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The construction of a diagnostic group test of word analysis

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THE CONSTRUCTION OF A DIAGNOSTIC GROUP TEST OF WORD ANALYSIS

Submitted by

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Sincere appreciation is expressed to Dean Donald D. Durrell for his guidance and inspiration in planning and completing this study. Appreciation is also expressed to the professional staff of the Needham, Massachusetts Public Schools for its help and guidance.

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Statement

It is generally accepted that children need some training which will help them attack unfamiliar words which they meet. Gray says as follows:

> As the child's growing stock of sight words gives him power and carries him into wider reading, he will inevitably encounter new words when the teacher is not at hand to tell him what they are. It is at this point that the effectiveness of sight vocabulary alone breaks down. Unless the child has been taught some simple techniques of word attack, his only alternatives are to guess at the words, to seek out the teacher and demand help, or to skip the new words without attempting to determine what they may be. Since none of these ways of responding to unfamiliar words is satisfactory as a general method, the need for definite instruction in usable methods of word analysis are obvious.1/

This instruction in word analysis is ordinarily considered to belong to primary grades, but one need only to look at the quantity of new words that intermediate grade children are constantly meeting, and their subsequent difficulty in recognizing them, to see the need for word analysis instruction beyond the primary grades.

1/ William S. Gray, On Their Own In Reading (Chicago: Scott, Foresman and Company, 1948), p. 51

As the child becomes older, his width of reading increases. He must be able to read material fluently and comprehendingly in order to gain benefit.

> To read fluently and comprehendingly, he must recognize words with ease and facility, and it therefore becomes an essential duty of the school to provide the child with effective methods of recognizing new words.[1]

Dolch[2] points out that a great vocabulary load is thrust suddenly upon children in the middle grades. They meet many new words in their science and social studies materials. He says that they must have some method of attacking these new words. Other advocates of word analysis training are Smith[3], Wilson[4], Judd[5], and Murphy[6].

1/ Agnes G. Gunderson, "Simplified Phonics" Elementary School Journal, 39: 593-603, April, 1939, p. 593

2/ Edward W. Dolch, Reading and Word Meanings (New York: Ginn and Company, 1927), pp. 11-43

3/ Nila B. Smith, "What Shall We Do About Reading Today", Elementary English Review, 19: 247-251

4/ F.T. Wilson, "Early Achievement in Reading" Elementary School Journal, 42: 609-15, April, 1942

5/ Charles H. Judd, "Reading: It's Nature and Development", Supplementary Education Monographs, Vol. 2, No. 4, (Chicago: Department of Education; University of Chicago, 1918), p. 60

6/ Helen A. Murphy, "Evaluation of the Effect of Specific Training in Auditory and Visual Discrimination on Beginning Reading" ,(Doctor's dissertation, Boston University, Boston, 1943)

We have all encountered poor readers whose understanding of spoken language is far superior to their understanding of printed language. This may be due in part to the fact that these poor readers may have no method of word analysis in attacking new words. Unfamiliar words met in context result in confusions which in turn affect comprehension of the material being read.

If a device could be constructed which would determine the elements of word analysis that poor readers in the intermediate grades lack, then an order of difficulty could be established for these elements, and the most difficult ones isolated, and given special instruction. With special instruction, it is believed that word analysis ability would improve and hence, reading ability.

It is the purpose of this study, therefore, to construct a diagnostic group word analysis test for grades four, five, and six. It is hoped to determine from the results of the test, the elements of word analysis that the population tested lacks. It is then hoped to establish a frequency and position of errors on each part of the test, and also to determine an existence of any particular pattern of error.

Review of Research

During the past years there have been various methods applied in recognizing new words.

> The chief aim of reading instruction from 1607 to 1840 was the accurate pronunciation of words by means of a reading program that emphasized mastery of the elements of words before the child was permitted to read. From 1840 to about 1880, the reading program emphasized the recognition of words by means of their configuration. From about 1880 to 1915 there was the most elaborate phonic techniques for aiding word recognition that had ever been used in the reading programs of this country. From 1915 to about 1930, emphasis was largely on silent reading for comprehension with phonics for those pupils who needed such aid.1/

We are now back to teaching definite word attack skills. These skills to aid word recognition include: the use of context, the use of the total configuration of the word, the use of the significant details of words such as compound words and "little words in big words", phonetic analysis, and the use of the dictionary.

Within recent years, various experiments have been reported which show that training in ability to recognize significant details of words, to master letter form and sound, and to see likenesses and differences in words is a valuable aid in promoting accuracy and independence in word recognition.

1/ Ralph W. House, "Effect of a Program of Initial Instruction on the Pronunciation Skills at the Fourth Grade Level as Evidenced in Skills Growth", (Abstract of a doctorate dissertation, Journal of Experimental Education, 10: 54-56, September, 1941), p. 54

Gates and Russell[1] made a study of the factors influential in beginning reading. They divided three hundred and fifty-four pupils into three groups, one receiving training in modern methods of word analysis, one receiving training in formal phonics, and the third receiving no definite training beyond that of the regular reading program. In the analysis of the results, it was found that the group which had definite word analysis training proved superior in reading achievement to the other groups.

House[2], in a study, gave an experimental group of fourth grade children definite word analysis training. In the analysis of results, it was found that the experimental group had better reading achievement scores after the training, than did the control group. The purpose of the study was to determine if training in word analysis would aid word recognition.

Acomb[3], in a test of word recognition in grades four, five, and six, concluded that visual and auditory

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1/ Arthur I. Gates and David H. Russell, "Types of Materials, Vocabulary Burden, Word Analysis, and Other Factors in Beginning Reading, I and II", Elementary School Journal, 39: 27-35, 119-28, September-October, 1938

2/ House, op. cit.

3/ Allan Acomb, "A Study of the Psychological Factors in Reading and Spelling", (Master's thesis, Boston University, Boston, 1936)

discrimination, perception, and associability are significant in relation to reading ability and spelling ability. He states as follows:

> The ability to detect small differences in words shows a fairly high correlation. Therefore, success in reading is dependent upon some ability to perceive clearly the significant features of words as is shown by the close relationship exhibited by these factors.1/

Crossley[2] in a study which evaluated the effect of using lantern slides to develop auditory and visual discrimination of word elements, found that the experimental group gain was statistically significant in relation to that of the control group. This would seem to indicate that special work on the elements of word analysis helps the development of sight vocabulary.

The chief controversy in word analysis techniques relates to the value of phonics as an aid in teaching pupils to read.

For decades, phonics was emphasized more vigorously than any other aid to word recognition. One advantage of its use lies in the fact that it helps pupils recognize many words known orally but which are unfamiliar

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1/ Ibid., p. 53

2/ B. Alice Crossley, "An Evaluation of the Effect of Lantern Slides on Auditory and Visual Discrimination of Word Elements," (Doctor's dissertation, Boston University, Boston, 1948)

in printed form. One of its disadvantages is that it directs attention chiefly to the form and sound of words, thus distracting from their meaning. The pupils become more interested in saying words, then in what the words say. Furthermore, when applied to unphonetic words the results are often disastrous.

The general feeling now is that phonetic analysis is excellent when a reasonable amount is combined with other methods of word analysis. Gray says:

> Skill in phonetic analysis is essential for independence in identifying new printed words, but this skill should be based on fundamental understandings of how sounds and their letter symbols function in our language; and these understandings should develop as generalizations based on the child's experience with words, words which he learns visually as meaningful wholes, rather than mechanically as a series of letter sounds. And finally the use of phonetic understandings and skills should be geared into the total process of word perception.1/

There are other methods of applying auditory means of analysis as well as formal phonics. Children not only must be able to sound word elements, but also must be able to combine these sounds into words, and hear the sounds when they occur in words. The children must be trained to be aware of sounds, to perceive them correctly, and to distinguish one from another.

1/ Gray, op. cit., p.32

Monroe[1] found in a study of children who had reading difficulties, that a lack of discrimination of certain sounds may lead to confusion of words which in turn affect speech and reading. She states:

> Lack of precision in the discrimination of the temporal sequence of sounds may impede progress in reading. The difficulty in discrimination of sequence of sounds may result from the inability to discriminate the separate sounds of the pattern. The child who cannot tell the difference between the separate sounds of the words cannot very well distingwish which sound comes first. The difficulty may be due to poor retention of auditory patterns so that the patterns cannot be held in mind long enough for temporal analysis. The child has difficulty in applying phonics as a method of word recognition. He may be able to give separate sounds for each of the letters composing a word but cannot blend the sounds to get the complete word.[2]

Studies of the correlation between phonetic ability and reading attainment by Tiffin and McKinnis[3] in grades five to eight inclusive, and by Rogers[4] at the

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1/ Marion Monroe, Children Who Cannot Read, (Chicago: University of Chicago Press, 1932)

2/ Ibid., p. 107

3/ Joseph Tiffin and Mary McKinnis, "Phonic Ability: Its Measurement and Relation to Reading Ability", School and Society, 51:190-192, February, 1940.

