AN EXAMINATION AND COMPARISON OF THE ORAL AND SILENT READING RATES OF ABLE AND DISABLED READERS

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CHAPTER I

INTRODUCTION

If a reader can decode and comprehend tests of a higher level than is reflected on tests using rate as one of the criteria, should the reader be labeled as a poor, or disabled, reader on the basis of rate alone? Should the reader be placed in a basal reader based on the level of reading achievement measured by such tests? Such placement can result in the student being put through a program of instruction emphasizing decoding and comprehension, rather than emphasizing the need for the development of fluency. Watkins (1953) found disabled readers to be superior to normal readers in their knowledge of phonetic skills. Their difficulty was in the efficient application of the skills. Perhaps the slow reader needs a different instructional program than the reader who has not developed adequate decoding and comprehension skills. Perhaps the slow reader needs to spend more time reading than learning reading skills (Allington, 1977, 1980).

Correlations ranging from -.42 to .92 have been reported in studies examining the relationship between reading rate and comprehension (Blommers & Lindquist, 1944; Harris, 1968; Rankin, 1962; Tinker, 1932). Faster readers have not always been measured to be the better readers on all reading tasks (Carlson, 1949). Thus a definite positive linear correlation between reading rate

and comprehension has not been evidenced. Yet, reading rate continues to be an influential factor in the evaluation of reading achievement. Commonly employed standardized tests purporting to measure reading achievement use reading rate as one criterion for judging performance on the test. By the use of time-limit measurement, such tests penalize the slow reader who could read and comprehend material at a higher level if given the time to do so (Blommers & Lindquist, 1944). The level of material the slow reader is able to decode and comprehend may be higher than the level of achievement reflected on a time-limit test (Flanagan, 1939; Preston & Botel, 1951).

This same difficulty with time-limit measures is reflected on diagnostic reading tests. For example, on the Durrell Analysis of Reading Difficulty (1980) the reader may be able to decode and comprehend an oral reading passage within the accepted criteria, yet be unable to read the passage within the required time frame. Likewise, the reader may be able to successfully recall a silent reading passage, but be unable to read it within the required time frame. Rate alone can cause the measured level of reading achievement to be significantly lower than the level of the material the reader is actually able to decode and comprehend.

Slow readers are often mislabeled as disabled readers. When tests using rate as one of the criteria for determining reading achievement level, the slow reader's measured achievement level is often found to be significantly below the reader's expected reading level. The classroom teacher often judges (consciously or unconsciously) the reading ability/disability of the student on the basis of reading rate. Haupt & Leonardis (1981) found IQ to be the best predictor

of a reader's ability to comprehend reading material, but the teacher's judgment of the student's grade level reading achievement was found to be the best predictor of reading rate.

Research has focused on various aspects of reading rate, but very little research has examined the oral or the silent reading rates of able or disabled readers as well-defined groups. The number of studies comparing the oral and/or the silent reading rates of well-defined groups of able and disabled readers has been even more limited. Watkins (1953) and Dowdy (1981) compared the silent reading rates of disabled and able readers. Packman (1970) compared the oral and silent reading rates of good, average, and poor readers enrolled in the fourth grade. Burge (1982) examined the oral and silent reading rates of a group of fourth-grade readers scoring below the fiftieth percentile on the SRA reading subtest. The results of these studies are inconsistent. The variety of methodologies, definitions, and controls employed in the studies, did not generate data that could be accurately compared or contrasted to identify consistent trends within or between groups of able and/or disabled readers. Research is needed that: (a) defines able and disabled readers clearly, (b) measures the individual reading achievement level of all subjects using the same criteria, (c) ensures equal relative difficulty of the rate passages for each subject, (d) measures comprehension on the same or strictly comparable materials as the rate, (e) communicates to the subjects the purpose for reading the rate passage, and (f) identifies the general intellectual capacity of each subject. Research following these guidelines would provide some of the baseline data needed to begin to uncover the relationship of reading rate to the reading behaviors of able

and disabled readers. Analysis of such data would provide information critical to further research regarding the appropriate diagnosis and remediation of related reading difficulties. It would provide classroom teachers with a better understanding of reading rate and with the information necessary for the effective consideration of the interaction between the achievement level of the reader, the relative difficulty of the material for the reader, and the time required for the reader to successfully complete the assigned task.

Statement of the Problem and the Hypothesis

The purpose of this study is to examine and compare the oral and silent reading rates of able and disabled readers functioning at two levels of reading achievement (Grade Level 4 and Grade Level 6) on passages of two levels of relative difficulty (Difficulty 1 and Difficulty 2) to determine if a significant interaction of group, level of reading achievement, method of reading, and level of relative difficulty exists. Difficulty 1 in this study reflects the grade level of the highest selected passage of the Standard Reading Inventory (S.R.I.) (McCracken, 1966) on which the reader obtained a word recognition score of 95 - 100% accuracy and a comprehension score of 70 - 100% accuracy and is hereafter referred to as Difficulty 1 (≥95%, ≥70%). Difficulty 2 in this study reflects the grade level of the lowest passage of the S.R.I. on which the reader obtained a word recognition of less than 91% accuracy and/or a comprehension score of less than 70% accuracy and is hereafter referred to as Difficulty 2 (<91%, <70%). The following questions are the focus of this study:

1. Do the oral and the silent reading rates of able readers fluctuate as level of achievement and the relative difficulty level of the passages change?
2. Do the oral and silent reading rates of the disabled readers fluctuate as level of achievement and the level of relative difficulty of the passage change?
3. Are there significant differences between the silent and oral reading rates of able readers at different levels of achievement or between different levels of relative difficulty?
4. Are there significant differences between the silent and oral reading rates of disabled readers at different levels of achievement or between different levels of relative difficulty?
5. Are the oral reading rates of able and disabled readers significantly different at any level of achievement or at any level of relative difficulty?
6. Are the silent reading rates of able and disabled readers significantly different at any level of achievement or at any level of relative difficulty?
7. Are there significant differences in the variance between the oral and silent reading rates between able and disabled readers at any level of achievement or at any level of relative difficulty?

The research questions are addressed in one hypothesis to be tested at the .05 level of significance. The hypothesis to be tested is stated in the null as follows:

There is no significant interaction of group (able, disabled), method of reading (oral, silent), level of reading achievement (Grade 4, Grade 6), and level

of relative difficulty [Difficulty 1 (≥95%, ≥70%), Difficulty 2 (<91%, <70%)] affecting the relationship of the silent and oral reading rates of able and disabled readers.

Definition of Terms

Expected Reading Level (ERL) in this study will be determined by the Bond-Tinker Formula: ERL = (IQ/100 x years in school) + 1 (Bond & Tinker, 1967).

Disabled reader in this study refers to a reader whose measured Difficulty 1 (≥95%, ≥70%) reading level is one or more years below the calculated expected reading level.

Able reader in this study refers to a reader whose measured Difficulty 1 (≥95%, ≥70%) reading level is on, above, or not more than nine months below the calculated reading expectancy as determined by the Bond-Tinker formula.

Relative difficulty in this study refers to the difficulty of the reading material in relation to the measured achievement level of an individual reader.

Difficulty 1 (≥95%, ≥70%) in this study reflects the grade level of the highest selected passage of the Standard Reading Inventory (S.R.I.) on which the reader obtained a word recognition score of 95 - 100% accuracy and a comprehension score of 70 - 100% accuracy (≥95%, ≥70%).

Difficulty 2 (<91%, <70%) in this study reflects the grade level of the lowest passage of the S.R.I. on which the reader obtained a word recognition of less than 91% accuracy and/or a comprehension score of less than 70% accuracy (<91%, <70%).

Inconsistency prevails throughout the literature as to what constitutes an error and as to the importance of each type of error (Hood, 1975-76, Leu, 1979;

Pikulski, 1974; and Weber, 1968). Reviewing the literature prior to 1968, Weber (1968) found that error categories varied from study to study as did the items included in identical categories. The added consideration of linguistic constraints and of psycholinguistic factors in the processing of print has enhanced, yet further complicated, the quantitative and qualitative analysis of oral reading errors (Goodman, K., 1969, 1980 and Weber, 1968). The literature reveals no general consensus on these issues. As a result of this absence of consensus regarding oral reading errors, the purpose of the researcher frequently guides the categorization and the evaluation of oral reading errors (Weber, 1968).

This study requires the isolation of the factor of reading rate or fluency for comparative purposes. Subjects are required to exhibit similar levels of word recognition skills and of comprehension on the same passage. Consequently, in this study only errors reflecting the miscalling of textual stimuli (substitutions and mispronunciations) or the absence of the verbal recognition of textual stimuli (words aided) are considered word recognition errors. Therefore, in this study word recognition errors refer to the following types of errors:

a. Substitution - of an incorrect word for the textual stimulus;

b. Mispronunciation - of a word wholly or in part, including any mispronunciation of the textual stimulus other than the substitution of some other whole word; and

c. Words Aided - by the examiner after a five-second delay on the part of the reader.

Insertions, repetitions, omissions, and self-corrections are not miscallings of textual stimuli. Self-corrections are considered to reflect the

eventual recognition of textual stimuli. Repetitions of correctly called words may involve inexact processing of textual stimuli such as self-correction, confirmation, or a form of hesitation, but do not reflect miscalling of the textual stimuli (Goodman, K., 1965). Both insertions and omissions have been found to be more predominate when subjects are reading easier materials (Christenson, 1966); to constitute a negligible portion of oral reading errors (D'Angelo & Wilson, 1979; Gilmore, 1947; and Goodman & Gollasch, 1980); and to have negligible effects on comprehension (D'Angelo & Wilson, 1979; Goodman, Y., 1976; Madden & Pratt, 1941; Monroe, 1932; and Spiegel, 1974). In view of this evidence and of the fact that insertions and omissions do not reflect the miscalling of textual stimuli, they are considered fluency errors rather than word recognition errors in this study. Deliberate omissions (Goodman, 1980) indicated by a decision-making pause prior to omission become words-aided. Consequently, Fluency Errors in this study refer to insertions, omissions, repetitions, and self-corrections. Such errors will be recorded, but will not be counted as errors in determining reading levels.

Reading rate in this study refers to the number of words read per minute (number of words in the passage/the number of seconds elapsed x 60). Seconds will be rounded to the nearest whole number before the rate is calculated.

Delimitations

Scope of the Study

This study included an examination and comparison of the oral and silent

reading rates of able and disabled readers achieving Difficulty 1 (≥95%, ≥70%) criteria on the Grade 4 or Grade 6 passage of the S.R.I. Oral and silent reading rates were measured on passages of two levels of relative difficulty - Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%). The oral and silent reading rates within and between the groups of able and disabled readers were examined in relationship to obtained levels of reading achievement (Grade 4 and Grade 6) and in relationship to identified levels of relative difficulty - Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%).

The subjects for this study were drawn from the fourth-, fifth-, sixth- and seventh-grade populations of selected public schools in Stillwater, Oklahoma. and from the clientele of the Oklahoma State University Reading/Math Center. The final sample consisted of 18 able and 18 disabled readers. All subjects were enrolled in the fourth, fifth, sixth, or seventh grade. All subjects obtained a Full Scale score of 89 or above on the WISC-R.

Limitations of the Study

This study is limited to those students enrolled in the fourth, fifth, sixth, and seventh grades of selected public schools in Stillwater, Oklahoma, for whom parental permission (Appendix A) to participate in the study could be procured. It is further limited to those fourth-, fifth-, and sixth-grade students of the Stillwater Public Schools with composite scores on the Gates-MacGinitie Reading Tests falling within the 16th to 84th percentile range and to those seventh-grade students with composite scores on the Gates-MacGinitie Reading Tests falling below the 60th percentile. It is further limited to those fourth-, fifth-, and

sixth-grade students receiving tutoring assistance at the Oklahoma State University Reading/Math Center.

The results of this study can be generalized only to reading material and to comprehension tasks similar to those used in this study. Studies using other material and/or different comprehension tasks may yield different results. No attempt was made to determine the subjects' background knowledge related to the content of the reading material used in this study.

Assumptions

It is assumed that there was no practice effect in that it is assumed the subjects had not been exposed to the passages prior to testing.

As the testing took place over a six-week period, it is assumed that no maturation or history effects interacted with the data collection.

Organization of the Study

Chapter I has presented the need for the study, the statement of the problem, the research questions, the hypothesis to be tested, the definitions of the terms as used in the study, and the delimitations of the study. Chapter II will review the literature related to the problem being studied. Chapter III will describe the sample, the instruments used for the collection of the data, the testing procedures, the research design, and the statistical techniques used to test the hypothesis. Chapter IV will contain a statistical analysis of the data. It will contain the treatment of the data, the analysis of the results, and indicate if the

null hypothesis was rejected or failed to be rejected. Chapter V will present a summary of the study, conclusions, and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The literature related to the rate of reading includes such topics as the relationship between rate and comprehension, eye movements during reading, speed reading, the concept of flexibility, the effect of the difficulty of the material on rate, the definition of reading rate, and the measurement of reading rate and/or rate of comprehension. While studies within each of these topics provide some information related to the questions of concern to this study, a limited number of the studies attempt to compare the reading rates of able and disabled readers on both oral and silent reading. None of the studies has made the comparison in terms of the levels of difficulty relative to the reading achievement level of the subjects as determined by an informal reading inventory. The review of literature that follows will be limited to those studies that in whole or in part address the issues of this study. The literature will be reviewed as it relates to the following areas: (a) the relationship between level of reading achievement and reading rate, (b) the relationship between the difficulty of the material and reading rate, (c) the relationship between reading disability and reading rate, and (d) the relationship between rate and comprehension.

