Gates) was -0.271, a figure which was significant at the .05 level. The hypothesis was accepted. These two correlations were the lowest of the significant correlations.

7. In hypothesis twelve, the Difference Test, which is the difference in individual scores of the Light Response Test and the Matching Symbol Test, had a negative relationship with the Gates-MacGinitie Reading Test. The correlation of the first Difference Test with the total (Gates) was -0.163, a figure which was not significant at the .05 level. The correlation of the second Difference Test with the total (Gates) was -0.157, a figure which was not significant at the .05 level. The hypothesis was rejected. Of the seven predictor tests, this was the only one that was not significant at the .05 level with the total scores of the Gates-MacGinitie Reading Test.

8. Hypothesis thirteen stated that the correlation coefficient of the multiple correlation would be significantly
higher than each single predictor variable correlation coefficient. The three highest predictors were the Metropolitan Readiness Test, the Wechsler Intelligence Scale for Children, and the Naming Letters Test. The multiple correlation coefficient was .7596, significantly higher than each of the single predictor variable correlation coefficients. As a result, hypothesis thirteen was accepted.

With regard to the Fisher t-ratio, the following relationships were found:

1. Hypothesis seven compared the first Light Response Test with the second Light Response Test. Less time was needed to complete the Light Response Test at the end of the school year than at the beginning of the school year. The significant level was .0003, indicating that age was a significant factor in the speed of the Light Response Test. The hypothesis was accepted.

2. Hypothesis eight compared the first Matching Symbol Test with the second Matching Symbol Test. Less time was needed to complete the Matching Symbol Test at the end of the school year than at the beginning of the school year. The significant level was .0235, a result which indicates that age is a significant factor in the speed of the Matching Symbol Test. The hypothesis was accepted.

3. In hypothesis nine, the first Light Response Test and the first Matching Symbol Test compared the age extremes
of each respective test. This comparison was made to determine if less time was needed by the older students (81 months and older) than by the younger students (75 months and younger) to complete each test.

Less time was needed by the older students (81 months and older) to complete the first Matching Symbol Test than by the younger students (75 months and younger). The significant level was .001, indicating farther that age is a significant factor in the speed of the Matching Symbol Test. This part of hypothesis nine was accepted.

In the comparison of the older students (81 months and older) with the younger students (75 months and younger), age was not a significant factor in the Light Response Test. This part of hypothesis nine was rejected.

4. Hypothesis ten compared the older students (81 months and older) with the younger students (75 months and younger) on the Wechsler Intelligence Scale for Children, Metropolitan Readiness Test, Teacher's Reading Readiness Rating Scale, and Naming Letters Test. The significant difference in means was not sufficient to meet the .05 level for any of the above predictor tests. Thus, age was not a significant factor in these tests. As a result, hypothesis ten was rejected.

5. Hypothesis eleven sought to determine whether reading had an effect on the speed of the Matching Symbol Test. The
results were not significant; therefore, the hypothesis was rejected. In fact, just the opposite was close to being true. The Fisher t-ratio at the .05 level of significance required a score of 1.98. The score made was 1.95, but in the opposite direction. This result indicated that reading or some experience in the first grade was a hindrance in the speed of matching symbols.

All the hypotheses of this study were significant at the .05 level or better except ten, eleven, twelve, and part of nine. Hypotheses nine and ten were concerned with the effect of age on the predictor variables. Hypothesis eleven was concerned with the effect of reading on the speed of matching symbols. Hypothesis twelve was concerned with the correlation of the difference in individual scores on the Light Response Test and the Matching Symbol Test with the Gates-MacGinitie Reading Test.

Conclusions

Consideration of the findings of this study permitted the formulation of the following conclusions:

1. It can still be concluded that the Metropolitan Readiness Test is one of the best single predictors of first grade reading success.

2. It is concluded that the tests that measure the specific aspects of the reading process (identifying, naming, and meaning) are the best predictors of first grade reading success.
3. The *Wechsler Intelligence Scale for Children* is a good predictor of first grade reading success. The verbal scale is a better predictor than the performance scale, as beginning reading gains much of its retention by verbalization.