4/ M.V. Rogers, "Test of Phonic Ability", Journal of Experimental Education, 6: 381-395, April, 1938

college level, supply convincing evidence of a positive relationship between these two abilities. In the former study the correlations between scores on the phonic test and three tests of silent reading ability varied from .55 to .70. Due to these significant relations, phonic training is advocated.

Other studies by Bond[1], Warnke[2], and Hincks[3] show positive relationships between phonetic ability, auditory discriminations, and reading ability.

Similar Tests

There have been several group tests constructed for various purposes which also test the elements of word analysis.

Carter[4] constructed tests of visual perception, auditory discrimination, and kinesthetic factors. She

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1/ Guy Bond, "The Auditory and Speech Characteristics of Poor Readers", Contributions to Education, No. 657, (Teachers College, Columbia University, 1935).

2/ Evelyn Warnke, "A Diagnostic Study of 25 Cases of Non-Readers", (Master's thesis, University of Minnesota, 1931).

3/ Elizabeth Hincks, "Disability in Reading and Its Relation to Personality", Harvard Monographs in Education, No. 7, (Cambridge: Harvard University Press, 1926).

4/ Bernadette Carter, "Construction Test of Visual Perception, and Discrimination, and Kinaesthetic Factors", (Master's thesis, Boston University, Boston, 1941).

used word configurations as test words to insure a pure test of perception. The visual test consisted of written recall of flashed words, and the auditory test consisted of a phonetic spelling test. The test was constructed to determine the relationship of the elements tested and spelling achievement. She found a correlation of .6385 between visual perception and spelling, and a correlation of .5725 between auditory perception and spelling. She concluded that auditory and visual factors are most important in discriminating between very poor and very good spellers.

Brooke[1/] constructed a test to compare recognition and recall of word elements as methods of measuring visual and auditory perception in spelling. She used single element words, two element words, and three element words. In the visual and auditory recognition test, the pupil was required to pick out the key word from among similar words, and in the visual recall, he was asked to reproduce all of a flashed word that he could remember. In the auditory recall test, the pupil was to reproduce words which were pronounced by the examiner. If the word elements were spelled phonetically they were considered to

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1/ Barbara Brooke, "Comparison of Recogniton and Recall of Word Elements As Methods of Measuring Visual and Auditory Perception in Spelling" (Master's thesis, Boston University, Boston, 1947).

be correct. The test was administered to one hundred and eighty fourth, fifth, and sixth graders. In the analysis of results, the recall test was found to be superior to the recognition test in visual and auditory perception. There was no pattern of errors in the recognition tests, but in the recall tests, the one part configurations had more errors on the right, the two part configurations had more errors on the second part, and the three part configurations had more errors on the first and second parts than on the second and third parts, and more errors on the first and third parts than on both the first and second parts and second and third parts together.

Monroe[1], Murphy[2], and Gates[3] have tests on the primary level which test auditory and visual discrimination in relation to reading readiness.

Monroe tests middle sounds. She concludes from her test, that if the children cannot distinguish between

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1/ Marion Monroe, Reading Aptitude Tests, (New York: Houghton-Mifflin Company, 1935).

2/ Helen A. Murphy, "Group Test for Auditory Discrimination" (Unpublished, Boston University, Boston, 1941).

3/ Arthur I. Gates, Gates Reading Readiness Test, (New York: Bureau of Publications, Teachers College, Columbia University, 1939).

middle sounds on the test, then they can't apply auditory sounds, or recognize the visual symbol for the sounds.

Murphy[1] tests initial consonants, initial blends, final consonants, final sounds, and rhymes. Biggy[2] administered Murphy's test in 1946 to two hundred and thirty-seven pupils in Grade I in order to establish an order of difficulty of the elements tested. The order for the beginning consonants was g,r,h,s,p,j,n,t,l,m,v,w from easiest to hardest. The order for the intial blends was ch,sp,tr,st,sh, and for the final consonants was y,s, t,k,l,n,g,p,d. The order of the rhymes from easiest to hardest was ing, an, un, and at.

Smart[3] constructed a diagnostic reading readiness test which was administered individually to one hundred and three first graders. She found a correlation of .68 between the visual perception test and a standardized word recognition test, a correlation of .60 between the auditory perception test and the standardized test, and a correlation of .55 between the combined auditory

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1/ Murphy, op.,cit.

2/ M. Virginia Biggy, "The Establishment of a Relative Order of Difficulty of Word Elements in Auditory Discrimination" (Master's thesis, Boston University, Boston, 1946).

3/ Alice Smart, "Diagnostic Reading Readiness Test", (Master's thesis, Boston University, Boston, 1941).

and visual scores and the standardized test. In the general conclusions, she found that naming initial and final letters and blends from the sound is more difficult than reproducing the sounds for the letters and blends.

Hill[1] made a study of the persistence of perceptual functions which are related to related to reading and spelling. She wished to determine whether weaknesses in visual and auditory perception carry through from primary grades to the intermediate grades. She administered several standardized tests, and constructed some of her own. In her visual discrimination test, the children picked out a flashed word from among several words, and in the auditory discrimination test, the children picked out a pronounced word from similar written words. These were administered to the fifth grade. She concluded that weaknesses do not persist through the intermediate grades. Of interest here, however, is the position of errors that she found in an item analysis of her tests. It was found that more errors in visual and auditory perception occur at the middle and end of a word rather than at the beginning, and of these, more occur at the middle than at

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1/ Barbara Hill, "The Persistence of Perceptual Functions Related to Reading and Spelling", (Master's thesis, Boston University, Boston, 1943).

the end of the words. This agrees with the findings of Tinker and Goodenough[1], Meek[2], and Herbert[3].

Restatement of Problem

In view of the forgoing research, the purpose of this study is to construct a diagnostic group word analysis test for grades four, five, and six. It is hoped to determine from the results of this test, the elements of word analysis that the population tested lacks. It is then hoped to establish a frequency and position of errors, and also to determine an existence of any particular pattern of error.

1/ Miles A. Tinker and Florence L. Goodenough, "Mirror Reading As A Method of Analyzing Factors Involved in Word Perception", Journal of Educational Psychology, 22: 493-502, October, 1931

2/ Lois Meek, "A Study of Learning and Retention in Young Children", Contributions to Education, No. 164, (New York: Teachers College, Columbia University, 1925).

3/ Dudley Herbert, "Word Perception in the Upper Grades", (Master's thesis, Boston University, Boston, 1939).

CHAPTER II

PURPOSES AND PROCEDURES OF STUDY

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Purpose

The purpose of this study is to construct a diagnostic group test of word analysis for grades four, five, and six. It is hoped to determine by this test the elements of word analysis that the population tested lacks, and therefore establish a frequency and order of difficulty of these elements.

Word analysis ability is defined as the ability to apply certain methods of attack upon meeting new words. The methods discussed in this study are visual and auditory.

Construction of Tests

The complete test is composed of four parts. The first two parts are auditory, and the second two parts are visual. The entire test requires approximately forty minutes to administer. A complete set of directions and answer booklet can be found in the appendix.

In order to fully explain each part of the test, and to clarify the constituents of each part, each part will be dealt with separately.

Part I

The first part of the test consists of forty items which measure the a ility to hear and identify sounds in spoken words. These items test thirteen ending consonants, and twenty-seven ending two-letter blends, which are a combination of those listed by Durrell[1] and Cordts[2].

The key words chosen for this part were taken from Thorndike[3]. The words used appear at least once per every 4,000,000 words but not as often as once per every 1,000,000 words. The words lullaby, gleby, whelk, and pelf, were taken from Walker[4] because words using the blends that they contain were unavailable in the Thorndike list.

1/ Donald D. Durrell, Helen Sullivan, and Helen Murphy, Building Word Power (Yonkers-on-Hudson, New York: World Book Company, 1945)

2/ Anna Cordts, "An Analysis and Classification of the Sounds of English Words in a Primary Reading Vocabulary", (Master's thesis, The University of Iowa, 1925)

3/ Edward L. Thorndike and Irving Lorge, The Teachers' Word Book of 30,000 Words (New York: Teachers College, Columbia University, 1944)

4/ John Walker, The Rhyming Dictionary (New York: E.P. Dutton and Company, 1904)

The words chosen were then compared with the Durrell-Sullivan Intermediate Reading Vocabulary[1/], and those which appeared on this list were omitted and others substituted. Care was taken to choose words that were felt would be beyond the children's spelling vocabulary, and would therefore be a true test of auditory perception.

Care was also taken to choose key words which had different vowel combinations preceding the letters tested. This was done so that the children would have an opportunity to hear the letters and blends in combination with different vowel sounds.

The following words are samples of the ones used for Part I.

1. behoof
   draff

2. kaolin
   banyan

3. patrimonial
   residual

4. basalt
   moult

The children listen to the two words that the examiner pronounces, and then circle the letter, from among a choice of four letters, with which the two pronounced words end. The four letters used in each choice are

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1/ Donald D. Durrell, Improvement of Basic Reading Abilities (Yonkers-on-Hudson, New York: World Book Company, 1940)

similar in form and sound.

In the case of the blends, the children listen to the two words that are pronounced for each item, and then circle the blend, from among a choice of four blends, with which the key words end. The choices are blends that are similar in form and sound.

