ANALYSIS OF ORAL READING ERRORS ON SEMI-MEANINGFUL, NONSENSE, AND TRADITIONAL READING MATERIALS

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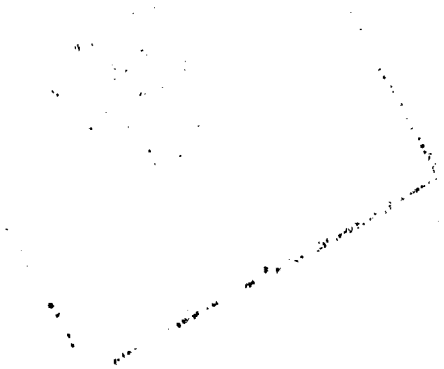

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CHAPTER I

PRESENTATION OF THE PROBLEM

Introduction

Clinicians in reading are acutely aware of the need to make an adequate diagnosis of students with reading difficulties in order to plan effective instruction. The measurement or identification of particular reading skill strengths and weaknesses is vital for effective remediation. Is there some way in which testing can be done that will allow greater specificity in remedial instruction? Will the pattern of errors from one test yield the same instructional directions as another test will? Apart from reading behaviors, will different tests point to different word recognition skill needs? This study will attempt to expand the knowledge needed to answer these questions. The study will attempt to garner further information by making a comparison between the behavioral errors on various tests, between positional errors on various tests, and between word recognition knowledge demonstrated on various tests.

Testing for reading progress is an accepted procedure for reading programs as evidenced by demands for testing to measure progress by governmental agencies which sponsor a variety of educational endeavors including reading programs.

Testing for reading progress is additionally subscribed to and supported by a vast array of public schools at all levels through general

achievement testing which invariably includes a section devoted to reading achievement.

Further testing of reading is done for those students with limiting disability in reading by sundry professional personnel who are responsible for guiding the reading growth of these students. While general reading testing is solely concerned with grade level placement, the diagnostic tests utilized by these professional people are more specific in measuring the complex of skills that conglomerate in the act of reading. The various skills may be measured directly in a subtest or they may be judged by the examiner and noted on a checklist.

Statement of the Problem

The purpose of the study was to devise and validate an instrument for measuring word recognition skills by demanding their application to nonsense words in a story format. To facilitate the analysis of this problem, the investigation has considered four major questions.

A. Does a student with a limiting disability in reading demonstrate a difference in the mean number of errors in behavioral categories on test materials of differing kinds? Specifically, will a lower percentage of errors in the behavioral categories occur on the Experimental Skill Application Test (SKApT), Nonsense and Semimeaningful forms (Form N and Form SM, respectively) than on the Gates-McKillop Reading Diagnostic Tests?

B. Does a student with a limiting disability in reading demonstrate a difference in the number of positional errors, as determined by the Gates-McKillop error analysis, on test materials of differeing kinds? Specifically, will more errors in positional categories occur on SKApT,

Forms N and SM than on the Gates-McKillop Reading Diagnostic Tests?

C. Does a student with a limiting disability in reading demonstrate a difference in the number of word recognition errors on test materials of differing kinds? Specifically, will more errors occur in word recognition on SKApT, Forms N and SM than on the Gates-McKillop Reading Diagnostic Tests?

D. Does a student with a limiting disability in reading demonstrate a difference in the number of consonant errors and the number of vowel errors on test materials of differing kinds? Specifically, will more errors in the consonant and vowel categories occur on SKApT, Forms N and SM than on the Gates-McKillop Reading Diagnostic Tests? Further, will more errors in the consonant and vowel categories occur on SKApT, Form N than on SKApT, Form SM though the same consonants and vowels are used on both tests?

Need for the Study

Three roles that the testing of reading occupies in reading instruction have been identified by Davis, (1966). These essentially are: (1) to measure a student's performance at a given time; (2) to measure change in performance; and (3) to estimate the degree to which reading potential has been achieved.

However, as Chall (1968) points out:

> The existing standardized tests measure a conglomerate of skills and abilities at the same time. What the teacher needs as I see it, are simple tests that get at more of the single, simple components of reading such as sight word recognition, tests of mastery of the alphabetic principle, tests of reading comprehension, and so on. Such tests would help the teacher know each child's strengths and weaknesses not only from semester to semester but perhaps from week to week and month to month.

In a similar statement, Traxler (1958) suggests that greater effort should be spent in measuring the specific skills that make up reading ability.

In order to establish appropriate objectives for a student's reading instruction, it is necessary to know more about his reading than the grade level score he received on a group silent reading test. Or as Wyatt (1968) states its:

> The determining of instructional level is a starting point for diagnostic teaching, but much more information is needed about a child after the instructional level is determined . . . the pinpointing of specific needs certainly must precede diagnostic teaching. It makes little sense to teach a child what he already knows . . . (p. 174)

For this reason, reading diagnosis in a clinical setting is based on interpretation of individual reading tests of a diagnostic type which include a portion requiring oral reading as well as subtests which assess various skills underlying reading.

The assessment of oral reading, in general terms, includes measurement of hesitations; insertion of sounds or words; repetition of one or more words; and omission of sounds or words; as well as substitutions of whole words; and mispronunciation of initial, medial, and final vowels and consonants. The placement score is influenced by all of these aspects of the oral reading act.

The interpretative portions of diagnostic testing of word recognition skills to date generally depend upon the examiner's sophistication in analyzing and interpreting the nature of errors thereby determining a reader's strengths and weaknesses in word recognition. In diagnosing reading difficulties, examiners assume that disabled readers do not have or do not use, certain word recognition skills. The error analysis

determines what these skills are by studying misidentified words; that is, by comparing the word or sound group pronounced by the reader with the word which is printed.

In completing an error analysis of word recognition skills, the diagnostician first notes whether the error is in the initial, medial, or final portion of the word. The next step is generally to determine whether the majority of errors involve single consonants, consonant blends, consonant digraphs, vowels, vowel digraphs, or dipthongs. In noting the error, it is also relevant to list the sounds which are substituted for the misidentified sound or element.

Most often in currently available tests, the number of times in which certain sound knowledges or specific word recognition skills are tested is not frequent enough to provide the examiner a firm foundation for explicit diagnosis, nor as Stuever (1969) found, are most tests of an adequate length for the pattern of errors to become stabilized. Additionally, from the fact that a reader does not use a particular skill, one cannot logically infer a lack of knowledge of the skill. And conversely, because a reader correctly pronounces a word one cannot assume that he necessarily has the skills for identifying a similar but unfamiliar word.

It is assumed that a more meaningful diagnosis could be attained by assessing word recognition skills through requiring the application of those skills to nonsense words. Although the studies of Hodges (1968) and Leton (1968) indicate less than perfect correlation in phoneme-grapheme correspondences, other studies by Ramsey (1967), Tiffin and McKinnis (1940), Rogers (1938), Templin (1954), and Rudisil (1950)

have used nonsense materials for assessing word recognition ability and found the procedure to be useful.

The problem under investigation in this study is to determine the feasibility of a more effective and efficient diagnosis of weaknesses in certain reading subskills; specifically, whether the skills used in recognizing words can be more accurately tested by requiring their application to nonsense words than by the current practice of inferring deficiencies from meaningful context. It also will attempt to determine whether nonsense or semi-meaningful materials are advantageous.

Definition of Terms

Disabled reader refers to a reader whose instructional level in reading is one year or more below his expected level of achievement based on the Bond formula (I.Q. times the years in school +1).

Limiting disability refers to students with serious deficiencies in basic skills as (a) word recognition deficiency, (b) limiting or interferring mechanical habits, (c) inability to sense thought units, (d) over-emphasis of a needed skill resulting in a lack of balance in reading skill.

Error analysis refers to a procedure whereby a reading diagnostician categorizes oral reading errors. For this study the error analysis categories of the Gates-McKillop Reading Diagnostic Tests are used. For complete information, see Appendix A.

Reading behaviors refers to errors that disrupt the fluency of oral reading or change the content of the materials (excluding substituted words) (Ray, 1969).

Positional errors refers to errors of misidentification of the letters or associated sounds of the initial, medial, or final portions, or several parts of a word.

Word recognition errors refers to oral reading errors involving the substitution or mispronunciation of a word. This group of errors includes misidentification of consonants and vowels in initial, medial, and final word positions, or in several word positions, as well as the omission or addition of sounds within the word.

3^1 reader refers to a student whose instructional level in reading is the first book of the third year in a Basal Reader Series.

Delimitations

Scope of the Study

This investigation includes an analysis of the reading performance of forty-eight fourth grade students. These students were enrolled in public and parochial schools in one county in north central Oklahoma. The fourth grade students who were referred by classroom teachers were screened to identify those students who met the following criteria: average or above in intelligence, one year or more retarded in reading, suffering no physical or psychological problems which might be an influencing factor in the reading disability, and placed at 3^1 on the criterion reading instrument.

This investigation is not concerned with remediation for these students nor does it consider causes of reading disabilities present in the sample.

Limitations of the Study

Though the sample meeting the criteria set by this study included a wide range of socio-economic levels, it does cover a relatively small geographic area.

Though this study does not presume to undertake standardization of an instrument, the selection of single reading level may produce an unexpected and unrecognized bias.

Though the total reading act must be understood as, at minimum, a two level process consisting of decoding and comprehending; this study is concerned only with the decoding process.

Elementary school students often behave and perform differently in unusual circumstances than they do in a classroom situation. This investigation did not attempt to compare test performances with classroom functioning.

Assumptions

1. The instruments used for criterion measurements are valid and reliable measurements of those skills and abilities tested.

2. This sample of fourth grade students with limiting disability in reading is representative of other fourth grade students with limiting disability in reading.

3. The growth in reading over the period of testing did not make any significant difference in the performance of these students between the initial criterion examination and the conclusion of the diagnostic battery.

4. The nature of errors made in oral reading are different in terms of their importance for diagnostic purposes e.g. that specific

word recognition errors give more direction to planning for remediation while behavioral errors reflect the reader's security in the task, and though important, do not help in setting objectives for instruction.

Organization of the Study

Chapter I has given an introduction to the problem to be studied. It has included the need for the study, the statement of the problem, the delimitations of the study, and the definition of terms used in the study.

Chapter II presents a review of the literature as it pertains to the hypotheses being tested.

Chapter III describes the population used, the instruments being evaluated, the tests used to measure reading achievement, the tests used to measure intelligence, and the statistical methods used to test the significance of differences between the variables.

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

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

CHAPTER II

RELATED LITERATURE

This chapter will include especially those studies which are related to the development of the instruments used in this study.

Application of Word Recognition Skills

These studies indicate that the use of isolated nonsense words for measuring word recognition skills is a feasible and reliable procedure. The obvious absence of nonsense words imbedded in a normal language pattern in this review is due to the fact that none exists to the knowledge of the investigator.

A study conducted by Rogers (1938) was interested in determining the relationship between mispronunciations and comprehension. The student personnel for her study were 72 poor silent readers from the freshman class who ranked at the 20th percentile or below on the Iowa Silent Reading Test in the University of Iowa Qualifying Examinations when they entered the university. Some measurement of phonic knowledge possessed by the students was necessary. To meet this need, a phonic ability test was constructed. Part I tested syllabication, Part II tested knowledge of the various principles of pronunciation. Nonsense words were used to measure these knowledges. Each item in Part II was constructed to measure only one thing. For example, the first item, 'histen', was designed to measure the student's knowledge of the fact that

the /t/ in words ending in /sten/ is silent. Each pronunciation record for each word was analyzed as to the type of error it contained. Errors were classified in several categories: omission of a sound, addition of a sound, substitution of a syllable, substitution of a word, reversal of a sound, faulty accent, faulty accent necessitated by another error, faulty consonant, repetition of a sound, repetition of a word, no attempt at a word, words containing one error, two errors, and three errors respectively. These errors were then classified as to whether or not they were accompanied by correct comprehension. Percentages of mispronunciations accompanied by wrong comprehension range from 56% to 90%.

