THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

ONE HUNDRED NINETEEN PHONOGRAMS: AN ANALYSIS OF PRONUNCIABILITY

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF EDUCATION

BY

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Norman, Oklahoma

1976

ONE HUNDRED NINETEEN PHONOGRAMS:

AN ANALYSIS OF PRONUNCIABILITY

APPROVED BY

DISSERTATION COMMITTEE

ACKNOWLEDGEMENTS

The organization, collection of data, and preparation of this document required the cooperation of many individuals. It is with pleasure that recognition be given in the opening pages of this paper.

Dr. Richard P. Williams served as my chairman, critique, and personal friend. The knowledges and understandings gained from this leader have, and will continue to, influence this writer regardless of time, age, or place. He has been the greatest single influence to my professional career. I will always be thankful to my "Chief".

Dr. Michael Langenbach, Dr. Gerald Kidd, and Dr. William Graves served as committee members, read the manuscript, and provided guidance with design and analysis.

Dr. Leon Bewley and Mr. Gene Ross provided the opportunity to conduct the study in the Moore School District. More than one hundred teachers and eight university students provided the staffing necessary to spend more than 600 hours testing 1,600 children.

My wife, Jan, lived with the pleasures, frustrations and sacrifices accompanying the development of a dissertation. She stayed by my side, gave up her personal desires, and devoted her time and energy keeping the project on time. It has made us strong together. I love her for the inspiration and strength she provided during the busy year on the paper.

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CHAPTER I

INTRODUCTION AND PROBLEM

Introduction

What can be done for students who have not responded adequately to beginning reading instructions? This question has been raised by more teachers, caused more frustration with parents, precipitated more research, and produced more devices than any other question within academic circles. The action of the Oklahoma City Board of Education in 1973 testifies the concern of cities throughout the country for teaching children to read. The headlines of the Daily Oklahoman read: "Reading Called No. 1 Priority." The article went to to state:

> Improvement of reading ability and language skills of Oklahoma City school students will have the No. 1 educational priority in the school district for the 1973-74 school year, the Oklahoma City Board of Education decided Thursday. By adopting the motion making reading number one in priority, the board agreed to expand the district's reading program significantly "beyond present plans for 1973-74, especially in the areas of assisting those students who are underachievers in reading.

> Board members and school administrators are in agreement that reading deficiencies among students at all grade levels constitute the single greatest educational problem in the school system.[1]

Although the above is an example of concern on a local level, literature abounds with information concerning reading problems throughout the nation. One of the more startling announcements came in 1969 when James Allen claimed that: (1) One out of every four students had significant reading problems, (2) In larger city school systems up to one-half of the students read below expectations, (3) There were more than 3,000,000 illiterates in our adult population, (4) About one-half of the unemployed youth in New York City, ages sixteen to twenty-one were functionally illiterate, and (5) In a recent U.S. Armed Forces program called PROJECT 100,000, 68.2 percent of the young men fell below grade seven in reading and general academic ability.[2]

According to the National Advisory Committee on Dyslexia and Reading Disorders' report in 1969, eight million children will not learn to read adequately. This means one child in seven is handicapped in his ability to acquire essential reading skills.[3] The factors contributing to a child's inability to learn to read are both numerous and

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[1] The Daily Oklahoman, May 18, 1973, p. 14.

[2] James E. Allen, Jr., "The Right to Read-Target for the 70's," Journal of Reading, (November, 1969), 95-101.

[3] Report of the Secretary's (HEW) National Advisory Committee on Dyslexia and Reading Disorders (Washington: U.S. Government Printing Office, 1969), p. 7.

complex but include mental retardation, environmental deprivation, and various physical, emotional and educational factors.[1]

While, on one hand, recently quoted statistics indicate an overwhelmingly increasing problem, the number of devices created to remediate these problems also increase at an alarming rate. In fact, the last fifty years has seen more innovations in reading than the previous three-hundred years antedating this period in American history.[2] There is a considerable amount of attention given to special programs for the mentally retarded, the emotionally disturbed, the learning disabled, the perceptually handicapped, the reading retarded, and the reluctant reader. Categories and classifications for every conceivable problem area are being identified. In the Putnam City School District, Oklahoma City, Oklahoma, a middle-sized rural school system of fifteen elementary schools, the number of learning disability classes increased from five in 1971 to fifty-seven in 1976 with hundreds of children on the waiting list for diagnosis and placement. Colleges and universities are rapidly developing new and expanded certification programs to meet the demands.

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[1]Ibid., p. 9.

[2]Nila Banton Smith, "What Have We Accomplished? A Review of the Past Fifty Years," Reading Instruction: Dimensions and Issues, ed. William K. Durr (Boston: Houghton Mifflin Co., 1967), p. 3.

In spite of the myriad devices available to education today, the overwhelming majority of students in the United States learn to read with the aid of a basal reading system with a vast assortment of ancillary materials serving in supportive roles only.[1] Although each basal system claims uniqueness in some way, all systems strongly emphasize a decoding base for beginning reading instruction. During the 1972 state textbook adoption hearings, this researcher served as one of five reading consultants to the State Textbook Committee of Oklahoma. Examination of seventeen basal programs revealed that all but one emphasized a phonics approach to beginning reading with Scholastic's Individualized Reading the lone exception.[2] The "phonics approach" includes the teaching of individual letters and their sounds, blends, consonant digraphs, vowel digraphs, and diphthongs in that order. The greatest impetus to the current phonics emphasis occurred in 1955 when Rudolf Flesch entered the look-say versus the phonics controversy. His book, Why Johnny Can't Read, quickly became a best seller. He defined phonics as "simplified phonetics for teaching reading," and made questionable statements such as calling the g's in gem and go "soft" and "hard." He also labeled the vowels in words such as mate,

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[1]Edward B. Fry, Reading Instructions For Classroom and Clinic, (New York: McGraw-Hill, 1972), p. 47.

[2]Elton G. Stetson, "The State Textbook Committee Explores Basal Reading," The Oklahoma Reader, VIII (Winter, 1972), 10-12.

mite, mote, and mute as long vowels rather than diphthongs and he classified au, ou, and oi as diphthongs. He developed a sequence of five steps which was guaranteed to teach any child to read.[1]

If the majority of beginning readers are placed in basal reading systems supporting phonics analysis as the important beginning reading skill, what effect has this emphasis had on reading achievement? Malmquist claims that, in spite of the trends, "the number of adult illiterates, rather than decreasing, is actually increasing at the rate of twenty-five to thirty million a year, owing to the fact that educational programs have not kept pace with the rapid population growth."[2]

Once a student has been identified as a poor reader, the question is raised as to what method should be employed to remediate the problem. Unfortunately current practices indicate that re-cycling through a phonics-based program is most often used with the assumption that additional exposure will solve the problem and produce a proficient decoder. An examination of many of the current innovations will reveal

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[1]Rudolf Flesch, Why Johnny Can't Read, (New York, Harper and Row, 1955), p. 22.

[2]Eve Malmquist, "Problems of Reading and Readers: An International Challenge," In Improving Reading Ability Around the World, Proceedings of the Third International Reading Association's World Congress, Sydney, Australia, August 7-9, 1970 (Newark, Delaware: International Reading Association, 1970), p. 69.

that, although the medium may differ, the approach will still be phonic-based.

Occasionally methodologies are introduced which advocate decoding instruction somewhat different from a phonics approach as described above. Gerald Glass introduced one such approach which he entitled: Glass Analysis For Perceptual Conditioning.[1] Glass claims that, first, decoding can and should be taught separate from the total reading process as long as the teaching of decoding skills utilizes words already known by the student. This analytic approach in which known words are broken down to smaller components provides an inductive method by which students may generalize about what is common to the words being analyzed.[2] One might conclude that the Glass approach is like the basal approach in that his system is inductive and analytic but unlike the basal approach in that decoding is taught as a separate and independent skill from meaning rather than concommitent with meaning. In defending his position of separating decoding from meaning, Glass draws an analogy to the importance of the ignition key to the automobile; although the ignition key is relatively unimportant compared to the high value of the total automobile, the automobile

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[1]Gerald G. Glass, Teaching Decoding As Separate From Reading: Freeing Reading From Non-Reading To The Advantage of Both (Garden City, New Jersey: Adelphi University Press, 1973), pp. 5-7.

[2]Delores Durkin, Teaching Them to Read (Boston: Allyn and Bacon, 1970), p. 132.

will not generally function without it. Likewise, Glass states that:

> Reading authorities would consider that one truly can read only if one is able to: decode the written word, obtain meaning of prescribed dimensions from the decoded words, react to and utilize these meanings for academic and personal growth. It is apparent that if a person is merely able to identify the sound of a word (decode), he is not reading unless he can at the same time respond with meaning. However, it must also be made apparent that, if one is to learn to read, one will never have the opportunity to respond to meanings already known (or to develop new meanings via the printed word) if the decoding ability is not there first. The person who could not decode would admittedly still have a wide range of avenues open to communicate but the avenue of reading would be blocked.
>
> While decoding is not reading, reading cannot come about without decoding. As a child can learn to listen only after he can hear, a child can learn to read only after he has developed the ability to decode. . . . Similarly, merely because a person is able to decode does not mean that he is able to read, i.e., to understand and to deal with meanings via the printed word. However, it is crucial to reiterate that it is impossible to read if decoding ability is not first developed.[1]

Another important claim made by Glass is that poor decoders, already having failed traditional reading instruction, should not be re-cycled through a beginning reading system such as phonics analysis. A more sensible approach would be to teach that student decoding skills more akin to those of a mature reader who, rather than identifying individual letter-sound relationships, identifies larger "chunks" or "clusters" resembling syllables.

> Words are initially seen as wholes and, then, are composed of parts (letter-clusters) which combine to form the correct sound. . . . The size of a configuration

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[1]Glass, p. 5.

> has little to do with its potential for being learned. The familiarity resulting from meaning-fulness and frequency is the major determinant of what one will recall and retain. Size of configuration is also irrelevant in identifying parts within whole words. If letter clusters within words can be made residually familiar to a reader, he might find the sound of a four letter cluster, such as /ight/ in the word 'insightful', no more difficult to identify than the sound of the single letter /o/ in the word 'hot'.[1]

Finally, Glass claims that, if one could identify these major "clusters" or phonograms that have consistent pronunciations in words, one could be conditioned through an auditory and visual training (perceptual conditioning) process to recognize these phonograms wherever they might appear in words, long or short.

> In decoding it is possible, and maybe even natural, for a child to isolate easily a three or four letter combination (such as /ing/, /ate/, and /ight/) within the whole word and to apply it to a single sound. Such clusters of letters are seen as one whole rather than three or four separate wholes. If one learns to see the clusters often enough within whole words, then the predictable results of such repetition would cause these clusters to be seen within the whole word as routinely as one sees single letters within the whole word. In addition, if the clustered letters are also associated with their accepted sounds, we have the beginning for a decoding process as a result of a conditioning process, which, by definition, becomes ingrained.[2]

Glass identified phonograms by examining a representative sample of primary basal readers used in New York City's School District 20. He and his staff listed all of the phonograms utilized in the basals designated for use in grades one through three, ranked them according to their

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[1]Ibid., pp. 17-18.

[2]Ibid., p. 20.

frequency of appearance and chose the top 119 phonograms to be used in his conditioning program. The list of 119 phonograms was then distributed to the teachers in School District 20 who were asked to re-arrange these phonograms in rank order from "easiest to pronounce" to "most difficult to pronounce." From this data Glass produced his list of phonograms in rank order of difficulty based on teachers' opinion. Further division was made with the establishment of five general levels of difficulty: Starters, Medium One, Medium Two, Harder One and Harder Two. Each category contained between twenty-two and twenty-five phonograms. Not only did each general category increase in difficulty from Starters through Harder Two but the phonograms within each category were ranked in order of difficulty.

One hundred nineteen packets were designed, one for each phonogram to be taught. Within each packet would be many cards, each containing a single word with the target phonogram at the beginning, middle or end of the word. There were some simple monosyllable words, "medium difficult" words of two or three syllables and hard words containing four or five syllables which enabled the packets to be used with young as well as older students.

The perceptual conditioning process advocated by Glass involved four steps followed consistently by the teacher:

1. Identify the <u>whole word</u> and the letters and sound of the <u>target cluster</u>.

2. Give the sound(s) and ask for the letter or letters.
3. Give the letter or letters and ask for the sound(s).
4. Take away letters and ask for the remaining sound.[1]

There are several mandates which are listed in the training manual for teacher's guidance in working with the perceptual conditioning program:

> Only individual words should be presented to the learner...the student does not see more or less than the whole word. When the word is first exposed to the student he is told the sound of the word....our concern is not with the correct identification of the specific words we use in training...(but) to condition the decoder to identify the appropriate sounds and letters (clusters) in a word he already knows.... (Letter Clusters are defined as two or more letters that, in a whole word, represent a relatively consistent sound...). Habit formation (for letter clustering) can best come about by frequent and consistent responses along with appropriate and consistent reinforcement.
>
> The decoder should be looking, at all times, at the word.
>
> .....
>
> Parts of the word may never be covered up to help with identifying letter clusters....The correct letter clustering must be seen with letters before and letters after, as when seen during actual reading.
>
> .....
>
> The teacher always directs how the pupil will examine the word. She is the agent for developing visual and auditory sets. As the decoder is looking at the word, the teacher directs the examination with two basic questions to develop the correct mental set.
>
> These questions are:
>
> What letters make the ..... sound?
>
> What sound do the letters ..... make?[2]

To provide the reader with an illustration of how a teacher would conduct a training session utilizing the four

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[1]Ibid., p. 33.

[2]Ibid., pp. 24-26.

training steps mentioned above a short segment will be taken directly from the training manual using the /o/n/g/ sound.

> Expose one card to the individual or group. Keep decoders as close to you as practical. Make sure all can see the card and are always looking toward the card. If you keep the card away from your line of vision, it will be easier to see who are looking at the word.
>
> Begin by saying the word and identifying the spelling of the cluster.
>
> "The word says, 'song'. What does the word say? (Response) We are going to learn the o/n/g sound that says 'ong'."
>
> Never separate letters that form a blend, a digraph, or a vowel cluster. Never cover up any part of the whole word. The student never sees less than the entire word.
>
> SONG- In the word, "song", what letter makes the "sss" sound? In the word "song", what letters make the "ong" sound? In the word "song", what sound does the letter /s/ make? What sound does o/n/g make?
>
> If I took off the /s/ what sound would be left? What is the whole word?[1]

A second card would be taken from the packet with the same target cluster, in this case "ong," and the same routine would be repeated. Only one cluster would be taught in any one training session which should last no more than ten to fifteen minutes.

Easier-to-Learn Materials of Garden City, New York, has produced a program in kit form that conforms to the theory of Perceptual Conditioning for Decoding. The kit contains those materials which are called for in the Glass-Analysis Method. Although the method has been gaining

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[1]Ibid., pp. 26-27.

increased attention since its publication in 1972 there are several questions, unanswered by Glass, which lend themselves to research possibilities. The first question relates to the rank order of difficulty Glass established by using teacher opinion: How would the rank order of difficulty established by Glass compare to an empirically-based rank order of difficulty utilizing student performance? Are teachers' opinions of what is difficult or easy to pronounce closely related to how children actually perform in a testing situation? Or, is there a great deal of disparity between the two?

The second question deals with the pronunciability of the 119 phonograms in the Glass program. Since these phonograms were identified from primary basal readers, just how difficult are these phonograms to pronounce, and at what levels should each of the phonograms be taught and mastered?

The third question centers around Glass' claim that three and four-letter phonograms can be identified and pronounced as easily as a single letter phonogram. Since all of the phonograms in his program are either two, three or four letters, are there significant differences in students' ability to pronounce two-letter, three-letter or four-letter phonograms?

The Problem

Statement of the Problem

The problems with which this study concerned itself were:

1. To determine whether there were differences between the rank order of phonogram difficulty established by teacher opinion and the rank order of the same phonograms based on students' performance.

2. To determine whether there were differences in the pronunciability of phonograms between male and female first, second, and third grade students of below average, average, and above average reading ability.

3. To determine whether there were differences in the pronunciability of two-letter, three-letter, and four-letter phonograms between male and female first, second, and third grade students of below average, average, and above average reading ability.

The study attempted to establish an empirically-based rank order of difficulty utilizing the same 119 phonograms in the Glass Method by using two hundred and seventy male and female first, second, and third grade students who were reading below average, average, and above average according to a standardized reading test. The dependent variable (number of correct pronunciations on the test of 119 phonograms) was then ranked according to the three independent variables (gender, grade, and reading ability) and the relationship between the independent variables and the dependent variable was determined through multiple correlation coefficients. The Spearman Rank-Order Correlation Coefficient (Rho) was utilized to determine rank order

relationships except when more than two ranks were tested and, in those cases, Kendall's Coefficient of Concordance (W) was used. The correlation coefficients were tested for statistical significance through the use of "t" tests.[1] Differences among mean scores on the phonogram tests were determined by Analysis of Variance.[2] Differences among mean scores between two-letter, three-letter, and four-letter phonograms were determined through multi-variate Analysis of Variance.

Significance of the Problem

At least three factors contribute to the significance of research generated by this study. The first concerns the fact that the majority of students in American education learn to read through the aid of a basal reader.

The second factor is the evidence that the overwhelming majority of basal reading systems emphasize phonics analysis as the most important decoding skill taught at the beginning reading level. Table 1 presents a summary of the results of a survey, conducted by Corder, showing the extent of phonics teaching by first and fourth grade teachers in a New England States Survey taken in 1967-68.