The first item is done as a sample item, and the examiner checks to see that all children understand what is expected.

Part II

The second part of the test consists of twenty items which measure the ability to discriminate between spoken words and similar visual words. Of these twenty items, the first is a sample which is done by the class together.

The key words and choices are three syllable word configurations using prefixes, suffixes, and word roots taken from those listed by Durrell[1/]. Coined words were used as it was felt that they would test the pure function of word analysis when they are not known words within a child's spelling vocabulary.

1/ Ibid.

The following words are samples of the words used for Part II.

1. fortainment
2. conportly
3. lafortine
4. dependful

The children draw a circle around the word that sounds like the one that the examiner reads. There is a choice of four similar words. In each word configuration a different element has been changed, so that each part of the key configuration will appear three times.

Part III

Part III consists of twenty items of which the first is a sample done by the class together.. These items test visual discrimination of beginnings, middles, and endings of words by means of identifying a flashed word from among similar words.

The key words and choices are three syllable word configurations composed of prefixes, suffixes, and word roots taken from those listed by Durrell[1/]. A few of the prefixes in the choices are those formed by the writer as a means of convenience in building similar word choices. Word configurations were used as they are felt to be a better test of pure visual analysis then words that are

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1/ Ibid.

in the children's spelling vocabulary.

The children look at a word on a flashed card, and then circle the word that they see on the card from among a choice of four similar words on their answer sheets.

In the choices, one element of each word has been changed while the other elements of the word remain constant. Therefore each part of the key word will appear three times.

The flash cards are twelve inches long and three inches wide. The words on the cards are one and one-half inches high, and are lettered by hand in manuscript print.

The following words are samples of those used on Part III.

1. forlectful
2. behabling
3. gaporten
4. katurbment

Part IV

Part IV is composed of twenty items which test the written recall of flashed words. There is no sample in this part.

The words are three syllable words which were taken from Thorndike[1/]. The words appear at least once per

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1/ Thorndike, op. cit.

every 4,000,000 words but not as often as once per every 1,000,000 words. The words were checked with the Durrell-Sullivan Intermediate Reading Vocabulary[1/]. Those words appearing on this list were omitted and others were substituted.

These words were chosen as it was felt that they would be unknown to the children and therefore would be a better test of pure recall than known words would be.

The children look at the flashed card and write as much of the word as they can remember.

The cards are twelve inches long and three inches wide. The words are one and one-half inches high, and lettered by hand in manuscript print.

The following words are samples of those used on Part IV.

1. allocate
2. environ
3. defaulter
4. interfuse

Administration of the Test

The test constructed was administered during the period from March 9 to March 17, 1950.

1/ Donald D. Durrell, Improvement of Basic Reading Abilities (Yonkers-on-Hudson, New York: World Book Company, 1940)

The general directions require that the testing room be at a comfortable temperature, and with adequate lighting. It is also specified that all children have a good view of the examiner.

The following directions were given to the pupils preceding each part of the test. They also include the time directions for each part of the test.

Part I

"You are going to take a test today. When you get your booklets you are to fill in the first five lines. Do not open your booklets until I tell you to. (Give three minutes). Has everyone filled in the first five lines? Now open your booklets to Page 1."

"I am going to say two words and you are to circle the letter that each word ends with. We will do the first one together. Look at Number 1 on your paper. See the box next to 1 that has the letters in it? I will say two words and you are to circle the letter in Box 1 that the words end with. Ready. (Pronounce the words next to 1). You should have circled the "f". How many circled "f"? Good. Now we will do the rest of the test. Listen carefully and be sure to circle the letter that the words I say end with." (Pronounce each word only once. Pause ten seconds between items).

Number 14 is the beginning of the items testing ending blends. "Now you are to circle the letters that each word I read ends with. Listen carefully. Here is Number 14."

Part II

"Turn to Part II on Page 3. I am going to read one word, and you are to draw a circle around the word that sounds like the one I read. We'll do the first one together. Look at the box next to 1. There are four words in the box and you are to circle the one that I read. Listen. (Read Number 1). Did you circle the second word? Good. You are to do the others I read the same way. Ready. Listen." (Pronounce each word only once. Pause ten seconds between each item).

Part III

"Turn to Part III on Page 5. Now I am going to show you a card, and then I'm going to take it away. You are to look at the card and after I take it away circle the word that you saw on the card. We'll do the first one together. Look at the card I show you, and circle the word that you saw in Box 1. (Flash Card 1 for three seconds). Did you circle the last word? That is correct. Ready now for Number 2." (Flash each card for three seconds, and pause five seconds between cards).

Part IV

"Now, I am going to show you some cards that also have words on them. This time when I take each card away you are to write the word that you saw on your paper. The first word will be next to Number 21. Watch carefully. Ready, here is the first word." (Flash each card for three seconds, and pause ten seconds between cards).

Scoring

The score on Part I is the number correct, including the sample "f". The highest score will therefore be forty.

The score on Part II is the total number correct, including the sample. The highest score will therefore be twenty.

The score on Part III is the total number correct, including the sample. The highest score will therefore be twenty.

The score on Part IV is the number of syllables correctly reproduced. As there are twenty words of three syllables each, there is a possibility of a correct total of sixty.

All scoring was done by the writer.

Population

The testing was all administered in the William Carter and Stephen Palmer Schools in Needham, Massachusetts. Ninety-two fourth graders, eighty-four fifth graders, and one hundred and five sixth graders, making a total of two hundred and eighty-two pupils were tested.

The children in these schools come from families on a slightly higher than average socio-economic level.

Tabulation of Data

In tabulating the data, record was kept of the chronological age of each pupil in years and months calculated to March 1, 1950. Tabulation was also made of the mental age and intelligence quotient of each pupil as obtained on the Kuhlmann-Anderson Intelligence Test[1] which was administered to grade four in January, 1949; to grade five in January, 1948; and to grade six in January, 1950. For convenience of comparison, the mental ages for grade four were advanced one year, and the mental ages for grade five were advanced two years. These advancements were computed in relation to the chronological ages and intelligence quotients.

1/ Published by Educational Test Bureau, Minneapolis

Spelling achievement and reading achievement scores were tabulated for each pupil tested. These scores were computed from the Iowa Every-Pupil Skills Tests[1/] which were administered to all grades in September of 1949.

Record was also kept, in the case of each pupil, of the total number of items perceived correctly in each part of the test, of the errors made on Part I of the test, and of the frequency and position of errors made on the last three parts of the test. In Parts II and III, tabulation was made, in the three part configurations, as to whether the choice made was the choice containing an error in the first part, second part, or third part of the word. Likewise, in Part IV, the recall test, a record was kept of the position of errors in the reproduction of each configuration.

1/ Published by Houghton-Mifflin Company, Boston

CHAPTER III

ANALYSIS OF DATA

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The purpose of this study was to construct a diagnostic group word analysis test for grades four, five, and six. It was hoped to determine by this test, the elements of word analysis that the population tested lacked. It was then hoped to establish a frequency and position of errors on each part of the test, and also to determine an existence of any particular pattern of error.

Two hundred and eighty-two fourth, fifth, and sixth grade pupils in Needham, Massachusetts were given the test constructed by the writer. The pupils' partial and total scores were tabulated for each grade. The ranges, means, and medians were computed for each distribution of scores. The errors on each part of the test were analyzed and grouped.

The chronological age, mental age, intelligence quotient, reading grade, and spelling grade of each pupil were also tabulated for each grade. Distributions were made for this data, and ranges, means, and medians computed for each distribution.

Table I shows the sex distribution of grades four, five, and six.

TABLE I

SEX DISTRIBUTION OF GRADES FOUR, FIVE, AND SIX

Grade	Boys	Girls	Total
4	47	45	92
5	47	37	84
6	41	64	105
Total	135	147	282

Table II is a grouped frequency distribution of the chronological ages of grades four, five, and six. The chronological ages are computed to March 1, 1950. They appear in terms of years and months.

TABLE II

CHRONOLOGICAL AGE DISTRIBUTION OF GRADES FOUR, FIVE, AND SIX

C. A.	Grade Four	Grade Five	Grade Six
13.10-14.0	0	0	1
13.7-13.9	0	0	0
13.4-13.6	0	0	1
13.1-13.3	0	0	0
12.10-13.0	0	0	2
12.7-12.9	0	0	5
12.4-12.6	1	0	4
12.1-12.3	1	1	10
11.10-12.0	0	1	17
11.7-11.9	0	3	26
11.4-11.6	1	1	27
11.1-11.3	1	11	7
10.10-11.0	1	15	3
10.7-10.9	4	16	1
10.4-10.6	4	23	1
10.1-10.3	11	7	0
9.10-10.0	24	5	0
9.7-9.9	14	0	0
9.4-9.6	23	1	0
9.1-9.3	5	0	0
8.10-9.0	2	0	0
Total	92	84	105

Table II shows that the range of chronological age for grade four extends from eight years and ten months to twelve years and six months, for grade five from nine years and four months to twelve years and three months, and for grade six from ten years and four months to fourteen years.