The Relationship Between Level of Reading Achievement and Reading Rate

In the current study, level of reading achievement is defined as the grade level of the selected S.R.I. passage on which the subject obtained the criteria for Difficulty 1 (≥95%, ≥70%). In studies examining rate across level of reading achievement, the level of reading achievement has been defined primarily as the grade level in which the subject is currently enrolled. One study (Dowdy, 1981) used the Sucher-Allred Reading Placement Inventory to control the level of comprehension required by students of a given grade level to participate in the study. Other commonly employed definitions include criteria such as teacher identification; standardized reading achievement test scores; graduated passages for oral and/or silent reading; and level of basal reader assignment. However, studies employing these criteria have not examined reading rate across levels of achievement, but instead have examined various characteristics of samples having obtained the same level of reading achievement. Although methods and materials used to measure reading rate across levels of achievement vary from study to study, the studies indicate one common trend. That is, reading rate, both oral and silent, tends to increase as level of achievement increases.

In 1941 Madden and Pratt conducted an oral reading survey of 1154 pupils in grades three through nine. The oral reading rate scores of the subjects were reported for each grade level. No attempt was made to control the individual level of reading achievement of the subjects. The sample for grades three through six was 591; the sample for grades seven through nine was 563. The

subjects in grades three through six read one selection from a social studies text and one selection from a science text. Subjects in grades seven through nine read one selection from a social studies text. The selections were taken from texts and supplementary books referred to most frequently in the subjects' classes. The median length of the selections ranged from 101 words for grade three to 223 words for grade nine.

The subjects were instructed to read each selection aloud. The examiner recorded the total number of seconds required for reading the selection and the total number of words read. Errors were recorded for the purpose of further analysis, but comprehension was not measured. The high, median and low rate scores for grades three through nine were reported for both the social studies and the science selections. The reading rates of the students enrolled in the grade levels of reading achievement targeted for the present study (Grade 4 and Grade 6) increased in science, but decreased in social studies. The high, median, and low scores reported all increased from Grade 4 to Grade 6 (Table I).

TABLE I

SUMMARY OF THE RESEARCH RELATED TO THE RELATIONSHIP BETWEEN READING ACHIEVEMENT AND COMPREHENSION

Shores & Husband 1950	Grade Assignment	N=90 Grades 4-6	Silent Amount-Limit Biological Science Grade Level	20 questions/ passage Reference to Text	Grade	Mean Rate Scores in WPM 4	5	6
					Orig.	104.5	128.6	194.6
					Work.	50.6	59.8	60.1
					Total	33.4	40.8	45.9
Dowdy 1981	Grade Assignment & Minimum Comprehension Normal=S.O.R.T. Disabled=Sucher-Allred	N=120 Grades 4-10 20 Normal/gd. 20 Disabled/gd.	Silent Amount-Limit Grade of Sub. Mat. 4 2 7 3 10 4 Grade of: Sub. Mat. 4 2 7 3 10 4	Condition A : General Condition B: Specific		Elapsed Time in Seconds Con.A	Con. B	
					4N	60.13	48.62	
					4D	103.49	101.11	
					7N	65.24	40.25	
					7D	109.41	94.46	
					10N	85.38	69.00	
					10D	131.70	106.54	

TABLE I (Continued)

Study	Achievement Measure	Sample	Rate Measure	Comprehension Task	Results
Madden & Pratt 1941	Grade Assigment	N=1154 Grades 3-6 (n=591) Grades 7-9 (n=563	Oral Amount-Limit S.S. Sci. Grade Level	None	High, Median and Low Rate Scores for Grades Three to Nine Inclusive in Reading Social Studies and Science Material Used in The Oral Reading Survey

Grade		3	4	5	6	7	8	9
High	S.S.	253	256	267	216	242	246	304
	Sci.	235	206	240	292			
Median	S.S.	85	121	130	150	150	157	158
	Sci.	103	120	130	151			
Low	S.S.	21	40	65	88	51	70	70
	Sci.	21	45	63	78			

Source: Madden, M. and Pratt, M. (1941). An oral reading survey as a teaching aid. Elementary English Review, 18, 122-126, 159.

To determine if fast readers were indeed the best readers, Shores and Husbands (1950) conducted a study with a total sample of 90 students enrolled in grades four, five, and six. No attempt was made to control for the individual reading achievement level of the subjects. Each subject was asked to read one passage of 700 words consisting of biological science material commonly found in grades four, five, and six. The specific readability of the material was not reported, but the material was reported to be well within the range of abilities of pupils of the middle grades.

The group measure was administered to one classroom at each identified grade level. Prior to the silent reading of the passage, a purpose was stated in question form by the examiner. While reading the passage, the subjects were required to record coded numbers on the test. These coded numbers were displayed for the group on large cards every three seconds during the first six and one-half minutes of the testing period and every ten seconds thereafter. A coded number was also recorded at the completion of the initial reading of the passage and again after answering the twenty questions. The students were allowed to refer to the passage when answering the questions. Rate scores were thus obtained for: (a) original reading time, (b) working time, and (c) total time. Although Shores and Husbands reported that the mechanics involved in marking the test did not appear to present a problem for the majority of the students, the time involved in marking the coded numbers on the test form undoubtedly affected the accuracy of the calculated rates of reading. The mean rate scores were reported in total number of seconds elapsed. The mean scores reported for the initial reading of the text have been converted into words per minute for

convenience of comparison with other studies (Table I). The silent reading rates increased in words read per minute as grade level increased. It is also noted that the mean number of seconds elapsed in working time (Grade 4, M = 830.58; Grade 5, M = 702.25; Grade 6, M = 698.69) and in total time (Grade 4, M = 1258.85 Grade 5, M = 1028.75; and Grade 6, M = 915.17) decreased as grade level increased.

To measure and compare the reading flexibility of learning disabled (d) and normal (n) readers, Carol Dowdy (1981) identified 20 normal and 20 disabled students enrolled in each identified grade (Grade 4, Grade 7, and Grade 10). Although the subjects were grouped according to grade placement, Dowdy used the Sucher-Allred Reading Placement Inventory to set minimum levels of comprehension achievement required for disabled readers to participate in the study. The Slosson Oral Reading Test was used to set minimum levels of achievement for the normal readers. However, she set different minimum levels for normal and disabled readers enrolled in the same grade level. The minimum level of comprehension was set for normal (n) and disabled (d) readers enrolled in the same grade as follows: (a) Grade 4, n = 3rd, d = 1st; (b) Grade 7, n = 6th, d = 2nd; and (c) Grade 10, n = 8th, d = 3rd. The passages administered were of the following Fry levels: (a) Grade 4 = 2nd, (b) Grade 7 = 3rd, and (c) Grade 10 = 4th. Obviously, the passages were more difficult for the disabled readers than for the normal readers.

Each subject was asked to silently read ten passages, five under each of two conditions: Condition A for the purpose of answering a general comprehension question posed prior to the reading, and Condition B for the

purpose of answering specific comprehensions questions posed prior to the reading. The passages and questions were presented on a microcomputer. The time was measured by a timing device activated by the space bar. The silent rate was reported in seconds elapsed during the reading of the passages. The highest and lowest elapsed times for each subject under each condition were eliminated. The average of the remaining three scores for each condition was used in the final analysis. The mean elapsed time decreased as the grade level increased when the subjects were reading to answer general comprehension questions. However, when reading to answer specific comprehension questions, the mean elapsed time for both normal and disabled readers decreased from Grade 4 to Grade 7, but increased again from Grade 7 to Grade 10 (Table I). Dowdy offered no explanation for this, but did conclude that the difference between normal or disabled groups on the two variables accounted for more of the variability than differences between the conditions.

The studies reviewed above indicated that the mean silent reading rates and the mean oral reading rates for a group of students at a given grade level can be expected to increase from that grade level to the next higher grade level. Madden and Pratt (1941) found consistent increases in oral reading rates from Grade 3 to Grade 6 when subjects were asked to read science material. The same increases were evidenced from Grade 3 to Grade 9 when reading social studies material with one exception. The oral reading rates of the fastest group of readers were erratic from Grade 4 to Grade 6. Shores and Husbands (1950) found consistent increases in silent reading rates from Grade 4 to Grade 6 when subjects read biological science materials. Dowdy (1981) found that the mean

silent reading rate of both normal and disabled readers increased from Grade 4 to Grade 7, but decreased slightly from Grade 7 to Grade 10 when subjects were reading to answer a specific comprehension question posed prior to reading a passage. The purpose for reading interacted with grade level assignment to decrease the silent reading rate. Studies reviewed in the following section on the relationship between reading rate and comprehension support that contention that the purpose set for reading (or the comprehension task) can affect the rate of reading.

In the current study, the rate scores are stratified and compared by the measured reading achievement level of the individual subject, not by the current grade level assignment of the subject. Individual achievement level is measured with an individually administered oral informal reading inventory. Only able and disabled readers obtaining the same achievement levels are compared. Under these controls, reading rates across actual grade level achievement and between able and disabled readers are more accurately examined.

The Relationship Between the Difficulty of the Material and Reading Rate

The relationship between the difficulty of the material and reading rate has been the subject of much research. The difficulty of the material has been defined as a readability score derived from a readability formula or as the grade level with which it is commonly associated. The more important concern, however, should be the relative difficulty of the material for the individual subject. In the majority of the rate studies, the material was judged to be more or less difficult for the subjects strictly in terms of the subject's current grade level

assignment. The subjects' individual levels of reading achievement were not measured. Without determining the actual level of achievement for each individual subject, it cannot be assumed that the relative difficulty of the experimental materials used is the same for each subject (Harrison, 1968).

In order to control for this factor of actual level of difficulty, the current study determines two levels of relative difficulty [Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%)] for each subject. The experimental rate measures administered to each subject were selected to correspond with each subject's two measured levels of relative difficulty. Consequently, the relative difficulty of the material for the targeted groups of subjects (Grade 4, Grade 6) are held constant in terms of word recognition and comprehension. As the research is reviewed, the importance of these controls becomes evident.

Thorsten Carlson (1949) examined the relationship of speed and accuracy of comprehension when the purpose, the level of difficulty, and the continuity of the material varied. The sample of 330 fifth-grade pupils was stratified into three groups on the basis of intelligence scores on the California Test of Mental Maturity. Each of these three groups was divided into two groups on the basis of reading rate. The Gates Silent Reading Tests, Levels 3 - 8, were used to measure speed for different purposes. Selections devised by Carlson were used to test for speed at different levels of difficulty and with varying degrees of continuity. These passages were administered under three conditions: (a) continuous selections at two levels of difficulty (intermediate and upper grade); (b) continuous selection at three levels of difficulty with comprehension questions interspersed throughout the material (third-, fifth-, and seventh-grade material);

and (c) a series of short selections followed by comprehension questions (third-, fifth-, and seventh-grade material). Rate was calculated in words per minute based on the amount of time required to read the passage and answer the comprehension questions. The comprehension score was the percent of questions answered accurately.

Reading rate scores were used to identify the fast readers and the slow readers of each IQ group. t tests were used to compare the mean scores of the fast and the slow groups on comprehension. Correlation coefficients were calculated to determine the relationship of rate to accuracy at each of the three levels of intelligence. Carlson concluded that reading rate was not a unitary concept that could be handled in a group situation using some kind of pacing device. He based his conclusion on the following results of his study. (Table II:

1. At the upper level of IQ rapid readers were more efficient.
2. At the middle and lower levels of IQ the slower readers were the better readers.
3. As the purpose for reading became more exacting, the slower readers at the lower IQ level were the better comprehenders.
4. At the upper level of IQ, the correlations between rate and accuracy were negative but not significant when the material varied in difficulty.
5. At the middle and lower levels of IQ the correlations between rate and accuracy were significantly negative.

TABLE II

SUMMARY OF THE RESEARCH RELATED TO THE RELATIONSHIP BETWEEN DIFFICULTY OF THE MATERIAL AND READING RATE

Study	Grouping Criteria	Sample	Rate Measure	Comprehension	Results
Carlson 1949	IQ (CTMM) High/Med/Low Gates Fast/Slow	N=330 Grade 5	Silent Gates SRT Type I-Continuous Levels A&B Type II-Interspersed Levels A,B,C Type III-Short Levels, A,B,C	Percent correct No reference to text	COEFFICIENTS OF CORRELATION BETWEEN SPEED AND ACCURACY OF COMPREHENSION AT THREE LEVELS OF INTELLIGENCE WHEN READING AT DIFFERENT LEVELS OF DIFFICULTY

	Upper Level of Intelligence			Middle Level of Intelligence			Lower Level of Intelligence		
	N	r	S.D.x	S.D.y	r	S.D.x	S.D.y	r	S.D.x	S.D.y
Type I Level A	110	-.11	45.20	12.43	-.21*	40.30	16.99	-.18	52.89	19.34
Type I Level B	110	-.04	44.62	14.25	-.27**	31.73	16.97	-.28**	38.95	17.03
Type II Level A	110	.06	51.654	5.89	.02	45.36	9.01	-.24**	52.33	15.53
Type II Level B	110	-.11	49.59	9.12	-.23*	46.43	15.05	-.25**	57.01	20.74
Type II Level C	110	-.30**	38.67	13.69	-.32**	36.10	16.93	-.43a**	53.40	18.68
Type III Level A	110	-.11	39.07	7.40	.01	39.62	9.89	-.26**	43.85	17.50
Type III Level B	110	-.08	29.29	9.23	-.18	25.07	11.07	-.26**	43.53	18.46
Type III Level C	110	-.17	22.99	10.69	-.32**	23.27	15.17	-.17	32.92	17.76

**Significant at the 1% level.
* Significant at the 5% level.
a Non linear. Correlation ratio of 67.

Source: CArlson, T. (1949) The Relationship Between Speed and Accuracy of Comprehension. Journal of Educational Research, 42, 500-512.