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[1] N.M. Downie and R.W. Heath, Basic Statistical Methods (3rd ed; New York: Harper & Row, 1970), pp. 122-25, 230-32, 238.

[2] Ibid., pp. 215-24.

TABLE 1

USE FREQUENCY OF INTENSIVE PHONIC MATERIAL[1]

(In New England States Survey, 1967-68)

Frequency	First Grade Teachers (%)	Fourth Grade Teachers (%)
much	76.7	28.7
some	17.6	42.4
little	2.2	20.6
never or not available	.3	6.4

While 94.3% of first grade teachers surveyed were involved with phonics instruction much or some of the time, 71.1% of the fourth grade teachers surveyed were still involved with phonics instruction even though many reading developmentalists agree that phonics analysis skills should be mastered within the second year of reading instruction.

The third factor is, in spite of the emphasis on basal readers and phonics analysis, school surveys at the fourth and fifth grade levels show that "about sixty percent of pupils fall outside their grade placement in group tests. That is, only about forty percent are within a year of grade placement. Using the standard of one-year retardation as a criterion or reading disability would automatically

[1] R. Corder, The Information Base for Current Assumptions Regarding the Status of Instruction and Achievement in Reading in the United States, Project No. 0-9031, Final Report to U.S. Office of Education, Educational Testing Service, 1971, p. 83.

classify about thirty percent of all school children as disabled readers."[1]

It is apparent that many students enter the intermediate grades possessing deficiencies in reading. Rembert expressed concern for the lack of methods available to the intermediate grade level teacher in dealing with poor decoders. She stated:

> It is common to find, in texts on teaching reading (at the intermediate and secondary level), admonition to insure adequate maintenance of word analysis skills: yet, few different, specific procedures are given (Harris, 1962; Heilman, 1967; Wilson, 1967; Spache and Spache, 1969). Innovative classroom approaches to provide word analysis practices are needed.[2]

Searfoss expressed concern for the same inadequacy:

> ...teaching strategies and materials available to intermediate grade teachers for review instruction in basic decoding skills are often inadequate and ineffective. The effectiveness of review instructions at the intermediate grade level seems to depend on several factors:
>
> 1. Utilization of teaching strategies and materials which will build success where failure has resulted for some students in the primary grades.
> 2. The necessity for providing instructional materials suitable in terms of interest and format to the intermediate grade student.
> 3. The effective scheduling of review instruction.[3]

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[1]George D. Spache, Diagnosing and Correcting Reading Disabilities (Boston: Allyn & Bacon, Inc., 1976), p. 5.

[2]E.W. Rembert, "Teaching Word Analysis to Fifth Graders Using SMOG Grading" (Unpublished doctoral dissertation, Syracuse University, 1972), p. 3.

[3]Lyndon W. Searfoss, "A Comparison of Two Strategies Designed to Teach Basic Decoding Skills to Selected Fourth Grade Readers" (Unpublished doctoral dissertation, Syracuse University, 1973), pp. 2-3.

Because of the factors stated it would appear research on the Glass Method, a program designed for intermediate and secondary decoding deficient students, should contribute to a somewhat neglected area of instruction. Should the study add statistical credibility to Glass's rank order of difficulty or reinforce his hypothesis that two and three-letter phonograms are as easily pronounced as single-letter phonograms, scientific support will have been added to an already popular program. Should the study modify some of the basic premises or change the rank order of difficulty for the 119 phonograms being tested, resulting questions and suggested alternatives will be made.

Statement of Hypotheses

Making definitive statements and arriving at defensible conclusions necessitated the stating and testing of hypotheses. In order to answer previously stated questions and arrive at conclusions most pertinent to the study it was necessary to formulate ten alternative hypotheses, each of which was restated in null form in order to facilitate testing. The hypotheses were:

$Ha_{1:0}$ There is a correlational difference between the 119 phonograms, ranked in order of difficulty by the study and the same phonograms, ranked in order of difficulty by Glass.

$Ho_{1:0}$ There is no significant difference between the phonograms ranked in order of difficulty empirically and the phonograms ranked in order of difficulty by teachers' opinion.

$Ha_{2:0}$ There will be differences in the mean number of correctly pronounced phonograms when students are grouped according to grade level.

$Ho_{2:0}$ There is no significant difference in the mean number of correctly pronounced phonograms when students are grouped according to grade.

$Ha_{3:0}$ There will be differences in the mean number of correctly pronounced phonograms when students are grouped according to reading ability.

$Ho_{3:0}$ There is no significant difference in the mean number of correctly pronounced phonograms when students are grouped according to reading ability.

$Ha_{4:0}$ There will be differences in the mean number of correctly pronounced phonograms when students are grouped according to gender.

$Ho_{4:0}$ There is no significant difference in the mean number of correctly pronounced phonograms when students are grouped according to gender.

$Ha_{5:0}$ There will be differences in the mean number of correctly pronounced phonograms when students are grouped according to grade level and reading ability.

$Ho_{5:0}$ There is no significant difference in the mean number of correctly pronounced phonograms when students are grouped according to grade and reading ability.

$Ha_{6:0}$ There will be differences in the mean number of correctly pronounced phonograms when students are grouped according to grade level and gender.

$Ho_{6:0}$ There is no significant difference in the mean number of correctly pronounced phonograms when students are grouped according to grade and gender.

$Ho_{7:0}$ There will be differences in the mean number of correctly pronounced phonograms when students are grouped according to gender and reading ability.

$Ho_{7:0}$ There is no significant difference in the mean number of correctly pronounced phonograms when students are grouped according to gender and reading ability.

$Ha_{8:0}$ There will be differences in the mean number of correctly pronounced phonograms when students are grouped according to reading level, grade level and gender.

$Ho_{8:0}$ There is no significant difference in the mean number of correctly pronounced phonograms when students are grouped according to grade, gender, and reading ability.

$Ha_{9:0}$ There will be differences in the mean number of correctly pronounced two-letter, three-letter, and four-letter phonograms when students are grouped according to reading level, grade level, and gender.

$Ho_{9:0}$ There is no significant difference in the mean number of correctly pronounced two-letter, three-letter, and four-letter phonograms when students are grouped according to reading level, grade level, and gender.

Definition of Terms

1. Decoding: The act of correctly determining the accepted sound connected with a printed word.

2. Perception: The awareness of objects, relations, or qualities stimulated by the sense organs and influenced by set and prior experience.

3. Visual Perception: The ability to perceive visual stimuli, particularly forms, letters, words, phrases, and sentences that are printed. It includes discrimination,

the ability to differentiate one stimulus from another; span, the ability to recall stimuli; and sequence, the ability to keep the stimuli in some prearranged order.

4. Auditory Perception: Includes the ability to perceive sounds, to differentiate one from another, to recall them, and to keep them in a prearranged order.

5. Letter-sound cluster, Phonogram, Chunk, or Cluster: One, two, three, four or more letters that, in a whole word or in isolation, represent a relatively consistent sound.

6. Below Average Reader: Those students reading, according to the Slosson Oral Reading Test, between .0 and .3 months within their grade placement; first graders reading between 1.0 and 1.3, second graders reading between 2.0 and 2.3, and third graders reading between 3.0 and 3.3.

7. Average Readers: Those students reading, according to the Slosson Oral Reading Test, between .4 and .6 months within their grade placement; first graders reading between 1.4 and 1.6, second graders between 2.4 and 2.6, and third graders between 3.4 and 3.6.

8. Above Average Readers: Those students reading, according to the Slosson Oral Reading Test, between .7 and .9 months within their grade placement; first graders reading between 1.7 and 1.9, second graders between 2.7 and 2.9, and third graders between 3.7 and 3.9.

Assumptions

1. The score obtained on the Slosson Oral Reading Test was assumed to be valid for each subject.

2. The reading category of below average, average, or above average which was assigned to each subject in the study was a designation limited for use in the study and did not necessarily relate to the reading level designation used in the school or by the subject's teacher.

3. The subjects were assumed to be representative of the primary grade population attending a Southwestern suburban community.

4. The number of correctly pronounced phonograms on the phonogram test was assumed to represent each subject's maximum performance.

5. The final evaluation and the generalizations derived from this study were assumed to be valid only when applied to the school district included in the study or to school districts with comparable pupil populations.

Delimitations of the Problem

1. Because permission slips were required before each subject was tested, those without parent-signed permission slips were not considered for the study.

2. Criteria for selection of subjects was limited to reading ability as determined by the Slosson Oral Reading Test, gender and grade placement.

3. Subjects with permission slips who missed the designated testing date because of absence or other conflict were given only one alternative testing date, then dropped from the study if a second absence occurred.

4. The study was restricted to six schools assigned by the Moore School System's administrative personnel. The decision was based on the projection of a higher return rate for the parent permission slips. Therefore, the six elementary schools in the Moore, Oklahoma School System may not have been a representative sample of the total school population in Moore.

5. In some instances the testing environment was not ideal and not without limited distractions.

Overview of Subsequent Chapters

Chapter II will present a review of literature and research related to decoding and other word recognition skills, visual and auditory perception, reading methods, theoretical models of word acquisition, and other related literature.

Chapter III will present the design and procedures of the study.

Chapter IV will present the findings of the study.

Chapter V will be concerned with the summary, conclusions, and recommendations of the study.

CHAPTER II

REVIEW OF THE LITERATURE

Because of the nature of the Glass Analysis for Perceptual Conditioning technique, it is necessary to present a review of the literature in several specific areas. Literature review will include: (1) History of word recognition, (2) Theory of Word Recognition, (3) Perception as it relates to word recognition, (4) Modalities of learning word recognition skills, and (5) Perceptual conditioning.

History of Word Recognition

One of the most significant factors influencing the history of reading instruction has been the various approaches to teaching word recognition skills. During the early history of reading instruction there appeared to be a dichotomy between the "whole-word-meaning" and the "phonics method" camps. This dichotomy persists to the present time. It has been difficult for many educators to embrace both ends of the dichotomy; rather, one is accepted, while the other is rejected.

Reading in American education has appeared to be a series of turning points. The early New England Primers taught the alphabet and simple religious rhymes. Later Noah Webster's American Spelling Book emphasized the "standard of pronunciation," the alphabet, nonsense syllables, and word families such as big, dig, fig, gig, pig, and wig. The McGuffey's Eclectic Readers taught the alphabet first but then left the teacher to decide between the alphabet method, the phonic method, or the word method as all of these were known and accepted during this era. Between 1836 and 1920 more than 120 million McGuffey Readers were sold. Toward the end of the 1800's the phonic method became more popular, while the alphabet and whole-word methods began to fade. By the turn of the twentieth century, as Gestalt psychology, dealing with configuration and structure as a physiological and psychological reality, gained eminence, the whole word method waxed as the phonic method waned.[1]

The first truly great breakthrough in reading progress came in 1910 with the birth of the scientific movement in education. In 1909 Thorndike presented his Handwriting Scale before the American Association for the Advance of Science. This document was recognized as the beginning of the contemporary movement for measuring educational products

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[1]Justin Fishbein and Robert Emans, A Question of Competence: Language, Intelligence, and Learning to Read (Chicago: Science Research Associates, 1972), pp. 1-3.

scientifically. As a result of the strong surge of scientifically-based education, there was a natural increase in the scientific study of reading.[1] As evidence, only thirty-four studies had been reported in reading prior to 1910, while two-hundred accounts appeared during the 1910-1920 decade. Most of these reports had to do with tests and school surveys.

For hundreds of years oral reading had maintained a supreme and undisputed claim on teaching methods, but during the 1910-1920 era the concept of silent reading burst onto the scene like a bombshell. Speakers at conventions and conferences began to talk about it and magazines began to publish articles discussing silent reading.

The "golden decade" of 1920 and 1930 concerned itself with practices in reading. New studies were effected in that the number of studies increased overwhelmingly compared to previous years. They covered a wider and broader scope of problems, and many of these took place directly in the classrooms rather than in the laboratories. In all, 763 studies were reported in this period compared to only 200 previously. The scope of research included silent reading, individual differences, and remedial differences. During the early part of this decade, many were obsessed

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[1]Nila Banton Smith, "What Have We Accomplished? A Review of the Past Fifty Years," Reading Instruction: Dimensions and Issues, ed. William K. Durr (Boston: Houghton Mifflin, 1967), p. 3.

with the idea of teaching silent reading.[1] In addition to silent reading, getting the central idea from the paragraph, noting details, and following directions were emphasized to the neglect of oral reading. The literature during this time, however, suggested that "a satisfactory methodology had not yet been found."[2] By 1925, when the National Society for the Study of Education published their Twenty-Fourth Yearbook, the public was made aware that the large proportion of the adult population had not mastered the basic reading skills. This publication suggested that schools develop programs of instruction that would be aimed toward developing a permanent interest in reading for leisure.[3] As Klapper stated, "The alphabet method did teach us to read, but it cheated the child of the joy of the story for many years, and, in the end, often made of him a lip reader."[4]

Teachers began to realize that there were individual differences in the reading achievement of children, and this brought on new efforts with ability grouping, flexible promotions, and differentiated assignments. The Winnetka and Dalton plans created new arrangements for individualization

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[1]Ibid., p. 4.

[2]Arthur J. Bronstein and Elsa Bronstein, "A Phonetic-Linguistic View of the Reading Controversy," Reading Instruction: Dimensions and Issues, ed. William K. Durr (Boston: Houghton Mifflin, 1967), p. 113.

[3]Ibid.

[4]Paul Klapper, Teaching Children to Read (New York: Appleton-Century-Crofts, 1926), p. 109.

that made progression into reading and other subjects possible by means of assignments in which the child worked through subject material that increased in small increments of difficulty. "Remedial Reading" was a new term along with standardized tests. Fernald's kinesthetic method was made known and Orton's theory of mixed dominance was published. Experience charts came into being, but their use did not become widely accepted until much later.[1]

During the later 20's the most acceptable concept in beginning reading instruction utilized phonic drill. Twenty-one of the most widely used programs taught phonetic training in some way.[2] Most of the leaders in phonics instruction such as Dolch, Bloomfield, Klapper, and Cordts decried the separate phonics drill and pleaded for systematic planning so that phonics could aid directly in reading.[3] Of great importance during this decade was the advent of reading readiness which began to take shape. In January of 1927 the Childhood Education Journal published, "Pupils' Readiness for Reading Instruction Upon Entrance to First Grade," and Smith claims this to be the first time the phrase "reading readiness" appeared.[4]

The period of 1930-1940 was considered a period of extension and application rather than revelation and

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[1]Smith, p. 5.

[2]Bronstein and Bronstein, p. 113.

[3]Ibid., p. 114.

[4]Smith, p. 6.

initiation. About twelve hundred studies were reported which appeared to be superior to earlier studies in terms of design and control. Readiness tests reached a peak and periodicals abounded with materials on readiness. Remedial reading programs became established and gained in stature. The colleges and universities were establishing courses in reading, diagnosing, and correction while attention began to turn to the high school, college, and adult reader.

A major turning point came in 1937 because of a study that cast doubt on planned phonics instructions in the earliest years of reading. The conclusion of Dolch's study was that, "Although there were individual differences, in general, a child did not benefit from phonics instruction before reaching the mental age of seven."[1] In the textbooks of the 40's this study was so often quoted that it contributed to a wide-spread delay of phonics instruction until at least the second grade. Although scholars still advocated early phonics instruction, the prevailing approach had become the "whole-word-look-and-say."[2] Smith stated that, "The progress of this decade was characterized by continuing investigations greater in number and higher in quality, application of the readiness concept, transfer of remedial

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[1]Edward A. Dolch and Maurine Bloomster, "Phonics Readiness," Elementary School Journal, 38 (November, 1937), p. 204.

[2]Bronstein and Bronstein, p. 114.

activities from the lab to the classroom, attention to reading at higher levels, and widespread interest in teaching reading as an integral part of the activity program."[1]

The decade of the 40's was overshadowed by the birth of the atomic age. Dr. Enrizo turned on the first successful nuclear energy machine in Chicago and the first atomic bomb was dropped on Hiroshima on August 6, 1945. Smith described the 40's in the following manner:

> The chief points of progress during this decade were: increased attention to teaching reading at the higher levels, growing attention to reading in the content subjects; concerns about mass communication; attempts to find relationships between reading and handwriting, spelling, vocabulary, and composition; and, perhaps most important of all, a growing consciousness of the profound truth that reading doesn't develop in a vacuum by itself, but that it is part and parcel of general child development and is affected by all other aspects of child growth.[2]

The decade beginning in 1950 brought many exciting changes. One of the most important changes involved the interest in reading for all teachers rather than only the primary teachers. For the first time reading instruction underwent severe criticism by laymen, and this produced more comparative studies which showed that reading teachers were doing as well or better than in preceeding years. However, this criticism forced teachers to examine their methods, stimulated the interest of parents and other laymen, and offered motives and opportunities to school people

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[1] Smith, pp. 7-8.

[2] Ibid., p. 9.

to explain the research, psychology, and philosophy on which present methods were based.