Table III shows the mean and median chronological ages for grades four, five, and six. The chronological ages were computed to March 1, 1950 for each grade. They are expressed in terms of years and months.

TABLE III

CHRONOLOGICAL AGE OF GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	9.5	10.0
5	84	10.10	10.8
6	105	11.9	11.9

Table IV shows the grouped frequency distribution of mental ages for grades four, five, and six. The mental ages were computed from the results of the Kuhlmann-

Anderson Intelligence Test[1/] which was administered to grade four in January of 1949, grade five in January of 1948, and grade six in January of 1950. In order to compare the mental ages of each grade, it was necessary to advance the mental ages for grade four, one year, and for grade five, two years. The advancements were computed in relation to the chronological ages and intelligence quotients. The mental ages are expressed in terms of years and months.

1/ Published by Education Test Bureau, Minneapolis

TABLE IV

MENTAL AGE DISTRIBUTION FOR GRADES FOUR, FIVE, AND SIX

M. A.	Grade Four	Grade Five	Grade Six
15.3-15.7	0	0	1
14.10-15.2	0	0	1
14.5-14.9	0	0	6
14.0-14.4	0	0	5
13.7-13.11	1	1	12
13.2-13.6	0	0	12
12.9-13.1	0	0	19
12.4-12.8	1	3	12
11.11-12.3	0	7	13
11.6-11.10	2	15	9
11.1-11.5	3	13	4
10.8-11.0	6	16	4
10.3-10.7	26	16	4
9.10-10.2	20	6	1
9.5-9.9	12	3	1
9.0-9.4	16	2	0
8.7-8.11	4	1	1
8.2-8.6	0	0	0
7.9-8.1	1	1	0
Total	92	84	105

The range of the mental ages for grade four as shown in Table IV extends from seven years and nine months to thirteen years and eleven months. The range for grade five is from seven years and nine months to thirteen years and eleven months, and the range for grade six extends from eight years and seven months to fifteen years and seven months. The curve of the distribution for each grade appears to be normal.

Table V shows the mean and median mental ages for grades four, five, and six as measured by the Kuhlmann-Anderson Intelligence Test[1/]. The mental ages are expressed in terms of years and months.

TABLE V

MEAN AND MEDIAN MENTAL AGE OF GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	10.1	10.1
5	84	10.10	11.0
6	105	12.8	12.10

1/Published by Education Test Bureau, Minneapolis

Table V shows that the mean mental age for grade four is ten years and one month, and the median is ten years and one month. The mean mental age for grade five is ten years and ten months, and the median is eleven years. The mean mental age for grade six is twelve years and eight months, and the median is twelve years and ten months. These figures would seem to indicate that the population tested is slightly above normal in mental age.

Table VI shows the grouped frequency distribution of intelligence quotients for the pupils in grades four, five, and six. These scores were computed from the results of the Kuhlmann-Anderson Intelligence Test[1] which was administered to grades four, five, and six in January of 1949, 1948, and 1950 respectively.

1/ Ibid.

TABLE VI

I. Q. DISTRIBUTION OF GRADES
FOUR, FIVE, AND SIX

I. Q.	Grade Four	Grade Five	Grade Six
143-147	1	0	0
138-142	0	0	0
133-137	0	1	2
128-132	1	0	7
123-127	0	0	7
118-122	1	2	11
113-117	8	11	25
108-112	21	17	13
103-107	26	27	20
98-102	17	10	6
93-97	11	7	5
88-92	5	5	5
83-87	1	2	1
78-82	0	2	2
73-77	0	0	0
68-72	0	0	1
Total	92	84	105

The distributions in Table VI show that the range of intelligence quotients for grade four is from 83 to 147, for grade five is from 78 to 137, and for grade six is from 68 to 137. The distribution for each grade seems to approximate a normal curve.

Table VII shows the mean and median intelligence quotients for grades four, five, and six. These measures were computed from the distributions shown in Table VI.

TABLE VII

MEAN AND MEDIAN I. Q. FOR GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	105	105
5	84	105	106
6	105	111	113

Table VII indicates that the mean I.Q. was 105 for grade four, 105 for grade five, and 111 for grade six. The median I.Q. was 105 for grade four, 106 for grade five, and 113 for grade six. Since the average I.Q. is considered to be 100, it would seem to be indicated from the mean and median scores of the groups

tested, that the population is above average in intelligence. Grade four and grade five are nearly equal, and grade six is higher than the other grades.

Table VIII shows the grouped frequency distribution of reading scores obtained on the Iowa Every-Pupil Tests of Basic Skills[1/] by grades four, five, and six. These tests were administered in September of 1949 to all three grades. The scores are expressed in terms of grade equivalents.

1/ Published by Houghton-Mifflin Company, Boston

TABLE VIII

READING ACHIEVEMENT FOR GRADES
FOUR, FIVE, AND SIX

Score	Grade Four	Grade Five	Grade Six
10.8-11.2	0	0	2
10.3-10.7	0	0	3
9.8-10.2	0	0	1
9.3-9.7	0	1	6
8.8-9.2	0	1	3
8.3-8.7	0	1	5
7.8-8.2	2	5	10
7.3-7.7	1	6	10
6.8-7.2	5	9	11
6.3-6.7	4	6	16
5.8-6.2	5	9	10
5.3-5.7	14	10	5
4.8-5.2	12	13	9
4.3-4.7	7	15	2
3.8-4.2	12	2	7
3.3-3.7	8	2	4
2.8-3.2	9	2	1
2.3-2.7	10	2	0
1.8-2.2	3	0	0
Total	92	84	105

Table VIII shows that the range of reading scores for grade four extends from 1.8 to 8.2. The range for grade five extends from 2.3 to 9.7, and the range for grade six extends from 2.8 to 11.2. The curve for each distribution seems to be normal.

Table IX shows the mean and median grade equivalent in reading achievement for grades four, five, and six.

TABLE IX

MEAN AND MEDIAN READING ACHIEVEMENT FOR GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	4.5	4.9
5	84	5.7	5.6
6	105	6.8	6.8

Table IX indicates that the mean grade equivalent in reading achievement is 4.5 for grade four, 5.7 for grade five, and 6.8 for grade six. The median for grade four is 4.9, for grade five is 5.6, and for grade six is 6.8. The mean in each grade is at least five-tenths grade above the norm for that grade. This would suggest

that the population is better than average in reading achievement.

Table X shows the grouped frequency distribution of spelling grades for grades four, five, and six. These grades were obtained on the Iowa Every-Pupil Tests of Basic Skills[1] which were administered in September of 1949 to all three grades. The scores are expressed in terms of grade equivalent.

1/ Ibid.

TABLE X

SPELLING ACHIEVEMENT FOR GRADES FOUR, FIVE, AND SIX

Scores	Grade Four	Grade Five	Grade Six
10.3-10.7	0	0	1
9.8-10.2	0	0	0
9.3-9.7	0	0	4
8.8-9.2	1	0	3
8.3-8.7	0	0	3
7.8-8.2	0	0	6
7.3-7.7	0	7	13
6.8-7.2	9	9	10
6.3-6.7	2	5	15
5.8-6.2	4	10	11
5.3-5.7	3	11	10
4.8-5.2	10	12	8
4.3-4.7	14	9	12
3.8-4.2	13	7	2
3.3-3.7	7	9	3
2.8-3.2	19	3	4
2.3-2.7	7	2	0
1.8-2.2	1	0	0
1.3-1.7	2	0	0
Total	92	84	105

Table X shows that the range of spelling scores for grade four extends from 1.3 to 9.2. The range for grade five extends from 2.3 to 7.7, and the range for grade six extends from 2.8 to 10.7. The curves of the distribution for each grade appear to be normal.

Table XI shows the mean and median spelling scores of grades four, five, and six. They are expressed in terms of grade equivalent.

TABLE XI

MEAN AND MEDIAN SPELLING SCORES FOR GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	4.3	4.2
5	84	5.3	5.3
6	105	6.3	7.2

Table XI shows that the means and medians of the spelling achievement for grades four, five, and six are two and three months above grade level. This would seem to indicate that the population is slightly above average in spelling achievement.

Table XII shows the grouped frequency distribution of scores obtained by grades four, five, and six on Part I of the test constructed in this study. Part I tests the ability to hear and identify sounds in spoken words.

For convenience and clarity, the test constructed in this study will henceforth be referred to as the "word analysis test".

TABLE XII

DISTRIBUTION OF SCORES OBTAINED ON PART I OF WORD ANALYSIS TEST BY GRADES FOUR, FIVE, AND SIX

38-40	52	42	69
35-37	21	27	19
32-34	10	9	8
29-31	5	4	6
26-28	1	1	1
23-25	1	0	1
20-22	1	0	0
17-19	1	0	0
14-16	0	0	1
11-13	0	1	0
Total	92	84	105

Table XII shows that the range of scores on Part I of the Word Analysis Test extends from 17 to 40 for grade four, from 11 to 40 for grade five, and from 14 to 40 for grade six. It is obvious that the

distribution for each grade is skewed to the left.