The reliability of the phonic ability test was computed by correlating the odd items against the even items for each part and applying the Spearman-Brown formula for estimating reliability for the whole test. For Part I, which measures ability to break words down into syllables, the estimated coefficient is .94; for Part II which requires the student to correctly pronounce, the coefficient is .88. Validity of the test was determined by correlation with the Iowa Silent Reading Test, yielding a correlation coefficient of .69. The conclusion reached by Rogers (1938) follows:

> The phonic ability test used in this research has a high reliability for poor readers and is valid for indicating weaknesses in phonic ability. As an aid in training, its usefulness will be highest when responses on individual items are used as an indication of the knowledge of the particular pronunciation principle.

In summary, this study indicates that requiring the application of word recognition skills to nonsense words is a feasible means of determining which skills should be included in plans for instruction or remediation.

Another study (Tiffin & McKinnis, 1940) also used Rogers (1938) phonic ability test but with modification. Each of the nonsense words was typed on a separate card, 3 inches by 5 inches, using giant primer type. In adminstering the test, the cards were shown one at a time to a child with these instructions: "This is a word which you have never seen. Just say it the way you think it sounds. You do not know what it means, but that does not make any difference. Just say the word the way you think it ought to sound." The examiner recorded whether the child's pronunciation was correct or incorrect.

The subjects in this investigation were 155 pupils from the 5th, 6th, and 7th grades. In addition to the phonic test, each child was given the Iowa Silent Reading Test, Elementary Form A; and the New Stanford Reading Test, Form V. The reliability of the phonic test was computed by the odd-even method. The coefficient of reliability for the 155 pupils tested was .94. The correlations between the phonics test and the reading tests were: New Stanford Reading Test, .70; Iowa Silent Reading Test (Comprehension), .66.

In summary, this study indicates that the use of nonsense words to measure reading ability in an oral task is a reliable and valid usage.

Templin (1954) investigated the level of phonic knowledge of fourth grade pupils, the relation between phonic knowledge and reading and spelling skill at this grade level, and what differences existed in the phonic knowledge of good and poor spellers and of good and poor readers. Templin constructed phonic tests to determine the ability of the children to associate sounds with the written symbols used to represent them. The sound-symbol association aspect of phonics was measured in one recall and three recognition tests. In the recall phonic test, the

children wrote out the spellings of twenty-five different consonant sounds and sound combinations which were uttered by the experimenter. Credit was given for any spelling which occurs in English. Three recognition measures of sound-symbol association were obtained in: (a) a word phonic test in which the children identified the letters at the beginning or end of a word pronounced by the experimenter; (b) a nonsense-word phonic test which was administered in the same manner as the word phonic test except that the experimenter pronounced a nonsense word; (c) a sound phonic test in which the children identified the letters representing an isolated sound produced by the experimenter.

The sample for this study consisted of 318 children from public schools who were in grade 4.9 at the time the testing was undertaken. Only those subjects were included in the analysis who had normal hearing, for whom intelligence test scores were available, and who had taken all of the phonic tests together with the standardized reading and spelling tests. Fifty-eight cases were dropped because of incomplete data. The scores of the sample were analyzed to determine the level of phonic knowledge and the interrelationships between the scores. The highest mean percentage scores were obtained on the word phonic test in which the subjects identified the beginning sound. A lower mean percentage score was made on the recall phonic tests where the subjects were required to write the sound or sound combination than on any of the recognition phonic tests in which they identified and marked their choice on a form. Phonic knowledge on the recognition tests was most successfully demonstrated on the word phonic tests with the lowest scores occurring on the nonsense word test. Between the good and poor readers, all of the phonic test scores were higher for the better

readers. The differences between the two groups reached the five percent level of confidence only when the sound was used as a stimulus.

The conclusion may be drawn from this study's findings that word recognition skills may not be generalized to nonsense words even when known words are recognized as evidenced by the fact that the lowest scores of phonic knowledge occurred on the nonsense test. The findings of this study also indicate that a more accurate measure of phonic knowledge is gained when a productive response is demanded than when a response of recognition is required.

Ramsey (1967) investigated forty-three poor readers in grades five and six who were given The McKee Inventories of Phonetic Skills along with two individually administered tests; one was a nonsense syllable reading test and the other a specially constructed test utilizing words from the Dolch list and requiring students to pronounce words which were constructed by changing one element in a Dolch word to make a new word. The changed element was written in cursive writing so that the form of the new word would be unfamiliar. All three tests tested the same basic elements. It was found that if the nonsense word test was used as a criterion, the McKee Test detected only 13.7% of the children's individual weaknesses in phonics. If the Dolch-Changed Element Test was used as a criterion, the McKee detected 16.7% of the weaknesses in phonics.

In summary, this study indicates the necessity of using nonsense words which are as far removed from known words as possible, but still sensible in terms of the rules for word construction in our language. It further indicates that the use of nonsense words is probably the most effective measure of word recognition skills.

An additional study (Rudisill, 1957) was concerned with functional phonic knowledge or the ability to pronounce new words in conformance

with phonetic principles. Three hundred and fifteen third grade children cooperated in the study. An inventory was constructed to measure ability to apply phonic knowledge in pronouncing new words. The 144 nonsense words of this inventory were organized to test: (1) ability to use the sounds of the various single consonants, speech consonants, and consonant blends in pronouncing new words which differed from a key word only in the initial consonant letter or letters; (2) ability to use the sounds of the various single consonants and consonant blends in pronouncing new words which differed from a key word only in the final consonant letter or letters; (3) ability to use vowel sounds according to phonetic principles in pronouncing one-syllable words having the following vowel situations: one vowel not at the end of the word, two vowels together, two vowels one of which is final e, and one vowel followed by r; and (4) ability to pronounce two-syllable words according to the principles governing syllabication and the sounds of vowels in syllables. The inventory was administered as an individual oral-pronunciation test. The total number of words pronounced correctly was used as the phonic knowledge score. Intelligence was measured by use of the Otis Quick-Scoring Mental Ability Test, Alpha Test, Verbal and Nonverbal, Form A; reading achievement was measured by use of the Stanford Achievement Test, Primary Reading Form D; and spelling achievement was measured by use of the second and third grade spelling lists of the Durrell-Sullivan Reading Achievement Test. The intercorrelations of reading, spelling, and phonic knowledge were about equal. They were: reading with spelling, .72; reading with phonic knowledge, .71; and spelling with phonic knowledge, .69. These intercorrelations were significantly higher than the correlation of either factor with mental age as measured by the Otis Alpha test. These correlations were: mental

age with reading, .52; mental age with spelling, .29; and mental age with phonic knowledge, .42. These correlations suggest that, to a great extent, there were common factors between reading, spelling, and phonic knowledge independent of intelligence. It is further suggested that the high correlation between this measure of phonic knowledge and reading is indicative of the notion that using nonsense words is probably the most effective measure of word recognition skills.

Word Perception and Word Recognition

There are two studies which indirectly indicate that the degree of similarity between the nonsense word and a real word of the English language may influence a student's performance.

The first study (Gibson, Gibson, Osser & Hammond; 1962) has to do with the recall of pronounceable nonsense words versus the recall of unpronounceable nonsense words. Their hypotheses were built on the observation that the rules for grapheme-phoneme correspondence are conditional on what precedes or what follows. Two sets of words were constructed: one with high spelling-to-sound correlation (referred to as pronounceable) and one with low spelling-to-sound correlation. The twenty-five words in the pronounceable list consisted of (1) an initial consonant spelling having a single regular pronunciation; (2) a final consonant spelling having a single, regular pronunciation, and (3) a vowel spelling placed between the two consonant spelling and having a single regular pronunciation when it follows and is followed by the given initial and final consonant spellings respectively. The words in the second list, those with low spelling-to-sound correlation, were constructed from the words in the first list. The initial consonant

spelling of the pronounceable words became the final consonant spelling of the unpronounceable words. The term pronounciability is used here as a convenient means of referring to a correlation of spelling-with-sound, according to the rules of English spelling and pronunciation. The task required the twenty-five adult subjects to identify a word as it was projected on a screen, and to write it down. Five presentations of the lists were given, with an increasing exposure time for each presentation.

The words recorded by the subjects were scored right or wrong, and separate means for pronounceable and unpronounceable words were obtained for each time interval. The curve for pronounceable words was consistently higher than for unpronounceable words. The percentage correct increased sharply from the first exposure to the second, and thereafter increased very little. The two curves were parallel throughout. The Wilcoxon Matched Pairs Signed Ranks Test was used to compare both sets of total scores. The difference between the total scores for the two lists was significant at better than the 1% level (two-tail). The higher level of recall of words constructed in accordance with the pronunciation principles of English from this study would suggest that tests using nonsense words in more than one occurrence may bias their results through the readers' learning within the task.

Another study (Miller, Bruner, and Postman, 1954) also utilized the procedure of having the subjects write the words that they saw projected on a screen. Their subjects were six Harvard undergraduates.

The first word list (zero-order approximation) for this study was constructed by selecting letters from the alphabet according to a table of random numbers. The list of words making up the first-order

approximation to English was obtained by selecting letters according to their relative frequencies of occurrence, again applying a table of random numbers. The third class of words reflected the relative frequencies of occurrence of pairs of letters in English. These were constructed by drawing pairs of letters from printed English according to a simple rule.

> Suppose the sequence started with "T". The next letter was selected by searching for the next occurrence of "T" (not in a final position), then recording the letter which followed immediately after. This was, say, "H". Then the next letter was selected by reading on through the passage until "H" occurred again, then recording the letter that followed. By this procedure the chance of selecting a given letter depends upon its likelihood after the preceding letter in normal English writing. The process might produce the pseudo word "THERARES", for example.

The final class of words reflected the relative frequencies of occurrence of sequences of four letters in English. Each letter was chosen according to the three letters that preceded it, with the same procedure as the example above except that instead of looking for one letter the sequence of three was used.

All of the nonsense words were eight letters long. Fifteen different words were constructed at each order of approximation to English. The degrees of approximation represent degrees of nonsense. The fourth order approximation words are less "nonsensical" than the zero order approximation words.

The results were scored in two different ways; by the percentage of letters correct (letter score) and by the percentage of correct sequences (placement score). The most nonsensical pseudo words (zero order) yielded the lowest scores, and the most sensible pseudo words (fourth-order) yielded the highest scores, with most errors here being

substitutions of a known word rather than omission of letters as in other approximation levels.

The findings of this study indicate that nonsense words should be of a fairly low order of approximation in order that skills will be applied in pronunciation rather than the substitution of a similar and known word.

Sound-Letter Correspondences

Two studies have dealt with sound-to-letter correspondences in English. The first, by Hodges, was limited to 3,428 monosyllabic words from the Thorndike list of 30,000 words. Hodges devised a phonemic classification system that employed twenty-eight consonant and twenty vowel phonemes including the additional notations that are appropriate for spelling. He found that consonants in the initial word position are in accord with the alphabetic principle 96% of the time; consonants in the medial position, 98.08%; and consonants in the final position, 59.66%; and the total for all positions was 64%. Percentage of correspondence for all phonemes (consonant and vowel) in all word positions combined was 81.36%.