The controversy between the phonetic training and the look-say method continued for more than a decade until Rudolf Flesch dramatically entered the controversy. His book Why Johnny Can't Read quickly became a best seller. Flesch's attack on the methods used in teaching reading stirred strong public reaction that educators and reading specialists could not ignore. His contributions were not new in their basic essence as he admittedly based his approach on the ideas presented by Leonard Bloomfield.[1] He defined phonetics as "simplified phonetics for teaching reading," and made questionable phonetic statements such as calling the g's in gem and go "soft" and "hard." He also labeled the vowels in words such as mate, mite, mote, and mute as long vowels rather than diphthongs, and he classified a-u as in the word Paul as a diphthong as he also did the o-u of spouse and the o-i of noise. He developed a natural sequence of any phonic method consisting of five steps which was guaranteed to teach any child to read.[2]

Although some educators actively resisted his philosophy and influence, there is no question that his word caused a reevaluation that, in time, produced changes. An

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[1]Rudolf Flesch, Why Johnny Can't Read (New York: Harper and Row, 1955), p. 22.

[2]Ibid.

example of the consequences of Flesch's attack was a conference of reading experts called by James Bryant Conant on September 22-23, 1961.[1] The primary purpose of the meeting was to prepare a public statement as to the place of phonics in a reading program and the constituent parts of such a program. The committee decided that skills of recognition were grouped primarily under two types: (1) learning to respond to the phonic cues provided by the letters and (2) learning to recognize words by the meaning clues provided by the other words standing in the material being read.[2] The conference actually concluded that there was no single best way to teach children to read.

Reading in the content fields, adult reading deficiencies, and television, as related to reading, came in for strong attention during the 1960's. The topic of phonics seems to have been replaced with studies of perception. Listening studies increased by leaps and bounds, which indicated an advance in reading as it related to the other language arts. The plan known as "individualized reading" loomed large on the horizon and became the most popular topic of discussion in educational magazines and at teacher gatherings. The individualization of the 20's,

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[1]James Bryant Conant, "Learning to Read: A Report of a Conference on Reading," A conference called of reading experts by the Carnegie Corporation of New York, September 22-23, 1961.

[2]Ibid., pp. 8-9.

which was subject-matter oriented, was not child-psychology oriented.[1]

Throughout the history of reading there has been a common thread. Smith very capably described this thread as follows:

> Progress in reading has been marked by a succession of turning points. For a period of years reading methods and materials all over the country are quite similar...an unbiased examiner might arrive at the conclusion that all had been turned out of the same mold with just a slightly different crimp here and there in the contour of the plan. Then rather suddenly, a new plan becomes popular, and we teach reading in this manner until another turning point arrives.[2]

The 1970's has brought a renewal of faith in phonics instruction, the "right-to-read" emphasis, compensatory education, and the place of vocational education for the increasing number of non-college bound students. Much of the time, effort, and financial support has been taken from program and curriculum planning in order to soften regularly occurring upheavals in the areas of educational accountability, collective bargaining, affirmative action employment, bussing, and other social and governmental issues at hand.

Theory and the Literature on Word Recognition

Word recognition has been the subject of research, debate, study, and speculation for centuries. It is no small wonder that it continues to challenge the efforts of reading educators, psychologists, linguists, and men of other

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[1]Smith, p. 11.

[2]Ibid., p. 3.

disciplines to explain how it occurs.[1] According to Spache, "recognition" has been the subject of more heated debate than any other element of the entire reading program since about 1910, and "most of the arguments have centered around the question of the values of teaching phonic analysis."[2] It is apparently evident that perhaps "the vital element, if any can be so claimed, is the ability to translate printed symbols into meaningful word-sounds or thoughts, and for the beginning reader this task essentially involves translating an unknown word symbol into a sound and meaning which are already known."[3]

Word identification and word recognition are two closely related features of word perception. When a reader first contacts a new word-form, there must be identification of the printed symbol in terms of its sound and meaning. Contacts with this same word-form in later exposures develop recognition.[4] This would imply that the relationship between symbol-sound associations can be conditioned initially without regard to meaning. The Economy's Keys to Reading

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[1]Robert Karlin, Teaching Elementary Reading: Principles and Strategies, (New York: Harcourt Brace Jovanovich, 1971), p. 14.

[2]George D. and Evelyn B. Spache, Reading in the Elementary School, 2nd ed. (Boston: Allyn and Bacon, 1969), p. 375.

[3]William Durr (ed.), Reading Instruction: Dimensions and Issues, (Boston: Houghton Mifflin, 1967), p. 99.

[4]Guy Bond and Miles A. Tinker, Reading Difficulties, Their Diagnosis and Correction, 2nd ed., (New York: Appleton-Century-Crofts, 1967), p. 304.

program would subscribe to this theory as their program teaches a rigid synthetic phonics during the first eight weeks of beginning first grade reading where the mastery of individual letter sounds is a prerequisite to reading words and sentences.

Unfortunately, the English orthography does not enjoy a simple relationship of grapheme and phoneme. Malmquist mentions that "the less the correspondence between the written characters and the sounds, the more difficult it will be learning to read...The Spanish, Finnish, and Korean languages are highly phonetic, whereas the English and French languages may have the same sounds represented by different letters."[1] Whether the relationship be simple or extremely complex, the tasks become the same rapid and efficient symbol-sound techniques. Until that printed symbol is recognized at a glance, i.e., until that symbol has become a sight symbol or sight word, recognition involves proper identification.[2] According to Glass, perhaps the more difficult English orthography accounts for the "observed fact that the overwhelming number of reading disabilities cases are, in

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[1]Eve Malmquist, "Problems of Reading and Readers: An International Challenge," In Improving Reading Ability Around the World, Proceedings of the Third International Reading Association's World Congress, Sydney, Australia, August 7-9, 1970, (Newark, Delaware: International Reading Association, 1970), p. 65.

[2]Bond and Tinker, p. 304.

actuality, decoding deficient cases."[1] Personal observation of this author would verify Glass' statement. During the 1974-1975 school year this researcher diagnosed more than eighty school aged children. In analyzing these children's deficiencies the following characteristics were prevalent in the majority of cases:

1. Basic sight vocabulary was usually deficient. This skill was measured by the Slosson Oral Reading Test of the reading portion of the Wide Range Achievement Test.
2. Decoding skills were usually deficient as well. This skill was measured by the Gates-McKillop Reading Diagnostic Test, the sub-test on Blending of Common Word Parts.
3. Comprehension was usually equal to or higher than the grade placement of the child.

It was interesting to observe children of all ages exhibiting very similar reading behavior: refusing to use word attack skills when unknown words were encountered. This happened in spite of the fact that all of these children were trained within school systems utilizing strong phonics instruction. It was also interesting to notice that, although children apparently performed very proficiently whenever a single phonic generalization was presented to them, their ability to employ many such generalizations normally required in a single sentence was often completely stimied. Whenever an unknown word was encountered, the general tendency was to completely stop and wait for help rather than decode with the

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[1]Gerald G. Glass, "Decoding Only?" In Some Persistent Questions on Beginning Reading, Edited by Robert C. Aukerman, (Newark, Delaware: International Reading Association, 1972), p. 6.

very generalization that might have been mastered in their phonic instruction in school.

Gentry states, "Reading authorities seem to agree that there are three basic approaches to the teaching of word recognition--the visual, the phonic, and the kinesthetic."[1] Durr tried to raise the question: What skill does the child need initially in order to read? "The obvious answer is that he needs to know how to associate word form--which he doesn't know for any given word--with the sound and meaning which he does know."[2] This truth is sometimes overlooked when teachers go to great length to teach children information which is basically not essential for beginning reading. Durr states:

> We sometimes go to great length to build meaning vocabulary as a prerequisite for initial reading. There can be serious question, however, about making these experiences a prerequisite for reading such words as look, see, come, and all of the other controlled vocabulary words which appear in most children's initial reading experiences.[3]

Cohen and Schwartz described three stages of word perception.[4] The first stage is referred to as the global

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[1]Larry A. Gentry, "A Clinical Method in Classroom Success - Kinesthetic Teaching," The Reading Teacher 28 (December 1974), pp. 298-300.

[2]William K. Durr, "Developing Reading Independence in the Primary Grades," In Reading Instruction: Dimensions and Issues, Edited by William K. Durr, (Boston: Houghton Mifflin, 1967), p. 102.

[3]Ibid.

[4]Alice Cohen and Elaine Schwartz, "Interpreting Errors in Word Recognition," The Reading Teacher 28 (March 1975), pp. 534-37.

or "blob" stage of word recognition. In this case only gross characteristics are observed. At this stage the child does not understand that a one-to-one correspondence exists between a discreet written word and its oral counterpart. The student is unable to differentiate a specific word from the words in the sentence. One substitutes indiscriminately and interchanges words having similar meaning (winter for snow - daddy for father, etc.). With letter recognition one might substitute b for d, or h or n, and when letters resemble each other in a global way the student, at this "blob" stage, will identify them by gross characteristics.

The second stage of word perception is called the analytic or signal stage, and this is evident when written words are differentiated on the basis of letter forms. The third stage of word perception is the synthetic or integrated stage where perceptual development permits the child to explore unfamiliar words by identifying essential graphic features and organizes this knowledge into meaningful language. This third stage is what Glass' perceptual conditioning approach tries to instill in the child--identifying essential letter patterns having consistent pronunciations. Gibson writes that:

> The essence of learning to read is the ability to identify those graphic features that are distinctive and those which remain invariant. As this is done, it permits transcendence of rote learning of individual words and transfer of regularities found in them to the perceiving of new words.[1]

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[1]E.J. Gibson, Principles of Perceptual Learning and Development (New York: Appleton-Century-Crofts, 1969), p. 52.

In discussing children who know individual letter sounds in isolation but do not focus on relevant details and do not apply this knowledge, Cohen and Schwartz claim that this difficulty is not developmental as much as it is a function of his cognitive style. Impulsively he selects the first solution that occurs without considering alternatives. He is often mistaken for the child who does not know his sounds. "This is the child who should learn scanning techniques rather than be re-taught letter sounds. He must learn which are the distinctive characteristics for him to attend."[1]

Bond and Tinker suggested instruction in word recognition should enable a child to do at least three interrelated tasks: (1) recognize known words rapidly with a minimum of analysis, (2) recognize partially known words with little analysis, and (3) develop a flexible set of skills that will enable him to work out the recognition of new words independently.[2]

Harris, Sipay, and others often define reading as "the meaningful interpretation of printed or verbal symbols."[3] Many authors insist decoding, separated from meaning, is extremely synthetic and, therefore, undesirable. While decoding is possible without meaning, meaning is not possible

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[1]Cohen and Schwartz, p. 537.

[2]Bond and Tinker, pp. 304-05.

[3]Albert J. Harris and Edward R. Sipay, Effective Teaching of Reading (5th ed.; New York: David McKay Co., 1971), p. 13.

without decoding. Many young readers, taught a thorough synthetic phonics approach, can mechanically decode words and sentences without regard to meaning. This often occurs with first grade children. Observation of this type of reader reveals a very mechanistic and methodical approach. The under achieving reader, even after the sounds of each letter, blend, and ending are carefully sounded out, usually without intonation and sense, has extreme difficulty relating what has been read. His mental limitations and environmental distractors prevent the concentration necessary for decoding and meaning to occur concommitently. In most cases, however, the beginning decoder, after struggling with letters and sentences can match meaning to decoding, no matter how sloppy the decoding process. This is due largely to the fact that even poor decoders have much higher meaning vocabulary (through listening and speaking) than reading vocabulary. Therefore, any decoding skill for these children is legitimate because most decoded words will have immediate meaning. In fact, Durr claimed most children have vocabulary competency that runs well into the thousands of words when he comes to school. The student's task is to translate word forms into familiar word sounds. One already has knowledge of word-sounds, knowledge of word meanings, knowledge that words together are expected to make sense, and is able to recognize some sounds in words.[1]

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[1]Durr, "Developing Reading Independence in the Primary Grades," p. 102.

Glass states there are instructional advantages in keeping the teaching of decoding operationally separate from the teaching of reading. First of all, learning to decode is on a lower cognitive level than learning to read and, thus, is less difficult to acquire. Secondly, decoding is only a limited skill compared to reading and, third, decoding is much more accessible to the effects of simple conditioning or habit formation.[1] Glass recognizes meaning in the usual sense as he writes:

> It is apparent that if a person is merely able to identify the sound of a word (decode), he is not reading unless he can at the same time respond with meaning.
>
> However, it must also be made apparent that, if one is to learn, one will never have the opportunity to respond to meanings already known (or to develop new meanings via the printed word) if the decoding ability is not there first.[2]

Glass places a great deal of emphasis on the fact that decoding is separate from reading. Where reading deals with the word meanings, decoding is defined as "the act of correctly determining the accepted sound connected with a printed word."[3] In defending his position on teaching decoding as a separate skill and its advantages he writes:

> In decoding we almost always want only one sound-response to the word stimulus. We want this sound-response no matter who the responder is. The correct

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[1]Gerald Glass, Teaching Decoding as Separate From Reading (Garden City, New York: Aldelphi University Press, 1973), p. 5.

[2]Ibid., p. 4.

[3]Ibid., p. 5.

> sound of the word is the same no matter who is making the response. The proverbial, bright, creative, culturally advantaged decoder, when he sees cow, must come up with the identical sound-response as the low achieving, relatively phlegmatic 'disadvantaged' decoder. Both must arrive at the sound that is cow.
>
> In decoding we are looking for a relatively narrow response, a response that does not allow for uniqueness and/or creativity. In contrast, when we are in the area of reading (vs. decoding), we find the situation dramatically different.
>
> ...decoding...does not have to allow for individual responses; all are taught to make the one correct decoding response...Decoding is merely identifying a prescribed correct sound.
>
> Since the decoding task is limited, we can logically assume that individual differences in students are less relevant when decoding than when reading...it should be easier to learn. Thus if we could hold in abeyance the teaching of reading (the more difficult) from the teaching of decoding, more youngsters would have an opportunity to learn to decode.[1]

Gibson stated that the learning of individual letter sounds becomes a very complicated procedure and, therefore, recommends children learn letter "chunks," which Gibson describes as larger than single letters. They are chunks which correspond to spelling-to-sound parts of the word. For example, the "at" cluster must be identified in the words cat, Atlantic, and habitat.[2] These "chunks" representing major spelling-to-sound combinations in our traditional orthography can be identified and perceptually learned through auditory and visual conditioning techniques. McCullough stated that "imitation and memorization are

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[1]Ibid., pp. 4-6.

[2]Gibson, p. 98.

important in the acquisition of speech patterns."[1] The two factors of imitation and memory are substantial parts of the Glass conditioning. When a child is exposed to the "at" cluster long enough and often enough, he will eventually be conditioned to sound it as a unit whenever it may appear in a word.

Glass claimed that "learning to decode is based more upon repetitions of sound-symbol correspondences than upon the many-dimensional intellectual learnings that are the substance of reading."[2] It appears that the more a child is exposed to a concept, the better the chance for mastery. Karlin wrote that "rapid recognition of words may be developed by presenting them in a meaningful context, providing a variety of exposures out of context to afford quick perception, and reinforcing their recognition through wide and extensive reading."[3]

Whatever the technique and whether decoding be taught simultaneously with or separate from reading, the key element is repetition. This leads us naturally into another discussion as to the mode of learning to recognize words. The four widely mentioned modes of learning are the visual, auditory, kinesthetic, and tactile. Eclectic theorists can

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[1]Constance M. McCullough, "Vital Principles in Need of Application," In A Decade of Innovations: Approaches To Beginning Reading, Vol. 12, Part 3, Proceedings of the Twelfth Annual Convention, International Reading Association, 1968, pp. 180-91.

[2]Glass, "Decoding Only?", p. 102.

[3]Karlin, p. 177.

point to a substantial body of research that tends to support the multi-sensory maxim; where the visual and auditory channels fail, tactile and kinesthetic mechanisms often succeed.[1] These modes of learning will be discussed in greater detail in the following section.

Literature on Perception Related to Word Recognition

Since the Glass Analysis for Perceptual Conditioning involves the visual and auditory modalities of learning, it would be appropriate to review some important literature on what perception is, what it involves, and the role it plays in reading instruction. Some clinical reports have identified a child as a visual learner, an auditory learner, or kinesthetic learner. Such a categorization of a child indicates the ignorance of the diagnostician. Is it even possible to suggest that a child uses the learning modality of visual perception to the exclusion of auditory or kinesthetic perception? Even an uninformed observer would deny such a possibility. On the other hand, it is possible that one learning modality might be physiologically or psychologically hindering such as a hearing loss or visual acuity weakness. In this sense, a child might tend to rely more heavily on one modality that has proven to be more useful or successful.

Jones claims:

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[1]Gentry, p. 298.

> The question of whether innate ability, experience, or habit patterns constitute the determiner of modal preference is circular. For example, innate ability allows one to make the most of experience, which, in turn is probably a deciding factor in the establishment of habit patterns. If one follows a pattern, experience with a particular mode is strengthened, again without the bounds of ability. Habit patterns cannot be measured except through signs of performance, i.e., experience.
>
> Another factor crucial to the determination of modal preference is sensory defects. A person who cannot see well is more dependent on listening as a means of sensory reception; the opposite would be true for someone with a significant hearing loss. But for someone without a sensory defect who has a strong modal preference, the determination of modal preference would be narrowed to one or more of the three factors discussed above (innate ability - experience - habit patterns).[1]

There appears to be little question as to the importance of perception in developing word recognition skills. "For the large majority of children proficiency in visual and auditory perception and integration of these two modalities are essential to achievement in reading."[2] As long ago as the mid '20's Gates experimented with various tests and reported that "visual-perceptual ability is not a unitary factor but that it has many facets."[3] After he

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[1]John Paul Jones, "Intersensory Transfer, Perceptual Shifting, Modal Preference, and Reading," In Reading Information Series: Where Do I Go? (Newark, Delaware: ERIC/Crier and International Reading Association, 1972), p. 29.