4. The multiple correlation of the best single correlations is the best predictor of first grade reading success.

5. Considering the amount of time in relation to the efficiency of predicting first grade reading success, the Naming Letters Test is recommended.

6. Age is a significant factor in the speed of matching symbols at the age of six.

7. Age (eight months or less) is not a significant factor in the better tests that predict first grade reading success.

8. The naming of a selected group of letters, both capital letters and lower case, as in this study, is a good predictor of first grade reading success.

9. Practice in matching symbols, as in workbooks, is not likely to improve first grade reading success, as the speed of matching symbols has a low negative correlation with reading.

**Recommendations**

On the basis of the findings and conclusions of this study, the following recommendations are made:
1. The Light Response Test and the Matching Symbol Test should be given at an earlier age in the hope of finding the imprinting period of both tests.

2. The effect of reading on the speed of matching symbols should be farther investigated to see if reading hinders the speed of matching symbols.

3. The effect of reading on the speed of matching letters should be farther investigated to see if reading hinders the speed of matching letters.

4. The investigation begun by this study should be continued to determine the significance of correlations with a different approach to the teaching of reading.

5. Other selected letters of the alphabet, as in the Naming Letters Test, should be investigated to determine their predictive correlation with first grade reading success.

6. The Naming Letters Test in this study should be farther investigated in light of different approaches to the teaching of reading.
APPENDIX A

Establishing the Reliability of the Instruments for Measuring Visual and Motor Responses

by

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Doctoral Advisory Committee

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1970
Introduction

Our ability to detect stimuli and differentiate the value is of great importance, as the stimulus is the physical energy that excites receptors and leads to perceptual experiences.

The ability to make preceptions is most critical to the process of learning, to the shaping of attitudes, and to the development of the personality. Perception is a selective process that can be measured to some degree. The differentiation by the individual requires time and happens prior to the recognition.

One of the outstanding factors marking disadvantaged children who make little progress in school is their lack of attentiveness (4, p. 459). Each individual seems to decide which stimuli to react to and which to ignore. Thus, some sort of memory ability is needed in differentiating the features. This ability to focus on the wanted information and to shut out the irrelevant information changes with age (4, p. 462).

As the child matures, he is better able to select and use those properties that serve to distinguish things from one another. This improved filtering ability is itself evidence of increasing economy in information pickup.

The individual perceives those aspects of his environment that, from his point of view, he needs to perceive to
maintain and enhance himself in the world in which he lives (5, p. 140). This selectivity results in reinforcing how the person perceives the world about him. Thus, we tend to see what we have seen before and that which fits best with our current orientation to the world. This reinforcement results in making perception more rapid and efficient (4, p. 194).

One of the puzzling phenomena of man is understanding the length of a moment. Experiments have shown that a given interval of time may seem to pass as much as five times as rapidly for children of ten as for adults of sixty, and that within the individual, there are tremendous variations from situation to situation, depending upon his mental and physiological status (6, p. 229). With these ideas in mind, the purpose of this paper was put forth.

Statement of the Problem

The purpose of this study was to determine the reliability of three instruments that may be used in finding if there is a relationship between (1) the speed of response to a light stimulus and (2) the speed of matching association to first grade reading success.

Hypotheses

In order to carry out the purpose of this study, the following hypotheses were formulated:
1. There will be a significant positive relationship between the scores of the first light test and the second light test as measured by the light response instrument.

2. There will be a significant positive relationship between the scores of the first letter test and the second letter test as measured by the matching letter response instrument.

3. There will be a significant positive relationship between the scores of the first symbol test and the second symbol test as measured with the matching symbol instrument.

Instrument

The three instruments are constructed with six switches. These switches are wired in order to permit them to be turned on one at a time by a master switch which is wired through a rotor. A relay is used to permit only one-way action. This enables the master switch to turn the switches on one at a time. The student's switch, that is, the one turned on, is the only switch that can turn the action off. Only one switch is alive at a time. The other five switches are dead until activated by the master switch through the rotor.