The findings of the study by Hodges (1968) imply that the positional constraint is important in influencing the sound to be associated with a given symbol so that if in using nonsense words the position of the element is changed, the acceptable pronunciations must be changed; or several times the original number of factors are being measured. For example, in the consonant combination /mb/; occurrence in the final position will probably signal a silent /b/ as in bomb, climb, etc.; but the occurrence of /mb/ in the medial position doubles the number of

acceptable pronunciations in that the /b/ may still be silent as in climber, dumbest, etc. or it may signal the phoneme /b/ as in bombard.

To demonstrate the stability and the ambiguity of sound-letter correspondences, consider that in some instances a reader can reliably predict the phoneme at the grapheme level, for example (ck) represents the phoneme /k/. The next level may be demonstrated with the digraph (gh); without a word, the reader does not know whether it is silent, represents the phoneme /f/, or represents the phoneme /g/. When the word (ghost) or (tough) or (bough) is read, the reader chooses the correct phoneme at the word level. In other instances the reader cannot determine the phoneme-grapheme relationship until he makes a syntactical analysis. To illustrate this level, consider the word (sow). This word is recognized as having either a "long o" or a combination of short vowel sounds. But in the phrase (sows wheat) or (fat sow) the phoneme to be chosen is limited by syntactical clues to the point that the appropriate phoneme can be assigned.

Leton (1968), used the Ginn Basic Readers and analyzed 6,949 words for one-way associations. The phoneme system used for comparison included 33 segmental phonemes, nine phoneme combinations, one juncture phoneme, and a nonphoneme. The nonphoneme was used to represent silent graphemes, (Ø = silent grapheme). Stress and pitch phonemes were regarded as suprasegmental and not included at this stage of analysis. Table I represents the findings of Leton's (1968) study.

This listing of the variabilities of sound associated with symbols even at the elementary school level indicates that a narrow application of pronunciations to be accepted cannot be used with justice in evaluating the results of a test using nonsense words.

TABLE I

RESULTS OF LETON'S STUDY

graphemes	b		c		ch		ck		d	
phonemes	b	.899	k	1.00	ch	1.00	k	1.00	t	.005
	Ø	.101							d	.992
									Ø	.002
graphemes	f		g		h		j		k	
phonemes	f	.977	g	.889	h	.967	j	1.00	k	.923
	v	.023	Ø	.111	Ø	.033			Ø	.074
graphemes	l		m		n		ng		p	
phonemes	l	.849	m	1.00	n	.972	ng	1.00	p	.949
	Ø	.151			ng	.001			Ø	.051
					Ø	.029				
graphemes	q		r		s		sh		t	
phonemes	k	1.00	r	1.00	s	.787	sh	1.00	t	.870
					z	.213			Ø	.130
graphemes	th		v		w		x		y	
phonemes	th	.838	v	1.00	w	.997	ks	1.00	y	.438
									i	.002
	th	.162			Ø	.003			iy	.422
	θ								ay	.118

TABLE I "Continued"

grapheme	z		a		a		a		e	
phonemes	z	1.00	e	.128	u	.088	ø	.018	e	.257
			a	.096	ɔ	.313			ə	.194
			æ	.291	ey	.022			u	.018
			ə	.039	ɔh	.005			iy	.116

graphemes	e		i		o		u		ee	
phonemes	ø	.415	i	.606	ə	.013	w	.178	iy	.995
					a	.206				
			iy	.047	u	.001	u	.610	ey	.005
					o	.068				
			ey	.174	ɔ	.268	ø	.211		
					uw	.265				
			ø	.173	ow	.223				
					ɔh	.013				
					ø	.009				

graphemes	ea		ew		ey		ai		ay	
phonemes	ey	1.00	uw	1.00	iy	.169	ey	1.00	ay	1.00
					ey	.502				
					ay	.328				

graphemes	aw		oy		ou		ow		oo	
phonemes	ɔh	1.00	oy	1.00	uw	.829	ow	.130	uw	.967
					aw	.171	aw	.870	ow	.033

graphemes	ue	
phon.	uw	1.00

Sound and Meaning

Several studies reported earlier found significant correlations between the ability to pronounce words and comprehension ability. The following discussion will explore why this might be.

Soffietti (1955) qualifies a phoneme as "the smallest semantically functional unit of sound". Thus the phonemes /b/ and /h/ indicate the difference in meaning between (bit) and (hit) and can be awarded semantic functionality.

The next smallest linguistic unit is called a morpheme and is characterized by having either a lexical or relational meaning of its own. For example, the word (hats) is made up of two morphemes (hat) and (s). The first morpheme (hat) has lexical meaning in that it has its referrent in the physical world; it signifies a thing to be worn on the head. The second morpheme (s) has relational meaning; it is a device for signalling plurality. The morpheme (ed) of (wished) would also have relational meaning in signifying past tense. Relational meanings are also signalled by other "specific and definite devices": prepositions have relational meanings; (er) and (est) signal comparative and superlative relations; and pronouns denote gender, number, and person.

The linguistic unit which is larger than the morpheme is the word. The word is the smallest linguistic unit that can stand alone.

Although Soffietti talks about different kinds of meanings, Fries (1963) refers to levels of meanings; he views language as a "code of signals" by which messages can be sent from one individual to another, as stated in this passage:

> In our language code, English, there are several important layers of signalling patterns. These layers can be separated for analysis and discussion

> but in the operation of our language code they supplement each other and constitute a system of signals. There is the layer of the signals of meanings carried by the lexical items. Secondly there is the layer of the signals of meanings carried by the grammatical structures. It is classes of words or parts of speech, not individual words themselves, that function as the structural units of the patterns that make up grammatical signals. Even a nonsense word so marked will automatically take on the form-class meaning of the particular "part of speech" class for which the markers identify it. Signals of the meanings carried by the grammatical structures consist also of "function" words. "Function" words differ sharply from the almost limitless number of words that are or can be marked to fit into the four form-classes or "parts of speech". The essential difference that sets off function words from those of the four large form classes lies in the fact that one must know the function words as items in order to respond to certain structural signals. (pp. 104-108)

To demonstrate "layers of meaning", this statement is presented: (It was bex one grev when hoont torve wids wased across the chacks strenubbing in a gloppet jad that was chadful to blay.) On the basis of knowledge of the code of English there are several questions that could be answered even though the layer of lexical meaning has been extracted. Form-class properties are attributed to the nonsense items, so that though wids are unknown, it is known that they are torve as well as that there are hoont of them. The reader's awareness of hoont as number is reinforced by observation of the morpheme (s) which indicates plurality. The reader could also answer such questions as: "What did the wids do?", or "Where did the wids wase?", or "What kind of jad resulted?".

Though various kinds or layers of meaning have been discussed and demonstrated, the view is not unanimously held. One dissenter, Chomsky, (1962) states:

> The notion of "structural meaning" as opposed to "lexical meaning", however, appears to be quite suspect, and it is questionable that the grammatical devices available in language are used consistently enough so that meaning can be assigned to them directly.

Summary

In summary the studies included in this chapter have indicated that the use of nonsense words for measuring word recognition skills is a feasible and reliable procedure for determining which skills should be included in planning for remediation (Rogers, 1938; Ramsey, 1967; Tiffin and McKinnis, 1940; Templin, 1954; Rudisill, 1950).

There also has been the indication that oral responses are superior to recognition responses in the measuring of word recognition skills (Templin, 1954).

Other studies have indicated that nonsense words should be dissimilar to known words yet within the framework of the rules for word construction in the English language (Ramsey, 1967; Gibson, Gibson, Osser and Hammond, 1962; Miller, Bruner, and Postman, 1954).

The studies concerned with sound-letter correspondences have indicated that the scoring of acceptable pronunciations for nonsense words must allow for many alternative productions (Leton, 1968; Hodges, 1968).

The discussion of various kinds of meaning has indicated that by removing only lexical items some of the naturalness of the task in normal reading can be retained by leaving the grammatical structure intact.

CHAPTER III

DESIGN AND METHODOLOGY

Introduction

This chapter describes the sample, the instruments being evaluated and their construction, the tests used to measure reading achievement, the tests used to measure intelligence, and the statistical methods used to test the significance of comparisons of the variables.

Description of the Sample and Procedure

This study was one of three independent studies utilizing the same pupil sample.[1] The studies were explained and permission obtained for the inclusion of all fourth grade disabled readers in the public and parochial schools of one county in north central Oklahoma. The thirty-two schools represented a cross-section of socioeconomic levels and included children from rural areas, towns, and small cities.

Teachers of fourth grade classrooms in cities and towns were asked for the names of the students whose reading ability was in the lower one-third of their classes. These students and all of the fourth graders in rural and township schools were screened with the Stanford Achievement Test, Primary II, Form W, (Reading Section). A total of

[1]The testing team consisted of Margery Berends, Rita Stuever, and the investigator, all of whom collected data for seperate dissertation investigations.

five hundred and five Stanford tests were administered and all children who scored at or below 4.0 reading level on this test were given the Peabody Picture Vocabulary Test, Form A. All those who scored 80 I.Q. or above on this test were further screened with the Standard Reading Inventory, Form B, to establish instructional reading levels. All students whose full scale I.Q. was 90 or above on the Wechsler Intelligence Scale for Children and who had no known speech, visual, or auditory handicaps that would interfere with the reading of the stories and who placed at 2^1 and 3^1 instructional groups as determined by the Standard Reading Inventory, Form B.

The sample which met the above criteria, numbered ninety-two but was subsequently lowered to seventy-six because of incomplete data and inaudible recordings. From this group, the forty-eight readers who scored at 3^1 were selected for this investigation. Thus, the students who comprised this selected sample met the following criteria:

(1) Instructional level of 3^1 as obtained by the Standard Reading Inventory, Form B.

(2) Full-scale WISC score of 90 or above.

(3) Reading Expectancy one or more years above the instructional level obtained on the Standard Reading Inventory, Form B.

Students in the final sample for the combined studies were given a battery of diagnostic reading tests. Those administered for this study are:

1. Experimental Skill Application Test (SKApT), Nonsense and Semi-meaningful Forms (Forms N and SM).
2. Gates-McKillop Reading Diagnostic Tests, oral reading.

The pupils were taken from the classrooms and considered the tests to be a new experience and were cooperative. As the students read orally, the examiners recorded on copies of the test selections the errors that were made by the student. Since all reading was tape recorded, oral errors were carefully rechecked.

Testing was completed during the spring semester of 1968. The diagnostic battery for each child was usually completed in a two day period.

The series of tests in the diagnostic battery were rotated so that no test was administered to all subjects in the same sequential position. Specific rotation patterns were assigned randomly to all subjects.

Instruments Used in the Study

The Standard Reading Inventory, Form B was used in this study to determine instructional levels for the following reasons: (1) the speed measure is not a restricting factor; (2) it contains a comprehension measure; (3) it has been standardized, making it more accurate than informal inventories.