TABLE II (Continued)

McCracken 1961	S.R.I. Grade Level On=average Above=good Below=poor	N=36 Grade 2 Ave. (n=9) Good (n=17) Poor (n=10)	Oral Sheldon Diagnostic Primer 2-1 2-2 3-1	Unaided recall	

Mean WPM Scores (range in seconds)

	P	2-1	2-2	3-1
Good	15 (16-30)	117 (16-25)	127 (17-37)	112 (30-62)
Ave.	101 (17-45)	81 (17-45)	88 (22-56)	62 (38-102)
Poor	57 (38-93)	43 (38-68)	49 (42-117)	34 (106-173)

Levin 1967	Coop. Eng. Test		M IQ	N=100 Grade 9	Silent Selection	Level	No reference to text
	Good	95-99%	129.66		A	5-6	
					B	11-12	
	Poor	47-53%	114.98		C	9-10 (main idea)	
					D	9-10 (main idea and facts)	

Mean WPM Scores

	A	B	C	D
Good	313	271	265	221
Poor	222	194	196	174

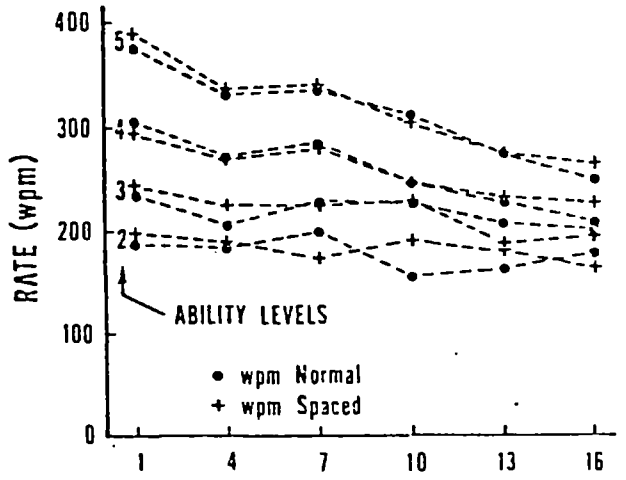
TABLE II (Continued)

Burge 1982	S.R.A. M grade quiv=2.9 M percentile=34%	N=18 Grade 4	Analytic Reading Inventory, Forms A (Silent) and B (Oral) Passages 2, 3, & 4	% Correct

Mean WPM Scores

	2	3	4
Silent	103.1	102.6	97.7
Oral	93.4	86.9	90.5

Carver 1983	National Reading Standards Ability level · Grade equiv. 1 = 1-3 2 = 4-6 3 = 7-9 4 = 10-12 5 = 13-15	N=435 Grades 4-12 (n=333) College (n=102) A1 (n=34) A2 (n=85) A3 (n=72) A4 (n=146) A5 (n=98)	Silent Condition A=normal Condition B=spaced Grade Difficulties 1,4,7,10,13,16	



Reading rate in actual words per min., wpm, as a function of the difficulty of the reading material for individuals at four different levels of reading ability who were reading both normal and spaced materials.

In general, as the material became more difficult the relationship between rate and comprehension became increasingly negative, but this trend was most evident at the lower level of IQ. Carlson's data indicates that the difficulty of the material exerts less influence on the relationship between rate and comprehension at the upper levels of intelligence than at the lower levels of intelligence.

Robert McCracken (1961) examined the oral reading behaviors of 36 second-grade students reading material below, on, and above grade level. He compared the performances of the good, average, and poor readers. Four paragraphs ranging from 39 - 77 words each were selected from the Diagnostic Tests of the Sheldon Basic Readers. The paragraphs were at the primer, 2-1, 2-2, and 3-1 grade levels. Each subject read all four paragraphs orally. Unaided recall was used as the measure of comprehension. The passages were read in order from the easiest to the most difficult. Oral reading errors were recorded and elapsed reading time was measured.

The teachers were asked to group the students into good, average, and poor readers. The basal, instructional, and frustration levels of reading performance of each subject were identified by McCracken based on oral reading errors. Based on these levels of reading performance, the subjects were identified as good, average, or poor readers. The groups identified by McCracken were almost identical to the groups identified by the teachers. The sample consisted of nine good readers, seventeen average readers, and ten poor readers. The actual independent, instructional, and frustration levels of the

sample were not reported. Consequently, the relative difficulty of the experimental passages for each subject is not known.

The good readers were superior to the average readers and to the poor readers in all three areas of rate, comprehension, and oral reading errors. The average group read faster and with fewer errors than the poor readers, but the poor readers had better comprehension. (McCracken reasoned that the poor readers waited for difficult words to be pronounced, while the average readers tried them on their own.) The good readers needed less help pronouncing words than the average readers. In turn, the average readers needed less help pronouncing words than the poor readers. McCracken concluded that fluent oral reading does not insure good comprehension, but poor oral reading indicates poor comprehension will probably ensue.

As shown in Table II, the mean number of words read per minute decreased for each group across levels of difficulty, except for the 2-1 passage. The mean oral reading rates of the good readers were faster than the average and slow readers on all passages. The mean oral reading rates of the average readers were faster than the mean rates of the poor readers on all passages. However, it is interesting to note the overlap in the range of seconds (in parenthesis) as reported for the groups. Would this range have been as great if the relative difficulty of the passage for each individual subject had been held constant?

Levin (1967) determined the reading ability of her subjects (N = 100) with a standardized reading test, The Cooperative English Test: Reading Comprehension, Form 2A. These ninth grade subjects were identified as good readers if they ranked between the 95th and 99th percentile or as poor readers if

they ranked between the 47th and 53rd percentile. Measured by the Otis Quick-Scoring Mental Ability Test: Gamma Test, Form EM, Group 1 had a mean IQ of 129.66 and Group 2 had a mean IQ of 114.98.

Two silent reading subtests designed by Levin were administered to the groups - Test A at the 5th-6th reading level and Test B at the 11th-12th reading level. The test selections were approximately 500 words each. The subjects were instructed to read the passage, mark the time elapsed, turn the paper over, and answer the comprehension questions. Both good and poor readers read Test A (Group 1, $\underline{M}$ = 313.120; Group 2, $\underline{M}$ - 222.120) faster than Test B (Group 1, $\underline{M}$ = 271.480; Group 2, $\underline{M}$ = 194.020) (Table II). Would these differences have been so great if the mean IQ of the groups was more similar? Would the differences have been so great if the percentile ranges for defining good and poor reading had been different? Do the standardized test scores actually reflect the functioning ability of the sample?

Levin continued her research by having both groups read two equally difficult 500-word passages (Grades 9 - 10) for different purposes. Passage C was read for main ideas only. Passage D was read for complete knowledge of main ideas and supporting facts. The poor readers read both passages significantly slower than the good readers. The good readers exhibited greater flexibility than the poor readers when the purpose for reading was changed. Levin concluded that the purpose for reading affects the rate of good readers more than the difficulty of the material, whereas the difficulty of the material is more influential on the rate of poor readers.

Burge (1982) defined the reading achievement level of a group of 18 fourth-graders as scores on the SRA Achievement Test. All subjects fell below the 50th percentile on the Total Reading subtest of the SRA Achievement Test. The mean grade equivalent score for the group was 2.9 and the mean percentile rank was 34. To compare oral and silent reading performance on three levels of difficulty, Burge administered six subtests of the Analytical Reading Inventory, each of which included a check of comprehension. The subjects read subtests Levels 2, 3, and 4 of Form A orally, and subtests Levels 2, 3, and 4 of Form B silently. These subtests were selected to correspond with the subjects' independent, and instructional level as related to the subjects' grade level assignment. No test of intellectual capacity was administered.

The tests were administered individually. Reading rate was measured in words per minute based only on the reading of the passages. Comprehension scores were measured by percentage of correct responses for both oral and silent reading subtests. The data was analyzed with a t Test for paired samples with alpha set at $p < .05$. No significant differences were found between the oral and silent reading rates at Levels 2 and 4. A significant difference was found at Level 3, ($t = 2.69$; df 17; $p < .02$). The mean oral reading rate was 86.9 and the mean silent rate was 102.6. The mean silent reading rate was higher at all levels than the mean oral reading rate. The silent reading rate was constant from Level 2 to Level 3 and decreased slightly from Level 3 to Level 4 (Level 2, $M = 103.1$; Level 3, $M = 103.6$; and Level 4, $M = 97.7$). A different pattern emerged for the mean oral reading rates (Level 2, $M = 93.4$; Level 3, $M = 86.9$; and Level 4, $M = 90.5$) (Table II).

Addressing the lower oral reading rate mean for Level 3, Burge examined the comprehension scores. The mean score for Level 2 was 73.1%, whereas the mean score for Level 3 was 77.3% and 70.4% for Level 4. He suggested two possible explanations: the subjects comprehended better because they read more slowly, or they read more slowly because they were comprehending more.

Significant differences were found between oral comprehension and silent comprehension at Level 3, $t\ 17 = 4.36$, $p < .0001$, and at Level 4, $t\ 17 = 6.90$, $p < .0001$. The mean silent comprehension scores were 67.3% for Level 2, 55.0% for Level 3, and 37.0% for Level 4. Burge noted that none of these scores reached the criteria of 75% commonly accepted for instructional level. He suggested that placement based on SRA Achievement Test scores (silent reading) would place the subjects considerably higher than they were actually able to function.

Carver (1983) had 333 subjects in grades 4-12 and 102 subjects enrolled in college, silently read 24 one-hundred word passages, four at each rauding grade of 4, 7, 10, 13, and 16. The passages were put in booklet form with four passages per page. The first page of each booklet was normal, but the rest of the pages alternated between one with normal spacing and one with an extra space between words and three spaces between sentences. Each book had three normally spaced pages and three with the experimental spacing. Before reading the booklets subjects were told: (a) they would be allowed one minute per page; (b) to circle the word they were reading at the moment they were told to stop; (c) that no test would be given; (d) to read at a normal rate; and (e) each page would be at a different level of difficulty. Elementary school subjects were told

that much of the material would be very difficult and they should skip unknown words and continue reading. No comprehension check was given.

Based on scores from the National Reading Standards Test (Carver, 1977) given one year previously to most of the subjects, ability level groups were identified (Table II). The reading rate for these groups was reported for both conditions and for all difficulty levels of the passages administered. While Carver was primarily interested in the differences between conditions and the differences in rate when reported in words per minute or in standard words per minute, the information relative to this study is the reading rate reported in actual words per minute as a function of the difficulty of the reading material for the identified groups reading the normally spaced material. It should be noted, however, that Carver again found that when reading rate is measured in units smaller than actual words per minute, individuals at all levels of ability read material that did not exceed their level of ability at a fairly constant rate (Table II).

The easier the material relative to the group's ability, the greater the average rate of reading (passage of Grade 1). Then the rate tends to decrease slightly as passage difficulty increases. More erratic patterns develop as the difficulty of the passage deviates from the ability level of the group (passages of Grades 13 and 16). Ability Levels 2 and 3 tended to read faster on the most difficult passages, while ability Levels 4 and 5 tended to read these passages more slowly (Table II). Would the presence of a comprehension check or oral reading of these passages change the pattern? Would the patterns change if the actual ability levels were more closely controlled, rather than generally grouped?

Studies examining the relationship between the difficulty of the reading material and the rate of reading have been reviewed. The difficulty of the material has been defined in a variety of ways: (a) readability formulae, (b) associated grade level, (c) rate of comprehension, (d) and cloze test scores. The evidence indicates that rate measured in words per minute, generally decreases as the difficulty of the materials increases as long was the material remains within the reader's educational experience (Carver, 1983). However, evidence has also been given that reading rate is influenced by the comprehension task as well as by the difficulty of the material. Levin (1967) found that the influence of the task on oral reading rates was stronger for the good readers whereas the difficulty of the material exerted a stronger influence on the oral reading rates of the poor readers.

The Relationship Between Reading Disability and Reading Rate

In the current study a disabled reader is defined as an individual reading one or more years below his expected reading level as calculated by the Bond-Tinker Reading Expectancy formula. An able reader is defined as an individual reading on or above, but less than one year below the calculated expected reading level. The reading level of each student was determined by an individually administered informal reading inventory. The intelligence quotient was determined by the individually administered Wechsler Intelligence Scale for Children-Revised (1974). Only subjects with a full scale sore of 89 or above were included in the sample. Consequently, comparisons are made within and between groups of subjects with similar intellectual capacities and exhibiting

similar word recognition and comprehension capacities on the same reading material.