[2]Ruth Strang, "Skillful Teaching: Theory and Practice," In Forging Ahead in Reading, Edited by J.A. Figurel (Newark, Delaware: International Reading Association, 1968), p. 139.

[3]Arthur I. Gates, "A Study of the Role of Visual Perception, Intelligence, and Certain Associative Processes in Reading and Spelling," Journal of Educational Research 19 (October 1926): p. 433.

conducted hundreds of research studies on perception and its relationship to reading, he concluded that "perception involving letters, syllables, and words was more closely related to reading achievement than the non-word forms."[1] The above conclusion comes from questions raised as to the value of perceptual training involving non-letter or non-word symbols such as lines, dots, and geometric shapes and the transfer value to real letters and words. Nevertheless, there appears to be general agreement that there are three major perceptual areas: visual, auditory, and kinesthetic or tactual.[2]

There is evidence, according to Karlin, that some children can process information better through one modality than another. "This suggests that teachers offer auditory, visual, and kinesthetic experiences in helping children learn to read."[3] If this be true, then approaches to word recognition purported to be auditory or visual in scope might be missing an important point. Robinson acknowledges these perceptual areas but then criticizes the methods traditionally used to develop them. She stated: "Today, after more than thirty years of study, the question

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[1]Ibid., p. 444.

[2]Helen M. Robinson, "Perceptual Training - Does it Result in Reading Improvement?" In Some Persistent Questions on Beginning Reading. Edited by Robert Aukerman (Newark, Delaware: International Reading Association, 1972), p. 135.

[3]Robert Karlin, p. 36.

of the effects of perceptual training on learning to read is not answered."[1]

Kephart has been a severe critic of teaching phonics analysis to beginning first grade children, because, he claims, the perceptual development of many six-year-olds has not matured enough to make such fine distinctions in words. He claimed this to be the case with any perceptually impaired reader whether they be young or old. In supporting this claim he stated:

> With the perceptually impaired or underdeveloped reader difficulty occurs when certain details alone are used as a cue to a word. For example, in the word toot there are elements that stick up at the front and back of the word. It is not necessary for the child to see the word as a whole, but he recognizes these characteristics and gets the desired result.
>
> This type of child deceives the teacher at first by learning sight words easily. Later trouble develops. With the word analysis method, the child is taught to break the word down into its parts and to sound out the phonic elements. How can this be done by the child that still only sees the global mass? He cannot break it up into parts if he sees no parts to begin with.[2]

Since perception usually encompasses the visual, auditory, and the kinesthetic, there are those who claim their techniques utilize all three modalities. V-A-K-T is the term which symbolizes visual - auditory - kinesthetic - tactile. This V-A-K-T approach has been described,

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[1]Robinson, "Perceptual Training - Does it Result in Reading Improvement," p. 135.

[2]Newell C. Kephart, The Slow Learner in the Classroom (Columbus, Ohio: Charles E. Merrill, 1960), pp. 72-74.

according to George and others, as an eclectic approach, because the child utilizes most of his sensory modalities when learning to read new words. The child looks at printed words, hears the word, touches and traces over the word with his finger while saying the word: the surface of the letters may be smooth, stencil cut, or of sandpaper.[1]

The V-A-K-T approach is very time consuming, and the major emphasis is placed upon the discrimination of whole words. According to George, research has not shown that the V-A-K-T approach is more effective than other approaches when used with either normal or abnormal children.[2]

With the brief introduction to perception and what some authorities are saying about perception and reading it would be appropriate to discuss some of the specific research areas. Subsequent discussion will include the topics of: auditory perception, visual perception, multisensory modalities, and perceptual conditioning.

Auditory Perception

Using a number of classes in three schools, Duggins introduced auditory training at the beginning of first

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[1]John E. George, "Variables in Beginning Reading Instruction," In Improving Reading Ability Around the World, Proceedings of the Third International Reading Association's World Congress, Sydney, Australia, August 7-9, 1970 (Newark, Delaware: International Reading Association, 1970), p. 31.

[2]Ibid., p. 32.

grade, in the middle of first, and in second grade. Results, at the end of second grade, indicated that the group that had received auditory perceptual training in the first grade averaged five months above the control group in reading achievement.[1]

Evans developed a series of auditory training sessions on tape. The program was based on Durrell's Building Word Power and involved forty training sessions, each lasting fifteen minutes. As a result of this experiment, auditory discrimination was improved significantly through the training, and there was a corresponding improvement in oral reading. Pupils with lower pre-test scores on the auditory discrimination test made the greatest gains on post-test results.[2]

Deutsch conducted two separate studies involving disadvantaged retarded readers in the primary grades having deficiencies in auditory discrimination. The treatments involved auditory training only, reading instruction only, and combined auditory training and reading instruction. Both studies indicated no evidence that auditory -

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[1]Lydia A. Duggins, "Experimental Studies in Auditory Perception in Beginning Reading." In Auditory Perception in the Beginning Reading Program, College Bulletin, Southern Louisiana College 13 (January 1956): p. 18.

[2]Jackie Merior Evans, "The Development of Auditory Discrimination in Third Grade Students by Use of Tape Recorded Materials." Unpublished doctoral dissertation, North Texas State University, 1965.

perceptual training had improved reading achievement.[1]

Wepman feels that research in auditory training is overlooking the important factor that maturation may be a more significant variable in achievement than the actual auditory training itself. He attempted to improve auditory discrimination and memory among children with speech defects and found spontaneous improvement equal to that found by training. Consequently, he ascribed much of the deficiencies in auditory perception to late maturation and noted that some children do not acquire adequate auditory abilities until the eighth year of life.[2] From the research mentioned in this section and from general conclusions drawn from the field, the problem of auditory discrimination training and its effect on reading achievement appears to be unsolved.[3]

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[1]Cynthia P. Deutsch, and Shirley C. Feldman, "A Study of the Effectiveness of Training for Retarded Readers in the Auditory Skills Underlying Reading." Title VII, Project No. 1127, Grant of the U.S. Department of HEW, Office of Education, Institute for Developmental Studies, New York Medical College, 1966, p. 102

[2]Joseph M. Wepman, "Modalities and Learning." In Coordinating Reading Instruction, Edited by Helen M. Robinson (Glenview, Illinois: Scott Foresman, 1971), p. 198.

[3]Robinson, "Perceptual Training - Does It Result in Reading Improvement?" p. 142.

Literature on Visual Perception

Conclusions by studies by Wheelock,[1] King,[2] and Karnes[3] have shown that training in visual discrimination is capable of increasing recognition of letters, words, and forms. Some of the debate in visual perceptual training has been the value it has in its relationship with individual letters and words. Barrett reviewed the literature on visual discrimination that included studies on the recognition of letters and words, pictures, and geometric designs. He reported studies which found that the ability to discern likenesses and differences among words was of greater significance than the ability to discriminate among letters.[4]

In recent years there has been a great deal of debate centered around the non-verbal visual discrimination skills such as the program developed by Marianne Frostig.[5] Rosen reported negative results of a perceptual training

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[1]N.J. Wheelock and J. Silugual, "An Investigation of Visual Discrimination Training for Beginning Readers." Journal of Typographical Research (September 1967):pp. 50-57.

[2]Ethal M. King, "Effects of Different Kinds of Visual Discrimination Training on Learning to Read Words." Journal of Educational Psychology 55 (December, 1964): pp. 325-33.

[3]Merle B. Karnes, et al., "An Evaluation of Two Pre-School Programs for Disadvantaged Children." Exceptional Children 34 (May, 1968): pp. 667-76.

[4]Thomas C. Barrett, "The Relationship Between Measures of Pre-Reading Visual Discrimination and First Grade Reading Achievement; A Review of the Literature." Reading Research Quarterly 1 (Fall, 1965): 51-76.

[5]Karlin, p. 80.

program developed with the Frostig materials. Training did not produce improvement in reading.[1]

Cohen completed research where the experimental group was given perceptual training which followed the Frostig program. Subjects in the experimental group made significant gains on the Visual Perceptual tests, but these gains were not reflected in reading growth.[2]

Balow described a study involving the training of first grade children who scored low on reading readiness tests. Using the Frostig workbooks as the basis for the experimental training the children received forty periods of training each lasting fifteen minutes. Results indicated that there was no significant difference between the experimental and the control groups in reading achievement. A comparison of those scoring lowest on the initial Frostig test showed that the control group far surpassed the trained children. This outcome suggested that listening to stories produced better reading progress than did the Frostig program.[3]

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[1]Carl L. Rosen, "An Experimental Study of Visual Perceptual Training and Reading Achievement in First Grade." Perceptual and Motor Skills 22 (June, 1966): 979-986.

[2]Ruth I. Cohen, "Remedial Training of First Grade Children with Visual Perceptual Retardation," Educational Horizons 45 (Winter, 1966): 66-73.

[3]Bruce Balow, "Perceptual - Motor Activities in the Treatment of Severe Reading Disabilities," Reading Teacher 24 (March, 1971): p. 525.

Jacobs studied kindergarten and first grade children using the Frostig materials. The results of testing showed that the children made significantly higher scores on a readiness test, but there was no significant difference in reading achievement on first level. During the second grade, these same children were given another reading achievement test with the results that the control group actually exceeded the experimental group.[1]

Rosen put his experimental group through training utilizing the Frostig Developmental Training materials. After twenty-nine days of training, he found that the trained group was superior to the untrained group on the Frostig tests, but there were no comparable gains with the experimental group in reading achievement. The control group surpassed the trained group on two other tests.[2]

Fortenberry used Frostig materials for culturally disadvantaged children over a period of twelve weeks. The results of his findings were that (1) no significant improvement on measures of visual perception were found, (2) on one sub-test of the Gates Primary Reading Test performance was significantly higher for the experimental group

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[1]J.N. Jacobs, Lenora Wirthlin, and C.B. Miller, "A Follow-Up Evaluation of the Frostig-Visual Perceptual Training Program," Educational Leadership 26 (November, 1968): p. 174.

[2]Carl L. Rosen, p. 984.

after twelve weeks, but (3) after twenty-four weeks superiority had disappeared.[1]

In summarizing research on the Frostig Perceptual Training program Robinson claimed:

> The Frostig program of visual-perceptual training is not effective in improving reading regardless of the school level at which it is introduced, the number of periods of instruction, the socio-economic level of the pupils, or the scores the pupils make on initial visual-perceptual tests.[2]

Literature on Multi-Sensory Modalities

Thus far the review of the literature does not speak well of auditory or visual perceptual training when this training is centered around non-verbal symbols. Now it would be appropriate to look at research where auditory, visual, and kinesthetic teaching are involved.

Ringler used the New York University Modality Test to classify the learning preference of 128 first grade children. These children were classified according to auditory, visual, kinesthetic, or no preference. Thirty children were identified as auditory learners, thirty-three as visual learners, twenty-eight as kinesthetic learners, and thirty-seven had no preference. Subjects within each

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[1]Warren D. Fortenberry, "An Investigation of the Effectiveness of a Special Program Upon the Development of Visual Perception for Word Recognition of Culturally Disadvantaged First Grade Students," In Reading: Process and Pedagogy, Nineteenth Yearbook of the National Reading Conference, (1970): p. 144.

[2]Robinson, "Perceptual Training - Does It Result in Reading Improvement?" p. 139.

modality were assigned to one of four experimental treatments or to a control group. The experimental groups were labeled auditory, visual, kinesthetic, and combination. Fifty vocabulary words were chosen as the learning task. These words were identified as part of the children's speaking vocabulary but not formally taught in the classroom. Seven and one-half hours of small group instruction, including differentiated presentation of these fifty words, was used. Oral reading of sentences and paragraphs was part of this program. These sentences and paragraphs contained the fifty words. The results of the experiment showed that the experimental groups made significantly greater gains than did the control group, but these experimental groups did not differ significantly from each other. Pupils who were taught using their preferred mode did not make significantly greater gains than those pupils who received instruction through some mode other than their perference.[1]

Cripe used the decoding and association sub-tests of the ITPA to find eighteen first graders who preferred the auditory mode and eighteen who preferred the visual mode. His subjects were administered tasks involving auditory and visual stimuli, both linguistic and non-linguistic

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[1]L.H. Ringler, I.L. Smith, and B.E. Cullinan, "Modality Preference, Differentiated Presentation of Reading Tasks, and Word Recognition of First-Grade Children," A Paper presented to the Annual Convention of the International Reading Association, 1971.

in nature. These two groups did not differ significantly in the rate at which they learned the tasks.[1]

Bruinink tried to determine whether subjects who show preference for either the auditory or the visual mode also show a preference for certain methods of learning unknown words. One hundred and five Negro boys in the second and third grades were administered a battery of six auditory and six visual perception tests. These tests were used to select twenty auditory and twenty visual learners. Each subject was taught to recognize fifteen unknown words, using a "look-say" and fifteen words using a phonic approach. The words were taught in two separate lessons, each twenty-three minutes long. Analysis of variance was employed to analyze the scores of the two preference groups. Neither of the groups demonstrated a preference for either method of teaching new words.[2]

Bateman sought to explore the relative effectiveness of visual and auditory approaches in beginning reading instruction. One hundred and eighty-two children from eight kindergarten classes were chosen. The Detroit

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[1]A.G. Cripe, "Auditory and Visual Learning Related to Illinois Test of Psycholinguistic Abilities Sensory Channels," Unpublished doctoral dissertation, Purdue University, 1966.

[2]R.H. Bruinink, "Relationship of Auditory and Visual Perceptual Strengths to Methods of Teaching Word Recognition Among Disadvantaged Negro Boys," Unpublished doctoral dissertation, George Peabody College for Teachers, 1968.

Group Intelligence Scale and the Metropolitan Reading Readiness Test were administered. In addition, the ITPA was given to four classes in order to divide the children into auditory and visual preference groups. Half of the auditory subjects were taught with a visual method, while the same procedure was followed for the two visual classes which did not have the ITPA. Visual methods employed the Scott Foresman New Basic Readers, and the Auditory method classes utilized Lippincott Basic Reading Series. Analysis of variance was used in the statistical treatment. The auditory method classes produced superior reading and spelling when compared with the visual method. Subjects labeled auditory learners made significantly greater gains than did the visual learners.[1]

Birch and Belmont conducted an experiment in intersensory transfer which employed analogous stimuli in a cross-modal situation. They used 150 retarded readers and 50 good readers ranging in age from nine to ten years. They concluded that one of the contributing factors of reading retardation was the poor development of intersensory transfer.[2]

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[1]B. Bateman, "The Efficacy of an Auditory and a Visual Method on First Grade Reading Instruction with Auditory and Visual Learning," In Perception and Reading. Edited by H.K. Smith (Newark, Delaware: International Reading Association, 1968).

[2]H.G. Birch and L. Belmont, "Auditory - Visual Integration in Normal and Retarded Readers," American Journal of Orthopsychiatry 34 (1964): 852-61.

Later, Kahn and Birch tested 350 randomly selected boys from grades two through six to test the relationship among auditory-visual transfer and reading achievement. The test, designed by Birch and Belmont in 1964, was increased from ten to twenty items. When intelligence was held constant, auditory-visual transfer and word recognition were significantly related, but the transfer and comprehension did not relate significantly.[1]

Muehl and Kremenak considered all possible combinations of intersensory and intra-sensory transfer involving the visual and auditory channels and their relationship to reading achievement. These combinations included (1) auditory to auditory, (2) visual to visual, (3) auditory to visual, and (4) visual to auditory. The tests used were similar to Birch and Belmont, but the visual stimuli consisted of dots and dashes, while the auditory stimuli were presented with a telegraph key hidden behind a screen. A four-pattern matching test was administered to 119 first grade children. Investigations found that the intersensory transfer ability is visual to auditory and auditory to visual to be significant independent predictors of first grade reading achievement, .39 and .52, respectively. Visual to auditory and auditory to visual performances were also significantly related to the ability to

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[1]D. Kahn and H.G. Birch, "Development of Auditory-Visual Integration and Reading Achievement," Perceptual and Motor Skills 27 (1968): 459-68.

name letters on the letter naming subtest of the Harrison-Stroud Reading Readiness Profiles. Letter naming ability proved to be the best single predictor of reading achievement.[1]

Jones attempted to determine the relationship between auditory-visual transfer and two measures of reading achievement, sight vocabulary and reading comprehension, for a group of ninety third-grade children. He modified the Birch and Belmont test to twenty items rather than ten. With the effects of intelligence controlled, intersensory transfer remained a significant predictor of sight vocabulary but not of reading comprehension.[2]

Beery used two groups of fifteen students, eight to thirteen years of age, who were controlled for I.Q., sex, and age but differed significantly in reading achievement. Three perceptual tests were administered: (1) The Birch and Belmont tests of Auditory, to Visual Intersensory Transfer, (2) a longer version of the Birch and Belmont test, and (3) the converse of the Birch and Belmont, which measured the visual to auditory intersensory transfer. All three of the perceptual transfer tests were significant

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[1]S. Muehl and S. Kremenak, "Ability to Match Information Within and Between Auditory and Visual Sense Modalities and Subsequent Reading Achievement," Journal of Psychology 57 (1966): 230-239.