Table XIII shows the means and medians for each grade tested on Part I of the Word Analysis Test. This part of the test is a measure of the ability to hear and identify sounds in spoken words.

TABLE XIII

MEAN AND MEDIAN SCORES ON PART I OF WORD ANALYSIS TEST FOR GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	37	38
5	84	37	36
6	105	37	38

Table XII shows that on Part I, 37 was the mean score for all grades tested. The table also shows that 38 was the median score for grade four, 36 the median score for grade five, and 38 the median score for grade six. There is no significant difference between mean or median scores for each grade. In view of the fact that the highest possible score on Part I is 40, it would seem that the distribution of scores for each grade is skewed to the left.

Table XIV shows a frequency distribution of the scores obtained on Part II of the Word Analysis Test by grades four, five, and six. Part II tests the ability to discriminate between spoken words and similar written words.

TABLE XIV

DISTRIBUTION OF SCORES OBTAINED ON PART II OF WORD ANALYSIS TEST BY GRADES FOUR, FIVE, AND SIX

Scores	Grade Four	Grade Five	Grade Six
20	11	11	15
19	15	11	26
18	14	18	28
17	15	10	15
16	7	10	5
15	8	9	5
14	4	6	4
13	4	3	2
12	2	2	1
11	0	3	1
10	4	1	3
9	7	0	0
8	1	0	0
Total	92	84	105

Table XIV shows that the range of scores obtained on Part II of the Word Analysis Test by grade four extends from 8 to 20. The range for grade five extends from 10 to 20, and the range for grade six extends from 10 to 20. It is obvious that the distributions for each grade are skewed to the left.

Table XV shows the means and medians of the scores obtained on Part II of the Word Analysis Test by grades four, five, and six. Part II tests the ability to identify a spoken word from among several similar written words.

TABLE XV

MEAN AND MEDIAN SCORES ON PART II OF WORD ANALYSIS TEST FOR GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	17	18
5	84	17	18
6	105	18	19

Table XV shows that the means and medians for the grades tested are very high when the highest possible score is 20. This would show that the distribution of scores for each grade are skewed to the left. The means and medians in each grade show no significant differences.

Table XVI shows the frequency distribution of scores obtained on Part III of the Word Analysis Test by grades four, five, and six. Part III measures the ability to identify a flashed word from among similar written words.

TABLE XVI

DISTRIBUTION OF SCORES OBTAINED ON PART III OF WORD ANALYSIS TEST BY GRADES FOUR, FIVE, AND SIX

Score	Grade Four	Grade Five	Grade Six
20	21	21	30
19	14	16	27
18	12	10	9
17	5	10	10
16	4	2	9
15	3	7	5
14	6	4	6
13	3	6	3
12	10	2	1
11	3	1	2
10	2	1	1
9	3	2	0
8	5	0	0
7	0	0	0
6	1	1	1
5	0	0	0
4	0	1	1
Total	92	84	105

Table XVI shows the range of scores for grade four on Part III of the Word Analysis Test to extend from 6 to 20. The range of scores for grade five extends from 4 to 20, and the range of scores for grade six extends from 4 to 20. It can be seen that the distribution for each grade is skewed to the left.

Table XVII shows the means and medians of grades four, five, and six on Part III of the Word Analysis Test. Part III tests the ability to identify a flashed word from among similar written words.

TABLE XVII

MEANS AND MEDIANS OF SCORES ON PART III OF WORD ANALYSIS TEST FOR GRADES FOUR, FIVE, AND SIX

Grades	No.	Mean	Median
4	92	16	18
5	84	17	19
6	105	18	19

Table XVII shows that the means and medians obtained on Part III of the Word Analysis Test by grades four, five, and six are very high. The means and medians would indicate that the distribution of scores for each grade are skewed to the left. There is no significant difference between the mean scores of each grade.

Table XVIII shows the grouped frequency distribution of scores obtained on Part IV of the Word Analysis Test by grades four, five, and six. Part IV tests the ability to reproduce a flashed word.

TABLE XVIII

DISTRIBUTION OF SCORES OBTAINED ON PART IV OF WORD ANALYSIS TEST BY GRADES FOUR, FIVE, AND SIX

58-60	0	0	2
55-57	2	7	13
52-54	3	5	9
49-51	9	4	13
46-48	5	4	14
43-45	6	5	13
40-42	7	9	7
37-39	6	8	9
34-36	12	12	8
31-33	6	8	5
28-30	4	4	4
25-27	6	8	2
22-24	11	3	4
19-21	6	4	0
16-18	5	2	1
13-15	1	0	0
10-12	2	0	0
7-9	1	0	1
4-6	0	0	0
1-3	0	1	0
Total	92	84	105

Table XVIII shows that the range of scores obtained on Part IV of the Word Analysis Test by grade four extends from 7 to 57. The range of scores for grade five extends from 1 to 57, and the range of scores for grade six extends from 7 to 60. The curve of the distribution for grades four and five approximates a normal curve. The curve of the distribution for grade six is slightly skewed to the left.

Table XIX shows the mean and median scores on Part IV of the Word Analysis Test for grades four, five, and six. Part IV tests the ability to reproduce a flashed word.

TABLE XIX

MEAN AND MEDIAN SCORES ON PART IV OF WORD ANALYSIS TEST FOR GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	34	35
5	84	37	37
6	105	43	46

Table XIX shows that the means and medians for grades four, five, and six on Part IV of the Word Analysis Test are slightly above the fifthieth percentile which is 30. Grade four is 4 above 30, grade five is 7 above 30, and grade six is 13 above 30, in mean. Grade four is 5 above 30, grade five is 7 above 30, and grade six is 16 above 30, in median. This test may be sensitive to the population tested as indicated by these means and medians.

Table XX shows the grouped frequency distribution of scores obtained on the total Word Analysis Test by grades four, five, and six.

TABLE XX

DISTRIBUTION OF TOTAL SCORES OBTAINED ON THE WORD ANALYSIS TEST BY GRADES FOUR, FIVE, SIX

Scores	Grade Four	Grade Five	Grade Six
138-142	0	1	1
133-137	3	5	14
128-132	7	7	10
123-127	8	7	20
118-122	7	6	15
113-117	10	11	8
108-112	11	12	14
103-107	2	8	4
98-102	5	5	5
93-97	10	5	5
88-92	7	6	0
83-87	5	3	1
78-82	5	5	1
73-77	4	2	4
68-72	3	0	1
63-67	1	0	0
58-62	2	0	1
53-57	0	0	0
48-52	1	0	1
43-47	1	0	0
38-42	0	0	0
33-37	0	1	0
Total	92	84	105

Table XX shows that the range of scores obtained on the total Word Analysis Test by grade four extends from 43 to 137. The range for grade five extends from 33 to 140, and the range for grade six extends from 48 to 140. The distribution for each grade is skewed to the left.

Table XXI shows the means and medians of the scores obtained on the total Word Analysis Test by grades four, five, and six.

TABLE XXI

MEAN AND MEDIAN SCORES ON TOTAL WORD ANALYSIS TEST FOR GRADES FOUR, FIVE, AND SIX

Grade	No.	Mean	Median
4	92	102	108
5	84	108	111
6	105	116	121

Table XXI shows that there is a difference of 6 in the means of grades four and five, a difference of 6 in the means of grades five and six, and a difference of 12 in the means of grades four and six. There is a

difference of 3 in the medians of grades four and five, a difference of 10 in the medians of grades five and six, and a difference of 13 in the medians of grades four and six. There was a possible score of 140 on the total test. In view of the high means and medians for each grade, it would seem that the total test is not a good measure of the population tested.

Table XXII shows the ending consonants as tested in Part I of the Word Analysis Test arranged in descending order of errors as made by grades four, five, and six. Part I tested the ability to hear and identify sounds in spoken words.

TABLE XXII

ENDING CONSONANTS ON PART I OF WORD ANALYSIS TEST IN ORDER OF ERROR MADE BY GRADES FOUR, FIVE, AND SIX

GRADE FOUR		GRADE FIVE		GRADE SIX	
Letter	Errors	Letter	Errors	Letter	Errors
b	15	y	11	b	13
y	11	t	3	y	11
l	7	s	3	r	10
d	7	b	3	d	6
m	4	m	2	p	6
r	4	d	2	l	4
n	4	p	2	m	4
s	4	r	2	n	3
p	3	l	1	t	1
t	0	k	1	k	1
k	0	n	1	g	1
g	0	f	0	f	0
f	0	g	0	s	0
Total	59		31		60

Table XXIII shows the descending order of errors made on the ending blends by grades four, five, and six. The ending blends are tested in Part I of the Word Analysis Test. Part I tests the ability to hear and identify sounds in spoken words.