The Standard Reading Inventory was constructed by Robert A. McCracken, Western Washington State College, and was published in 1966 by Pioneer Printing Company. The test consists of eleven stories for oral reading, eight stories for silent reading, and eleven word lists for measuring ability to pronounce words in isolation. The stories vary in length from 47 words to 151 words. The stories and word lists are at eleven basal reading book levels from pre-primer through seventh reader. Four areas of reading achievement are measured:

1. Recognition Vocabulary (in isolation and context)
2. Oral Errors (word recognition and total)
3. Comprehension (recall and interpretation; oral and silent)
4. Speed (oral and silent)

Concurrent validity for the Standard Reading Inventory is 0.87 for seventy-nine second grade children when compared with the California Reading Test; and 0.77 for seventy-seven third grade children when compared with the Stanford Achievement Tests.

Reliability for the two forms of this test was determined by the administration to sixty children from grades one through six. Pearson product-moment correlations were computed using the total results. Correlations on the reading levels were 0.91 for frustration, 0.91 for instructional, and 0.86 for independent. No measure of internal reliability is reported. The normative population is not described in the test manual.

Form B of the Standard Reading Inventory was administered to the sample population to identify those students whose instructional level in reading was 2^1 or 3^1.

The Peabody Picture Vocabulary Test, Form A, was used in this study for the following reasons: (1) it does not demand that the examinee read, thus does not unduly penalize disabled readers; (2) administration and scoring can be accomplished with facility in a minimum of time; and (3) the administration is untimed thus yielding a power measurement.

The Peabody Picture Vocabulary Test was constructed by Lloyd M. Dunn, George Peabody College for Teachers, and was published in 1959 by American Guidance Service, Inc. The test consists of 600 illustrations for 150 words. The subject is asked to identify one (from four)

illustration of a word pronounced by the examiner. In this way the test gives an estimate of a subject's verbal intelligence through a measurement of his auding vocabulary.

The normative population for the Peabody Picture Vocabulary Test included a total of 4,012 cases at age levels from 2.5 years to 18 years. Only white children and youth residing in and around Nashville, Tennessee were included in the final standardization group.

Reliability coefficients for the Peabody Picture Vocabulary Test were obtained by calculating Pearson product-moment correlations on the raw scores of the standardization subjects for Forms A and B at each age level. Correlations ranged from a low of 0.67 at the six year level to a high of 0.84 at the 17 and 18 year levels, with a median correlation of 0.77.

Several studies have determined the level of congruent validity for the Peabody Picture Vocabulary Test. These studies have used samples of both normal and exceptional subjects and have compared this test with a variety of other measures of the same function. These studies are summarized below:

Number	Subjects	Test Compared	Correlation
315	"educable" mentally retarded	Revised Stanford-Binet Test of Intelligence	0.76
220	"trainable" mentally retarded	Revised Stanford-Binet Test of Intelligence	0.66
20	Cerebral Palsied	Revised Van Alstyne Picture Vocab. Test	0.94
20	Cerebral Palsied	Ammons Full-Range Picture Vocab. Test	0.91
20	Cerebral Palsied	Revised Columbia Mental Maturity Scale	0.82

150	seventh graders	California Tests of Mental Maturity	0.58
150	seventh graders	Henmon-Nelson Tests of Mental Ability	0.61

Form A of the Peabody Picture Vocabulary Test was administered to the sample population to identify students who might fail to meet the criterion of normal intelligence or above.

The Gates-McKillop Reading Diagnostic Tests was used in this study for the following reasons: (1) the norming is one of the most specific and complete among diagnostic tests; (2) slow readers are not penalized; and (3) the vocabulary includes unusual words which require the use of particular word recognition skills.

This test was revised from the original Gates Diagnostic Reading Test by Arthur I. Gates and Anne S. McKillop, Columbia University and was published in 1962 by the Bureau of Publications, Teachers College. This test contains many sections: oral reading; word lists of flash and untimed presentations; phrases in flash presentation; knowledge of word parts, letter sounds, and letter names; recognizing the visual form of sounds, nonsense words, initial letters, final letters, and vowels; auditory blending; supplementary tests of spelling, oral vocabulary, syllabication, and auditory discrimination. The section used in this investigation was oral reading which contains seven paragraphs of increasing difficulty and which combine to make one story.

The Wechsler Intelligence Scale for Children was used in this study for the following reasons: (1) it is one of the most reliable measures of intelligence; and (2) responses are either oral or manipulative thus transcending the confusion of reading with intelligence.

The Wechsler Intelligence Scale for Children was constructed by David Wechsler and was published by the Psychological Corporation in 1949.

This test consists of two scales, each containing six subtests, which combine to form the full scale instrument. The Verbal Scale includes measures of general information, comprehension, vocabulary, similarities, digit span, and arithmetic. The Performance Scale includes measures of picture completion, picture arrangement, block design, object assembly, mazes, and coding.

The standardization sample of the Wechsler Intelligence Scale for Children consisted of 2,200 cases with 100 boys and 100 girls at each age level from five through fifteen years. The sample was drawn from the four major geographic areas and met as closely as practicable certain other sampling requirements based on U. S. Census Bureau data for 1940: (1) urban-rural proportions and (2) fourteen categories of parental occupations.

The reliability coefficients for the individual subtests and of the Verbal, Performance and Full-Scale Scores were computed by the split-half technique, with appropriate correction for full length by the Spearman-Brown formula. At age 10 1/2 (the age nearest the sample for this investigation) reliability coefficients for individual subtests range from .59 for digit span to .91 for vocabulary; Verbal Scale reliability is reported as .96, with .89 for the Performance Scale, and .95 for the Full-Scale Score.

The Stanford Achievement Test, Primary II, Form W (Reading Section) was used in this study for the following reasons: (1) it could be quickly administered, (2) it could be administered to groups, and

(3) it was not used as a part of the regular testing program in the schools involved in this study.

This test was constructed by Richard Madden, Sonoma State College; Eric Gardner, Syracuse University; Herbert Rudman, Michigan State University; and Truman Kelly (deceased). The test was published by Harcourt, Brace, and World in 1964.

The test consists of eight sections measuring all aspects of school achievement. The reading section which was used in this investigation contains measures of word meaning, paragraph meaning, and word study skills. The paragraph meaning section, which was used for screening in this study, consists of a series of paragraphs graduated in difficulty, from each of which one or more words has been deleted. The pupil's task is to demonstrate his comprehension of the paragraph by selecting from four choices the proper word for each omission.

The norming sample includes all fifty states plus the District of Columbia. Approximately 30,000 pupils from grades 1-3 in 264 school systems comprised the norming sample. School types include public and private, integrated and segregated.

Reliability was determined through odd-even split-half procedure using the Kuder-Richardson formula. Reliability coefficients for paragraph meaning at grade two is 0.93 and at grade three is 0.91.

It is suggested in the manual for this test that each person utilizing this achievement battery determine its content validity by comparing the test items with the instructional objectives.

Form W of the Stanford Achievement Test (Reading Section) was administered to the recommended population as an aid in quickly

identifying those students who might be disabled readers and could therefore meet one of the criteria for the studies.

The Experimental Skill Application Test is an individual oral reading test measuring word recognition skill through their application to unknown words. In the nonsense form all words which would have lexical meaning in our language have been replaced by a nonsense word. The semi-meaningful form is an adventure story of the escapades of non-earth beings in a child's home. All conversation among the "six wee men" has been reported using nonsense words.

Both forms of the Experimental Skill Application Test were used in this study in order to collect the data necessary for determining the reliability and concurrent validity for the tests. Norms will be established after further revision.

Test Construction

The initial step in building the current test was to write an adventure story of 2.1 readability level as assessed by the Spache formula. The average sentence length was six words and the Dale score was 5. The unknown words were three verbs and four nouns all of which were consistent in pronunciation with major phonetic rules. This story is reproduced in Appendix B.

In the semi-meaningful form which was based on this story, the conversation among the characters was converted to total nonsense (the grammatical structure was removed as well as the semantic content). The conversation includes letter combinations that it was deemed important to measure, but which did not occur in the original story. A study of the table in Appendix D will demonstrate that various

combinations of vowels, as well as consonant blends and digraphs are absent. Exemplary of this observation are the absences of (ck), (dg), (oy), (oa), (thr), (oi), and (ch). The semi-meaningful form of the test is reproduced in Appendix C.

The skills involved in reading the stories have been classified in terms of whether they apply to the sound system or the grammatical system of our language:

I. Elements of the Sound System:

   a. knowledge of single consonant sound in final and initial positions

   b. knowledge of short vowel sounds

   c. silent, final (e) rule

   d. vowel-consonant-final (y) rule

   e. consonant digraph

   f. variant sounds of (c) and (g)

   g. long vowel digraphs

   h. vowel plus (r)

   i. broad (o)

   j. sound of diphthongs

   k. consonant blends in initial and final positions

   l. double consonants

   m. silent consonants

II. Elements of the Grammatical System:

   a. Inflectional endings:

      1. plural and possessive forms of nouns

      2. verb tense endings

      3. comparative and superlative forms of adjectives and adverbs

b. Structure words:

1. helping verbs
2. form-class markers
3. denote relativity
4. denote relationship
5. pronouns

In formulating the nonsense form from the story base, all parts of the normal sentence pattern (words and morphemes containing relational meaning) were left intact. For example, the fifth and sixth sentences in the original story are: "The six men became very upset. They shouted, "Look! A man is telling of finding our space ship!" The same sentences in the nonsense form are: The torve wids utted very laig. They fanded, 'Mab! A lem is vogging of zidding our yout gope!'" Thus, any final (s) which indicates plurality of a noun form is consistent in all forms, as is (ly) which indicates the adverbial form class. Other morphemes which remain intact in both forms are (ed) which indicates a preterit verb form (er) the indicator of a comparative form, (est) the indicator of a superlative form, ('s) which is the indication of possessive form, and the (ing) of verb forms. At the word level, words that mark the noun form class (an, the, a) are left intact. Words which indicate relativity (other, one, soon, each, very, another, all) and those that indicate relationship (in, that, from, of, then, into, at, and, off, over, to, but, not) also remain consistent. All helping verb forms which accompany an (ing) or (en) form of a verb remain intact, too (was, were, is, are, had, could). In constructing the nonsense form from the original story, preterit verbs which are indicated by vowel alternation were dissected and the familiar (ed) signal

affixed to the nonsense word substitution (felt, found, flew, heard, said, knew, ran, went, became, took). Insofar as the use of pronouns increased in the development of our language in relation to the decrease of gendered inflectional endings, they are treated as structural units of the language and are left in the nonsense form (it, your, my, I, they, our, he, them, we, their).

All language parts containing semantic content were regrouped phonemically to produce nonsense words which are neither spelled like nor sound like a meaningful (known) word thus avoiding the substitution of a known word which closely resembles a nonsense word. This care is being taken because of the results of a study by Miller, Bruner, and Postman (1954) which indicated that when nonsense words are constructed with different orders of approximation to English, the higher order of approximation, the lower the visual recognition threshold.

In the phonemic regrouping, all letters that were in the initial word position in the original word retained their initial word position in the nonsense word; the same is true of letters in the medial and final word positions also, in accordance with the study by Hodges (1968) which was reported earlier.

Although effort was made to have consistent comparison of elements between the semi-meaningful and nonsense forms, the frequency of repetition of some words made it impossible to do so in an absolute manner. For example, in the original story, "wee" occurs five times; in regrouping the letters, the initial (w) was used in "wids" which occurs six times but the final (ee) which was used in "coctee" occurs only once.

In order to determine whether the semi-meaningful and nonsense forms of the experimental tests are really measuring the same process as occurs in usual reading the means of all errors were compared. Results of this comparison are presented in Table II.