[2]J.P. Jones, "A Study of the Relationships Among Intersensory Transfer, Intersensory Perceptual Shifting, Modal Preference, and Reading Achievement at the Third Grade Level," unpublished doctoral dissertation, University of Georgia, 1971.

predictors of reading achievement. This demonstrated that intersensory integration ability is an independent predictor of achievement in reading.[1]

Literature on Perceptual Conditioning

This section of the chapter is designed to present a review of the literature and research as it relates specifically to the perceptual conditioning approach. The literature on theory of Word Recognition presented earlier was geared in a more general manner to word recognition, while this section is much more specifically designed to provide a theoretical base for the perceptual conditioning approach.

There are two major types of learning theories that can be drawn upon in the discussion of word recognition: Stimulus-Response theories and Cognitive or field theories.[2] Thorndike's model was based on the stimulus-response theory of learning. He argued that learning to read depended on acquisition of correct oral responses to words or word parts. All that was needed was to expose each stimulus to the student, identify its correct oral

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[1]J.W. Beery, "Matching of Auditory and Visual Stimuli by Average and Retarded Readers," Child Development 38 (1967), 827-33.

[2]Harry Singer, "Theories, Models, and Strategies For Learning to Read," in The Literature of Research in Reading With Emphasis on Models, Project No. 0-9030, Final Report to the U.S. Office of Education (New Brusnwick, New Jersey: Rutgers University, 1971), p. 7; 116.

response, and provide proper and positive reinforcement each time the stimulus is handled correctly.[1] This is the precise principle upon which the look-say method is based. The teaching of sight vocabulary from prepared word lists such as the Dolch 220 Basic Sight Words or the Edward Fry List of 600 High Frequency Words, the language-experience charts, and other methods which emphasize repetitive exposure to word-parts, words or phrases are excellent examples of approaches based on the S-R theory.

Thorndike believed in the S-R pattern to teach words so much that he recommended high frequency words be taught first. This idea precipitated the Teacher's Word Book which contained a list of high frequency words that he thought should be taught first.[2] Ten years later, he published The Teacher's Word Book of 20,000 Words[3] and finally, in 1944, he published a third book containing 30,000 words.[4] Although Thorndike advocated the teaching of sight vocabulary, his model was followed for teaching

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[1]Ibid., p. 7; 116.

[2]E.L. Thorndike, Teacher's Word Book (New York: Teacher's College Press, Columbia University, 1931).

[3]E.L. Thorndike, The Teacher's Word Book of 20,000 Words (New York: Teacher's College Press, Columbia University, 1941).

[4]E.L. Thorndike and I.D. Lorge, The Teacher's Word Book of 30,000 Words (New York: Teacher's College Press, Columbia University, 1944).

correct responses to word parts such as occur in phrases or structural analysis skills.[1]

Staats used Skinner's S-R theory to demonstrate that children (pre-schoolers, remedial readers, and delinquents) could be trained at least in the beginning stages of reading instruction to decode printed stimuli to speech through a conditioning S-R approach.[2]

Singer was somewhat critical of the strict S-R approach and suggested that a lack of credibility existed with respect to the explanation of the "how" and "why" the learner can acquire, store, and mobilize appropriate sub-systems for responses to the print.[3]

The mention of stimulus-response learning theory in connection with the Glass Method is important because Glass makes it clear where he stands concerning his relationship to the stimulus-response theory of learning:

> ...our assumption is that the ability to decode is based less upon the knowledge of rules and principles and more upon an instant-response to whole words and/or a conditioned automatic-like response to the structural parts within a whole word. Simply stated,

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[1]Harry Singer, "Theories, Models, and Strategies For Learning To Read," p. 7; 117.

[2]A.W. Staats, "Integrated Functional Learning Theory For Reading," In A.J. Kingston (ed.), Use of Theoretical Models in Research (Newark, Delaware: International Reading Association, 1969).

[3]Harry Singer, "Substrata-Factor Theory of Reading: Theoretical Design for Teaching Reading," In J.A. Figurel (ed.), Challenge and Experiment in Reading (Newark, Delaware: International Reading Association, 1962), p. 229.

> we have discovered that successful decoders simply are able to remember what they have seen and heard before. Nothing more!....We term the process by which the correction structural parts are identified to form the whole word, Perceptual Conditioning.[1]

The field or cognitive-learning theory places major emphasis on purposeful behavior, knowledge concerning means-end relationship, and different ways to achieve goals. The language experience story approach is usually utilized to identify language a child uses regularly but cannot read. Thus, un-readable words are identified and some system is usually used to teach these words to the child. Although the system used to teach the words would be considered an S-R approach, the manner used to identify these words, the language experience story, would be based on field theory.[2] While the Glass Method is definitely S-R in its teaching approach, it follows the field theory's concept in the respect that the method capitalizes on the concept of grouping words with common elements, placing stress on learning to conceptualize or to discriminate and to generalize phonem-grapheme correspondences, and spelling patterns. The method is also field-based in its insistence that words analyzed are first known to the learner in some manner, just as the language experience story utilizes vocabulary that is familiar to the child's oral language development.

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[1]Gerald Glass, Teaching Decoding As Separate From Reading, p. 16.

[2]Harry Singer, "Theories, Models, and Strategies For Learning to Read," p. 7; 118.

Gibson divided decoding into four components: (1) acquisiton of speech prior to reading, (2) discrimination of graphemes, (3) decoding letters to sounds, and (4) shifting from lower to higher-order units or from phoneme-grapheme relationships to spelling patterns; that is, clusters of graphemes in a given pronunciation according to the rules of English.[1]

Jeffrey and Samuels reported that kindergarten children read more new words when they were taught to recognize a group of words by a phonic method than did students who were taught by a look-say method.[2] There appears to be little question that, while the acquisition of sight vocabulary through a look-say method is necessary and, probably, a prerequisite to learning other decoding skills effectively, decoding ability will ultimately be necessary.

Researching perception and word acquisition, Gibson, Osser, and Pick concluded that first grade children, by the time they finished the school year, tended to read in short units and had already generalized some regular spelling-to-sound patterns. By third grade, this span had increased to four and five letters in phonograms or words

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[1]E.J. Gibson, "Learning to Read," Science, 148 (1965), 1068.

[2]W.E. Jeffrey and S.J. Samuels, "The Effect of Method of Reading Training on Initial Reading and Transfer," Journal of Verbal Learning and Verbal Behavior, 6 (1967), 354-58.

which involved more complicated rules and more complex clusters of spelling-to-sound correspondences.[1]

Fries suggested that discovery and conceptualizing of decoding rules might be enhanced if reading materials were programmed according to spelling patterns.[2] Reading programs based on the linguistic philosophies of Fries, Bloomfield, and LeFevre have been utilized to a great extent with children experiencing reading difficulties.

Gibson and others established an order-of-ease concerning perception as follows: (1) real words, (2) non-word pronounceable strings of letters, and (3) meaningful, but unpronounceable, letter strings.[3] The Glass Method requires that the student know real words before they are allowed to be conditioned on non-word pronounceable strings of letters (clusters).

Glass claims that conditioning is not a difficult task and certainly not as difficult as the mastering of dozens of phonic generalizations. Samuels supported this concept and showed that children can be taught to use a

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[1]E.J. Gibson, H. Osser, and A.D. Pick, "A Study in the Development of Grapheme-Phoneme Correspondences," Journal of Verbal Learning and Verbal Behavior, 2 (1963), 142-46.

[2]Charles C. Fries, Linguistics and Reading (New York: Holt, Rinehart, and Winston, 1962).

[3]E.J. Gibson, C.H. Bishop, W. Schiff, and J. Smith, "Comparison of Meaningfulness and Proniciability as Grouping Principles in the Perception and Retention of Verbal Materials," Journal of Experimental Psychology 67 (1964), 173-82.

particular cue, even though the cue may not be related or relevant for transfer. For example, using color-cues with words produced more rapid learning than the use of non-color-cued words. However, when the color-cues were removed the children had difficulty because of the lack of transfer to non-color-cued words.[1] In an earlier article, Samuels and Jeffrey discussed the ease with which children can be taught to use cues, whether relevant or irrelevant. They concluded that techniques for speed of initial learning was not so effective ultimately as a strategy for slower rate with more effective and relevant transfer.[2]

Summarizing this section on theories related to conditioning, one might conclude that the Glass Method is stimulus-response in teaching approach and field theory-based in its ultimate goal of clustering elements which will be generalized into use and transfer to words and word-parts universally. Gibson, Jeffrey, Samuels, Osser, Pick, and others have built a strong case from which Glass has based his program, a low rationale conditioning program which teaches grapheme-phoneme correspondences of

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[1]S.J. Samuels, "Relationship Between Formal Intralist Similarity and the Von Restorff Effect," Journal of Educational Psychology, 59 (1968), 432-37.

[2]S.J. Samuels and W.D. Jeffrey, "Discriminability of Words and Letter Cues Used in Learning to Read," Journal of Educational Psychology, 57 (1966), 337-40.

naturally clustered strings of letters which provide relevant cues for transfer.

Glass maintains several points of view, making his method different from phonic approaches. He bases his approach on the theoretical backing stated clearly in this section. Some of these points are as follows:

1. Decoding is not reading and should be taught separately from reading.[1]

2. Successful decoders do not apply principles as generalizations through a reasoning process; rather, through perceptual conditioning abilities.[2]

3. Unknown words are identified through a process which utilizes a conditioned perceptual set that scans a word for its structural sounding elements (letter clusters) as they have been historically consistent in the reader's experience.[3]

4. Size of configuration is not relevant to identifying parts of words. Letter clusters which are familiar will not be dependent upon length.

5. Size of configuration is also irrelevant in identifying parts within whole words. If letter clusters within words can be made residually familiar to a reader, he might find the sound of a four-letter cluster...no more difficult to identify than the sound of a single letter...in a word.[4]

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[1]Glass, Teaching Decoding as Separate From Reading, p. 8.

[2]Ibid., p. 16.

[3]Gerald Glass, "Teaching of Word Analysis Through Perceptual Conditioning," In M.A. Dawson, Teaching Word Recognition Skills (Newark, Delaware: International Reading Association, 1971), pp. 227-30.

[4]Glass, Teaching Decoding as Separate From Reading, p. 17.

It would be appropriate at this time to look at the three research studies that have been based on the Glass Method.

Glass himself used 217 students in grades one through five for thirty weeks of instruction, three times per week. He reported that the average growth in decoding skills was two years as opposed to the normal growth pattern that would have been less than one year.[1] In a later study, 56 students, in grades three through six, received daily instruction for 42 days during a summer term. Although all of the readers were considered remedial, the overall gains were slightly less than one year on a word analysis test.[2]

A more controlled research study was completed by Searfoss in which the Glass Method was compared to the Russell-Murphy-Durrell approach and a control group after eight weeks of training. The following conclusions were specified:

1. There was no significant difference in decoding skills among the Russell-Murphy-Durrell (RMD) approach, the Glass approach, and the Control group. Achievement order from high to low was Glass, RMD, and Control group.

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[1]Gerald Glass, "Decoding Only? The Effectiveness of Two Programs, (One Developmental, One Remedial, Designed Specifically to Teach Decoding Utilizing a Decoding Only Strategy)." Paper presented to the International Reading Association Convention, Atlanta City, May, 1971.

[2]Ibid.

2. There were significant differences in reading comprehension among the groups which was measured by the Gates-MacGinitie Reading Test - Survey D. The achievement order from high to low was the Control group, Glass, and RMD.

3. There was no significant difference for vocabulary among the groups with the achievement order from high to low as RMD, Glass, and Control group.

4. There was no significant difference in phonic spelling of words among the groups as measured by the Phonic Spelling of Words, Durrell Analysis of Reading Difficulty Tests. The achievement order from high to low favored Glass, Control group, and RMD in that order.

5. There were significant differences in spelling among the groups as measured by the spelling tests, Durrell Analysis of Reading Difficulty. The achievement order from high to low was RMD, Control group, and Glass.

6. There was no significant difference among groups in attitude towards reading as measured by the Reading Attitude Dialogue. Significant changes in attitude from most significant to least significant favored the Control group, RMD, and Glass in that order.[1]

Searfoss concluded that review instruction in basic decoding was of questionable value to fourth grade pupils, the RMD approach did seem to have some positive effects on the development of spelling ability, and the RMD approach really failed to establish itself as efficient due to the fact that it failed to help in phonic spelling ability.[2]

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[1]Lyndon W. Searfoss, "A Comparison of Two Strategies Designed to Teach Basic Decoding Skills to Selected Fourth Grade Readers." (Unpublished Ph.D. Dissertation, Syracuse University, 1973), pp. 68-69.

[2]Ibid., pp. 69-70.

It is unfortunate that Searfoss did not extend his study for a longer period of time. Each student in the training sessions received only twenty minutes of instruction per session and only about seven hours of total instruction for the study. This researcher suggests that using the Glass Method with its conditioning concept would, by its very nature, require that training be continued over an extended period of time. In the Searfoss study only twenty to twenty-five of the clusters could have been taught, while another one hundred of the clusters would have been untouched. This is hardly a true test of effectiveness, no matter what the method.

Summary

The literature on the history of word recognition seems to indicate that trends in instructional strategies have experienced a series of turning points. These turning points have been influenced and initiated, often times, through one piece of research, one book, or one individual. The McGuffey Readers maintained strong control for more than seventy years until the Gestaltist forced reading teachers to look at the whole-word approach. The Handwriting Scale, produced by Thorndike, brought with it the birth of educational measurement and the surge of educational experimentation, perhaps one of the more powerful influences in the total direction of American education.

The 1920's saw the trend toward silent reading, until the National Society for the Study of Education released its charge that the adult population had not learned to master basic reading skills. Remedial reading got its start when Fernald and Orton published their research. Dolch influenced the decline of the teaching of phonics until the second grade until Flesch published his book, Why Johnny Can't Read, in 1955. His document brought severe changes not only in teaching methodology but in the nomenclature of the language of reading. With Flesch came the re-marriage of the first grade teacher and phonics instruction and this marriage has continued to this day. Perhaps a new turning point is on the horizon.

Literature and theory on word recognition has been a heated debate for years. Although there are many differences of opinion on what should be taught, there is general agreement that most reading deficient cases are, in fact, cases of decoding deficiency. This is due, primarily, to the fact that the English orthography presents complicated problems to phoneme-grapheme correspondences that no one has solved for the majority. There appeared to be three approaches to decoding: visual, auditory, and kinesthetic.

There is a dichotomy which exists concerning the relationship decoding has to reading. Many feel that decoding is and can be separated from the rest of the reading process, while others demand that the two are inseparable. Those who suggest that decoding can and should be separated

from the rest of the reading process also admit that decoding without meaning is irrelevant.

The literature on perception as it relates to word recognition covers the areas of visual and auditory perception and the integration of the two. It is generally agreed that perceptual training is more relevant when it involves word forms rather than non-word forms. The use of lines, dots, and geometric shapes has questionable transfer value to reading achievement. Reading people prefer to teach perceptual abilities using letters, clusters, words, and sentences.

Kephart and others have been critical of teaching phonics to first grade children because they claim that the perceptual development has not matured enough. While Dolch would agree, the topic is still open to debate.

Evans and Deutsch have raised some questions as to the value auditory training has to transfer to reading achievement. Wepman feels that maturation may be the most significant factor in achievement and not the auditory training itself. Studies on visual perception have focused a great deal on the Frostig Visual Perception program. Cohen, Balow, Jacobs, Rosen, and Fortenberry have all shown through their research that there is no significant relationship between perceptual training and reading achievement.

The study of learning modalities has identified three primary learning modes: visual, auditory, and

kinesthetic. Attempts have been made to identify the type of learning or sensory approach that individual children possess. Research by Ringler, Cripe, Bruinink, and Robinson had difficulty showing that one modality proved more successful than another over the larger population averages. While investigators such as Birch, Belmont, and Kahn have attempted to identify individual sensory preferences and the ability to transfer from one sensory modality to another, significant contributions have been questionable simply because the very nature of reading acquisition is an audio-visual process requiring constant inter-sensory transfer ability. Perhaps the best information we have received is that: (1) The best single predator of reading achievement might be the ability to name letters, and (2) one of the major factors involved in reading retardation is the poor development of intersensory transfer ability.

Perceptual conditioning and the supporting theoretical base began with Thorndike and Skinner's stimulus-response theory of learning. Thorndike's ideas lead to a heavy emphasis on sight vocabulary. Staats showed that children could decode printed stimuli to speech; Jeffrey showed that training with phonic methods was more effective than look-say. Gibson, Osser, and Pick demonstrated that children naturally begin to look at words from a larger chunk concept by the end of the first grade year.

Samuels showed that students can be conditioned even with irrelevant conditioning cues to use these cues to decode. However, it was agreed that a slower pace and more relevant conditioning was more effective than conditioning with irrelevant cues.

The final three research studies cited in Chapter II were directly related to the Glass Method. The first two, conducted by Glass, were poorly reported and raised questions of validity, while the third study, by Searfoss, was well organized but not conducted over a long enough period of time to treat the variables reliably.

The research review in this chapter includes studies and the theoretical base from which Glass has drawn support for his views on: (1) teaching decoding as a separate and autonomous skill of reading, (2) decoding as a crucial aspect of developmental and remedial reading instruction at every level, and (3) perceptual conditioning as a theory-based approach for teaching decoding skills.