TABLE XXIII

ENDING BLENDS ON PART I OF WORD ANALYSIS TEST IN ORDER OF ERROR MADE BY GRADES FOUR, FIVE, SIX

GRADE FOUR		GRADE FIVE		GRADE SIX	
Blends	Errors	Blends	Errors	Blends	Errors
nd	28	sk	36	nd	27
sk	26	nd	24	sk	24
lf	17	ch	19	ch	16
pt	14	nk	18	sh	15
sh	13	ng	18	lf	15
nk	13	lf	17	nk	13
lm	13	lm	12	se	10
lt	11	al	11	ct	10
lp	11	ct	10	th	9
ct	11	sh	9	nt	9
ng	11	nt	9	ng	9
se	11	mp	9	lm	8
ft	8	pt	8	rk	8
ch	8	se	7	mp	7
on	8	th	6	pt	7
mp	7	ty	5	ty	7
ld	7	lp	5	on	5
al	6	rk	5	ck	5
nt	5	by	5	ld	5
st	5	lt	4	lt	5
th	5	st	3	lp	4
lk	4	ld	3	ly	3
ly	4	on	3	by	3
by	3	lk	3	st	3
ty	3	ck	2	ft	2
rk	2	ly	1	lk	2
ck	2	ft	0	al	1

Table XXIV shows the number of errors made on each ending consonant by each grade. The ending consonants are in Part I of the Word Analysis Test which tests the ability to hear and identify sounds in spoken words.

TABLE XXIV

ERRORS ON ENDING CONSONANTS OF PART I OF WORD ANALYSIS TEST MADE BY GRADES FOUR, FIVE, SIX

Letter	Grade Four	Grade Five	Grade Six
f	0	0	0
g	0	0	1
b	15	3	13
l	7	1	4
m	4	2	4
d	7	2	6
p	3	2	6
r	4	2	10
k	0	1	1
n	4	1	3
s	4	3	0
t	0	3	1
y	11	11	11
Total	59	31	60

Table XXV shows the number of errors made by grades four, five, and six on the ending blends which are tested in Part I of the Word Analysis Test. Part I measures the ability to hear and identify sounds in spoken words.

TABLE XXV

ERRORS MADE ON ENDING BLENDS IN PART I OF WORD ANALYSIS TEST BY GRADES FOUR, FIVE, AND SIX

Blends	Grade Four	Grade Five	Grade Six
sh	13	9	15
ch	8	19	16
al	6	11	1
on	8	3	5
ck	2	2	5
ly	4	1	3
nk	13	18	13
lk	4	3	2
by	3	5	3
nt	5	9	9
rk	2	5	8
se	11	7	10
ty	3	5	7
ng	11	18	9
nd	28	24	27
ft	8	0	2
pt	14	8	7
th	5	6	9
ld	7	3	5
lt	11	4	5
lp	11	5	4
lf	17	17	15
lm	13	12	8
ct	11	10	10
mp	7	9	7
st	5	3	3
sk	26	36	24

Table XXVI shows the number of errors that were made by grades four, five, and six on each part of the word configurations in Part II of the Word Analysis Test. Part II measures the ability to identify a spoken word from among similar written words.

TABLE XXVI

ERRORS MADE ON WORD CONFIGURATIONS
OF PART II OF WORD ANALYSIS TEST
BY GRADES FOUR, FIVE, AND SIX

Grade	Beginning	Middle	Ending	Omissions	Total
4	194	103	55	1	353
5	165	73	32	2	272
6	174	56	27	0	257

Table XXVI shows that each grade was consistent in making the greatest number of errors on the beginning part of the word configurations, the next greatest number of errors on the middle of the words, and the least number of errors on the last part of the words. These results would seem to indicate that the first part of the words in auditory discrimination are the hardest to distinguish.

Table XXVII shows the number of errors made by each grade tested on each element of the word configurations in Part III of the Word Analysis Test. Part III tests the ability to identify a flashed word from among similar written words.

TABLE XXVII

ERRORS MADE ON WORD CONFIGURATIONS OF PART III OF WORD ANALYSIS TEST BY GRADES FOUR, FIVE, AND SIX

Grade	Beginning	Middle	Ending	Omissions	Total
4	75	163	127	10	375
5	65	87	99	11	262
6	60	85	91	23	259

Table XXVII shows that grade four made the greatest number of errors on the middle part of the word configurations, the next greatest number of errors on the last part of the words, and the least number of errors on the first part of the configurations. Grades five, and six made the greatest number of errors on the last part of the words, the next greatest number of errors on the middle part of the words, and the least number of errors on the first part of the words.

Table XXVIII shows the position and frequency of errors made on Part IV of the Word Analysis Test by grades four, five, and six. Part IV tests the ability to reproduce flashed words.

TABLE XXVIII

ERRORS MADE ON WORDS IN PART IV OF WORD ANALYSIS TEST BY GRADES FOUR, FIVE, AND SIX

Grade	Beginning	Middle	Ending	Total
4	353	883	1159	2395
5	258	653	888	1799
6	263	714	798	1775
Total	874	2250	2845	5969

Table XXVIII shows that each grade was consistent in making the greatest number of errors on the last part of the words, the next greatest number of errors on the middle of the words, and the least number of errors on the first part of the words.

CHAPTER IV

SUMMARY AND CONCLUSIONS

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Summary

The purpose of this study was to construct a diagnostic group word analysis test for grades four, five, and six. It was hoped to determine from the results of the test, the elements of word analysis that the population tested lacked. It was then hoped to establish a frequency and position of errors on each part of the test, and also to determine an existence of any particular pattern of error.

Auditory and visual perception and recall tests were constructed and administered to grades four, five, and six in the public schools of Needham, Massachusetts. The testing was administered during the time extending from March 9 to March 17, 1950. Two hundred and eighty-two pupils were tested, of which one hundred and thirty-five were boys, and one hundred and forty-seven were girls. All testing and scoring was done by the writer.

Conclusions

The results from the analysis of the data permit the following conclusions to be drawn in regard to the

purpose of this study as stated in the introduction of this chapter:

1. Part I, which tested auditory perception of sounds within spoken words was found to be too easy for the population tested, as the scores of the distribution of each grade were clustered at the top.
2. Part II, which tested the ability to discriminate between spoken words and similar visual words, was found to be too easy for the population tested, as the scores of the distribution of each grade were clustered at the top.
3. Part III, which tested the ability to identify a flashed word from among similar words, was found to be too easy for the population tested, as the scores of the distribution of each grade were clustered at the top.
4. Part IV, which tested the ability to reproduce a flashed word from recall, was found to be fairly sensitive to the population tested. The distribution of scores for each grade approximated a normal curve.
5. The total test was found to be too easy for the population tested, as the scores of the dis-

tribution of each grade were clustered at the top.

6. An order of difficulty was established for the ending consonants tested in Part I. The order of difficulty for grade four is as follows: b,y,l,d,m,r,n,s,p,t,k,g,f. The order of difficulty for grade five is as follows: y,t,s,b,m, d,p,r,l,k,n,f,g. The order of difficulty for grade six is as follows: b,y,r,d,p,l,m,n,t,k, g,f,s.

7. An order of difficulty was established for the ending blends tested in Part I. The order of difficulty for grade four is as follows: nd,sk, lf,pt,sh,nk,lm,lt,lp,ct,ng,se,ft,ch,on,mp,ld, al,nt,st,th,lk,ly,by,ty,rk,ck. The order of difficulty for grade five is as follows: sk,nd, ch,nk,ng,lf,lm,al,ct,sh,nt,mp,pt,se,th,ty,lp, rk,by,lt,st,ld,on,lk,ck,ly,ft. The order of difficulty for grade six is as follows: nd,sk, ch,sh,lf,nk,se,ct,th,nt,ng,lm,rk,mp,pt,ty,on, ck,ld,lt,lp,ly,by,st,ft,lk,al.

8. The position of errors on Part II which tested auditory discrimination of three part word configurations fell consistently for each grade. The greatest number of errors fell in

the first part of the word, the next greatest number of errors in the middle part of the word, and the least number of errors in the last part of the word.

9. The position of errors in Part III which tested visual discrimination of three part word configurations is as follows. Grade four had the greatest number of errors on the middle part of the word, the next greatest number of errors on the last part of the word, and the least number of errors on the first part of the word. Grades five and six had the greatest number of errors on the last part of the word, the next greatest number of errors on the middle part of the word, and the least number of errors on the first part of the word.

10. The position of errors on Part IV which tested written recall of flashed three syllable words is as follows. Each grade made the greatest number of errors on the last part of the words, the next greatest number of errors on the middle part of the words, and the least number of errors on the first part of the words.

BIBLIOGRAPHY

BIBLIOGRAPHY

Acomb, Allan, "A Study of the Psychological Factors in Reading and Spelling." Master's thesis, Boston University, Boston, 1936.

Anderson, Irving H., "An Evaluation of Some Recent Research in the Psychology of Learning," Harvard Educational Review, 7: 330-39, May, 1937.

Betts, Emmett A., "Inter-relationship of Reading and Spelling," Elementary English Review, 22: 12-23, January, 1945.

_____, The Prevention and Correction of Reading Difficulties, New York: Row, Peterson and Company, 1936.

Biggy, M.Virginia, "The Establishment of a Relative Order of Difficulty of Word Elements in Auditory Discrimination." Master's thesis, Boston University, Boston, 1946.

Bond, Guy, "The Auditory and Speech Characteristics of Poor Readers," Contributions to Education, No. 657, New York: Teachers College, Columbia University, 1935.