TABLE II

STATISTICAL COMPARISON OF MEAN NUMBER OF ERRORS

Tests	Correlation coefficient
SKApT, Form N; Gates -McKillop	.30567*
SKApT, Form N; SKApT, Form SM	.73551***
Gates-McKillop; SKApT, Form SM	.44619**

*With 45 df, greater than .05 level of significance (.2875)

**With 45 df, greater than .01 level of significance (.3721)

***With 45 df, greater than .001 level of significance (.4648)

The significant correlations for total errors is expected to be indicative of the fact that reading unusual and difficult materials is, in essence, the same as reading familiar and meaningful materials. Apparently, the unnaturalness of meaningless nonsense does not totally distort the basic nature of the reading task.

Scoring the Tests

All tests of oral reading were scored on three levels. The first level of evaluation involved a direct count of the total number of errors. The choice to use the actual number of errors rather than to use the Gates-McKillop conversion to raw scores was made for the following reasons: (1) to avoid manipulation of decimals in the data from the Gates-McKillop which after five errors becomes a raw score of less than one (on the first five paragraphs); (2) there is a one-to-one inverse relationship between the raw score and total errors so that using total errors has no real difference from the use of raw scores. Only the first five paragraphs of the Gates-McKillop Reading Diagnostic Tests are used for three reasons: (1) to insure having complete data on more cases, (2) this is the point at which the length was most equal to the length of SKApT, and (3) error analysis data in the manual of Gates-McKillop Reading Diagnostic Tests includes only the first four paragraphs.

In the second level of scoring, all errors on all tests were categorized on the basis of type in accordance with the error analysis outlined in the manual for the Gates-McKillop Reading Diagnostic Tests. Error analysis categories used were (a) omission of words, (b) addition of words, (c) repetition, (d) mispronunciation, (e) full reversals, (f) reversal of parts, (g) wrong order, (h) wrong beginning, (i) wrong middle, (j) wrong ending, (k) wrong in several parts. Greater specificity is presented in Appendix A.

The final evaluation of errors was made by checking which vowels and consonants were mispronounced. On the nonsense words, any pronunciation that could occur in the English language (verified through

Webster's Third New International Dictionary) in response to a letter group was accepted as correct. Morphemes that form word parts and contain relational meaning were not scored for pronunciation but were excluded along with service or function words. Greater clarification on scoring the nonsense test is presented in Appendix F.

Statistical Design

The statistical procedure selected to calculate the reliability coefficient is to calculate the product-moment correlation between the sum of the odd items, the even items, and then to correct the resulting coefficient for length of passage.

The statistical method selected for testing the degree of difference between the variables is the T-ratio (Bruning and Kintz, 1968). The t-test formula for related measures was chosen because a significant degree of relationship had been previously demonstrated. Additionally, both experimental groups had the same number of measures since they represented two measures on the same subjects.

Summary

This chapter has described the procedure followed in collecting the data, the population used, the criteria met by the selected sample, the instruments being evaluated, and their construction, the tests used to measure reading achievement, the tests used to measure intelligence, and the statistical methods used to determine the level of significance of difference between errors in several categories on the different types of test materials.

CHAPTER IV

TREATMENT OF DATA AND ANALYSIS OF RESULTS

Introduction

This chapter is composed of a detailed account of the statistical treatment of the data and the analysis of the results. This chapter will indicate the degree to which the hypotheses are found to be correct within recognized limitations.

The data will be discussed under the following headings: (1) the differences among various kinds of test materials in the mean number of behavioral errors, (2) the differences among various kinds of test materials in the mean number of positional errors, (3) the differences among various kinds of test materials in the mean number of word recognition errors, (4) the differences among various kinds of test materials in the mean number of consonant errors and the mean number of vowel errors.

Determination of Reliability

In order to determine the reliability of each form of SKApT, odd-even split half correlation coefficients were calculated. The correlation for SKApT, Form N was .86 which when corrected for length yields a reliability of .92. The correlation for SKApT, Form SM was .95 which when corrected for length yields a reliability of .97.

The Differences Among Various Kinds of Test Materials in Behavioral Errors

This portion of the paper presents the results of the statistical analysis performed in order to test the hypotheses which are concerned with errors in the behavioral categories: words added, words omitted, and words repeated. The T-ratios for words added are presented in Table III as results of testing the following hypotheses:

1. For 3^1 readers there are significantly fewer words added on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

2. For 3^1 readers there are significantly fewer words added on SKApT, Form N than on SKApT, Form SM.

3. For 3^1 readers there are significantly fewer words added on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE III

WORDS ADDED

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	0.0208	.1428	4.4774**
Gates-McKillop	0.6458	.9463	
SKApT, Form N;	0.0208	.1428	1.4148
SKApT, Form SM	0.1250	.4841	
SKApT, Form SM;	0.1250	.4841	3.3593*
Gates-McKillop	0.6458	.9463	

**With 40 df, greater than .0005 level of significance for directional tests (3.551)

*With df, greater than .005 level of significance for directional tests (2.704)

For treatment of words added, the hypothesis of fewer words added on SKApT, Form N than on SKApT, Form SM cannot be accepted on the basis of the evidence presented. The very limited number of words added on the two forms of SKApT (sums of 1 and 6) would seem to suggest that this kind of error is resultant when awareness of the message is present and that if a student is reading meaningless materials there is no need to add words that have meaning. The hypotheses of significantly fewer words added on SKApT, Form N than on the Gates-McKillop and significantly fewer words added on SKApT, Form SM than on the Gates-McKillop are in agreement with the findings and can be accepted on the basis of the evidence presented.

The T-ratios for words omitted are presented in Table IV as results of testing the following hypotheses:

4. For 3^1 readers there are significantly fewer words omitted on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

5. For 3^1 readers there are significantly fewer words omitted on SKApT, Form N than on SKApT, Form SM.

6. For 3^1 readers there are significantly fewer words omitted on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

In the treatment of words omitted the significance of difference between SKApT, Form N and the Gates-McKillop as well as between SKApT, Form N and SKApT, Form SM is in agreement with the hypotheses but the direction of occurrence is in opposition to the anticipation. Only in relation to the difference between SKApT, Form SM and the Gates-McKillop is the prediction accurate. It is expected that the great number of

omissions on SKApT, Form N is one of the important indications of the frustration of the task. It seems plausible that since a reader will not miss any information by skipping a line or two that he is more likely to do so in order to shorten his labor thereby diminishing his discomfort.

TABLE IV

WORDS OMITTED

Tests	Mean	S.D.	T-ratio
SKApT, Form N; Gates-McKillop	4.2917 2.4375	6.3046 3.6737	1.7421*
SKApT, Form N; SKApT, Form SM	4.2917 1.3125	6.3046 2.3377	3.0375**
SKApT, Form SM; Gates-McKillop	1.3125 2.4375	2.3377 3.6737	1.7712*

*With 40 df, greater than .005 level of dignificance for directional tests (2.704)

**With 40 df, greater than .05 level of significance for directional tests (1.684)

The T-ratios for words repeated are presented in Table V as results of testing the following hypotheses:

7. For 3^1 readers there are significantly fewer words repeated on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

8. For 3^1 readers there are significantly fewer words repeated on SKApT, Form N than on SKApT, Form SM.

9. For 3^1 readers there are significantly fewer words repeated on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Test, oral reading.

TABLE V

WORDS REPEATED

Tests	Mean	S.D.	T-ratio
SKApT, Form N; Gates-McKillop	0.0625 4.9375	.2421 4.0692	8.1987*
SKApT, Form N; SKApT, Form SM	0.0625 0.1667	.2421 .3727	1.6070
SKApT, Form SM; Gates-McKillop	0.1667 4.9375	.3727 4.0692	8.0042*

*With 40 df, greater than .0005 level of significance for directional tests (3.551)

For treatment of words repeated, hypotheses of significant difference in the direction predicted between both forms of SKApT and the Gates-McKillop are in agreement with the findings and may be accepted on the basis of the evidence presented.

The hypothesis of significant difference between SKApT, Form N and SKApT, Form SM is not in agreement with the findings and cannot be accepted on the basis of the evidence presented.

The very few number of words repeated on SKApT, Form N (sum of 3) and SKApT, Form SM (sum of 8) as compared to the Gates-McKillop (sum of 237) would probably indicate that repetitions will occur either in an effort to strengthen the reader's understanding of the material or to correct a mispronounced word, but when meaningfulness is not present and pronunciation is not absolute, then repetitions serve no purpose and do not occur. The few repetition errors on SKApT, Form N may be better explained in terms of the cybernetic process which operates when one speaks or reads aloud. When an oral response is heard by the reader, he matches that production with the auditory memory that he has of a known word, but if the word is unfamiliar then this verification mechanic cannot function.

The Differences Among Various Kinds of Test Materials in Positional Errors

This portion of the chapter presents the results of the statistical analysis performed in order to test the hypotheses which are concerned with errors in the positional categories: wrong order, wrong beginnings, wrong middles, wrong endings, and wrong in several parts.

The T-ratios for wrong order (full reversals) are presented in Table VI as results of testing the following hypotheses:

10. For 3^1 readers there are significantly more full reversals on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

11. For 3^1 readers there are significantly more full reversals on SKApT, Form N than on SKApT, Form SM.

12. For 3^1 readers there are significantly more full reversals on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE VI

FULL REVERSALS

Tests	Mean	S.D.	T-ratio
SKApT, Form N; Gates-McKillop	.0625 .0625	.2421 .2421	0
SKApT, Form N; SKApT, Form SM	.0625 .0208	.2421 .2421	1.0163
SKApT, Form SM; Gates-McKillop	.0208 .0625	.2421 .2421	1.0163

For treatment of full reversals, all hypotheses of significant difference are is disagreement with the findings and cannot be accepted on the basis of the evidence presented. It is expected that the non-significance of these differences reflects the fact that full reversal errors generally do not occur after the achievement of a reading level of 2.8 and the subjects in this sample had achieved a reading level of 3^1.

The T-ratios for wrong order (partial reversals) are presented in Table VII as results of testing the following hypotheses:

13. For 3^1 readers there are significantly more partial reversals

on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

14. For 3^1 readers there are significantly more partial reversals on SKApT, Form N than on SKApT, Form SM.

15. For 3^1 readers there are significantly more partial reversals on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE VII

PARTIAL REVERSALS

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	2.7083	2.5328	7.1726*
Gates-McKillop	0.0417	.2857	
SKApT, Form N;	2.7083	2.5328	5.3227*
SKApT, Form SM	0.5833	1.0375	
SKApT, Form SM;	0.5833	1.0375	
Gates-McKillop	0.0417	.2857	3.4509**

*With 40 df, greater than .0005 level of significance for directional tests (3.551)

**With 40 df, greater than .005 level of significance for directional tests (2.704)

For treatment of partial reversals, all hypotheses of significant difference in the direction predicted are in agreement with the findings and may be accepted on the basis of the evidence presented. The large number of partial reversals on SKApT, Form N (sum of 130) as

compared with SKApT, Form SM (sum of 28) and the Gates-McKillop (sum of 2) may be explained in terms of an inner speech process which operates in response to a visual language stimulus and directs the articulators in oral production. In essence, the visual message clues the auditory memory association which the reader "hears" and then produces. Since the reader has no auditory memory trace for nonsense words, the partial reversals may result from inaccurate directions to the articulators. The many additions and omissions of sounds within the nonsense words which were observed informally further tend to substantiate this explanation.