CHAPTER III

DESIGN AND PROCEDURES

The purpose of this field-based study was to determine the relationship which exists: (1) between the 119 phonograms ranked in order of difficulty empirically through this study and the rank order of difficulty established through teacher opinion, (2) between grade, gender, reading ability; and the pronunciability of phonograms, and (3) between grade, gender, reading ability; and the pronunciability of two-letter, three-letter, and four-letter phonograms. This chapter includes the setting and sample, screening procedure, experimental procedures, instruments utilized, and analysis of data.

Setting and Sample

The setting for the study was Moore, Oklahoma, School System which is located ten miles south of the center of Oklahoma City, Oklahoma, and provides suburban living for approximately thirty thousand residents. The major employment opportunities include business, industry, federal government, state government, and agriculture.

The school system contains a kindergarten school, one primary school, one intermediate school, eight full elementary schools, three junior high schools, a single high school, and a special services complex. Four of the full-sized elementary schools were assigned to the research project with two more schools added when testing indicated the need for a larger sample. The six schools involved were chosen by administrative personnel because it was believed that the parent permission slip return rate would be considerably higher. The schools involved in the study were: Northmoor, Fairview, Kingsgate, Sky Ranch, Southgate, and Kelley.

The student enrollment for grades one, two, and three for all schools in the study was 1,927. Permission slips were distributed to all parents with the notification that only students whose parents signed permission slips would be tested. Permission slip returns resulted in 1,383 subjects being tested with the Slosson Oral Reading Test. Of the 1,383 tested with the SORT, 390 qualified for the study by scoring within the reading range as established with 270 of these randomly selected to take the phonogram test. Table 2 presents the enrollment figures for each school and grade, the number of SORT's administered, subjects qualified for the study, and the number randomly selected. Table 3 identifies the qualified population and number randomly selected according to grade level, reading ability and gender. According to this table the minimum

TABLE 2

POPULATION OF SUBJECTS BY GRADE, SCHOOL, ENROLLMENT, NUMBER OF SORT'S ADMINISTERED, SUBJECTS QUALIFIED FOR THE STUDY AND SUBJECTS RANDOMLY SELECTED

Grade	School No.	Students Enrolled	SORT Given	Qualified For Study	Randomly Selected
1st	1	99	66	17	13
	2	96	46	15	12
	3	101	45	13	12
	4	73	33	15	11
	5	170	146	34	22
	6	150	129	28	20
	Grade Totals	(689)	(465)	(122)	(90)
2nd	1	98	80	11	6
	2	91	51	15	9
	3	70	58	13	10
	4	59	22	7	6
	5	139	103	57	34
	6	150	113	37	25
	Grade Totals	(607)	(428)	(140)	(90)
3rd	1	115	75	25	21
	2	104	75	10	6
	3	70	45	12	7
	4	77	61	5	5
	5	132	108	46	25
	6	133	126	30	26
	Grade Totals	(631)	(490)	(128)	(90)
GRAND	TOTALS	1,927	1,383	390	270

TABLE 3

POPULATION BY READING ABILITY, GRADE, AND GENDER

	First Grade B1		Second Grade B2		Third Grade B3		
	M C1	F C2	M C1	F C2	M C1	F C2	
Below Ave.	18*	24*	21*	26*	20*	17*	126*
A1	15**	15**	15**	15**	15**	15**	90**
Average	18*	21*	22*	22*	21*	23*	127*
A2	15**	15**	15**	15**	15**	15**	90**
Above Ave.	18*	23*	26*	23*	25*	22*	137*
A3	15**	15**	15**	15**	15**	15**	90**
	122*	90*	140*	90**	128*	90**	
	M = 189*	135*	F = 201*	135**			

* Number of subject in the population.
** Number of subjects randomly selected for the study.

number of qualified subjects for any single cell was 17 while the maximum number qualified was 26.

Procedure

On March 18, 1976 the principal investigator met with the Assistant Superintendent, Director of Reading Instruction, and four elementary principals to outline procedures for screening and testing. On March 22-23, in-service meetings were held with primary teachers in each of the target schools. During this meeting the objectives of the study were presented, procedural steps discussed, the SORT and Phonogram test demonstrated, and permission slips distributed. One of the important functions of the teachers' meetings was to elicit their cooperation by encouraging a high return of permission slips. This cooperativeness contributed to a 72% return rate with several classes achieving one-hundred percent return rates.

Screening Procedure

In order to establish a rank order of difficulty for the 119 phonograms which were identified by Glass from primary basal readers, it was desirable to use a large number of children equally distributed by grade, gender, and narrowly defined reading levels. By using students in grades one, two, and three, and dividing each grade level into three reading levels, the study would utilize nine different closely controlled reading levels from the virtual non-reading below average first grader to the rather

proficient and independent above average third grade reader. By identifying male and female groups within each of the groups a total of 18 cells could be identified for use in the study. Table 4 illustrates the criterion used for placement of students into each of the eighteen cells. There was a need to identify a minimum of fifteen males and fifteen females for each of the nine reading categories with all thirty subjects in the designated category reading within three months of each other. It was determined that a population of approximately 800 students would be needed to identify enough qualified subjects to fill each of the eighteen cells. This estimate was later increased to more than thirteen hundred subjects.

Although the school system administers general achievement tests on an annual basis, it was decided that these tests were not administered recently enough to be considered valid indicators of current reading ability. Furthermore, the achievement tests were group administered which allowed too many uncontrolled variables which the study attempted to screen out. The Slosson Oral Reading Test was chosen as the reading screening test, because it is individually administered, tests oral reading ability necessary for the study, correlates highly ($r = .96$) with the Gray Oral Reading Tests, a nationally normed test, takes three to five minutes per child to administer and score, and could be given by undergraduate and graduate

TABLE 4

CRITERION READING RANGE, SUBJECTS QUALIFIED, MEAN SORT SCORE, AND NUMBER SELECTED FOR EACH CELL

Cell #	Description	Criterion Reading Range	Number to Qualify	Mean SORT Score	N
1	1st-Below Ave. M	1.0 - 1.3	18	1.16	15
2	1st-Below Ave. F	1.0 - 1.3	24	1.14	15
3	1st-Average Male	1.4 - 1.6	18	1.51	15
4	1st-Average Female	1.4 - 1.6	21	1.47	15
5	1st-Above Ave. M	1.7 - 1.9	18	1.79	15
6	1st-Above Ave. F	1.7 - 1.9	23	1.79	15
7	2nd-Below Ave. M	2.0 - 2.3	21	2.16	15
8	2nd-Below Ave. F	2.0 - 2.3	26	2.15	15
9	2nd-Average Male	2.4 - 2.6	22	2.49	15
10	2nd-Average Female	2.4 - 2.6	22	2.55	15
11	2nd-Above Ave. M	2.7 - 2.9	26	2.83	15
12	2nd-Above Ave. F	2.7 - 2.9	23	2.75	15
13	3rd-Below Ave. M	3.0 - 3.3	20	3.13	15
14	3rd-Below Ave. F	3.0 - 3.3	17	3.17	15
15	3rd-Average Male	3.4 - 3.6	21	3.50	15
16	3rd-Average Female	3.4 - 3.6	23	3.54	15
17	3rd-Above Ave. M	3.7 - 3.9	25	3.79	15
18	3rd-Above Ave. F	3.7 - 3.9	22	3.80	15
	Total All Cells	1.0 - 3.9	390	2.48	270

students assisting with the study with a reasonable amount of inservice training.[1]

On March 24, 1976, two graduate and six undergraduate students met for a two-hour training session on the administration of the Slosson Oral Reading Test. This test contains ten lists of twenty words each, arranged by increasing levels of reading difficulty. The subject reads each word orally until he or she reaches a list where none of the words is recognized or pronounced correctly. Testing is stopped, correct responses are tabulated, and the raw score is converted to grade equivalents. Proficiency in administering the SORT was achieved by each assistant giving five tests under the supervision of the principal investigator. All eight assistants achieved proficiency by the fifth administration of the test and were then allowed to test in the field.

Field testing began on March 26 and continued until April 23, 1976. During the nineteen working days required to complete the SORT testing, 1,383 subjects were given the test and 182 hours were spent administering and scoring the test. The average time required per text was approximately eight minutes. Of the 1,383 subjects tested, only 390 qualified for the study by scoring within required ranges. All cells were filled adequately with a minimum of 17 subjects, identified for the below average third

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[1]Richard L. Slosson, Slosson Oral Reading Test (SORT) (East Aurora, New York: Slosson Educ. Pub., Inc., 1963).

grade female group, and a maximum of 26 identified in the below average second grade female and above average second grade male groups. A review of Table 3, page 77, shows the distribution of the 390 qualified subjects according to grade, gender, and reading ability.

Within each cell seventeen subjects were randomly chosen using a table of random numbers. The sixteenth and seventeenth subjects in each cell were designated as alternates to be used in cases of absences. In only two cells were alternates necessary. Table 4 identifies the number of subjects which qualified for each cell, the criterion reading range necessary, the mean reading score, and the number randomly selected for each group.

Experimental Procedure

Glass identified the 119 phonograms (117 vowel clusters and 2 consonant clusters) in the Glass Method and had them ranked in order of difficulty from easiest to hardest to learn. He then sub-divided his list into five board categories of difficulty which he entitled: Starters, Medium One, Medium Two, Harder One, and Harder Two. Table 5 illustrates the rank order as established by Glass. Since the purpose of the study was to establish an empirically based rank order of difficulty and to compare mean differences in pronunciability, the most effective method of obtaining this data was to have the 270 subjects attempt to pronounce each of the phonograms.

TABLE 5

LIST OF 119 PHONOGRAMS (117 VOWEL CLUSTERS AND 2 CONSONANT CLUSTERS) IDENTIFIED IN THE GLASS METHOD AND RANKED IN ORDER OF DIFFICULTY ACCORDING TO TEACHERS OPINIONS

Starters	Medium One	Medium Two	Harder One	Harder Two
1. sat	1. bed	1. fall	1. fowl	1. her
2. sing	2. big	2. saw	2. bus	2. hair
3. set	3. lip	3. tel(l)	3. fil(l)	3. pal
4. sit	4. mud	4. deck	4. bite	4. tied
5. hot	5. lid	5. nice	5. mes(s)	5. few
6. him	6. den	6. tick	6. Tom	6. fire
7. top	7. hug	7. clif(f)	7. poke	7. hear
8. ran	8. hut	8. sink	8. tore	8. real
9. say	9. far	9. cob	9. tow	9. tea
10. sad	10. hem	10. sod	10. cast	10. bee
11. jam	11. cup	11. fog	11. cane	11. care
12. sun	12. mate	12. tub	12. meat	12. deaf
13. tin	13. tent	13. cuf(f)	13. glas(s)	13. boat
14. rap	14. test	14. rush	14. Bev	14. cue
15. sand	15. rake	15. table	15. kind	15. too
16. tack	16. hide	16. sight	16. toss	16. out
17. sum	17. lock	17. mis(s)	17. team	17. pound
18. tab	18. made	18. Ron	18. most	18. cure
19. bag	19. came	19. for	19. rol(l)	19. nature
20. told	20. cape	20. ful(l)	20. bone	20. fur
21. rash	21. face	21. fact	21. pale	21. fir
22. fish	22. sang	22. taf(f)y	22. save	22. raid
	23. sank	23. cook	23. rove	23. auto
	24. song	24. Nation	24. folly	24. boil
			25. sage	

*Underlined portions of the word represent the actual phonogram.

**Letters in parentheses do not affect the sound.

Several alterations were made on the original Glass list. First of all, the entire list of phonograms were re-arranged in random order using a table of random numbers. All of the assisting letters were removed from each word leaving only the cluster itself or the underlined portion of the words in Table 5. This was necessary to reduce the chance for recognition as a whole or sight word. Since all but two of the 119 phonograms were vowel phonograms, some of the phonograms would be real words. Likewise, some of the phonograms were too ambiguous when left alone allowing more than one pronunciation for the symbols supplied. In these cases, helping letters were added before or after the phonogram to narrow the choice down to the desired pronunciation. The final list contained 51 phonograms which were real words and 68 which were pronounceable but not real words.

Although the presence of real and nonsence words within the same test instrument raises important questions concerning validity, the rationale for a mixture in this case is justifiable. The process of decoding is a process of recognizing identifiable parts, real or nonsense, which give clues to pronunciation. It is natural for one using a structural approach to word identification (i.e., prefixes, suffixes, compound words, root words) to spot those clusters, whether real or nonsense, which give clues to the pronunciation of that word. The concept of perceptual conditioning is to train the student to visually and

auditorily recognize phonograms which provide rather consistent patterns for usage within words. The fact that some of these phonograms will be real words to some students will enhance the conditioning process but will not alter the fact that all phonograms, real or nonsense, will need to be learned.

The phonogram test, arranged in random order, was typed onto white paper using a primary typewriter with ¼ inch letters. The 119 phonograms (see Table 6) were arranged into nine lists of fourteen words each, except for list nine, which contained only seven words. Each word was spaced on the list to avoid chances of skipping words. The phonogram test was administered in much the same manner as the SORT. Students were taken individually to an isolated testing area. They were asked to attempt to pronounce each word or part of a word. If they could not pronounce the phonogram they could say the word "skip" indicating their desire to move to the next phonogram. They were also told that, although some phonograms made real words while others did not, all of the phonograms could be pronounced. Each student tested sat to the left of the examiner with the first sheet in front of him or her. Lists Two and Three on the first sheet were covered with a sheet of plain paper. The examiner held a blank 3 x 5 card over the first list and moved the card down the list one phonogram at a time. The student either pronounced the phonogram correctly, incorrectly, said "skip," or, after five seconds

TABLE 6

LIST OF 119 PHONOGRAMS ARRANGED IN RANDOM ORDER FOR PURPOSE OF TESTING

LIST 1	LIST 2	LIST 3	LIST 4	LIST 5	LIST 6	LIST 7	LIST 8	LIST 9
ight	air	aid	ill	ite	age	id	all	oke
affy	ate	fir	en	eal	tone	om	at	an
ound	ame	ane	fire	too	oll	ong	ull	auto
on	iff	ade	ink	ay	ale	care	cure	most
ot	im	or	ank	eam	ick	ock	iss	ash
um	ape	ug	ig	ack	ad	ast	ag	uff
og	tion	tar	ap	it	ess	od	boil	ell
able	and	ide	ed	ear	ab	cue	ice	
op	owl	cook	act	ang	tass	ub	ut	
ore	ud	est	tea	deaf	few	ish	ing	
ip	ace	oat	eat	fur	ied	ob	us	
olly	ave	ee	tow	her	ent	un	saw	
ake	ess	old	em	ush	et	out	am	
ture	ev	eck	ind	al	ove	up	in	

*Words were typed on a primary-sized typewriter using all lower case letters. Three lists were typed on a full size sheet of paper and double-spaced. A 3 x 5 index card was used to underline the phonogram to be pronounced. After five seconds the index card was moved to the next phonogram and, if there was no response or an incorrect response, the item was counted as wrong.

of waiting time with no response, the examiner said "skip" and moved the card down to the next word. After List One was complete, List Two was uncovered and the same procedure was followed. When the nine lists were completed, testing was complete and the student sent back to his or her room.

Each examiner had a Student Response Sheet for each student tested. Phonograms were listed on the response sheet in the same order as the phonograms were listed on the test copy. Next to each phonogram was a "y" and an "n." A correct response was indicated by the "y" and an incorrect response by the "n." The single criterion for scoring was that the phonogram had to be pronounced correctly within the five seconds allowed. If the student made an error but corrected himself within the five second period of time, he would be given credit (y). A mispronunciation, a "skip," or no response at all resulted in no credit (n).

Two of the eight assistants who administered the reading test were chosen to assist with the phonogram test. Six hours of in-service were required to prepare each of the assistants to administer the test. Each of the phonograms was pronounced individually by each assistant. Differences of opinion were cleared up and variable pronunciations were discussed. It was agreed that one and only one pronunciation would be acceptable in each case. Each assistant was asked to score five tests, previously taped by this writer, using students in the schools who were not in the study. Proficiency was achieved when each student

could score three tests without error. After testing began each assistant was required to record the complete testing session for ten students. These sessions were critiqued by the principal investigator and, from that point on, recording and critiquing were suspended due to a lack of need.

The phonogram testing required a span of five days from April 30th through May 6, 1976 and took approximately seventy hours, or fifteen minutes per testing session. Once the testing was completed, the responses from each of the 270 subjects were keypunched onto computer cards for the convenience of data analysis. Correct responses were given the value of "1" while incorrect responses were given the value of "2."

Selection of the Variables

The independent variables in the study were grade in school, gender, and reading ability as determined by the Slosson Oral Reading Test. The number of correct responses on the phonogram test was the criterion (dependent) variable in the study. It was assumed that random sampling would control other variables that might have influenced the results of the study.

Instruments Utilized

The Slosson Oral Reading Test was designed by Richard Slosson in 1963 and has been used extensively by clinicians and classroom teachers to measure oral reading ability.[1]

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[1]Slosson, p. 2.

The test contains 200 individual words arranged in ten lists of twenty words each. The first list, List P, and the next two, List 1 and List 2, are printed in primary-sized lower case letters while the remaining seven lists contain standard size letters. Each list increases in difficulty by one grade equivalent and grade norms range from 0.1 (first month of the kindergarten level) to high school.