Bragdon, Florence D., "The Construction of Exercises for Specific Training in Word Analysis and Recognition in the Fourth Grade," Service Paper, Boston University, Boston, 1949.

Brooke, Barbara A., "Comparison of Recognition and Recall of Word Elements as Methods of Measuring Visual and Auditory Perception in Spelling." Master's thesis, Boston University, Boston, 1947.

Carter, Bernadette, "Construction Tests of Visual Perception, Auditory Discrimination, and Kinesthetic Factors." Master's thesis, Boston University, Boston, 1941.

Cole, Luella, The Elementary School Subjects. New York: Rinehart and Company, Inc., 1946.

Cordts, Anna, "An Analysis and Classification of the Sounds of English Words in a Primary Reading Vocabulary." Master's thesis, University of Iowa, 1925.

Crossley, B. Alice, "An Evaluation of the Effect of Lantern Slides on Auditory and Visual Discrimination of Word Elements." Doctor's dissertation, Boston University, Boston, 1948.

Dolch, Edward W., Reading and Word Meanings. New York: Ginn and Company, 1927.

Durrell, Donald D., "A Vocabulary for Corrective Reading," Elementary English Review, 11: 106-9, March, 1934.

_____, Improvement of Basic Reading Abilities. Yonkers-on-Hudson, New York: World Book Company, 1940.

_____, Helen Sullivan, and Helen Murphy, Building Word Power. Yonkers-on-Hudson, New York: World Book Company, 1945.

Gates, Arthur I., Gates Reading Readiness Test, New York: Bureau of Publications, Teachers College, Columbia University, 1939.

_____, "Studies of Phonetic Training in Beginning Reading" Journal of Educational Psychology 18: 217-226, April, 1927.

_____, "The Psychology of Reading and Spelling With Special Reference to Disability," Contributions to Education, No. 129, New York: Bureau of Publications, Teachers College, Columbia University, 1922.

_____, "Reading in Relation to Spelling," Teachers Service Bulletin in Reading, Vol. 7, No. 2, New York: Macmillan Company, October, 1944.

_____, and David H. Russell, "Types of Materials, Vocabulary Burden, Word Analysis, and Other Factors in Beginning Reading, I and II," Elementary School Journal, 39: 27-35, 119-28, September-October, 1938.

Gray, William S., On Their Own in Reading. Chicago: Scott, Foresman and Company, 1948.

Gunderson, Agnes G., "Simplified Phonics," Elementary School Journal, 39: 593-603, April, 1939.

Herbert, Dudley, "Word Perception in the Upper Grades," Master's thesis, Boston University, Boston, 1939.

Hill, Barbara, "The Persistence of Perceptual Functions Related to Reading and Spelling," Master's thesis, Boston University, Boston, 1943.

Hill, Mary B., "A Study of the Process of Word Division in Individuals Beginning to Read," Journal of Educational Research, 29: 487-500, March, 1936.

Hincks, Elizabeth, "Disability in Reading and Its Relation to Personality," Harvard Monographs in Education, No. 7, Cambridge: Harvard University Press, 1926.

House, Ralph W., "Effect of a Program of Initial Instruction on the Pronunciation Skills at the Fourth Grade Level as Evidenced in Skills Growth," Abstract of a doctorate dissertation, Journal of Experimental Education, 10: 54-56, September, 1941.

Iowa Every-Pupil Skills Tests, Published by Houghton-Mifflin Company, Boston.

Judd, Charles H., "Reading: Its Nature and Development," Supplementary Education Monographs, Vol. 2, No. 4, Chicago: Department of Education, University of Chicago, 1918.

Kuhlmann-Anderson Intelligence Test, Published by Educational Test Bureau, Minneapolis.

Leary, Bernice E., "What Does Research Say About Reading," Journal of Educational Research, 39: 434-44, February, 1946.

Meek, Lois, "A Study of Learning and Retention in Young Children," Contributions to Education, No. 164, New York: Teachers College, Columbia University, 1925.

Monroe, Marion, Children Who Cannot Read. Chicago: University of Chicago Press, 1932.

_____, Reading Aptitude Tests, New York: Houghton-Mifflin Company, 1935.

Murphy, Helen A., "Evaluation of the Effect of Specific Training in Auditory and Visual Discrimination on Beginning Reading," Doctorate dissertation, Boston University, Boston, 1943.

_____, "Group Test for Auditory Discrimination," Unpublished, Boston University, Boston, 1941.

_____, and Kathryn Junkins, "Increasing the Rate of Learning in First Grade Reading," Education, 62: 37-39, September, 1941.

Peake, Nellie L., "Relation Between Spelling Ability and Reading Ability," Journal of Experimental Education, 9: 192-98, December, 1940.

Rogers, M.V., "Test of Phonic Ability," Journal of Experimental Education, 6: 381-395, April, 1938.

Scallon, Ruth A., "The Incidental Learning of Spelling Thru Reading," Master's thesis, Boston University, Boston, 1947.

Smart, Alice, "Diagnostic Reading Readiness Test," Master's thesis, Boston University, Boston, 1941.

Smith, Nila B., "Shall We Teach Phonics," Elementary English Review, 20: 60-67, February, 1943.

_____, "What Shall We Do About Reading Today," Elementary English Review, 19: 247-251

Spache, George, "Characteristic Errors of Good and Poor Spellers," Journal of Educational Research, 34: 182-189, November, 1940.

_____, "Phonics Manual for Primary and Remedial Teachers," Elementary English Review, 16: 147-50, 156, 191-98, April-May, 1939.

Strang, Ruth M., "How Students Attack Unfamiliar Words," English Journal, 33: 88-93, February, 1944.

Thorndike, Edward L., and Irving Lorge, The Teachers Word Book of 30,000 Words, New York: Teachers College, Columbia University, 1944.

Tiffin, J. and M. McKinnis, "Phonic Ability, Its Measurement and Relation to Reading Ability," School and Society, 51: 190-92, February 10, 1940.

Tinker, Miles A., "Visual Apperception and Perception in Reading," Psychological Bulletin, 26: 223-240, 1929.

_____, and Florence L. Goodenough, "Mirror Reading As A Method of Analyzing Factors Involved in Word Perception," Journal of Educational Psychology, 22: 493-502, October, 1931.

Tufts, Betty R., "Evaluation of Several Types of Auditory Discrimination Tests for Kindergarten," Master's thesis, Boston University, Boston, 1941.

Walker, John, The Rhyming Dictionary. New York: E.P. Dutton and Company, 1904.

Warnke, Evelyn, "A Diagnostic Study of 25 Cases of Non-Readers," Master's thesis, University of Minnesota, 1931.

Wilson, Frank T., "Early Achievement in Reading," Elementary School Journal, 42: 609-15, April, 1942.

APPENDIX

GROUP TEST OF WORD ANALYSIS FOR GRADES FOUR, FIVE AND SIX

There are four parts to this test. Part I and Part II are auditory, and Part III and Part IV are visual. The entire test requires about forty minutes to administer.

Physical Factors

1. Have room at comfortable temperature
2. Lighting should be adequate.
3. All children should have a good view of the examiner.

Materials

1. Test booklets for each pupil.
2. See that all children have sharpened pencils. Also, have a supply of sharpened pencils on hand.
3. Forty flash cards.

Directions for Administering

1. Read the directions aloud to the pupils at the beginning of each part of the test.
2. Give five minutes rest between each part of the test.
3. Part I.....Pronounce each word clearly and concisely.
   Pronounce each word only once.
   Pause ten seconds between each item
4. Part II....See Part I above
5. Part III...Flash cards, holding each card before class for three seconds. Be sure that all can see.
   Pause five seconds between cards.
6. Part IV....Flash cards, holding each card before class for three seconds. Be sure that all can see.
   Pause ten seconds between cards.
7. All scoring will be done by test builder.

Read to children:

You are going to take a test today. When you get your booklets you are to fill in the first five lines. Do not open your booklets until I tell you to. (Give three minutes). Has everyone filled in the first five lines? Now open your books to Page 1.

PART I

Directions: (Read aloud)

I am going to say two words and you are to circle the letter that each word ends with. We will do the first one together. Look at Number 1 on your paper. See the box next to 1 that has the letters in it? I will say two words and you are to circle the letter in Box 1 that the words end with. Ready. (Pronounce the words next to one). You should have circled "f". How many circled "f"? Good. Now we will do the rest of the test. Listen carefully and be sure to circle the letter that the words I say end with. (Pronounce each word only once. Pause ten seconds between items).

1. behoof bē hoof
   draff dràf

2. trig trĭg
   scrag skrăg

3. scarab skăr′ăb
   drub drŭb

4. dactyl dăk′tĭl
   caudal kô′d'l

5. cadmium kăd′mĭ ŭm
   beldam bĕl′dăm

6. rancid răn′sĭd
   triad trī′ăd

7. shallop shăl′ŭp
   fillip fĭl′ĭp

8. Kashmir kăsh′mĭr
   lemur lē′mẽr

9. batik bă tēk′,
   grosbeak grōs′bēk

10. kaolin kā′ō lĭn
    banyan băn′yăn

11. discus dĭs′kŭs,
    meningitis mĕn′ĭn-jī′tĭs

12. ocelot ō′sĕ.lŏt
    manchet măn′chĕt

13. malmsey măm′zĭ
    obloquy ŏb′lō kwĭ

Directions: (Read Aloud)

Now you are to circle the letters that each word I read ends with. Listen carefully. Here is Number 14.