Other studies comparing able and disabled readers (frequently referred to as good and poor readers or as normal and poor readers) have calculated an expected reading level, but have used scores from standardized achievement test scores rather than an individually administered measure. Such time-limit tests penalize the slower reader irrespective of his ability to read and comprehend more difficult material if given the time to do so. The multiple choice format of such tests permits the subject to guess and/or to mark answers without reading the material if he so chooses. Such behaviors are discouraged by the intimacy of an individually administered measure and by the oral administration of the comprehension questions.

Researchers have employed such instruments as the Stanford-Binet and the Slosson Intelligence Test as measures of intelligence for the purposes of applying a reading expectancy formula. Other researchers have identified poor and good readers without consideration of intellectual capacity or of a reading expectancy level. The primary consideration has been the number of levels (textbook levels or grade equivalencies from an achievement test) above or below the subject's current grade level assignment. Percentile scores were frequently used in the same fashion. The complications resulting from such definitions become evident as comparative studies are reviewed.

Mary Watkins (1953) compared the reading proficiencies of 64 matched pairs of normal-progress and reading disability cases of the same IQ and reading level. All subjects obtained a score of 80 or above on the Stanford Binet, Form L,

Revised. The mean intelligence quotient for the normal-progress readers was 101.3 while the mean for the retarded readers was 100.8. The Gates Basic Readings Tests, Types A, B, C, and D for grade three were administered to 534 students in grades three, four, five, and six. Normal- progress readers were defined as those scoring within three months of the norm for grade three students (3.4). Retarded readers were defined as those students from grades four, five, and six also scoring within three months of the 3.4 norm for third graders. The mean average reading score for the normal- progress readers was 3.44 and 3.43 for the retarded readers.

To compare the reading proficiencies of these two groups, three measures were administered: Gates Diagnostic Reading Tests, Revised Edition, 1945; five parts of Monroe's Diagnostic Reading Examination; and the Bond Silent Reading Diagnostic Tests, a group administered test. Test VII of the Bond Silent Reading Diagnostic Tests was the only subtest administered measuring rate of reading (silent). This group-administered subtest consists of numerous short stories followed by comprehension questions. It is a group- administered, silent reading, time-limit test allowing 15 minutes for completion. There was no significant difference between the means for the two groups on this subtest. However, the mean for the normal-progress readers was 108.0 words per minute, whereas the mean for the retarded readers was 97.6 words per minute. The variability among the retarded readers was greater than the variability among the normal-progress readers. This difference in variability between the two groups was consistent on the three measures administered. Watkins concluded that it cannot be assumed a reader has mastered a certain sequence of skills because

he is able to read at a given level, but it is the individual patterns of strengths and weaknesses that are important for diagnostic and remedial purposes.

Ten good readers, ten average readers, and ten poor readers were identified from a group of 173 fourth grade students by Packman (1970) on the basis of stanine scores of the from the Word Meaning and Paragraph Meaning tests of the Stanford Achievement Test. Neither a measure of general intelligence nor an expected reading level was obtained for individual subjects.

The subjects were asked to read passages and respond to accompanying comprehension questions from the Standard Reading Inventory until each of the following comprehension scores were obtained on silent and oral readings: 91 to 100%; 81 to 90%; 71 to 80%; 61 to 70%; 51 to 60%; and 50% or below. Word recognition percentages, rate of reading, quality of intonation, and presence of vocalization were compared at each of these comprehension levels. Seven separate analyses of variance were used to analyze the data. The rate of oral reading was found to decrease significantly as the level of reading comprehension decreased. No significant decrease was found in the mean silent reading rate as comprehension decreased. Poor readers had significantly lower silent and oral reading rates than the average or good readers. No significant difference was found in the shape of the curve defined by silent or oral reading rate over the six levels of reading comprehension for the good, average, or poor readers.

In the study reviewed previously, Dowdy (1981) compared the silent reading flexibility of learning disabled and normal students at three grade levels (four, seven, and ten) by measuring elapsed time and comprehension of silent

reading under two conditions: to answer a general comprehension question and to answer a specific comprehension question posed prior to reading. The learning disabled students were selected from learning disabilities resource programs. Consequently, the placement criteria of a significant discrepancy between expected reading achievement and actual achievement had been previously determined. The comprehension score of the Sucher-Allred Reading Placement Inventory was used to determine current level of reading achievement for the learning disabled subjects (d). On the other hand, the accuracy score on the Slosson Oral Reading Test was used to determine the current level of reading achievement for the normal progress students (n). In addition, different minimum levels of reading achievement were established for the two groups: (a) Grade 4, n = 3rd, d = 1st; (b) Grade 7, n = 6th, d = 2nd; and (c) Grade 10, n = 8th, d = 3rd. Comparable reading achievement of three grade levels groups cannot be assumed under these conditions.

An analysis of variance on elapsed time and comprehension was used to analyze the data. Dowdy found that Grade 4 readers, both normal and disabled, decreased mean elapsed time and increased mean comprehension under Condition 2. However, under both conditions, the normal readers (Condition 1, $\underline{M}$ = 85.38; Condition 2, $\underline{M}$ = 69.00) read significantly faster ($\underline{F}$ = 21.65; df = 1,38; $\underline{p}$ < .0001), than the disabled readers (Condition 1, $\underline{M}$ = 131.70; Condition 2, $\underline{M}$ = 106.54). Under both conditions the normal readers (Condition 1, $\underline{M}$ = 82%; Condition 2, $\underline{M}$ = 96%) demonstrated better comprehension ($\underline{F}$ = 17.61; fg = 1,38; $\underline{p}$ > .0002), than the disabled reader (Condition 1, $\underline{M}$ = 65%; Condition

2, M = 73%). Differences between groups accounted for more of the variance than differences between conditions.

In Grade 7, there was no significant difference between groups in comprehension. However, both groups decreased elapsed time and maintained comprehension under Condition 2. Under both conditions, the normal readers (Condition 1, M = 65.24; Condition 2, M = 40.25) read significantly faster, (F = 35.18; df = 1,38; $p < .000$)1 than the disabled readers (Condition 1, M = 109.41; Condition 2, M = 94.46.).

In Grade 10, the normal readers decreased elapsed time and increased comprehension under Condition 2, while the disabled reader did not decrease elapsed time but did increase the comprehension score significantly (F = 15.72; df = 1,38; $p < .0003$), under Condition 2 (Condition 1, M = 79%; Condition 2, M = 85%). The normal readers (M = 98%) obtained a significantly higher comprehension score under Condition 2 than did the disabled readers (M = 85%).

At each grade level the normal group read significantly faster than the disabled group (elapsed time). The normal group obtained a significantly higher comprehension score at Grade 4, but no significant differences between groups were found in comprehension in Grades 7 and 10 although the disabled readers did have lower mean scores (Table I).

As noted in the previous review, Burge (1982) examined the oral and silent reading rates of 18 fourth-graders scoring below the fiftieth percentile on the Total Reading subtest of the SRA. As a group, the subjects read faster silently than orally across three levels of difficulty. The mean silent reading rate decreased as

the difficulty of the material increased. There was no difference between the mean oral reading rate and the mean silent reading rate on Level 2 or Level 4 material. Level 3 material was read at a slower oral reading rate than the Level 2. However, the mean comprehension score was higher for the Level 2 material than the Level 1 material (Table II). Burge suggested two possible explanations: The subjects comprehended more because they read more slowly or they read more slowly because they were comprehending more.

The variety of methodologies and controls employed in these studies do not allow completely accurate comparisons. However, the results suggest that disabled readers will read more slowly than able readers. Watkins (1953) found no significant difference in the silent reading rates of normal progress and disabled readers, but did find the normal progress reader to have a higher mean rate than the disabled readers. Dowdy (1981) found normal readers to read significantly faster than disabled readers. Packman (1970) concluded that poor readers read at a significantly lower oral and silent reading rate than normal readers. The Poor readers in Burge's (1982) study read silently faster than orally at three levels of difficulty. The silent reading rate decreased as the difficulty of the material increased.

The Relationship Between Comprehension and Reading Rate

Previous reviews of the literature regarding the relationship of rate and comprehension (Blommers & Lindquist, 1944; Harris, 1968; Rankin, 1962; Tinker, 1932) have found correlations ranging from low negative, -.47, (King, 1916) to high positive, .92 (Gates, 1921). The results of the studies varied with

the age of the subjects, the content and difficulty of the material, the purpose established for reading, the intellectual capacity of the subjects, and the measurement techniques employed. Low correlations have been reported when rate has been measured on one test and comprehension has been measured on another (Tinker, 1932). High correlations have been reported when rate and comprehension are measured on the same material (Gates, 1921; Tinker, 1932). Correlations have differed as the content (i.e., social studies, science, literal) of the material has varied (Anderson & Dearborn, 1941; Thurstone, 1944). Correlations between rate and comprehension have been reported to decrease as the difficulty of the material increases (Tinker, 1932). Carlson (1949) reported correlations varying with the intellectual capacity of the subject and the comprehension task required. Studies by Blommers and Lindquist (1944) and by Shores and Husbands (1950) have reported correlations to vary with the purpose established for reading.

Differences in the correlation between rate and comprehension have been found when time-limit measurements or amount-limit measurements are used. Time-limit measurements of combined reading and comprehension time have resulted in high correlations (Gates, 1921). Lower correlations have resulted when amount-limit measurements of combined reading and comprehension time are employed (Flanagan, 1939; Preston & Botel, 1951). When the time for answering questions was not included in the amount-time measurements of rate, low correlations have been found between rate and comprehension (Blommers & Lindquist, 1944; Shores & Husbands, 1950; Seashore, Stackford, & Swartz, 1937).

Most of the studies cited above involved subjects enrolled in high school or college. Traditionally, reading rate instruction has been viewed as appropriate only for the secondary grades. Consequently, most of the studies focused on the secondary level. The studies reviewed below are those studies that can be related to the intermediate grades.

Stroud and Henderson (1943) examined the relationship between rate and comprehension in two separate experiments. The first experiment was conducted with 286 students in grades five through eight. The students were asked to read two passages (642 words and 586 words) from the Iowa Every Pupil Tests of Basic Skills and to respond to the question without referring back to the text. Time was recorded after the reading of each passage and before the 15 comprehension questions were answered. The correlation coefficients for grades five, six, seven and eight respectively were .06, .02, .12, and .02, indicating that reading rate and comprehension were not related.

Six hundred and twenty-five fifth-grade students participated in the second experiment. Subjects were asked to read four, twelve hundred-word passages silently. Two of the passages were excerpted from fifth-grade social science books and two of the passages were excerpted from second- and ninth-grade social science books. The subjects read each passage silently, then responded to 15 comprehension questions. Prior to reading the first selection (fifth-grade passage), the subjects were not informed that a comprehension test would be given. Prior to reading the remaining selections, subjects were informed of the comprehension tests to follow. The correlation coefficients obtained for the four selections were: +.03, -.02, -.05, and +.05. Stroud and Henderson concluded

that the correlations obtained did not support the claim than faster readers learn more than slower readers.

Using the rate scores of the second fifth-grade passage administered, the fastest 10% and the slowest 10% of the subjects were identified. The difference in reading time between the second-grade and the ninth-grade passages was approximately equal for both groups of readers. Using the comprehension scores of the second fifth-grade passage administered, the top 10% ($\underline{M}$ = 12.99) and the bottom 10% ($\underline{M}$ = 3.14) of the readers were identified. The top 10% read the ninth-grade passage at an average rate of 199 wpm, whereas the bottom 10% read it at an average rate of 249 wpm. The top 10% read the second-grade passage at a rate of 265 wpm, whereas the bottom 10% of the readers read it at an average of 234 wpm. The subjects with the highest comprehension scores adapted reading rate to the difficulty of the passage more than the subjects with the lowest comprehension scores. The fastest readers were not the best comprehenders. However, the comprehension and scores and the rate scores compared were not measured on material of the same level of difficulty.

Shores and Husbands (1950) provided evidence that fast readers are the best readers only when limited comprehension is required and the measure consists of easy story-type material. The Reading for Problem-Solving in Science Test, designed by Shores and Husbands, was administered to 90 subjects in grades four, five, and six. The test consisted of a single 700-word passage based on biological science material common to fourth, fifth, and sixth grade texts. The passage was judged to be within the range of abilities of pupils of the middle grades.

A problem was stated in question form prior to reading to set the purpose for reading. Three measures of time were recorded; original reading time, the time for rereading and answering the 20 multiple choice questions following the passage, and the total reading time. The comprehension score was the number of correct responses to the twenty questions. Coefficients of correlation were calculated between rate and comprehension. Correlations were calculated for original time and comprehension (-.13); rereading/question time and comprehension (.06); and total time and comprehension (-.05). Shores and Husbands concluded that fast readers are not necessarily the best readers on all types of materials. The purpose for reading and the nature of the material exert a strong influence on the relationship between reading and comprehension.

Shores (1951) examined the reading rate and comprehension of 46 sixth-graders and 51 undergraduate and graduate students. The sixth-graders were administered the Iowa Silent Reading Tests and the California Achievement Test. Subtests measuring the same area of reading were combined to produce one score. The Reading for Problem Solving in Science and Directed Reading of Science Materials tests, both developed by Shores, were administered to all subjects. On the latter tests, both sixth-graders and adults were divided into two groups each, A and B. Group A was directed to read the passages of the Directed Reading of Science Materials test to determine the main idea, whereas Group B was directed to read the same passages to remember the important ideas of the passage in the proper sequence. As in the initial study, three rates were identified: (a) original reading time, (b) rereading/question time, and (c) total time. Groups A and B of the sixth-graders were not found to be significantly

different in chronological age, mental age (as measured by the California Test of Mental Maturity, Non-Language Section), science achievement (as measured the Sequential Tests of Educational Progress), or general reading ability.