The T-ratios for words with wrong beginnings are presented in Table VIII as results of testing the following hypotheses:

16. For 3^1 readers there are significantly more words with wrong beginnings on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

17. For 3^1 readers there are significantly more words with wrong beginnings on SKApT, Form N than on SKApT, Form SM.

18. For 3^1 readers there are significantly more words with wrong beginnings on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

For treatment of words with wrong beginnings, the significant differences in the direction anticipated are in agreement with the hypotheses for comparison of SKApT, Form N with the other tests. The hypothesis of difference between SKApT, Form SM and the Gates-McKillop is not in agreement with the findings. The low frequency of errors in the beginning of words on the Gates-McKillop and SKApT, Form SM is demonstrative of the observation that this kind of error generally decreases

after a reader has achieved an instructional reading level of 2.8. The large number of beginning errors on SKApT, Form N is probably a result of the frustration produced by overly difficult reading materials.

TABLE VIII

WRONG BEGINNINGS

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	4.6875	3.0287	5.5975*
Gates-McKillop	1.7500	.9419	
SKApT, Form N;	4.6875	3.0287	5.8662*
SKApT, Form SM	1.8542	1.3384	
SKApT, Form SM;	1.8542	1.3304	0.3028
Gates-McKillop	1.7500	.9419	

*With 40 df, greater than .0005 level of significance for directional tests (3.551)

The T-ratios for words with wrong middles are presented in Table IX as results of testing the following hypotheses:

19. For 3^1 readers there are significantly more words with wrong middles on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

20. For 3^1 readers there are significantly more words with wrong middles on SKApT, Form N than on SKApT, Form SM.

21. For 3^1 readers there are significantly more words with wrong

middles on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE IX

WRONG MIDDLES

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	19.5417	7.1062	16.9162*
Gates-McKillop	1.7292	1.2075	
SKApT, Form N;	19.5417	7.1062	10.8232*
SKApT, Form SM	7.1250	3.3704	
SKApT, Form SM;	7.1250	3.3704	10.2702*
Gates-McKillop	1.7292	1.2075	

*With 40 df, greater than .0005 level of significance for directional tests. (3.551)

For treatment of words with wrong middles all hypotheses of significant difference in the direction anticipated are in agreement with the findings and accepted on the basis of the evidence presented. In explanation of these differences it is assumed that this error category is a direct measurement of ability to apply word recognition skills to unfamiliar words, and that the SKApT Forms have demonstrated greater facility in this ability to measure a reader's application of skills.

The T-ratios for words with wrong endings are presented in Table X as results of testing the following hypotheses:

22. For 3^1 readers there are significantly more words with wrong

endings on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

23. For 3^1 readers there are significantly more words with wrong endings on SKApT, Form N than on SKApT, Form SM.

24. For 3^1 readers there are significantly more words with wrong endings on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE X

WRONG ENDINGS

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	7.4583	3.6398	8.6287**
Gates-McKillop	2.2708	1.9377	
SKApT, Form N;	7.4583	3.6398	6.1147**
SKApT, Form SM	3.3750	2.7736	
SKApT Form SM;	3.3750	2.7736	2.2389*
Gates-McKillop	2.2708	1.9377	

**With 40 df, greater than .0005 level of significance for directional tests (3.551)

*With 40 df, greater than .025 level of significance for directional tests (2.021)

For treatment of words with wrong endings, all hypotheses of significant difference in the direction anticipated are in agreement with the findings and accepted on the basis of the evidence presented. As with wrong beginnings and wrong middles, wrong endings may be explained

by the assumption that the errors in this category are direct demonstration of the competency of nonsense or semi-meaningful materials in the measurement of word recognition skill.

The T-ratios for words wrong in several parts are presented in Table XI as results of testing the following hypotheses:

25. For 3^1 readers there are significantly more words which are wrong in several parts on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

26. For 3^1 readers there are significantly more words which are wrong in several parts on SKApT, Form N than on SKApT, Form SM.

27. For 3^1 readers there are significantly more words which are wrong in several parts on SKApT, Form SM than on Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE XI

WRONG IN SEVERAL PARTS

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	12.2292	8.4144	5.3827**
Gates-McKillop	5.2250	3.3268	
SKApT, Form N;	12.2292	8.4144	2.7430*
SKApT, Form SM	8.2708	5.2031	
SKApT, Form SM;	8.2708	5.2031	3.4922*
Gates-McKillop	5.2250	3.3268	

*With 40 df, greater than .005 level of significance for directional tests (3.704)

**With 40 df, greater than .0005 level of significance for directional tests (3.551)

For treatment of words wrong in several parts, all hypotheses of significant difference in the direction anticipated are in agreement with the findings and accepted on the basis of the evidence presented. Explanation of the significance of these differences is probably in the fact that these errors are a direct measure of abilities in word recognition.

Differences Among Various Kinds of Test Materials in Total Word Recognition Errors

This portion of the paper presents the results of the statistical analysis performed in order to test the hypotheses which are concerned with errors in word recognition.

The T-ratios of word recognition errors are presented in Table XII as results of testing the following hypotheses:

28. For 3^1 readers there are significantly more total word recognition errors on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

29. For 3^1 readers there are significantly more total word recognition errors on SKApT, Form N than on SKApT, Form SM.

30. For 3^1 readers there are significantly more total word recognition errors on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

For treatment of word recognition errors, all hypotheses of significant difference in the direction expected are in agreement with the findings and accepted on the basis of the evidence presented. These results are interpreted as being indicative of the expectation that the SKApT, forms would be effective in identifying word recognition skill needs for disabled readers.

TABLE XII

TOTAL WORD RECOGNITION ERRORS

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	47.0208	14.954	15.7214*
Gates-McKillop	10.7600	5.1498	
SKApT, Form N;	47.0208	14.954	10.8843*
SKApT, Form SM	20.9375	6.8020	
SKApT, Form SM;	20.9375	6.8020	8.1863*
Gates-McKillop	10.7600	5.1498	

*With 40 df, greater than .0005 level of significance for directional tests (3.551)

Differences Among Various Kinds of Test Materials in Consonant and Vowel Errors

This portion of the paper presents the results of the statistical analysis performed in order to test the hypotheses which are concerned with errors in the consonant and vowel categories.

The T-ratios for consonant errors are presented in Table XIII as results of testing the following hypotheses:

31. For 3^1 readers there are significantly more consonant errors on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

32. For 3^1 readers there are significantly more consonant errors on SKApT, Form N than on SKApT, Form SM.

33. For 3^1 readers there are significantly more consonant errors

on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE XIII

CONSONANT ERRORS

Tests	Mean	S.D.	T-ratio
SKApT, Form N; Gates-McKillop	19.8542 6.4375	9.5416 4.1579	8.8373*
SKApT, Form N; SKApT, Form SM	19.8542 10.4583	9.5416 5.5338	5.8399*
SKApT, Form SM; Gates-McKillop	10.4583 6.4375	5.5338 4.1579	3.9824*

*With 40 df, greater than .0005 level of significance for directional tests (3.551)

For treatment of consonant errors, all hypotheses of significant difference in the direction anticipated are in agreement with the findings and accepted on the basis of the evidence presented. As expected, the SKApT, forms identified more consonant errors than the Gates-McKillop, further supporting the assumption that the forms of SKApT would be serviceable in diagnostic situations.

The T-ratios for vowel errors are presented in Table XIV as results of testing the following hypotheses:

34. For 3^1 readers there are significantly more vowel errors on

SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

35. For 3^1 readers there are significantly more vowel errors on SKApT, Form N than on SKApT, Form SM.

36. For 3^1 readers there are significantly more vowel errors on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

TABLE XIV

VOWEL ERRORS

Tests	Mean	S.D.	T-ratio
SKApT, Form N;	21.9625	9.8434	9.6631*
Gates-McKillop	6.4167	3.3281	
SKApT, Form N;	21.9625	9.8434	5.6107*
SKApT, Form SM	11.9167	5.2908	
SKApT, Form SM;	11.9167	5.2908	6.0324*
Gates-McKillop	6.4167	3.3281	

*With 40 df, greater than .0005 level of significance for directional tests (3.551)

For treatment of vowel errors, all hypotheses of significant difference in the direction anticipated are in agreement with the findings and accepted on the basis of the evidence presented. These differences again suggest that in reading known words the disabled reader does not

apply word recognition skills nor does he generalize the knowledge inherent in his identification of the known word. If the application of word recognition skills were the forte of disabled readers the differences between the SKApT, forms where nearly identical elements occur would not have been significant.

Summary

In answer to the questions about behavioral errors, the following hypotheses were correct predictions of the findings and were accepted.

1. For 3^1 readers there are significantly fewer words added on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

2. For 3^1 readers there are significantly fewer words added on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

3. For 3^1 readers there are significantly fewer words omitted on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

4. For 3^1 readers there are significantly fewer words repeated on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

5. For 3^1 readers there are significantly fewer words repeated on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

In answer to questions about positional errors, the following hypotheses were correct predictions of the findings and were accepted.

1. For 3^1 readers there are significantly more partial reversals

on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

2. For 3^1 readers there are significantly more partial reversals on SKApT, Form N than on SKApT, Form SM.

3. For 3^1 readers there are significantly more partial reversals on SKApT, SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

4. For 3^1 readers there are significantly more wrong beginnings on SKApT, Form N than the Gates-McKillop Reading Diagnostic Tests, oral reading.

5. For 3^1 readers there are significantly more wrong beginnings on SKApT, Form N than on SKApT, Form SM.

6. For 3^1 readers there are significantly more wrong middles on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

7. For 3^1 readers there are significantly more wrong middles on SKApT, Form N than on SKApT, Form SM.

8. For 3^1 readers there are significantly more wrong middles on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

9. For 3^1 readers there are significantly more wrong endings on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

10. For 3^1 readers there are significantly more wrong endings on SKApT, Form N than on SKApT, Form SM.

11. For 3^1 readers there are significantly more wrong endings on

SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

12. For 3^1 readers there are significantly more words wrong in several parts on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

13. For 3^1 readers there are significantly more words wrong in several parts on SKApT, Form N than on SKApT, Form SM.

14. For 3^1 readers there are significantly more words wrong in several parts on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

In answer to questions about word recognition errors, the following hypotheses were correct predictions of the findings and were accepted.

1. For 3^1 readers there are significantly more word recognition errors on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

2. For 3^1 readers there are significantly more word recognition errors on SKApT, Form N than on SKApT, Form SM.

3. For 3^1 readers there are significantly more word recognition errors on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

In answer to questions about consonant and vowel errors, the following hypotheses were correct predictions of the findings and were accepted.

1. For 3^1 readers there are significantly more consonant errors on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

2. For 3^1 readers there are significantly more consonant errors on SKApT, Form N than on SKApT, Form SM.

3. For 3^1 readers there are significantly more consonant errors on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

4. For 3^1 readers there are significantly more vowel errors on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

5. For 3^1 readers there are significantly more vowel errors on SKApT, Form N than on SKApT, Form SM.

6. For 3^1 readers there are significantly more vowel errors on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

In answer to questions about behavioral errors the following hypotheses were not correct predictions of the findings and could not be accepted.