Subjects are to read directly from the test copy while the examiner is to make notations on a record copy. The subject is asked to read each word aloud as carefully as he or she can. When one comes to a difficult word, the word should be attempted. If the word cannot be read the subject can say "skip" and move on to the next word. Testing should begin with a list where the subject can pronounce all words correctly. Each list of words is graded. List P (primer) is for the first few months of the first grade while List 1 is for the remainder of the first grade year. List 2 is for second grade, List 5 is for fifth grade, etc. If the starting list is too difficult (i.e., less than 100% correct pronunciation) the subject is taken backwards on the tests until a list is identified where no errors are recorded. Once this basal level is obtained, testing is continued to the right into more advanced lists until the ceiling list is identified where the subject mispronounces or is unable to read all 20 words.

A five-second time limit for pronunciation is allowed. All mispronounced words, omitted words, and

pronunciations taking longer than five seconds are counted as incorrect responses. The raw score is the number of correctly pronounced words in all lists as well as words below the basal or starting list for which one is automatically given credit. A table is provided to convert raw scores to reading levels. A simple way to determine reading level is to take one-half the raw score.

According to Slosson:

> This Oral Reading Test is to be given individually and is based on the ability to pronounce words at different levels of difficulty. The words have been taken from standardized school readers and the Reading Level obtained from testing represents median or standardized school achievement. A correlation of .96 (variability on a group of 108 children from first grade through high school: Gray Mean = 5.0, SORT Mean = 5.0, Gray S.D. = 2.0, SORT S.D. = 2.3) was obtained with the Standard Oral Reading Paragraphs by William S. Gray....
>
> A reliability coefficient of .99 (test-retest interval of one week) shows that this Oral Reading Test can be used at frequent intervals to measure a child's progress in reading, provided no specific coaching with these particular words has been given. Such periodic testing can be highly motivating.[1]

Although the Mental Measurement Yearbook identifies the SORT in its seventh edition, no review or bibliography is provided.[2] Buros' Tests in Print II identified five references pertaining to the SORT. Four were done at Cardinal Stritch College, Milwaukee, Wisconsin, all concerned with the relationship between the SORT and intelligence

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[1]Slosson, p. 2.

[2]Oscar K. Buros, Mental Measurement Yearbook, (7th ed., Highland Park, New Jersey; The Gryphon Press, 1971), p. 6:844.

tests, particularly the Slosson Intelligence Test. One reference identified a study by Braddock in which the SORT was correlated with the McCracken Word Recognition Subtest.[1] Information concerning sampling, data analysis, or findings was not provided.

Analysis of the Data

The data collected for each subject included: (1) the score of correct or incorrect pronunciation for each of the 119 phonograms in the phonogram test, (2) grade in school, (3) gender, and (4) reading ability identified as either below average, average, or above average.

In order to test the nine hypotheses stated in Chapter I, it was necessary to utilize three different types of analyses. Since hypothesis #1 dealt with rank order correlation coefficients, it was necessary to produce frequency counts, rank order, and a difficulty index for the three reading levels within each grade, male and female groups within each grade, male and female groups for the total study, and the total study itself. The Kendall's coefficient of concordance, W, was used any time three or more rank orders were correlated. Significance testing for W was achieved through the use critical values identified in Table M, by Downie and Heath.[2] In cases where two rank

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[1]Oscar K. Buros, Tests in Print II, (Highland Park, New Jersey: The Gryphon Press, 1974), p. 1690.

[2]N.M. Downie and R.W. Heath, Basic Statistical Methods (3rd ed; New York: Harper & Row, 1970), pp. 326-27.

orders were correlated, the Spearman rank order correlation coefficient, rho, was used. The rho was utilized in correlations between male and female ranks within grades, male and female ranks for all subjects, and in comparing rank order difficulties, for all subjects, between the study and the teacher opinion-based rank order established by Glass in the Glass Method. Testing for significance was achieved through t test analysis.

Testing hypotheses #2 through #8 required the computation of factorial analysis of variance using the mean number of correctly pronounced phonograms per cell. The first step was to compute means and standard deviations of the scores on the phonogram test for the total sample of 270 subjects and for each of the eighteen sub-groups within the study. In cases where the computed F-value exceeded the critical value, the Scheffé method of multiple comparisons between means was used to determine which of the means had differed significantly from the other.

Analyses of variance were computed for the following groups: (1) among mean scores of first, second, and third graders to test hypothesis Two, (2) among three reading levels to test hypothesis Three, (3) between males and females to test hypothesis Four, (4) among grade level and the reading ability groups to test hypothesis Five, (5) among grade level and the gender groups to test hypothesis Six, (6) among reading ability and the gender groups to test hypothesis Seven, and (7) among grade, reading ability, and gender

groups to test hypothesis Eight. A summary Analysis of variance table was established to show the results of the analysis for each group tested, and Scheffé tests were computed on all significant variances to identify which of the mean score contributed to that significance.

The ninth hypothesis required a comparison of mean scores for three levels of the dependent variable, (two-letter, three-letter, and four-letter phonograms) with the three independent variables (grade, gender, and reading ability). A Repeated Measures Analysis of Variance was computed with the data cards and the BMD08V program at the Merrick Computer Center, University of Oklahoma.[1] In cases where the obtained F-value exceeded the alpha values at the .05 level of significance, Scheffé tests were computed to determine the particular mean comparisons which contributed to the significance.

For this study the alpha level of .05 was accepted as the criterion level of significance.

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[1]W.J. Dixon, ed., BMD: Biomedical Computer Programs, (Berkley: University of California Press, 1970)

CHAPTER IV

FINDINGS AND DISCUSSION

The purpose of this study was to establish a rank order of difficulty for 119 phonograms identified in the Glass Analysis for Perceptual Conditioning program utilizing first, second, and third grade pupils, compare the established empirically-based rank order with that previously established by Gerald Glass through the survey of teachers' opinions, test the pronunciability of these phonograms (dependent variable) against the conditions of grade level, reading ability, and gender (independent variables), and compare the different phonograms by length.

The testing procedure began in the City of Moore, Oklahoma, during the month of March, 1976. Six schools with an enrollment of 1,927 students at the primary grade levels were available as a base for gathering data. After permission slips for testing were returned, 1,383 pupils were administered the Slosson Oral Reading Test from which 390 qualified for the study. From the qualified pupils, eighteen cells were established over three grade levels, three reading levels within each grade, and gender, with fifteen pupils randomly selected for each cell.

Each of the 270 pupils was given the phonogram test containing 119 phonograms. These phonograms, the same phonograms identified in the Glass Method, were randomly arranged in nine lists, three lists per page, fourteen phonograms per list, in primary-size lower case letters. Each pupil was asked to pronounce each phonogram and follow the same procedure used in the administration of the Slosson Oral Reading Test; the pupil had five seconds to pronounce the phonogram or say "skip" in the event he or she did not know and did not want to guess.

All of the analyses of this study were based on the correct or incorrect pronunciation of each phonogram and the total number of correctly pronounced phonograms for each of the 270 pupils in the study. It is the purpose of this chapter to analyze each stated null hypothesis and to present the findings in the same order as the hypotheses were presented in Chapter One.

Hypothesis #1 stated there was no difference between the rank order of difficulty established with 119 phonograms by the study and the rank order establish by Glass through teachers' opinion. To test this hypothesis it was necessary to establish a rank order for all 270 subjects in the study. In order to establish internal validity and to have definitive data to compare rank orders among various sub-groups, twenty-one different rank orders were tabulated. Table 7 identifies these various groups. Separate tables were established identifying the correct response frequency, the

TABLE 7

THE TWENTY-ONE GROUPS AND SUB-GROUPS WHICH HAVE RANK ORDERS ESTABLISHED AND THE NUMBER IN THE GROUP

GROUP IDENTIFICATION	NUMBER IN GROUP
First Grade Below Average Readers	30
First Grade Average Readers	30
First Grade Above Average Readers	30
Second Grade Below Average Readers	30
Second Grade Average Readers	30
Second Grade Above Average Readers	30
Third Grade Below Average Readers	30
Third Grade Average Readers	30
Third Grade Above Average Readers	30
First Grade Males	45
First Grade Females	45
Second Grade Males	45
Second Grade Females	45
Third Grade Males	45
Third Grade Females	45
All First Grade Pupils (male & female)	90
All Second Grade Pupils (male & female)	90
All Third Grade Pupils (male & female)	90
All Males in the Study	135
All Females in the Study	135
All Students in the Study (male & female)	270

rank order of difficulty, and the item difficulty for each phonogram. Because of their length these tables were placed in Appendix A. Rank order correlation coefficients were calculated for all of the major groups. Spearman rank order correlation coefficient, rho, was used when comparisons were made between only two groups, while Kendall's coefficient of concordance, W, was used when three or more groups were correlated. A list of the groups correlated, statistic used, r, alpha level for .01, are illustrated in Table 8. The

TABLE 8

CORRELATION COEFFICIENTS FOR PHONOGRAMS RANKED IN ORDER OF DIFFICULTY AMONG GROUPS, STATISTIC USED, COMPUTED r, ALPHA VALUES, AND DIFFERENCES

Rank Orders Correlated	Stat. Used	r	Alpha Level at .01	p
1st Grade- Below Ave. 1st Grade- Average 1st Grade- Above Ave.	W	.89	(n3,m30) r= .15	< .01
1st Grade Males 1st Grade Females	Rho	.95	r= .25	< .01
2nd Grade- Below Ave. 2nd Grade- Average 2nd Grade- Above Ave.	W	.91	(n3,m30) r= .15	< .01
2nd Grade Males 2nd Grade Females	Rho	.96	r= .25	< .01
3rd Grade- Below Ave. 3rd Grade- Average 3rd Grade- Above Ave.	W	.91	(n3,m30) r= .15	< .01
3rd Grade Males 3rd Grade Females	Rho	.91	r= .25	< .01
All First Graders All Second Graders All Third Graders	W	.86	(n3,m30) r= .15	< .01
All Male Students All Female Students	Rho	.97	r= .25	< .01
All Students in Study Rank Order of Glass Method	Rho	.38	r= .25	< .01

highest correlation (r=.97) was obtained between all the males and females in the study. High correlations were also established between male and female first graders (r=.95), male and female second graders (r=.96), and male and female third graders (r=.91). Rank orders among below average, average, and above average readers within the first grade correlated at .89, below average, average, and above average second graders correlated at .91, and below average, average, and above average third grade readers correlated at .86, which was the lowest correlation coefficient among the groups in the study.

When the rank order established in the study was compared to the rank order established by Glass (through teachers' opinion) the correlation was low but positive (r= .38). Because the computed value (r= .38) exceeded the alpha value (r = .25; df = 100) at the .01 level of significance, it was concluded the correlation between the rank order established by Glass and the rank order established in the study was significant. Therefore, hypothesis #1, predicting no difference between ranks, was not rejected.

An examination of the two rank orders revealed that fifty-nine of the phonograms had rank order differences of twenty-five points or more, twenty-four phonograms had rank order differences of ten to twenty-four points, while only thirty-six phonograms had rank order differences from zero to ten points. List 9, Appendix A, illustrates the fifty-nine phonograms having rank order differences of

twenty-five points or more, the rank order established in each study, and the difference between the two rank orders.

Testing of hypotheses two through eight required the comparison of phonogram test scores (dependent variable) among grade levels, reading levels, and gender groups (independent variables). A 3 x 3 x 2 factorial analysis of variance was computed which provided an analysis of mean differences to test the seven hypotheses.

Hypothesis #2 stated there is no difference in the mean number of correctly pronounced phonograms when subjects are grouped according to grade. Mean scores and standard deviations were calculated for each grade level and presented in Table 10. The ANOVA computed in order to determine whether differences among the mean scores for the three grades were significant showed an F-value of 60.104 which was beyond the .01 level of significance (4.71; df = 2/252 (2/200)). Table 11 presents the summary of the Analysis of Variance for hypotheses two through eight.

TABLE 10

SUM OF SCORES, MEANS, AND STANDARD DEVIATIONS OF THE PHONOGRAM TEST SCORES FOR SUBJECTS GROUPED BY GRADE LEVELS

First Graders (N= 90)	Second Graders (N= 90)	Third Graders (N= 90)
Sum X= 4780	Sum X= 6019	Sum X= 7406
$\bar{X}$= 53.11	$\bar{X}$= 66.88	$\bar{X}$= 82.29
s= 20.61	s= 20.13	s= 16.55

TABLE 11

SUMMARY OF 3 X 3 X 2 FACTORIAL ANALYSIS OF VARIANCE, COMPARING MEAN PHONOGRAM TEST SCORES FOR 270 SUBJECTS

Source of Variation	df	Sum of Squares	Mean Squares	F*	p
Grade (G)	2	38,351.0	19,175.5	60.104	< .01
Reading (R)	2	16,345.8	8,172.9	25.617	< .01
Gender (S)	1	222.6	222.6	.698	
Grade/Reading (GxR)	4	482.0	120.5	.378	
Grade/Gender (GxS)	2	328.0	164.0	.514	
Reading/Gender (RxS)	2	22.0	11.0	.034	
Grade/Reading/ Gender (GxRxS)	4	1,573.8	393.5	1.233	
Error	252	80,398.8	319.0		
Total	269	137,724.0			

* F (df= 2/252 (2/200)) = 3.04 at .05 ; 4.71 at .01
  F (df= 1/252 (1/200)) = 3.89 at .05
  F (df= 4/252 (4/200)) = 2.41 at .05

Since the resulting F-value was significant, it was necessary to compare mean phonogram scores for subjects grouped according to grade level in order to determine which groups differed significantly from the others. The Scheffe' method of multiple comparisons, the S-method, was used to compare mean phonogram scores for the three groups. Results of the comparisons are reported in Table 12.

TABLE 12

COMPARISON OF MEAN PHONOGRAM TEST SCORES FOR PUPILS GROUPED ACCORDING TO FIRST, SECOND, AND THIRD GRADE

Groups	Means	D	S	p
First Graders	53.11	26.74	9.42	$< .01$
Second Graders	66.88			
First Graders	53.11	120.09	9.42	$< .01$
Third Graders	82.29			
Second Graders	66.88	33.49	9.42	$< .01$
Third Graders	33.49			

The comparison of means for the first and second grade groups indicated a significant difference (D = 26.74; S = 9.42). Significant differences were also found between the first and third grade means (D = 120.09; S = 9.42) and between the

second and third grade means (D = 33.49; S = 9.42). Therefore the differences among mean scores were significant among all three grade levels. $Ho_{2:0}$, which predicted no significant difference among mean phonogram test scores when subjects are grouped according to grade level, was rejected.

Hypothesis #3 concerned the pronunciability of phonograms when subjects are grouped according to reading ability. The sum of scores, means, and standard deviations of the phonogram test scores used in the statistical comparisons are presented in Table 13.

TABLE 13

SUM OF SCORES, MEANS, AND STANDARD DEVIATIONS OF THE PHONOGRAM TEST SCORES FOR SUBJECTS GROUPED ACCORDING TO BELOW AVERAGE, AVERAGE, AND ABOVE AVERAGE READERS

Below Average Readers(N=90)	Average Readers(N=90)	Above Average Readers(N=90)
Sum X = 5107	Sum X = 6343	Sum X = 6755
$\bar{X}$ = 56.75	$\bar{X}$ = 70.48	$\bar{X}$ = 75.06
s = 22.54	s = 22.29	s = 18.54

Means calculated for the groups were 56.75 for the below average readers, 70.48 for the average readers, and 75.06 for the above average readers. The order of achievement from high to low mean scores was above average> average> below average readers.

A Factorial ANOVA was computed to test the null

hypothesis of no significance to determine whether the differences among the three group means were significant. An F-value of 25.617 (df = 2/252) was obtained which exceeded the criterion for significance at the .01 level (4.71; df = 2/252). $Ho_{3:0}$, which predicted no significant difference among mean phonogram test scores when subjects are grouped accord- to reading ability, was rejected. This analysis was reported in Table 11.

Since the resulting F-value was significant, it was necessary to compare mean phonogram test scores for subjects grouped according to reading ability in order to determine which groups differed significantly from the others. The Scheffé method of multiple comparisons was used to compare mean phonogram test scores for the three groups. Results of the comparisons are reported in Table 14.

TABLE 14

COMPARISON OF MEANS OF PHONOGRAM TEST SCORES FOR SUBJECTS GROUPED ACCORDING TO READING ABILITY

Groups	Means	D	S	p
Below Ave. Readers	56.75	26.59	9.42	$<.01$
Average Readers	70.48			
Below Ave. Readers	56.75	47.29	9.42	$<.01$
Above Ave. Readers	75.06			
Average Readers	70.48	2.95	6.08	$>.05$
Above Ave. Readers	75.06			

The comparisons of means for the below average and average readers (D = 26.59) and the below average and above average readers (D = 47.29) indicated a difference which exceeded the criterion S at the .01 level (S = 9.42). The comparison of means for the average and above average readers (D = 2.95) failed to reach the criterion S at the .05 level (S = 6.08)

Hypothesis #4 concerned the pronunciability of phonograms when subjects are grouped according to gender. The sum of scores, means, and standard deviations of the phonogram test scores used in the statistical comparisons are presented in Table 15.

TABLE 15

SUM OF SCORES, MEANS, AND STANDARD DEVIATIONS OF PHONOGRAM TEST SCORES FOR SUBJECTS GROUPED ACCORDING TO GENDER

All Males (N = 135)	All Females (N = 135)
Sum X = 9,225	Sum X = 8,980
$\bar{X}$ = 68.33	$\bar{X}$ = 66.52
s = 20.96	s = 24.06

Means calculated for the groups were 68.33 for the males and 66.52 for the females. The order of achievement from high to low mean scores was males > females.