Shores concluded that sixth-grade fast readers are the better readers when rate is measured by the Iowa Silent Reading Test, but are not the best readers on the Reading for Problem Solving in Science test. Correlations between rate and comprehension on this measure ranged from .29 to -.09 with most being low positive correlation. Fast readers were not the best readers on the Directed Reading of Science Tests when reading to recall the sequence of ideas. A low correlation of .06 was found. For the sixth-graders in general, there was a high correlation between rates of original reading and comprehension of general reading abilities.

The rate and comprehension scores of the adults in the study had a low correlation on all measures. Adult fast readers, as the sixth-grade fast readers, were not the best readers when reading scientific materials for any of the established purposes. It was also demonstrated that both adults and sixth-graders who worked rapidly on the reread/question measure were not necessarily the best readers.

Comparison of the sixth-graders and the adults did identify some differences. The adults averaged 90% comprehension at an average rate of 291 wpm, whereas the sixth-graders averaged 63% comprehension at an average rate of 153 wpm on the test of Reading for Problem Solving in Science. Adults averaged 213 wpm with 92% comprehension on the Directed Reading of Science Material Tests when reading for the main ideas, as contrasted with the

sixth-graders' average of 138 wpm with 52% comprehension. When reading to recall the sequence ideas, the adults read at an average rate of 182 wpm with 80% comprehension as compared with the sixth-graders' average of 137 wpm with 42% comprehension. Not only did the adults read faster and with greater accuracy, but they demonstrated more flexibility in adjusting reading rate to the demands of the task.

The studies reviewed have reported inconsistent correlations between comprehension and reading rate. Stroud and Henderson (1943) found no significant correlation between reading rate and comprehension, but did find a low positive correlation. Shores (1951) and Shores & Husbands (1950) found that the correlation between reading rate and comprehension varied with the type of material read, as well as with the nature of the comprehension task posed for the subject. Previous research at the secondary level reported correlations ranging from -.47 (King, 1916) to +.92 (Gates, 1921).

Summary of the Literature

The review of the literature has focused on those studies most relevant to the current study. Only those studies involving subjects of relevant grade levels have been reviewed. The review focused on four areas: (1) the relationship between reading rate and level of reading achievement; (2) the relationship of reading rate to the difficulty of the material; (3) the relationship of reading rate and reading disability; and (4) the relationship of reading rate and comprehension.

The studies reviewed indicated that the mean silent reading rates and the mean oral reading rates for a group of students at a given grade level can be expected to increase from that grade level to the next higher grade level. Madden and Pratt (1941) found consistent increases in oral reading rates from Grade 3 to Grade 6 when subjects were asked to read science material. The same increases were evidenced from Grade 3 to Grade 9 when reading social studies material with one exception. The oral reading rates of the fastest group of readers were erratic from Grade 4 to Grade 6. Shores and Husbands (1950) found consistent increases in silent reading rates from Grade 4 to Grade 6 when subjects read biological science materials. Dowdy (1981) found that the mean silent reading rate of both normal and disabled readers increased from Grade 4 to Grade 7, but decreased slightly from Grade 7 to Grade 10 when subjects were reading to answer a specific comprehension question posed prior to reading a passage. The purpose for reading interacted with grade level assignment to decrease the silent reading rate. Studies reviewed in the following section on the relationship between reading rate and comprehension support the contention that the purpose set for reading (or the comprehension task) can affect the rate of reading.

In studies examining the relationship between the difficulty of the reading material and the rate of reading, the difficulty of the material has been defined in a variety of ways: (a) readability formulae, (b) associated grade level, (c) rate of comprehension, (d) and cloze test scores. The evidence indicates that rate measured in words per minute, generally decreases as the difficulty of the materials increases as long as the material remains within the reader's

educational experience (Carver, 1983). However, evidence has also been given that reading rate is influenced by the comprehension task as well as by the difficulty of the material. Levin (1967) found that the influence of the task on oral reading rates was stronger for the good readers, whereas the difficulty of the material exerted a stronger influence on the oral reading rates of the poor reader.

The variety of methodologies and controls employed in the studies concerning the relationship of reading rate and reading disability does not allow completely accurate comparisons. However, the studies suggested that disabled readers will read more slowly than able readers. Watkins (1953) found no significant difference in the silent reading rates of normal progress and disabled readers, but did find the normal progress reader to have a higher mean rate than the disabled readers. Dowdy (1981) found normal readers to read significantly faster than disabled readers. Packman (1970) concluded that poor readers read at a significantly lower oral and silent reading rate than normal readers. The poor readers in Burge's (1982) study read faster silently than orally at three levels of difficulty. The silent reading rate decreased as the difficulty of the material increased.

The studies reviewed reported inconsistent correlations between comprehension and reading rate. Stroud and Henderson (1943) found no significant correlation between reading rate and comprehension, but did find a low positive correlation. Shores (1951) and Shores & Husbands (1950) found that the correlation between reading rate and comprehension varied with the type of material read as well as with the nature of the comprehension task posed for the subject. Previous research at the secondary level reported correlations

between reading rate and comprehension ranging from -.47 (King, 1916) to +.92 (Gates, 1921).

The evidence presented in the review of the literature has demonstrated the need for the more stringent control of the variables and the need for more consistency of methodology in the measurement of oral and silent reading rates. These needs are especially evident in the studies examining the oral and/or silent reading rates of disabled and/or poor readers and in the studies comparing the oral and/or silent reading rates of disabled/poor readers with those of able/normal readers.

The variety of criteria employed to establish the current reading achievement level and the variety of criteria employed to define able/good readers and disabled/poor readers have not elicited consistent or comparable patterns of oral and silent reading rates for either group of readers. The wide range of discrepancy between the identified reading achievement levels of the subjects and the level of the material on which reading rate and/or comprehension has been measured has further complicated the information than can be gleaned from the studies.

CHAPTER III

METHODOLOGY

This chapter describes the methodology employed in the study. It contains a description of the sample, the testing procedures, the test instruments used in collecting the data, the statistical treatment of the data, and the research design.

Description of the Sample

The sample for this study consisted of fourth-, fifth-, sixth-, and seventh-grade students enrolled in selected public schools in Stillwater, Oklahoma and/or receiving reading instruction at the Oklahoma State University Reading/Math Center. Fourth-, fifth-, and sixth-grade subjects from the public schools obtained scores within the sixteenth to the eighty-fourth percentile (16% - 84%) range on the Gates-MacGinitie Reading Tests (MacGinitie et al, 1978). The seventh-grade subjects from the public schools obtained scores below the sixtieth percentile (60%) on the Gates-MacGintie Reading Tests. All subjects obtained a word recognition score of ≥95%-100% and a comprehension score of 70%-100%, hereafter referred to as Difficulty 1 (≥95%, ≥70%) on the Grade 4 or the Grade 6 passage of the Standard Reading Inventory (S.R.I.). All subjects obtained a Full Scale score on the Wechsler Intelligence Test for Children-Revised (WISC-R) of

89 or above. None of the subjects exhibited any discernible handicaps which would interfere with the reading of the passages.

The sample for this study consisted of 18 able and 18 disabled readers. Each reader obtained Difficulty 1 (≥95% ≥70%) criteria on the S.R.I. passage (Grade 4 or Grade 6) on, above, or less than one year below the reader's calculated expected reading level. The group of able readers consisted of eight Grade 4 readers with a mean Full Scale IQ of 101 and 10 Grade 6 readers with a mean Full Scale IQ of 99. The group of disabled readers consisted of 11 Grade 4 readers with a mean Full Scale IQ of 109 and seven Grade 6 readers with a mean Full Scale IQ of 114. The group of able readers consisted of 13 males and five females. Thirteen able readers were enrolled in Grade 4, three in Grade 5, and two in Grade 6. The group of disabled readers consisted of eight males and ten females. One disabled reader was enrolled in grade 5, nine in Grade 6, and eight in Grade 7. The demographic distribution of the sample is exhibited in Table III.

TABLE III

DEMOGRAPHIC DISTRIBUTION OF THE SAMPLE

Reading	Grade Level Assignment	Sex	Full Scale IQ	Expected Reading Level
Able				
4	4	M	106	5.1
4	4	M	110	5.3
4	4	M	91	4.5
4	4	F	90	5.4
4	4	M	89	5.3
4	4	F	123	5.8
4	4	F	113	5.4
4	5	M	89	5.3
6	4	F	102	5.0
6	6	F	97	6.7
6	5	M	92	6.4
6	4	M	89	6.3
6	5	M	99	5.9
6	4	M	91	5.5
6	4	M	105	6.1
6	6	M	101	7.0
6	4	M	110	5.3
6	4	M	103	5.0
Disabled				
4	7	F	117	9.1
4	6	M	109	7.4
4	7	F	124	9.6
4	7	F	105	8.2
4	7	F	118	9.1
4	6	M	109	7.4
4	7	M	100	7.9
4	5	M	108	6.2
4	6	M	102	8.0
4	6	M	109	7.4
4	7	F	101	8.0
6	6	F	100	7.9
6	6	M	124	8.3
6	6	F	120	8.1
6	6	F	127	8.5
6	7	F	109	8.5
6	6	M	110	8.6
6	7	F	111	8.7.

Testing Procedure

The word list of the S.R.I., Form B, was used to determine the appropriate entry level passage of the selected graduated passages of the S.R.I. The selected S.R.I. passages were administered orally until two levels of performance [Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%)] were identified for each subject. All word recognition and fluency errors were recorded. For the purposes of this study all responses identified as substitutions, mispronunciations, and words aided were counted as word recognition errors. Errors on proper nouns and errors reflecting dialect were not counted. Responses to the comprehension questions were recorded. The elapsed time for the reading of each passage was recorded. All interactions with each subject were audio- taped.

Two experimental passages corresponding to each relative level of difficulty [Difficulty 1 (≥95% ≥70%) and Difficulty 2 (<91%, <70%)] obtained on the selected passages of the S.R.I. were administered to each subject. One passage at each identified level was randomly designated as the passage to be read silently and the other was designated as the passage to be read orally. To control for order effect, the subjects from each targeted achievement level subjects were randomly assigned to read the identified passages orally or silently first. The random assignment was determined by the roll of a die. An odd number designated oral reading to be first, whereas an even number designated silent reading to be first. To further control for order effect, subjects were randomly assigned to read either Difficulty 1 (≥95%, ≥70%) or Difficulty 2 (<91%, <70%) passages first. A roll of a die determined the order in which the passages

were presented. An odd number designated Difficulty 1 (≥95%, ≥70%) passages to be read first, whereas an even number designated Difficulty 2 (<91%, <70%) passages to be read first.

A practice passage from the alternate form of the S.R.I. corresponding to the subject's obtained Difficulty 1 (≥95%, ≥70%) level was read prior to the administration of the rate measures, serving as a warm-up passage (Chang & Hanna, 1980). The accompanying comprehension questions were administered to serve as a model for the comprehension task (Samuels & Dahl, 1974). The same procedure was followed prior to the administration of the first rate measure, oral or silent. The oral practice passage was introduced as follows: "Let's begin with a practice story. Read this story called [title of the passage] aloud. When you finish, I will ask you to tell me about the story. Then I will ask you some questions about the story. You may begin." The silent practice passage was introduced as follows: "Let's begin with a practice story. When I say 'Begin', read this story called (title of the passage) silently. When you are finished, say 'Finished'. I will ask you to tell me about the story. Then I will ask you some questions about the story. You may begin."

Prereading instructions for the actual oral rate measures were as follows: "Read this story called (title of passage) aloud. When you finish I will ask you to tell me about the story. Then I will ask you questions similar to those asked on the practice story." The prereading instructions for the actual silent rate measures were as follows: "When I say 'Begin', read this story called (title of the passage) silently. When you are finished, say 'Finished'. I will ask you to tell me about the

story. Then I will ask you questions similar to those asked on the practice story. You may begin."

Following the reading of each passage, the subject was asked to tell about the story. Any of the 10 comprehension questions answered during the retelling of the story were recorded as correct. Any questions not answered during the retelling of the story were asked. Responses were recorded, but were not used in the analysis of the data. The comprehension task was modeled during the practice passage and maintained throughout the administration of the rate measures to insure the comprehension task was the same for all subjects and was consistent throughout the measurement process. The actual reading time for each passage was measured by the examiner with a stopwatch from the audio-tape of the interactions. The number of words read per minute was calculated for each passage. All passages and all responses to questions were audio-taped for the purpose of rechecking the scoring accuracy.

Description of the Testing Instruments

The Gates-MacGintie Reading Test , Primary C and Survey D, (MacGinitie, et al, 1978) is a group administered survey test of reading achievement. Primary C is designed for grade three. Survey D is designed for grades 4-6. The test consists of two components, Vocabulary and Comprehension. The vocabulary component of Primary C is designed to sample the child's ability to recognize or analyze isolated words. The vocabulary test of Survey D samples the student's reading vocabulary. The comprehension test of both C and D is designed to measure the student's ability to read complete prose passages with

understanding. A composite score is calculated in addition to a score for each component. The Gates-MacGintie Tests are administered annually by the Stillwater Public Schools to determine eligibility for Chapter I services. Students scoring below the fortieth percentile (40%) are considered for Chapter I services. (Chapter I services are those services provided through federal funds to those schools having a designated percentage of students to qualify for free or reduced school lunches based on the family's annual income.) Scores from the Gates-MacGintie Reading Tests were used as an initial screening device to locate that portion of the school population targeted for this study.