The signals are matched with the student's switches. This relationship is what gives meaning to the question of which switch to press.
The clock measures only the time between giving the signal and turning the signal off.

The letters used for the matching letters test are A, E, I, O, U and X.

The symbols used for the matching symbols test are a, C, +, *, and •.

How the Test Works

The student is to react as quickly as possible by pressing the appropriate switch which turns the signal off and stops the clock.

Each pupil is given fifteen opportunities to respond after three practice trials. The instrument measures the length of time the student needs to become aware which signal is turned on and to respond by pressing the appropriate switch. The score is the accumulated time of the fifteen responses.

The order that the switches were turned on was obtained by random drawing. This order was 1, 4, 5, 1, 6, 3, 2, 5, 6, 2, 4, 5, 3, 4, 1, 3, 6 and 2. This order was also observed on the three practice trials.

School

The school where the testing was done, Diamond Hill Elementary, is located in one of the older, lower economic
sections of Fort Worth. The buildings, except for the lunch-room, are well over fifty years old, but in usable condition.

The tests were given to about half the first grade students. Approximately three-fourths of the pupils tested were taking part in the "Follow Through" program.

Procedure

The tests were administered in the cloak-room as an unused room. The instrument was placed on a table so that the pupils could stand in front and easily manipulate the switches.

Each of the three instruments was tested twice on the same forty-five or more students. The first test with each instrument was given in the morning, followed by the second test in the afternoon. There was a two-week interval between the testing with each instrument. The instruments were used in the following order: Light Response Test, Matching Letter Test, and Matching Symbol Test.

Instructions

The students were instructed about the test in groups of three, but were tested individually.

The instructions were that each student's reaction time and matching time would be measured. The students were shown how to press the switches correctly. Each pupil was permitted a practice response to the signal during the
instruction period. This procedure resulted in each child responding as quickly as possible to the given signal. The children were taken out of the cloak-room as a group and brought back one at a time. Each child received three individual practice tries before the test.

The second test was given in the afternoon, with no further instructions given other than the three practice tries.

Light Response Test

The average range of the two Light Response Tests was from 14.13 to 24.72, spanning 10.59 seconds. The responses of the middle 50 per cent were from 16.57 to 20.78, covering only 4.21 seconds. The average response was 1.26 of a second, with an average difference of .09 of a second.

The standard deviation of the average of the two tests was 2.70, with a quartile deviation of 2.10. The mean was 18.91, with a median of 19.04.

The reliability was .83, indicating a rather high consistency, as hypothesized. Thus, hypothesis one was accepted, as it more than reached the .01 level of significance.

The information gathered indicated that the children did not improve from one test to the next, and that if there had been any improvement, it was lost by the second test.
The scores seem to cluster around nineteen, resulting in a bell shaped curve with a long tail toward the slower response.

Matching Letter Tests

The average range for the two Matching Letter Tests was much longer than for the light test. The letter response was from 15.49 to 44.10 seconds. The middle 50 per cent was from 22.25 to 31.12, spanning 8.87 seconds. This is about twice that of the light test.

The standard deviation was 6.74, with a quartile deviation of 4.43. The mean was 26.76, with the median of 25.82. The reliability was .93, showing a very high level of consistency. Thus, hypothesis two was accepted, as it more than reached the .01 level of significance.

The data of the two letter tests showed that the children had a carry-over from the first test to the second test. The length of response decreased .12 of a second, with the mean decreasing 1.80 of a second. The scores were well clustered above thirty-two, with scattered responses to forty-four.

Matching Symbol Tests

The Matching Symbol Tests' results were like the Matching Letter Tests' in many respects but different in others. The average range of the two was almost identical,
from 15.84 to 45.04, with a span of 19.20 seconds. The middle 50 per cent range was within one-fourth of a second of the letter tests (22.49 to 31.00).

The reliability was .75, which is eighteen points lower than that of the letter test. Hypothesis three was accepted, as it more than reached the .01 level of significance. The amount of learned carry-over, if any, from the first test was very small—.05. This is well within the range of variance.