14. succotash sŭk´ō·tăsh
galosh ga lŏsh´

15. mooch mōōch
self-reproach sĕlf-rē prōch´

16. patrimonial păt´rĭ-mō´nĭ-ăl
residual rĭ·zĭd´ū-ăl

17. trillion trĭl´yŭn
sturgeon stŭr´jŭn

18. pollack pŏl´ăk
cassock kăs´ŭk

19. caustically kŏs´tik al ē
obscurely ŏb·skūr´ly

20. spunk spŭngk
prink prĭngk

21. whelk hwĕlk
ilk ĭlk

22. lullaby lŭl´ă·bī
glaby glā´bi

23. ministrant mĭn´ĭs·trănt
congruent kŏng´grōō·ĕnt

24. murk mŭrk
shagbark shăg´bärk

25. enthuse en thūz´
equipoise ē´kwĭ·poiz

26. modernity mŏ·dûr´nĭ·tĭ
causality kô·zăl´ĭ·tĭ

27. bung bŭng
diphthong dĭf´thŏng

28. borderland bôr´dĕr lănd
dachshund dăks´hŏond

29. daft daft
croft kroft

30. disrupt dis rupt
inapt in apt

31. bismuth biz muth
frith frith

32. piebald pī bold
leasehold lēs hold

33. basalt ba· sôlt
moult môlt

34. kelp kelp
palp palp

35. werewolf wer woolf
pelf pelf

36. Stockholm stok hōlm
whelm hwelm

37. evict e-vikt
inject in jekt

38. decamp de· kamp
frump frump

39. bombast bom bast
encyst en-sist

40. basilisk bas i· lisk
kiosk ke· osk

PART II

Directions: (Read aloud)

Turn to Part II on Page 3. I am going to read one word, and you are to draw a circle around the word that sounds like the one I read. We'll do the first one together. Look at the box next to Number 1. There are four words in the box and you are to circle the one that I read. Listen (Read Number 1). Did you circle the second word? Good. You are to do the others I read the same way. Ready. Listen. (Pronounce each word only once. Pause ten seconds between each item).

1. fortainment
2. conportly
3. lafortine
4. dependful
5. transvertion
6. perspectment
7. comserveless
8. subtendling
9. proscribeful
10. extainly
11. upventry
12. returbic
13. purtainish
14. surlectance
15. adserveful
16. involory
17. uncertine
18. disventel
19. enpartment
20. obsetize

PART III

Directions: (Read aloud)

Turn to Part III on Page 5. Now I am goin g to show you a card, and then I'm going to take it away. You are to look at the card and after I take it away circle the word that you saw on the card. We'll do the first one together. Look at the card I show you, and circle the word that you saw in Box 1. (Flash card 1 for three seconds). Did you circle the last word? That is correct. Ready now for Number 2. (Flash each card for three seconds, and pause five seconds between cards).

1. forlectful
2. behabling
3. hemortish
4. gaporten
5. concertic
6. lapendious
7. morgraphist
8. degraphal
9. jorspection
10. katurbment
11. noportate
12. pertainful
13. relectium
14. worsentor
15. supventish
16. yorpendless
17. virgraphious
18. transgraphly
19. gasentic
20. ciducant

PART IV

Directions: (Read aloud)

Now, I am going to show you some cards that also have words on them. This time when I take each card away you are to write the word that you saw on your paper. The first word will be next to Number 21. Watch carefully. Ready, here is the first word. (Flash each card for three seconds, and pause ten seconds between cards).

21. allocate
22. environ
23. binnacle
24. omega
25. pendulous
26. chinchilla
27. habitude
28. reminisce
29. sapient
30. vertebral
31. defaulter
32. subtrahend
33. unicorn
34. decalog
35. laminate
36. figurine
37. tuberose
38. zeppelin
39. interfuse
40. brilliantine

PART IV

Directions: (Read aloud)

Now, I am going to show you some cards that also have words on them. This time when I take each card away you are to write the word that you saw on your paper. The first word will be next to Number 21. Watch carefully. Ready, here is the first word. (Flash each card for three seconds, and pause ten seconds between cards).

21. allocate
22. environ
23. binnacle
24. omega
25. pendulous
26. chinchilla
27. habitude
28. reminisce
29. sapient
30. vertebral
31. defaulter
32. subtrahend
33. unicorn
34. decalog
35. laminate
36. figurine
37. tuberose
38. zeppelin
39. interfuse
40. brilliantine

1. Name _____ Grade _____

2. School _____ City _____

3. Date Today _____

4. Date of Birth _____

5. Boy Girl _____

M.A. _____ I.Q. _____

Reading Achievement _____

Spelling Achievement _____

SCORES

	# Correct	Tabulation	
		Order of Correct Items	
Part I		Letters	Blends
		Order of Incorrect Items	
		Letters	Blends
Part II		# of Mistakes	
		Beginning	Middle Ending
Part III		# of Mistakes	
		Beginning	Middle Ending
Part IV		# of Mistakes	
		Beginning	Middle Ending

PART I

1.	b	f	n	t
2.	r	y	g	b
3.	b	n	d	p
4.	f	l	p	t
5.	n	t	w	m
6.	d	m	b	p
7.	b	s	p	y
8.	l	r	s	g
9.	h	k	m	l
10.	m	l	n	p
11.	s	y	r	I
12.	l	m	p	t
13.	r	y	f	g

14.	ch	se	sh	nt
15.	ch	rk	cl	sh
16.	rk	al	se	lk
17.	nt	rk	ly	on
18.	rk	by	ck	cl
19.	ly	rk	by	al
20.	rk	nk	ty	nt
21.	rk	al	lk	on
22.	rk	by	on	ly
23.	nk	ty	ch	nt
24.	al	lk	rk	on
25.	se	on	ck	ty
26.	nt	ty	rk	ly

27.	nk	ng	nd	by
28.	nd	ld	nk	mp
29.	nt	lm	ft	ty
30.	nt	lp	pt	se
31.	th	nt	ch	by
32.	ly	nd	rk	ld
33.	ly	nt	se	lt

34.	lp	mp	ty	ly
35.	ld	lf	ft	ct
36.	al	th	lm	mp
37.	ch	th	lp	ct
38.	mp	lm	lp	sk
39.	nt	sh	st	lp
40.	sk	ck	sh	ty

PART II

1.	portainment	fortainment	fortendment	fortainium
2.	conportfy	conportly	comportly	conpartly
3.	tafortine	laportine	lafortine	lafortless
4.	departful	dependful	tependful	dependfy
5.	transvertion	transverteous	transrection	prevertion
6.	perspectium	prospectium	persolument	perspectment
7.	comserveless	conserveless	comspectless	comserveling
8.	surtendling	subturbling	subtendling	subtendial
9.	proscribefy	perscribeful	proscribeful	proserveful
10.	extainly	extendly	intainly	extainal
11.	upvolry	upventry	unventry	upventor
12.	returbor	deturbic	returbic	retendic

13.	purtainish	purtendish	purtainine	fortainish
14.	surlegance	surlectance	surlectible	purlectance
15.	imserveful	adtendful	adservely	adserveful
16.	involage	disvolory	involory	invertory
17.	uncertine	incertine	unvertine	uncertling
18.	bevental	disvental	disventate	dispendal
19.	unpartment	entainment	enpartium	enpartment
20.	upsetize	obvertize	obsetize	obsetal

PART III

1.	fortectful	gorlectful	forlectlet	forlectful
2.	behabling	behabful	rehabling	belecting
3.	hemortish	hetainish	hemortic	femortish
4.	gaportful	gaporten	gapendful	caportful
5.	concertic	goncertic	conrectic	concertine
6.	lasentious	lapendious	rapendious	lapendible
7.	morgraphist	morfortist	rorgraphist	morgraphish
8.	begraphal	devental	degraphly	degraphal
9.	forspection	jorspection	jorsention	jorspectium
10.	kaportment	katurbive	katurbment	paturbment
11.	noportate	noportic	moportate	nopartate
12.	pertainic	pertendful	pertainful	bertainful
13.	relectium	telectium	retainium	relectious

14.	worsentic	worsentor	morsentor	worpendor
15.	supcentish	supventine	supventish	stupventish
16.	yorpendly	yorpartless	yorpendless	porpendless
17.	virgraphious	wirgraphious	virtainious	virgraphic
18.	transvertly	transgraphly	transgraphty	pransgraphly
19.	gasentic	gasentry	rasentic	galectic
20.	ciducor	ciducant	siducant	cinatant

21. _____ 31. _____

22. _____ 32. _____

23. _____ 33. _____

24. _____ 34. _____

25. _____ 35. _____

26. _____ 36. _____

27. _____ 37. _____

28. _____ 38. _____

29. _____ 39. _____

30. _____ 40. _____