The Wechsler Intelligence Test for Children - Revised (WISC-R) (Wechsler, 1974) was used to determine the intelligence quotient of each subject. The WISC-R is an individually administered test designed to determine general intellectual capacity in both verbal and performance areas. It consists of 12 subtests measuring specific cognitive skills. The Full Scale score is based on the total number of points received on ten of the subtests (five in each area). This test was selected because of the excellent standardization process and the .96 split-half reliability coefficient of the Full Scale score (Wechsler, 1972).

Selected passages from the Standard Reading Inventory, Forms A and B (McCracken, 1966) were used as a basis for determining the reading achievement level (Grade 4, Grade 6) of the subjects and the two levels of relative difficulty - Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%). The Dale-Chall Formula for Predicting Readability (Dale & Chall, 1948) was used to determine the readability of the passages for Grades 4 through 7. The level for each passage of Form A was evaluated subjectively by 15 nationally recognized

reading experts. A .994 rank correlation between experts' ratings and S.R.I. levels was obtained. Thirty-three of the 38 level ratings obtained agreed with the S.R.I. levels (McCracken, 1966).

For the purposes of this study, the appropriate readability formula was applied to determine the raw readability score of each passage. Passages were selected from both levels to provide the greatest degree of discrimination for Grades 4 through 7. The passages selected for Grade 4 through Grade 7 and the readability data for each passage are presented in Table IV. Figure 2 reflects the intervals between the selected passages.

TABLE IV

READABILITY DATA FOR THE SELECTED S.R.I. PASSAGES AND THE CORRESPONDING RATE PASSAGE

Level	Form	#Sen.	#Wds.	Av.S.	Unk.	% Unk.	Raw Dale-Chall
S.R.I. 4 Oral	(B)	13	149	11.46	4	2.7	4.60
*Rate Passages 4		22	250	11.36	8	3.2	4.66
S.R.I. 5 Silent	(B)	12	149	12.4	8	5.4	5.02
Rate Passages 5		20	250	12.5	.13	5.2	5.02
S.R.I. 6 Silent	(A)	12	149	12.4	14	9.4	5.75
Rate Passages 6		19	250	13.1	24	9.6	5.7
S.R.I. 7 Silent	(B)	9	149	16.5	19	12.75	6.48
Rate Passages 7		16	250	15.5	32	13.0	6.48

*R = Both the corresponding experimental rate passages for a given level contained the same number of sentences, words, and unknown words, consequently having identical readability data.
#Sen = Number of Sentences
#Wds = Number of Words
Av.S. = Average sentence length
Unk. = Number of Unknown Words
%=Percentage of Unknown Words

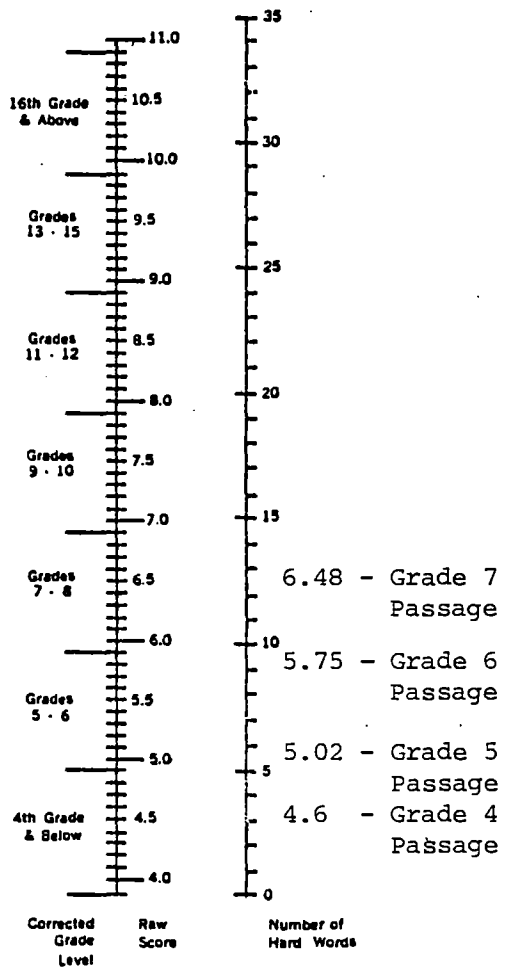


Figure 1. Dale-Chall Raw Score Intervals of the Selected S.R.I. Passages

The criteria applied to determine each subject's relative levels of difficulty (Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%) - are those used by the O.S.U. Reading/Math Center on informal reading inventories. These criteria do not penalize the student for fluency or rate errors, but reflect only word recognition and comprehension errors.

Experimental passages of 250 words for Grade 4 to Grade 7 were designed for this study to measure both oral and silent rates of reading. The passages were selected and adapted from a variety of resources. The original material was selected on the basis of the similarity of the content to the corresponding selected passages of the S.R.I. The material was rewritten to correspond as much as possible to the raw readability scores of the corresponding S.R.I. passages. Table V reflects the readability information for each S.R.I. passage and the corresponding experimental measures. Ten comprehension questions were written for each experimental passage. The questions were modeled after the questions on the S.R.I.

The validity of the experimental passages was corroborated by a panel of six experts. The panel consisted of three reading specialists employed in the public schools, two university reading professionals, and one university educational psychologist. The panel evaluated the similarity of the experimental passages and questions to the corresponding S.R.I. passages and questions on the basis of content, cognitive demands, and developmental appropriateness. With the exceptions of three passages, all six experts rated the passages and questions as very similar or somewhat similar to the S.R.I.

counterparts. One of the six experts rated the two Grade 4 passages and one of the Grade 7 passages as not similar in content.

Equivalent forms reliabilities were established for the experimental passages. Both passages at each level were read by five students enrolled in Grades 4 through 7. The correlation coefficients of equivalence were as follows: Level 4 = .72, Level 5 = .96, Level 6 = .64, and Level 7 = .92.

Research Design

A casual comparative design was employed for this resarch due to the ex post facto nature of the data collection; that is, there was no prior manipulation of two of the variables (group and level of reading achievement). Because this design is ex post facto in nature, it permits only tentative cause-effect statements to be made. The two independent, non-repeated, fixed factors were group (able, disabled) and level of reading achievement (Grade 4, Grade 6). The two independent, repeated factors were method of reading (oral, silent) and level of relative difficulty [Difficulty 1 (≥95% ≥70%) and Difficulty 2 (<91%, <70%)]. The design is presented in Figure 2.

Group	Level of Reading Achievement	Oral Rates		Silent Rates	
		Diff. 1	Diff. 2	Diff. 1	Diff. 2
Able n=18	4	n=8	n=8	n=8	n=8
	6	n=10	n=10	n=10	n=10
Disabled n=18	4	n=11	n=11	n=11	n=11
	6	n=7	n=7	n=7	n=7
N=36	N=36	N=36	N=36	N=36	N=36

Figure 2. Causal Comparative Research Design of the Study

Statistical Techniques Used in the Treatment of the Data

To test the hypothesis, a 2x2x2x2 , mixed model analysis of variance for repeated measures was performed on the mean word per minute scores of the four measures of reading rate. The two independent non-repeated, fixed factors were group (able, disabled) and level of reading achievement (Grade 4, Grade 6). The two independent, repeated fixed factors were method of reading (oral, silent) and level of relative difficulty [Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%)]. The dependent variable measured at each point was reading rate calculated in words per minute.

The alpha level was set of .05. If the probability for F was greater than .05, the study failed to reject the null hypothesis. If the probability for F was less than .05, the null hypothesis was rejected. Since the cell sizes contained unequal numbers of subjects, Eta Squared was used to calculate the strength of association.

Summary

This chapter included a description of the methodology employed in the study. It described the sample, the instruments used for the collection of the data, the testing procedures, the statistical techniques used to test the hypothesis, and the research design. Chapter IV contains a statistical analysis of the data. It contains the treatment of the data, the analysis of the results, and indicates if the null hypothesis was rejected or failed to be rejected.

CHAPTER IV

TREATMENT OF THE DATA AND ANALYSIS OF THE RESULTS

This study was concerned with the oral and silent reading rates of able and disabled readers meeting Difficulty 1 (≥95%, ≥70%) criteria on the Grade 4 or Grade 6 passage of the S.R.I. Four measures of reading rate (measured in words per minute) formed the bases for the comparisons. Of these four measures, two were based on oral reading and two on silent reading. One measure of each method of reading was made on a passage corresponding to the S.R.I. passages on which the subject obtained the criteria for Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%).

Determination of the differences in reading rate were made within and between groups. The interactions of group (able, disabled), reading achievement level (Grade 4, Grade 6), method of reading (oral, silent), and level of relative difficulty [Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%)] of the passages were examined.

The main hypothesis regarding the interaction of group, level of reading achievement, method of reading, and level of relative difficulty is examined first. Subsequent hypotheses are examined as indicated by the presence or absence of a significant four-way interaction.

The hypotheses covering all of the research questions was tested using a 2x2x2x2, mixed model analysis of variance for repeated measures. F-tests were performed on the sample means (Table V) for each measure of reading rate. The .05 level of significance was used to ascertain whether or not a reasonable interaction was apparent.

TABLE V

MEANS AND STANDARD DEVIATIONS OF THE SAMPLE

LEVEL OF READING ACHIEVEMENT	ORAL				SILENT			
	Difficulty 1 (≥95%, ≥70%)		Difficulty 2 (<91%, <70%)		Difficulty 1 (≥95%, ≥70%)		Difficulty 2 (<91%, <70%)	
	M	SD	M	SD	M	SD	M	SD
Able								
4	109.02	27.69	83.51	21.76	102.93	24.28	117.29	35.59
6	83.98	23.88	79.22	30.66	108.48	39.56	104.82	37.98
Disabled								
4	152.54	23.62	125.09	29.11	130.15	29.96	152.96	28.75
6	124.28	17.13	126.67	14.36	162.44	35.38	156.06	50.08

Test of the Hypothesis

There is no significant interaction of group, method of reading, level of achievement, and level of relative difficulty affecting the reading rates of the sample.

As can be seen from the Source Table (Table VI), this hypothesis failed to be rejected ($F = 2.55$; $df = 1,32$; $p < .05$). Since the primary interaction was not found to be significant, the subsequent three-way interactions were examined. The three-way interaction of level of achievement, method of reading, and level of relative difficulty was found to be significant ($F = 58.95$; $df = 1,32$; $p < .05$). Application of Eta Squared indicated that this interaction accounted for 4% of the variability in the rate measures. Able and disabled readers were collapsed across levels of reading achievement (Grade 4, Grade 6). The means for each measure of reading rate for those subjects at Grade 4 of reaching achievement are demonstrated in Figure 3. The means for each measure of reading rate for those subjects at Grade 6 of reading achievement are demonstrated in Figure 4.

TABLE VI

SOURCE TABLE OF THE 2x2x2x2, MIXED-MODEL ANALYSIS OF VARIANCE FOR REPEATED MEASURES

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F VALUE*
Group (G)	66,186.56	1	66,186.56	21.31
Level of Reading Achievement (RA)	439.27	1	439.27	.14
G x RA	1,101.38	1	401.38	.35
Error	3,105.69	32	3,105.69	
Method (M)	10,952.49	1	10,952.49	23.31
G x M	248.77	1	248.77	.54
RA x M	3,820.59	1	3,820.59	8.27
G x RA x M	856.54	1	856.54	1.85
Error	14,779.19	32	461.85	
Level of Relative Difficulty (DL)	442.23	1	442.23	5.98
G x DL	61.95	1	61.95	.84
RA x DL	6.45	1	6.45	.09
G x RA x DL	2.37	1	2.37	.03
Error	2,365,37	32	73.92	
M x DL	4,684.15	1	4,684.15	53.37
G x M x DL	181.19	1	181.19	2.06
RA x M x DL	5,173.75	1	5,173.75	58.95
G x RA x M x DL	224.09	1	224.09	2.55
Error	2,808.36	32	87.76	
Total	117,440.39	36		

*Significant at the .05 level if F is greater than 4.15.