1. For 3^1 readers there are significantly fewer words added on SKApT, Form N than on SKApT, Form SM.

2. For 3^1 readers there are significantly fewer words repeated on SKApT, Form N than on SKApT, Form SM.

3. For 3^1 readers there are significantly fewer words omitted on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

4. For 3^1 readers there are significantly fewer words omitted on SKApT, Form N than on SKApT, Form SM.

In answer to questions about positional errors, the following

hypotheses were not correct predictions of the findings and could not be accepted.

1. For 3^1 readers there are significantly more full reversals on SKApT, Form N than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

2. For 3^1 readers there are significantly more full reversals on SKApT, Form N than SKApT, Form SM.

3. For 3^1 readers there are significantly more full reversals on SKApT, Form SM than the Gates-McKillop Reading Diagnostic Tests, oral reading.

4. For 3^1 readers there are significantly more wrong beginnings on SKApT, Form SM than on the Gates-McKillop Reading Diagnostic Tests, oral reading.

CHAPTER V

SUMMARY AND CONCLUSIONS

General Summary of the Investigation

This investigation examined the measurement of reading skills as assessed by different kinds of test materials; the Gates-McKillop Reading Diagnostic Tests, oral reading and two original test forms, one semi-meaningful and one nonsensical. Four areas of concern were investigated: (1) the mean number of behavioral errors; (2) the mean numbers of positional errors; (3) the mean number of word recognition errors; and (4) the mean number of consonant and vowel errors. Hypotheses that significant difference in a given direction among various kinds of test were used.

Students with limiting disabilities in reading from fourth grade classrooms in one county were used in this investigation. These students were administered a battery of diagnostic reading tests.

The testing instruments used were the Gates-McKillop Reading Diagnostic Tests, oral reading; SKApT, Form N; and SKApT, Form SM with an examination being made of each test in twelve oral reading error categories: the number of word recognition errors, the number of consonant errors, the number of vowel errors, the number of words added, the number of words omitted, the number of words repeated, the number of words in wrong order (full and partial reversals), the number of words with wrong beginnings, the number of words with wrong middles, the

number of words with wrong endings, and the number of words wrong in several part.

Summary of Results

Results are summarized in the following areas of concern: (1) differences in behavioral error categories among the test material used; (2) differences in positional error categories among the test materials used; (3) differences in total word recognition errors among the test materials used; and (4) differences in vowel and consonant error categories among the test materials used.

The results of the portion of the study dealing with differences of behavioral error categories between SKApT, Form N and the Gates-McKillop Reading Diagnostic Tests, oral reading, show significant differences in all behavioral error groups. Differences for behavioral categories are significant for SKApT, Form SM, and the Gates-McKillop also. Only on words omitted is a significant difference demonstrated between SKApT, Form N and SKApT, Form SM.

A summary of the significance of differences between each of the tests in each oral reading category is presented in Table XV.

In explanation of the differences in the behavioral error categories of words added, words omitted, and words repeated, it is suggested that these errors are influenced by the nature of the task, and/or by the individual disabled reader's habits in coping with a reading task. The larger sum of words omitted on SKApT, Form N would most likely be the single behavior that most strongly indicates the frustration felt by the disabled reader as he faces an extremely taxing chore. The larger number of errors in words added and words repeated

on the Gates-McKillop would suggest that these errors occur as a result of a cybernetic process which operates only when enough meaningfulness is present that errors in interpreting the message can be recognized. This interpretation of these errors would lead to the implication that disabled readers may not gain the comprehension clues from the structure of the language that better readers do.

In the portion of the study dealing with positional errors, there was no significant difference in full reversals in any of the tests. The factor which is expected to be operative in this situation is the level of reading achievement since this particular type of error is expected generally to cease being an important error in reading by the time a youngster has reached approximately a reading elvel of 2.8 and the students in this sample were achieving at a reading level of 3[1].

The other non-significant difference is in wrong beginnings between SKApT, Form SM and the Gates-McKillop and is expected to reflect the fact that readers usually make fewer errors in the beginnings of words after achieving an instructional reading level of 2.8. The continuation of a large number of errors in word beginnings of SKApT, Form N is probably an indication of the reactions wrought in a disabled reader by an overly difficult task.

The significant differences in errors between all of the tests on wrong middles, wrong endings, partial reversals, and wrong in several parts are interpreted as differences in the efficiency of measuring the lack of success that disabled readers have in attacking unknown words. The differences are in agreement with the anticipation that more skill deficiencies would be identified by the two forms of SKApT, than by the Gates-McKillop.

TABLE XV

SUMMARY TABLE OF SIGNIFICANCES OF DIFFERENCES

Tests:	Gates-McKillop SKApT, N		SKApT, N SKApT, SM		SKApT, SM Gates-McKillop	
Categories	T-ratio	s	T-ratio	s	T-ratio	s
Words Added	4.4774	.0005	1.4148	NS	3.3593	.005
Words Omitted	1.7421	.05	3.0375	.005	1.7712	.05
Words Repeated	8.1987	.0005	1.6070	NS	8.0042	.0005
Full Reversals	0	NS	1.0163	NS	1.0163	NS
Partial Reversals	7.1726	.0005	5.3227	.0005	3.4509	.005
Wrong Beginnings	5.5975	.0005	5.8662	.0005	.3028	NS
Wrong Middles	16.916	.0005	10.8232	.0005	10.2702	.0005
Wrong Endings	8.6287	.0005	6.1174	.0005	2.2389	.025
Wrong Several Parts	5.3827	.0005	2.7430	.005	3.4922	.005
Word Recognition (Total)	15.7214	.0005	10.8843	.0005	8.1863	.0005
Consonant	8.8373	.0005	5.8399	.0005	3.9824	.0005
Vowels	1.6631	.0005	5.6107	.0005	6.0324	.0005

In the portion of the study dealing with total word recognition errors, differences among all of the tests were significant, thus implying that semi-meaningful and nonsense kinds of test materials can be more effective in assessing the word recognition skill needs of disabled readers than can other materials.

The portion of the study concerned with consonant and vowel errors further substantiates the interpretation that test materials of various kinds have different degrees of competencies in identifying word recognition skills needed by disabled readers. This interpretation is supported by the significant differences found among the various kinds of tests used in this study.

Table XVI gives a summary of the means, sums, and standard deviations of errors for each oral reading category on each test.

Among the oral reading categories of errors that reflect the readers' strengths or weaknesses in word recognition skills, the pattern is for the largest number of errors to occur on SKApT, Form N; the second largest number of errors occurs on SKApT, Form SM; and the fewest number of errors occurs on the Gates-McKillop Reading Diagnostic Test. From this information, it can be concluded that the greatest degree of knowledge for guiding instructional programs could be gained from SKApT, Form N. The high occurrence of word recognition, consonant, and vowel errors on tests using nonsense words would imply that disabled readers do not make extensive use of word recognition skills. At the same time, the fairly low number of word recognition errors on tests using meaningful words would imply that disabled function at their reading achievement level on the basis of visual recognition of the whole word instantaneously. However, it may be that the nature of

TABLE XVI

SUMMARY TABLE OF MEANS AND STANDARD DEVIATIONS

Test	SKApT, N		SKApT, SM		Gates-McKillop	
	Mean	SD	Mean	SD	Mean	SD
Category						
Words Added	.0208	.1428	.1250	.4841	.6458	.9463
Words Omitted	4.2917	6.304	1.3125	2.337	2.437	3.673
Words Repeated	.0625	.2421	.1667	.372	4.9375	4.0692
Full Reversals	.0625	.2421	.0208	.2421	.0625	.2421
Partial Reversals	2.7083	2.5328	.5833	1.0375	.0417	.2857
Wrong Beginnings	4.6875	3.0287	1.8542	1.338	1.7500	.9419
Wrong Middles	19.541	7.106	7.1250	3.37	1.729	1.2705
Wrong Endings	7.4583	3.6393	.3750	2.7736	2.2708	1.9377
Wrong Several Parts	12.229	8.414	8.2708	5.2031	5.225	3.326
Word Recognition (Total)	47.020	14.954	20.937	6.802	10.760	5.1498
Consonants	19.8542	9.541	10.458	6.533	6.4375	4.157
Vowels	21.9629	9.843	11.9167	5.290	6.4167	3.3281

the task in reading nonsense is such that it thwarts efforts to be correct by virtue of the fact that feedback knowledge gained from the pronunciation does not indicate to the reader the correctness or incorrectness of his response.

While tradition maintains equality among the various categories of oral reading errors, the percentages of occurrence presented in Table XVII would tend to suggest that there are qualitative differences among them. Although the passages read by the students comprising this sample were of nearly equal length, the numbers of errors occurring on each are quite different. However, the percentages of errors occurring in each category are nearly identical between SKApT; Form N and SKApT, Form SM.

Table XVII presents in percentages, the ratio of errors in each category in relation to the total errors from each test.

In comparing the percentages of word recognition errors, further substantiation is demonstrated for the conclusion that a greater degree of information for guiding instructional programs could be gained from either form of SKApT. On SKApT, Form N, 91% of the total errors are word recognition errors; on SKApT, Form SM, 91% of the total errors are word recognition errors; and on the Gates-McKillop, 55% of the total errors are word recognition errors. Thus of all the errors made on a test, the two SKApT, forms provide the highest ratio of information that is useful in identifying the readers' weakness in word attack skills and in providing direction for instructional plans.

TABLE XVII

PERCENTAGES OF TOTAL ERRORS FOR EACH CATEGORY ON EACH TEST

Test	SKApT, N	Gates	SKApT, SM
Category			
Additions	0.04%	3.4%	0.5%
Omissions	8.3%	12.8%	5.7%
Repetitions	0.12%	26.0%	0.7%
Full Reversals	0.12%	3.3%	0.08%
Partial Reversals	5.2%	2.2%	2.5%
Wrong Beginning	9.0%	9.2%	8.1%
Wrong Middle	37.9%	9.1%	31.0%
Wrong Ending	14.4%	12.0%	14.0%
Wrong Several Part	24.1%	27.0%	36.0%
Word Recognition	91.0%	55.0%	91.0%
Consonant	39.0%	35.0%	46.0%
Vowel	41.0%	34.0%	52.0%

Concluding Statement

The results of this study would support the concept that greater specificity in planning remedial instruction can be provided by a test utilizing nonsense or semi-meaningful material represented here by the SKApT forms because of the specific identification of different word attack skill needs apart from reading behaviors. It is apparent from these findings that the skills used in recognizing words can be more adequately assessed by requiring their application to nonsense words than by inferring deficiencies from meaningful context.

Although both forms of SKApT are highly effective in identifying word recognition skill needs, a preference for SKApT, Form SM is determined on the basis of the lesser number of errors of omission, wrong beginnings, and partial reversals which are errors that, while important in working with a student, provide little direction in determining what should be included in the remedial instruction for a disabled reader.

Recommendations

1. That another study using similar materials and the same procedures be effected using other disabled readers at both higher and lower instructional reading levels.

2. That another study be effected using a sample of students whose instructional reading level is the same as their potential level and using materials similar to and procedures the same as this study.

3. That a study concerned with the comprehension clues gained from the structure of the language by good and poor readers be undertaken.