The scores of the symbol test were clustered similarly to those of the letter test, with a scattered tapering of scores from thirty-one to forty-six. The average difference between the two symbol tests was 1.04 seconds less than the average difference between the two letter tests; yet the correlation was higher for the letter tests. This result shows that, even though the variation was higher in the letter tests, it was also more uniform than that of the symbol tests.

Interrelationship

When grouped separately, the boys had a correlation of .67 between their light and symbol responses. The girls' correlation for the same two tests was .37.

The boys also had a correlation of .96 between the light and letter responses. This result indicates that a score on one test could serve as a good predictor of the
score on the other test. The girls had a correlation of .14 for the same two tests. This result indicates that the girls' tests had little relationship and that one score could not serve as a predictor of the other. These correlations indicate that the boys, when ranked by scores, were more uniform.

The boys on the average as a group were .50 of a second faster than the girls on the light and symbol responses; but on the letter response, the boys were 1.05 second slower than the girls. It seems that if the boys were faster as a group on two of the tests (light and symbol), they also should have been faster on the letter test. Instead, the boys were more than twice as slow.

In the light test, 46 per cent of the students made faster scores on the second test. This leaves 54 per cent making slower scores on the second test.

In the letter test, 73 per cent of the students made faster scores on the second test. This leaves 27 per cent of the students making slower scores on the second test.

In the symbol test, 62 per cent of the students made faster scores on the second test. This leaves 38 per cent of the students making slower scores on the second test.

These results indicate that the light tests did not have a learning carry-over but that the letter and symbol
tests could have had a learning carry-over between the first and second tests.

Comparing the light test with the letter test revealed a .23 difference between the two correlations. Comparing the light test with the symbol test showed a .16 difference. A comparison of the letter test with the symbol test revealed a .11 difference.

The significant difference in means of the light response and the letter response was 7.48 by the use of the "t" test. This was more than enough to be significant at the .001 level.

The significant difference in means of the light response and the symbol response was 7.66. This also was more than sufficient to be significant at the .001 level.

Summary

From the information gained in this study, it was clear that the three tests were highly reliable; thus, the three hypotheses are accepted. Because of the greater difference in significance of the means, the light and symbol tests were used in the study on predicting first grade reading success, as they best served in establishing the relationship of response to reading.
TABLE I
THE FULL RANGE OF TIME RESPONSE

Light Response Test

Light

100%

Matching Letter Test

Letter

100%

Matching Symbol Test

Symbol

100%
<table>
<thead>
<tr>
<th>Test Type</th>
<th>Range</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Response Test</td>
<td>16-20</td>
<td>50%</td>
</tr>
<tr>
<td>Matching Letter Test</td>
<td>21-31</td>
<td>50%</td>
</tr>
<tr>
<td>Matching Symbol Test</td>
<td>22-31</td>
<td>50%</td>
</tr>
</tbody>
</table>
PILOT STUDY BIBLIOGRAPHY


# APPENDIX B

## Teacher's Reading Readiness Rating Scale

<table>
<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td>Birth</td>
<td>Score</td>
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<table>
<thead>
<tr>
<th>Characteristic</th>
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<th>Average</th>
<th>High</th>
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<tbody>
<tr>
<td></td>
<td>-2</td>
<td>-1</td>
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</tbody>
</table>

## Intellectual development
- General mental maturity (MA)
- Brightness (IQ)
- Visual perception
- Auditory perception
- Listening comprehension
- Knowledge and concepts

## Language development
- Vocabulary
- Sentence structure and length
- Maturity of pronunciation

## Physical development
- Vision
- Hearing
- Muscular coordination
- General health and vigor
- Consistent hand preference

## Home background
- Cultural-educational level
- Richness and variety of experience
- Parental interest in schooling

## Emotional and social development
- Self-reliance and independence
- Emotional maturity, self-control
- Group participation

## Interest development
- Knowledge of alphabet, words
- Attention during story reading
- Expressed desire to read and write

**Column Totals:**
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Tests