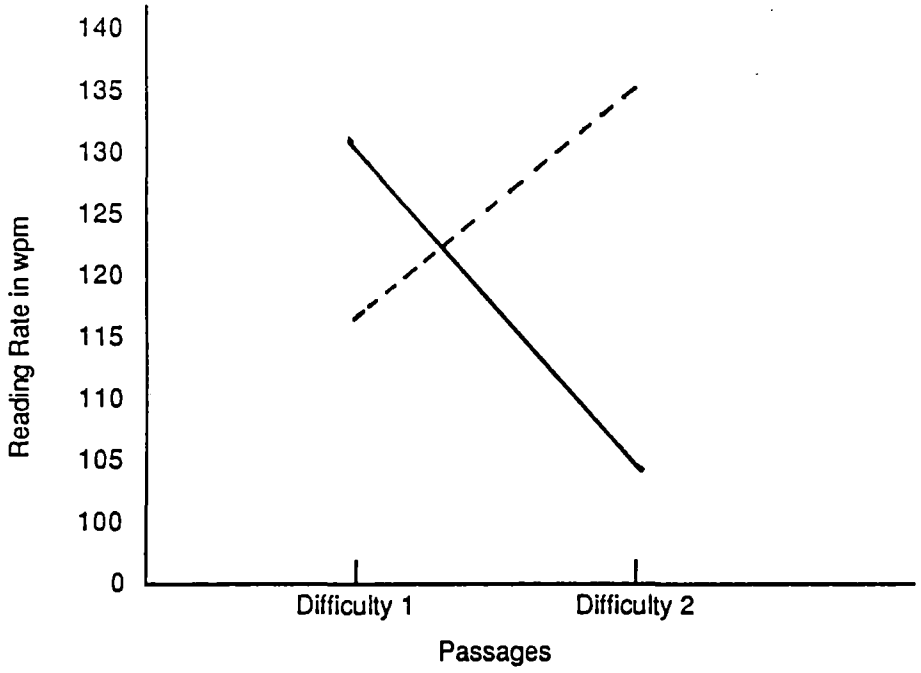


Figure 3. Mean Oral and Silent Reading Rates of Reading Achievement of Grade 4 Subjects for Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%) Passages

Key Oral ———
Silent ---------

Figure 4. Mean Oral and Silent Reading Rates of Reading Achievement of Grade 6 Subjects for Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%) Passages

Key Oral ———
Silent - - - - - - -

As can be seen in Figure 3, the Grade 4 readers read faster orally (M = 130.78) at Difficulty 1 (≥95%, ≥70%) than at Difficulty 2 (<91%, <70%) (M = 104.30). They read faster silently (M = 135.13) at Difficulty 2 (<91%, <70%) than at Difficulty 1 (≥95%, ≥70%) (M = 116.54).

Examination of Figure 4 demonstrates that Grade 6 readers read faster orally at Difficulty 1 (≥95%, ≥70%) (M = 104.13) than at Difficulty 2 (<91%, <70%) (M = 102.95. The same pattern persisted in silent reading. Grade 6 readers read

Difficulty 1 (≥95%, ≥70%) passages faster silently (M = 135.46) than Difficulty 2 (<91%, <70%) passages (M = 1139.44).

Comparing the oral reading means of Grade 4 and Grade 6 readers (Table VII), it can be seen that Grade 4 readers read faster orally than Grade 6 readers at both levels of personal difficulty. The Grade 4 readers read Difficulty 1 (≥95%, ≥70%) passages orally at the mean rate of 130.78 wpm whereas the Grade 6 readers read Difficulty 1 (≥95%, ≥70%) passages orally at the mean rate of 104.13 wpm. Difficulty 2 passages (<91%, <70%) were read orally by the Grade 4 readers at the mean rate of 104.30 wpm whereas the Grade 6 readers read the Difficulty 2 passages (<91%, <70%) orally at the mean rate of 102.95 wpm. Both Grade 4 and Grade 6 readers decreased the mean oral reading rate as the relative difficulty of the passage increased. However, the mean oral reading rate decreased rather than increased as the level of reading achievement increased.

TABLE VII

MEAN ORAL AND SILENT READING RATES OF READING ACHIEVEMENT GRADE 4 AND GRADE 6 SUBJECTS BY LEVEL OF RELATIVE DIFFICULTY

Level of Reading Achievement	Oral		Silent	
	Difficulty 1 (≥95%, ≥70%)	Difficulty 2 (<91%, <70%)	Difficulty 1 (≥95%, ≥70%)	Difficulty 2 (<91%,<70%)
Grade 4	130.78	104.30	116.54	135.13
Grade 6	104.13	102.95	135.46	130.44

Comparison of the silent reading means of Grade 4 and Grade 6 readers (Table VII) demonstrates that Grade 6 readers silently read Difficulty 1 (≥95%, ≥70%) passages more rapidly ($\underline{M}$ = 135.46) than Grade 4 readers ($\underline{M}$ = 116.54). However, Grade 4 readers silently read Difficulty 2 (<91%, <70%) passages more rapidly ($\underline{M}$ = 135.13) than Grade 6 readers ($\underline{M}$ = 130.44).

TABLE VIII

MEAN ORAL AND SILENT READING RATES OF ABLE AND DISABLED SUBJECTS BY LEVEL OF RELATIVE DIFFICULTY

	Oral		Silent	
Group	Difficulty 1 (≥95%, ≥70%)	Difficulty 2 (<91%, <70%)	Difficulty 1 (≥95%, ≥70%)	Difficulty 2 (<91%,<70%)
Able	96.5	81.37	105.71	111.06
Disabled	138.41	125.88	146.30	154.51

Because the independent variable of group (able, disabled) was not part of the significant interaction, the main effect of group (able, disabled) could be examined. Results showed that groupwas significant ($F = 21.31$; $df = 1,32$; $p = <.05$). Eta Squared strength of association indicated that the independent variable of group accounted for 56% of the variance in the measures of reading rate. Collapsing across grade levels of reading achievement, the means of the able and disabled readers for the four measures of reading rate are exhibited in

Table VIII. As is clearly demonstrated in Figure 5, the disabled readers read significantly faster than the able readers on all four measures of reading rate. Both groups read orally more rapidly at Difficulty 1 (≥95%, ≥70%) than at Difficulty 2 (<91%, <70%). Both groups read silently more rapidly at Difficulty 2 (<91%, <70%) than at Difficulty 1 (≥95%, ≥70%). Both groups read passages of equal difficulty faster silently than orally.

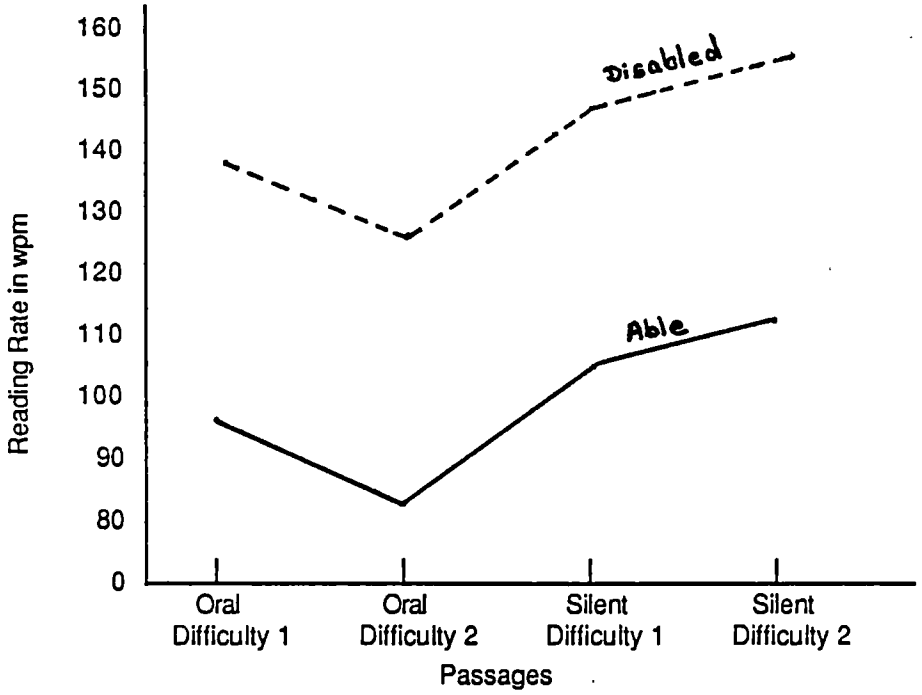


Figure 5. Mean Oral and Silent Reading Rates of Able and Disabled Readers for Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%) Passages

Summary

This chapter included an account of the treatment of the data. F tests performed on the sample means were used to determine if there was a significant interaction among the sample means of able and disabled readers on four measures of reading rate. The four measures of reading rate were: (1) Oral, Difficulty 1 (≥95%, ≥70%); (2) Oral, Difficulty 2 (<91%, <70%); (3) Silent, Difficulty 1 (≥95%, ≥70%); and (4) Silent, Difficulty 2 (<91%, <70%). Both able and disabled readers were stratified into two reading achievement groups, Grade 4 and Grade 6.

The interaction of group (able, disabled), level of reading achievement (Grade 4, Grade 6), method of reading (oral, silent), and level of relative difficulty [Difficulty 1 (≥95% ≥70%) and Difficulty 2 (<91%, <70%)] was found to be significant. Collapsing the means across groups, it was found that Grade 4 readers read orally faster than Grade 6 readers with a greater difference between the two groups occurring on Difficulty 1 (≥95%, ≥70%) passages. Grade 6 readers read silently faster than Grade 4 readers on Difficulty 1 (≥95%, ≥70%) passages, whereas Grade 4 readers read silently faster than Grade 6 readers on Difficulty 2 (<91%, <70%) passages. A greater difference occurred between the groups at Difficulty 1 (≥95%, ≥70%) than at Difficulty 2 (<91%, <70%).

Able and disabled readers were found to read at significantly different rates. Disabled readers were found to read significantly faster than able readers on all four measures of reading rate. Both able and disabled readers exhibited a greater difference between levels of relative difficulty within oral reading than

within silent reading. The difference between able and disabled readers was consistent across both methods of reading and level of relative difficulty.

CHAPTER V

SUMMARY AND CONCLUSIONS

General Summary of the Investigation

This study was concerned with the oral and silent reading rates of able and disabled readers obtaining Difficulty 1 (≥95%, ≥70%) criteria on the Grade 4 or Grade 6 passage of the S.R.I. Four measures of reading rate (measured in words per minute) formed the bases for the comparisons. Of these four measures, two were based on oral reading and two on silent reading. One measure of reading rate was taken for each method of reading (oral, silent) on a passage corresponding to the S.R.I. passage on which the subject obtained the criteria for Difficulty 1 (≥95%, ≥70%) and for Difficulty 2 (<91%, <70%).

The sample consisted of 36 fourth-, fifth-, sixth-, and seventh-graders attending selected public schools in Stillwater, Oklahoma, and/or attending the Oklahoma State University Reading/Math Center. All of the subjects obtained a Full Scale score of 89 or above on the Wechsler Intelligence Scale for Children-Revised. All 36 subjects obtained the criteria for Difficulty 1 (≥95%, ≥70%) on the Grade 4 or the Grade 6 passage of the S.R.I.

Of the 36 subjects, 19 obtained the Difficulty 1 (≥95%, ≥70%) criteria on the Grade 4 passage of the S.R.I. The remaining 17 subjects obtained the Difficulty 1 (≥95%, ≥70%) criteria on the Grade 6 passage of the S.R.I. Eleven of the Grade

4 readers and seven of the Grade 6 readers were classified as disabled readers (one or more years below the expected reading level as calculated by the Bond-Tinker formula). Eight of the Grade 4 readers and ten of the Grade 6 readers were classified as able readers (reading on, above, or less than one year below the expected reading level as calculated by the Bond-Tinker formula). None of the subjects had discernible handicaps which would interfere with the reading of the materials or the subsequent analysis of the reading rates measured.

Four measures of reading rate were obtained for each subject - Oral, Difficulty 1 (≥95%, ≥70%); Oral, Difficulty 2 (<91%, <70%); Silent, Difficulty 1 (≥95%, ≥70%); and Silent, Difficulty 2 (<91%, <70%). A 2x2x2x2, mixed model analysis of variance for repeated measures was used to determine if a significant interaction of group, level of reading achievement, method of reading, and level of relative difficulty was apparent.

Conclusions

The results indicate that there is a significant interaction of level of reading achievement, method of reading, and level of relative difficulty affecting the reading rates of the subjects of this study. Collapsing the means across groups (able, disabled), it was found that Grade 4 readers read orally faster than Grade 6 readers at both levels of relative difficulty. Grade 6 readers read silently faster than Grade 4 readers on Difficulty 1 (≥95%, ≥70%); whereas Grade 4 readers read silently faster than Grade 6 readers on Difficulty 2 (<91%, <70%) passages.

Grade 4 readers exhibited a greater difference between levels of relative difficulty within both oral and silent reading than did Grade 6 readers. The difference between the two levels of relative difficulty was greater within oral reading than within silent reading for the Grade 4 readers. Grade 6 readers exhibited only minimal differences between levels of relative difficulty within methods of reading.

Able and disabled readers were found to read at significantly different rates. Disabled readers were found to read significantly faster than able readers on all four measures of reading rate. Both able and disabled readers exhibited a greater difference between levels of relative difficulty within oral reading than within silent reading. The difference between able and disabled readers was consistent across both method of reading and level of relative difficulty.

The results of this study concur with previous research in evidencing that oral reading is generally slower than silent reading (Burge, 1982) and that less difficult material is generally read more rapidly than more difficulty material (Carlson, 1949; McCracken, 1961; Levin, 1967; Burge, 1982; and Carver, 1983). However, the results of this study are inconsistent with previous research related to the relationship between level of achievement and reading rate. Previous research evidenced that rate of reading increases as level of achievement increases (Madden & Pratt, 1943; Shores & Husbands, 1950; Taylor, et al, 1965). This study indicated that Grade 4 readers read faster than Grade 6 readers when reading Difficulty 1 (≥95%, ≥70%) or Difficulty 2 (<91%, <70%) passages orally and when reading Difficulty 2 (<91%, <70%) passages silently. Yet, Grade 6 readers read Difficulty 1 (≥95%, ≥70%) passages more

rapidly than Grade 4 readers when reading silently. As demonstrated in Figure 6, this pattern was consistent between Grade 4 and Grade 6 readers within the group of able readers. An examination of Figure 6 reveals that among disabled readers, the Grade 4 readers read more rapidly than the Grade 6 readers only when reading Difficulty 1 (≥95%, ≥70%) passages orally. Under all other identified conditions, the Grade 6 disabled readers read more rapidly than the Grade 4 disabled reader. The differences between the Grade 4 and Grade 6 disabled readers are greater on Difficulty 1 (≥95%, ≥70%) passages than on Difficulty 2 (<91%, <70%) passages whether reading orally or silently.