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APPENDIX A

GATES-McKILLOP ERROR ANALYSIS

a. Omissions of Words

Number of whole words omitted. This includes failures to respond in five seconds and also words skipped over or "refused" by the child.

b. Additions of Words

Whole words added.

c. Repetitions of two or more consecutive words.

d. Mispronunciations of a word wholly or in part. The words in this grouping are the total number of words falling under classifications g through k. All that is necessary to compute the number of errors in this category, therefore, is to add together the errors in the others.

e. Full Reversals, such as was for saw, etc., due to clear reversal of letters; also such reversals as toin for into.

f. Reversal of Parts. Any case not entered under e in which the letters or word-parts are in a wrong order, such as arnely for nearly, aws for saw, are for ear.

g. Wrong Order. This is the total number of words falling under e and f; that is, the total number of words in which the order of letters or parts is incorrect.

h. Wrong Beginning. These are cases in which the initial part of the word is wrong, but in which the order of parts is correct. Thus here would go bad for had, stove for drove, as for is, etc. Cases in which the first part is omitted should be included, such as ad for bad, rove for drove, is for his. Also parts added, such as into for to, almost for most.

i. Wrong Middle. Order of elements correct; for example, row for raw, smelling for smiling. Omissions of middle parts, such as door for

doctor, had for head, money for monkey. Also parts added, such as heard for head, bearing for being.

J. Wrong Ending. Order of elements correct; for example, it for is, dig for did, all for alone, also for alone, peep for peak, cry for cried, no for now, start for stack. Ending omitted, such as some for something, brow for brown, mad for made, no for not. Also parts added, such as smiling for smile, rats for rat, stopped for stop.

K. Wrong in Several (two or more) Parts; for example, barking for donkey, ill for silly, biting for better, blow for brown, balloon for baby, etc., when the incorrect word is not a new word made up of parts of the actual word in incorrect order. This classification would include totally different words, such as are for his, come for sing. Include contractions, such as don't for do not, in this category.

Care must be exercised to distinguish between errors in which the elements are given in incorrect order and hence are to be classified under e or f, and errors which are not due to rearrangement of word parts and hence are to be included under h, i, j, or k. Mispronunciations should be entered in only one of the categories. The total of g, h, i, j, and k errors will therefore be the total mispronunciations to be entered under d.

APPENDIX B

ORIGINAL STORY FROM WHICH THE TEST FORMS WERE DEVISED

It was late one morning. Six wee men were watching TV in my house. I knew that they were from Pluto. Soon a picture of a Pluto candy bar was shown. The six men became very upset. They shouted, "Look! A man is telling of finding our space ship!" "What should we do?" Then the wee men went into the kitchen. They looked at the stove and said, "What is that?" One of the men felt the hot stove. He screamed, "Ouch! The thing burned me!" Another of the wee men found a bag of popcorn. He asked, "What is that?" I took the popcorn, and he said, "What are you doing?" The six wee men watched the corn pop. They said, "The beans are bursting!" One of them grabbed the lid off the popper. Popcorn popped all over the kitchen. The wee men ran wildly. I heard them shout, "Quickly! The boy's food is meanest of all things! We must run faster." I had hoped we could get to know each other better. But they ran straight to their space ship. They flew away and I heard them shout, "Your world is bad. We shall not return again!"

APPENDIX C

SEMI-MEANINGFUL FORM OF SKApT

It was late one morning. Six wee men were watching TV in my house. I knew that they were from Otloip. Soon a picture of an Otloip candy bar was shown. The six men became very upset. They shouted, "Mab! A lem is vogging of zidding our yout gope! Jupe kade chike freme?" Then the wee men went into the kitchen. They looked at the stove and said, "Shud baim whoad?" One of the men felt the hot stove. He screamed, "Troyt! The quaym wauped ler!" Another of the wee men found a bag of popcorn. He asked, "Gydcy thrawp?" I took the popcorn, and he said, "Primb are you gurping?" The six wee men watched the corn pop. They said, "The plirbs are sputting!" One of them grabbed the lid off the popper. Popcorn popped all over the kitchen. The wee men ran wildly. I heard them shout, "Knidgely! The feab's wreff is hibbest of zox thams!" "Vub cack neep slecher." I had hoped we could get to know each other better. But they ran straight to their space ship. They flew away and I heard them shout, "Your poon is rahl. We sall not tewps yane!"

APPENDIX D

TABLE DEMONSTRATING THE REGROUPING OF PHONEMES FROM LEXICAL ITEMS TO NONSENSE TERMS

LEXICAL TERM	POSITION I	M	F	NONSENSE TERM I	M	F
bar	b		ar	bex		gar
became	be	c	ame	beaking	acay	scrame
bag	b	a	g	ben	fand	laig
better	b	e	tt	bor	tetch	utt
ask	a		sk	acay		tisk
candy	c	a nd	y	coctee/ pate/manded		py
corn	c	or	n	cowt		ben
felt	f	e	lt	fand	het	stoult
flew	fl		ew	Flitchew		hew
found	f	ou	nd	fim	stoult	fand
get	g	e	t	gar	ben	shat
grab	gr	a	b	greve	mand	roub
hear	h	ea	r	het	seach	bor
hot	h	o	t	hew	coctee	kated
house	h	ou	se	hoont	roub	wase
hope	h	o	pe	honed	shoce	knope
knew	kn		ew	knope		Flitchew
kitchen	k i	tch	en	kated/ wid/	Flitchew/	stren
late	l	a	te	lin	wase	pate
lid	l	i	d	lought	lin	wid
look	l	oo	k	laig	hoont	SK
men	m	e	n	manded	wepsure	lin
morning	m	or	n	mip	torve	wen
picture	p i	ct	ure	pate fims/	coctee	wepsure
pop	p	o	p	py	bor	mip
ran	r	a	n	roub	wan	hon
six	s	i	x	SK		bex
shown	sh	ow	n	shat	cowt	
shout	sh	ou	t	shoce	shoun	cowt
said	s	ai	d	seach		
scream	scr	ea	m	scrame	beaking	fim
straight	str	ai	ght	stren	laig	lought
space	sp	a	ce	spoop	kated	shoce
ship	sh	i	p	shoun	mip	spoop
TV	t		v	tetch		
took	t	oo	k	torve	spoop	beaking
touch	t	ou	ch	tisk	lought	seach
upset	u p	s e	t	ut wepsure	greve	het
wee	w		ee	wid		coctee
watch	w	a	tch	wase	shat	tetch
went	w	e	nt	wepsure		hoont
wild	w	i	ld	wen	tisk	uld
stove	st	o	ve	stoult	honed	torve

APPENDIX E

NONSENSE FORM OF SKApT

It was bex one greving. Hoont torve wids were beaking SK in my coctee. I strenned that they were from Flitchew. Soon a spoop of a Flitchew stoult cowt was honed. The torve wids utted very laig. They fanded, "Mab! A lem is vogging of zidding our yout gope! Jupe kade chike freme?" Then the torve wids roubed into the wepsure. They manded at the scrame and knoped, "Shud baim whoad?" One of the wids kated the mip scrame. He loughted, "Troyt! The quaym wauped ler!" Another of the torve wids wased a tetch of shocelin. He seached, "Gydcy thrawp?" I tisked the shocelin, and he knoped "Primb are you gurping?" The hoont torve wids beaked the lin shoce. They knoped, "The plirbs are sputting!" One of them shouned the bor off the shocer. Shocelin shoced all over the wepsure. The torve wids acay hewly. I pated them fand, "Knidgely! The feab's wreff is hibbest of zox thams! Vub cack neep slecher." I had shatted we could gar to stren each other fimer. But they acay het to their ben py. They ulded away and I pated them fand, "Your poon is rahl. We sall not tewps yane!"

APPENDIX F

ACCEPTABLE PRONUNCIATION OF NONSENSE WORDS

ACCEPTABLE PRONUNCIATION OF NONSENSE WORDS

bex	b	e England entree system egg	ks	
greve greving (give, giving) (have, having)	gr	e evening lever neve revanche reveal	v	
hoont	h	oo brooch flood moon look	nt	
torve	t	or force attorney	v	
wid wids	w	i widow tidal machine medicine	d(z)	
BEAK(ing)	b	ea team break bread	k	ing
coctee	k	o fox wolf move folk son women	k	tee levee melee
Flitchew	fl	i (see wids)	t	ch / sh ew blew few sew
STOULT	ST	ou cough shout couple should SOUL group	lt	
cowt	k	ow now blown	t	
honed hone (shine, shined)	h	o note move some	n	d
SPOOP	sp	oo spoon look blood brooch	p	
utted ut (pit, pitted)	u under busy put rule useful	t		ted patted
laig	l	ai rain plaid said aisle naive	g	

strenned stren	str strait	en then England	ed canned	
knoped	kn know	o p (see gope)	t capped	
yout	y	ou (see stoult)	t	
yout	y (same as above)	ou	t	
gope	g	o (see honed)	p	
jupe	j	u accuse (see ut)	p	
loughted	l (see stoult)	ou straight draught	ght	ed slated
wauped	w	au autumn gauge laugh hautboy sauerkraut	p	t slapped
roubed	r	ou (see stoult)	b	ed sobbed
wepsure	w	e (see bex)	p	s ure sure capt- ure

fanded fand	f	a fan father any machine & bass-fiddle	nd	ed sanded
shud	sh	u (see ut)	d	
baim	b	ai (see laig)	m	
WHOAD	WH where who	oa road broad protozoa oasis	d	
kade	k	a fate	d	
CHIKE	ch cherub choir Chicago	i (see wid)	k	
TROYT	tr	oy boy	t	
quaym	qu queen quay	ay say says bayou quay	m	
freme	fr	e (see greve)	m	
ler	l	er number merit austere		

tetch	t	e (see bex)	tch	
acay	a acre about	k	ay (see quaym)	
shocelin	sh	o (see grope)	c	
thams	th there thing	a (see fanded)	mm	z
vub	v	u (see ut)	b	
cack	k	a (see fanded)	k	
neep	n	ee keen been	p	
slecher	sl	e (see bex)	ch (see chike)	er
shatted	sh	a (see fanded)	t	ted
GAR	g	ar chart charity		
fimer	f	i (see wid)	m	e r

bor	b	or (see torve)		
hewly	h	ew (see Flitchew)		ly
lin	l	i (see Flitchew)	n	
ben	b	e (see bex)	n	
py	p		y by candy	
ULDED	U (see ut)	ld	ed	
poon	p	oo (see spoop)	n	
Rahl	r	a	l	
sall	s	all shall		
TEWPS	t	ew (u)	p	s
yane	y	a	n	
mab	m	a (see fanded)	b	

het	h	e	t	
		(see bex)		
zidding	z	i	d	ing
		(see wids)		
manded	m	a	nd	ed
		(see fanded)		
seached	s	ea	ch	ed
		(see beaking)	(see chiked)	hatched
gydcy	g	y	d	c y
		gypsy Egypt gift		racy spicy
thrawp	thr	aw	p	
	three	awful raw		
tisked	t	i	sk	ed
		(see Flitchew)		frisked
primb	pr	i	m	
		(see Flitchew)		
gurping	g	ur	p	ing
		lurch		
plirbs	pl	ir	b	s
		girl		cabs
sputting	sp	u	t	ing
		(see stoult)		

lem	l	e	m	
		(see bex)		
vogging	v	o	g	ing
		(see coctee)		
scrame	scr	a	m	
		(see kade)		
pated	p	a	t	d
		(see kade)		
knidgely	kn	i	dg	ly
			edge bridge	
feab's	f	ea	b	z
		(see beaking)		
wreff	wr	e		ff
	wrong	(see bex)		off
hibbest	h	i	b	est
		(see Flitchew)		
zox	z	o	x	
		(see coctee)		
shouned	sh	ou	n	ed
		(see stoult)		

VITA
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