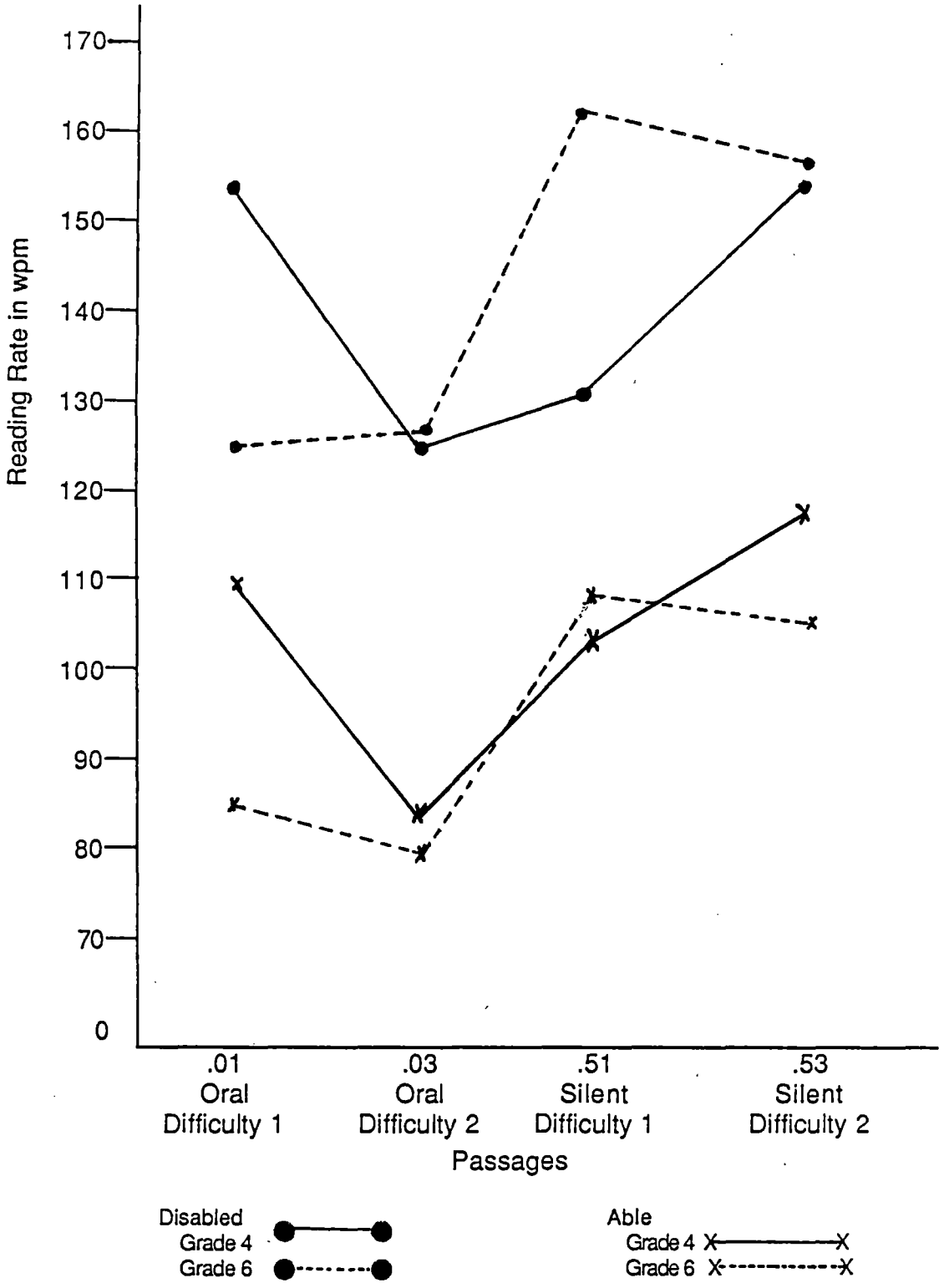


Figure 6. Mean Oral and Silent Reading Rates of Reading Achievement Grade 4 and Grade 6 Able and Disabled Readers for Difficulty 1 (≥95%, ≥70%) and Difficulty 2 (<91%, <70%) Passages

It appears that, whereas reading rate averages based on grade level assignment may demonstrate a positive correlation with grade level, reading rate averages based on measured level of reading achievement do not demonstrate the same positive correlation. Inconsistencies in the expected pattern are found not only between levels of achievement, but also between methods of reading and between the difficulty levels of the material read. The discrepancy of the level of measured achievement and the expected reading level of the subject (able, disabled) also appears to influence the rate of reading. All of these factors appear to have some degree of influence on rate of reading even when the level of word recognition and the level of comprehension are held constant in measuring level of reading achievement. The results of this study indicate that slow readers are not necessarily poor readers in terms of word recognition and comprehension, a conclusion which is consistent with Carlson's (1949) study. Consequently, differentiated instruction for these readers is required. For these slow readers, instruction at the obtained Difficulty 1 (≥95%, ≥70%) level should focus on strategies to increase rate of reading or fluency as opposed to word recognition skills or comprehension skills.

This study is also inconsistent with the findings of Watkins (1953), Packman (1970), Dowdy (1981), and Burge (1982). Each of these researchers evidenced that disabled readers read more slowly than able readers. In this study, as demonstrated in Table 8, disabled readers read significantly faster than able readers when reading orally or silently and when reading Difficulty 1 (≥95%, ≥70%) or Difficulty 2 (<91%, <70%) passages. This pattern was consistent

between able and disabled readers of achievement Grade 4 (Figure 6) and of achievement Grade 6 (Figure 5).

Examining the mean silent reading rates of both able and disabled readers for Difficulty 1 (≥95%, ≥70%) passages, the following means are found for Grade 4 readers: able $\underline{M}$ = 102.93, disabled $\underline{M}$ = 130.15. The following means are found for Grade 6 readers: able $\underline{M}$ = 108.48, disabled $\underline{M}$ = 162.44. A comparison of these means to the grade level means for silent reading established by Taylor, et al (1960) is cause for concern. The mean silent reading rate with comprehension at Grade 4 reported by Taylor, et al (1960) was 158 wpm. The highest mean reported at Grade 4 in this study was 130.15 wpm which is 27.85 wpm slower. The mean silent reading rate with comprehension reported by Taylor, et al (1960) was 185 wpm compared to 162.44 wpm, the highest Grade 6 mean reported in this study. Although not all Grade 4 subjects in this study were enrolled in Grade 4 and not all Grade 6 subjects were enrolled in Grade 6, it appears the general degree of fluency has declined since the study by Taylor, et al (1960). Changes in instructional objectives and techniques, instructional materials, and reading habits of the students should be examined to determine if significant relationships to the apparent decline in reading rate.

The fact that the results of this study differ from results of previous research related to the differences in reading rate between able and disabled readers is cause for concern. While the difference between the groups in this study accounted for 56% of the variance in reading rates (as opposed to the minute 4% accounted to be the interaction of level of reading achievement, method of reading, and level of relative difficulty), the fact that the able readers in this

sample read significantly slower than the disabled readers is puzzling. Several explanations are offered.

It is suggested that the measurement of the level of reading achievement might have been inaccurate. Future researchers should consider the appropriateness or inappropriateness of an informal reading inventory as an instrument to be used as the basis for determining whether a reader is able or disabled. Not one of the subjects in this sample fell below the 91% word recognition criterion on the Difficulty 2 (<91%, <70%) passages. Each subject fell below the 70% comprehension criterion. Yet, on the rate measures, comprehension was frequently above the 70% level. Consequently, it is possible that some of the subjects might not have fallen below the comprehension criterion on a passage of the same level on the alternate form of the S.R.I. or on passages of higher levels on either form of the S.R.I. While the usefulness of the informal reading inventory as a diagnostic instrument is not in question, perhaps the practice of terminating an informal inventory on the first passage on which the criteria for Difficulty 2 (<91%, <70%) is not obtained should be reconsidered. Perhaps the appropriateness of the use of a single set of graduated paragraphs for determining the reading achievement level of a reader should be reconsidered.

The variables of gender, grade level assignment (years in school), and IQ should be reconsidered. Examination of the demographic data (Table 4) for this sample indicates that the mean Full Scale score of the disabled readers was 112, whereas the mean Full Scale score of the abled readers was 100. The fact that the abled readers read slower than the disabled readers lends credence to

Carlson's (1949) suggestion that IQ affects reading rate. The majority of the disabled readers were assigned to Grades 6 and 7, whereas the majority of the able readers were assigned to Grade 4. Examination of the data from this perspective would be more consistent with previous studies evidencing an increase in rate as grade level increases. The majority of the disabled readers were females, whereas the majority of the abled readers were males. The factor of gender has not been examined in previous research, but perhaps it should be considered in future research.

Perhaps the most important implication of this study is that the degree of reading rate (fluency) varies significantly among readers achieving the same degree of word recognition and the same degree of comprehension at the same level of relative difficulty. Consequently, reading rate (fluency) should be considered a separate aspect of the reading process. The diagnostic process must include an evaluation of both oral and silent reading rate. Instruction must then be differentiated to address the fluency needs of individual readers.

Recommendations

1. It is recommended that this study be replicated across reading Grades 2 through 6 to ascertain whether or not similar patterns of differences occur across these levels.

2. It is recommended that this study be replicated with groups matched on the basis of Full Scale scores on the WISC-R to ascertain whether or not the patterns of differences are maintained with this additional control. Groups within a narrow range of Full Scale scores should be compared.

3. It is recommended that this study be replicated with a larger sample size to determine whether or not the same patterns of differences persist.

4. It is recommended that a similar study be designed using more than one graduated series of paragraphs to measure each subject's level of reading achievement and/or that the procedure for determining the Difficulty 2 (<91%, <70%) level be adjusted to insure a valid measure.

5. It is recommended that a similar study be designed incorporating as independent, fixed, non-repeated variables the factors of IQ, gender, and grade level assignment (years in school).

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APPENDIX A

April 10, 1986

Dear Parents,

My name is Karen Daves. I am a sixth grade reading teacher at the Stillwater Middle School. Currently, I am on leave to work on an advanced degree in reading instruction. To complete my research, I need your permission for your child to participate in my study.

The purpose of the study is to compare the silent and oral reading rates of students making normal progress in reading with those of students experiencing difficulty. If your child is allowed to participate in the study, an individual assessment of his/her current level of reading achievement will be made using an informal reading inventory. If his/her obtained level is one targeted for the study, he/she will be asked to read additional stories for the purpose of measuring his/her rate of reading. These activities will take place at your child's school.

In addition, I will ask that you schedule a two-hour block of time after school or on the weekend for the purpose of determining your child's expected reading level based on his/her general intellectual capacity. The Wechsler Intelligence Scale for Children - Revised will be administered. This is an individually administered test. This testing will take place at the O.S.U. Reading Center, 104 Gundersen. (If your child has already taken the WISC-R, I will be able to use the test results with your permission.)

All test results will remain confidential. Numbers will be used in place of names. However, the results of your child's performance will be made available to you upon request. I will be happy to answer any questions you might have about his/her performance.

In order for your child to participate in this study, please sign the attached permission form and return it to your child's teacher. If you have any questions or concerns, please feel free to call me at the O.S.U. Reading Center (624-7119). I appreciate your cooperation.

Sincerely,

Karen S. Daves

My child, _____,
has permission to participate in the research study conducted by Karen S. Daves. I understand the results of my child's testing will remain confidential, but will be released to me upon my request.

_____ I am willing to schedule a time to bring my child to the O.S.U. Reading Center for the administration of the Wechsler Intelligence Scale for Children - Revised (WISC-R).

_____ My child has already taken the WISC-R and I hereby grant permission for the results to be released to Karen S. Daves.

Date: April _____, 1986

Parent's Signature: _____

VITA

Karen Sue Daves

Candidate for the Degree of

Doctor of Education

Thesis: AN EXAMINATION AND COMPARISON OF THE ORAL AND SILENT READING RATES OF ABLE AND DISABLED READERS

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Professional Experience: Taught third grade in Del Valle, Texas, from 1970 to 1972; directed Head Start Program in Nacogdoches, Texas, from 1972 to 1973; served as consultant to Caldwell Playschools in Tyler, Texas, from 1973 to 1974; directed Children's World in Farmer's Branch, Texas, from December, 1976 to August, 1977; taught Learning Disabilities classes in Garland, Texas, from 1976 to 1980; served as Reading Specialist in Sand Springs, Oklahoma, from 1980 to 1982; taught sixth grade reading in Stillwater, Oklahoma, from 1982 to 1985; served as graduate assistant and instructor of reading courses, Department of Curriculum and Instruction, Oklahoma State University, from 1985 to 1986; Assistant Professor of Reading, University of Northern Colorado from 1986 to present.