A Factorial ANOVA was computed to test the null hypothesis of no significance to determine whether the

observed differences between the two groups was significant. An F-value less than 1 was obtained (df = 1/252) which failed to reach the criterion for significance at the .05 level (3.89; df = 1/252). Therefore the $Ho_{4:0}$, which predicted no significant difference between mean phonogram test scores when subjects are grouped by gender, was not rejected. Since the F-value was not significant, no further analysis was necessary. This analysis was reported in Table 11.

Hypothesis #5 concerned the pronunciability of phonograms when subjects are grouped according to grade and readability. The sum of scores, means, and standard deviations of the phonogram test scores used in the statistical comparisons are presented in Table 16.

TABLE 16

SUM OF SCORES, MEANS, AND STANDARD DEVIATIONS OF PHONOGRAM TEST SCORES WHEN SUBJECTS ARE GROUPED ACCORDING TO GRADE LEVEL AND READING ABILITY

	First Graders (N = 90)	Second Graders (N = 90)	Third Graders (N = 90)
Below Average Readers	Sum X = 1,232 $\bar{X}$ = 41.07 s = 17.18	Sum X = 1,682 $\bar{X}$ = 56.07 s = 18.92	Sum X = 2,193 $\bar{X}$ = 73.10 s = 18.92
Average Readers	Sum X = 1,740 $\bar{X}$ = 58.00 s = 20.75	Sum X = 2,046 $\bar{X}$ = 68.20 s = 22.49	Sum X = 2,557 $\bar{X}$ = 85.24 s = 13.23
Above Average Readers	Sum X = 1,808 $\bar{X}$ = 60.27 s = 18.12	Sum X = 2,291 $\bar{X}$ = 76.37 s = 11.98	Sum X = 2,656 $\bar{X}$ = 88.53 s = 12.53

Means calculated for the groups were 41.07, 56.07, and 73.10 for the below average first, second, and third grade readers; 58.0, 68.20, and 85.24 for the average first, second, and third grade readers; and 60.27, 76.37, and 88.53 for the above average first, second, and third grade readers. The order of achievement from high to low mean scores was above average 3rd> average 3rd> above average 2nd> below average 3rd> average 2nd> above average 1st> average 1st> below average 2nd> below average 1st.

A Factorial ANOVA was computed to test the null hypothesis of no significant interaction to determine if the observed differences among the six groups were significant. An F-value less than 1 (df = 4/252) was obtained which failed to reach the criterion for significance at the .05 level (2.41; df = 4/252). As Figure 1 indicates, probably no interaction effects existed among the group means and, therefore, no change in group mean relationships occured when subjects were grouped by grade and reading ability. Since the F-value was not significant, no further analysis was necessary. This analysis was reported in Table 11. $Ho_{5:0}$ was not rejected.

Hypothesis #6 concerned the pronunciability of phonograms when subjects are grouped according to grade and gender. The sum of scores, means, and standard deviations of the phonogram test scores used in the statistical comparisons are presented in Table 17.

Means calculated for the groups were 54.67 and 51.56 for male and female first graders, 68.69 and 65.07 for male

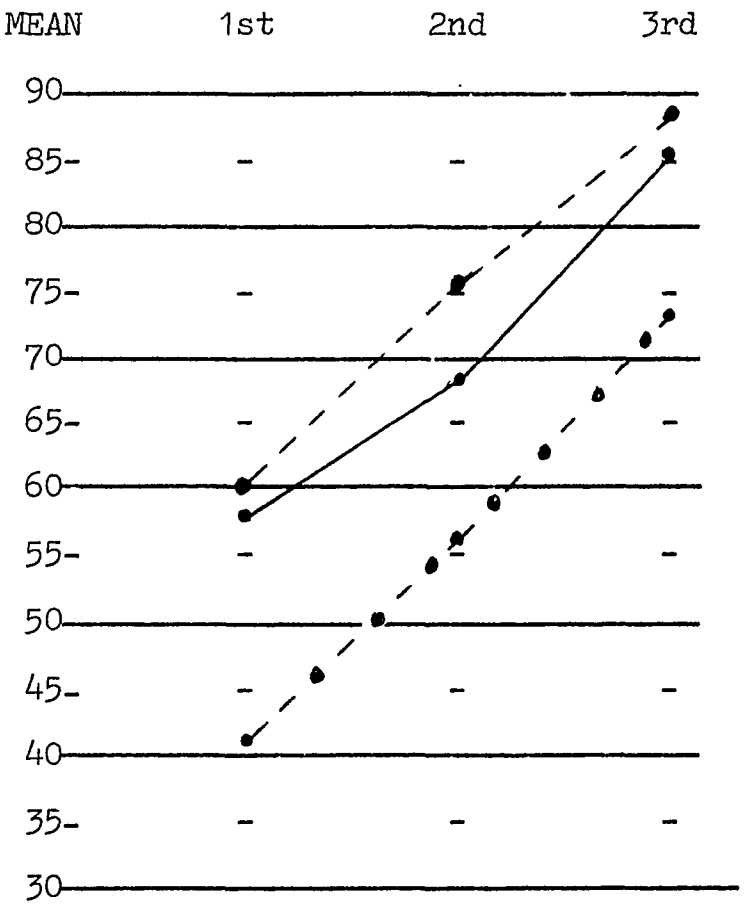

Fig. 1 -- INTERACTION RxG -- SUBJECTS GROUPED BY GRADE LEVEL AND READING ABILITY

and female second graders, and 81.64 and 82.93 for male and female third graders. The order of achievement from high to low mean scores was female 3rd > male 3rd > male 2nd > female 2nd > male 1st > female 1st.

TABLE 17

SUM OF SCORES, MEANS AND STANDARD DEVIATIONS OF PHONOGRAM TEST SCORES WHEN SUBJECTS ARE GROUPED BY GENDER AND GRADE

First Graders (N = 90)	Second Graders (N = 90)	Third Graders (N = 90)
Males	Males	Males
N = 45	N = 45	N = 45
Sum X = 2,460	Sum X = 3,091	Sum X = 3,674
$\overline{X}$ = 54.67	$\overline{X}$ = 68.69	$\overline{X}$ = 81.64
s = 19.28	s = 19.68	s = 13.98
Females	Females	Females
N = 45	N = 45	N = 45
Sum X = 2,320	Sum X = 2,928	Sum X = 3,732
$\overline{X}$ = 51.56	$\overline{X}$ = 65.07	$\overline{X}$ = 82.93
s = 21.75	s = 20.42	s = 18.76

A Factorial ANOVA was computed to test the null hypothesis of no significant interaction to determine whether the observed differences among the six group means were significant. An F-value less than 1 (df = 2/252) was obtained which failed to reach the criterion for significance at the .05 level (3.04; df = 2/252). Figure 2 indicates probably no interaction effects existed among the group means and, therefore, no change in group mean relationsips occured when subjects were grouped by grade and gender. Since the F-value was not significant, no further analysis was necessary. This analysis was reported in Table 11. $Ho_{6:0}$ was not rejected.

Hypothesis #7 concerned the pronunciability of phonograms when subjects were grouped according to reading ability

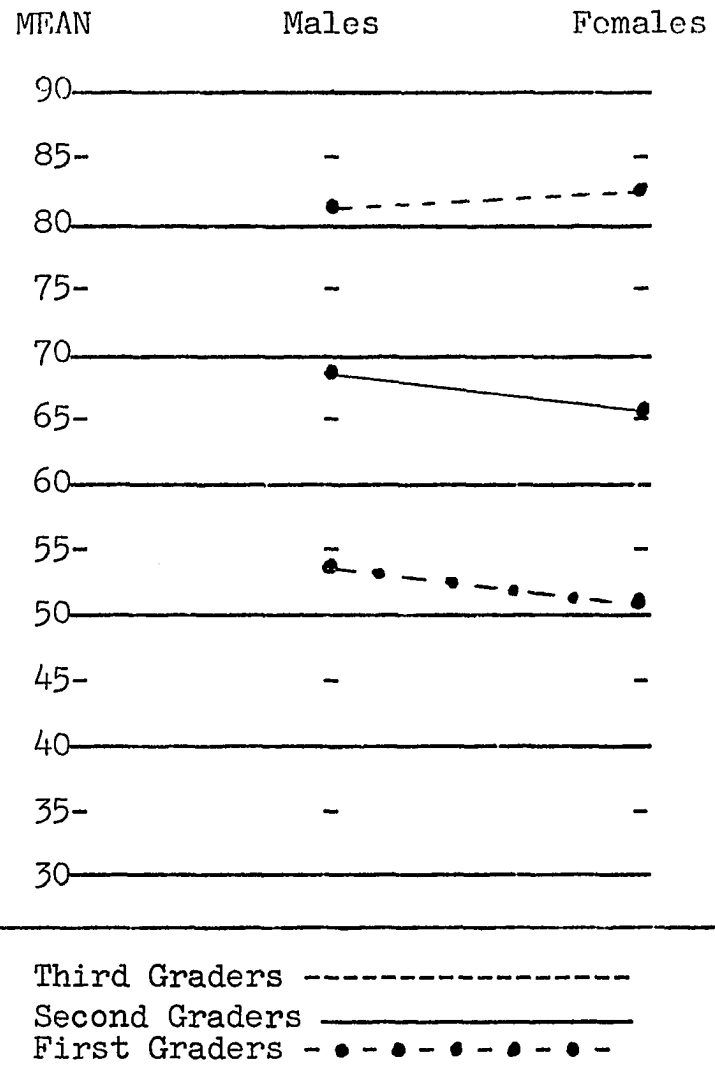

Fig. 2 --INTERACTION GxS -- SUBJECTS GROUPED BY GRADE LEVEL AND GENDER

and grade level. The sum of scores, means, and standard deviations of the phonogram scores used in the statistical comparisons are presented in Table 18. Means calculated for the groups were 57.98, 71.42, and 75.60 for the below average, average, and above average male readers, and 55.51, 69.53, and 74.51 for the below average, average, and above average

females. The order of achievement from high to low mean scores was above average males > above average females > average males > average females > below average males > below average females.

TABLE 18

SUM OF SCORES, MEANS, AND STANDARD DEVIATIONS OF PHONOGRAM TEST SCORES FOR SUBJECTS GROUPED ACCORDING TO READING ABILITY AND GENDER

Below Average Readers (N=90)	Average Readers (N=90)	Above Average Readers (N=90)
Males N = 45 Sum X = 2,609 $\bar{X}$ = 57.98 s = 20.70	Males N = 45 Sum X = 3,214 $\bar{X}$ = 71.42 s = 20.45	Males N = 45 Sum X = 3,402 $\bar{X}$ = 75.60 s = 17.39
Females N = 45 Sum X = 2,498 $\bar{X}$ = 55.51 s = 24.19	Females N = 45 Sum X = 3,129 $\bar{X}$ = 69.53 s = 23.94	Females N = 45 Sum X = 3,353 $\bar{X}$ = 74.51 s = 19.61

A Factorial ANOVA was computed to test the null hypothesis of no significant interaction to determine if the observed differences among the six group means were significant. An F-value less than 1 (df = 2/252) was obtained which failed to reach the criterion for significance at the .05 level (3.04; df = 2/252). Therefore the $Ho_{7:0}$, which predicted no significant interaction among mean phonogram test scores when subjects are grouped according to reading ability

and gender, was not rejected. As Figure 3 indicates, probably no interaction effects existed among the group means and, therefore, no change in group mean relationships occured when subjects were grouped by reading ability and gender. Since the F-value was not significant, no further analysis was necessary. This analysis was reported in Table 11.

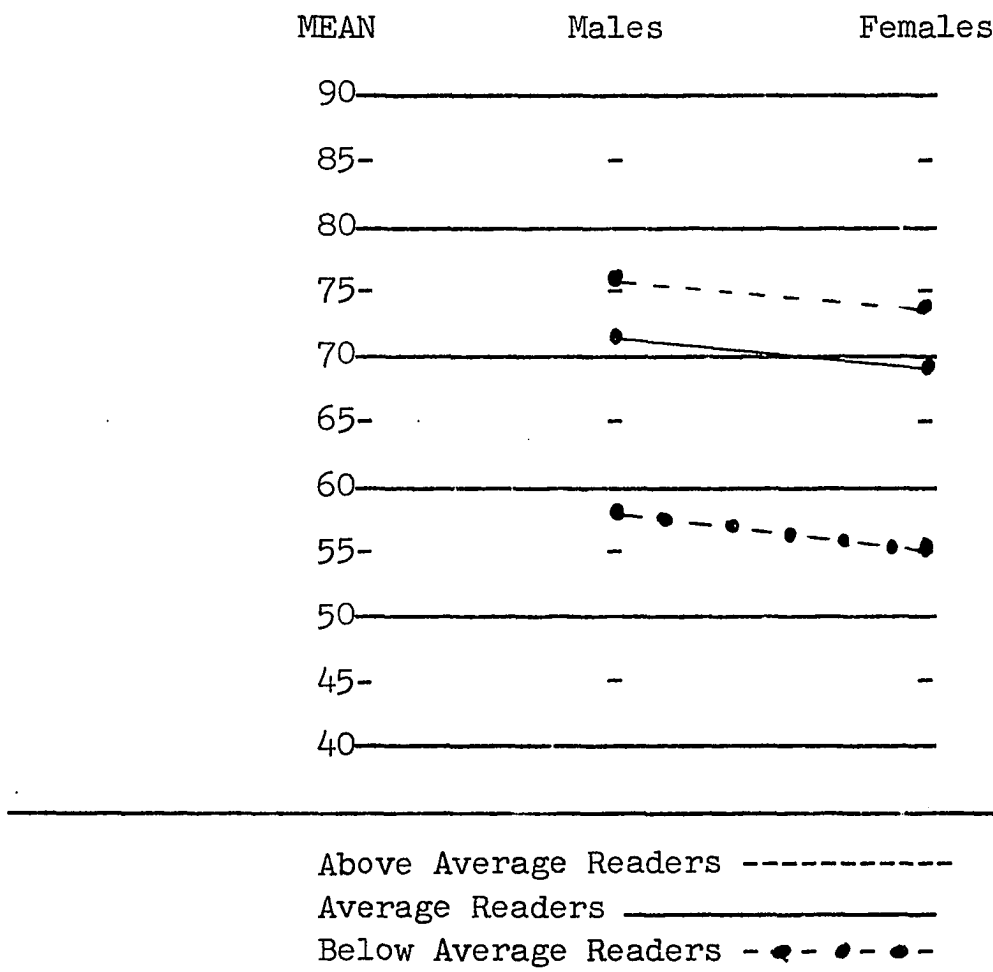

Fig. 3 --INTERACTION RxS -- SUBJECTS GROUPED BY READING ABILITY AND GENDER

Hypothesis #8 concerned the pronunciability of phonograms when subjects were grouped according to grade, gender, and reading ability. The sum of scores, means, and standard deviations of the phonogram test scores used in the statistical comparisons are presented in Table 19. Means calculated for the groups were as follows: 40.07, 62.87, and 61.07 for below average, average, and above average first grade males; 42.07, 53.13, and 59.47 for below average, average, and above average first grade females; 59.73, 65.93, and 80.40 for below average, average, and above average second grade males; 52.40, 70.47, and 72.33 for below average, average, and above average second grade females; 74.13, 85.47, and 85.33 for below average, average, and above average third grade males; and 72.06, 85.0, and 91.73 for below average, average, and above average third grade females. The order of achievement from high to low mean scores was 3rd AAF > 3rd AM > 3rd AAM > 3rd AF > 2nd AAM > 3rd BAM > 2nd AAF > 3rd BAF > 2nd AF > 2nd AM > 1st AM > 1st AAM > 2nd BAM > 1st AAM > 1st AF > 2nd BAF > 1st BAF > 1st BAM.

A Factorial ANOVA was computed to test the null hypothesis of no significant interaction to determine if the observed differences among the eighteen group means were significant. An F-value of 1.233 (df = 4/252) was obtained which failed to reach the criterion for significance at the .05 level (2.41; df = 4/252). Therefore the $Ho_{8:0}$, which predicted no significant interaction among mean phonogram test scores when subjects are grouped according to grade, gender,

TABLE 19

SUM OF SCORES, MEANS, AND STANDARD DEVIATIONS OF PHONOGRAM TEST SCORES FOR PUPILS GROUPED ACCORDING TO GRADE LEVEL, READING ABILITY, AND GENDER

	First Graders G1 N=90		Second Graders G2 N=90		Third Graders G3 N=90		
	Males S1	Females S2	Males S1	Females S2	Males S1	Females S2	
Below Ave Readers R1 N=90	ΣX= 601 $\bar{X}$= 40.07 s= 15.88	ΣX= 631 $\bar{X}$= 42.07 s= 18.34	ΣX= 896 $\bar{X}$= 59.73 s= 15.26	ΣX= 786 $\bar{X}$= 52.40 s= 21.35	ΣX= 1112 $\bar{X}$= 74.13 s= 14.66	ΣX= 1081 $\bar{X}$= 72.06 s= 22.33	ΣX= 5107 $\bar{X}$= 56.75 s= 22.54
Average Readers R2 N=90	ΣX= 943 $\bar{X}$= 62.87 s= 12.81	ΣX= 797 $\bar{X}$= 53.13 S= 25.47	ΣX= 989 $\bar{X}$= 65.93 s= 25.04	ΣX= 1057 $\bar{X}$= 70.47 s= 19.36	ΣX= 1282 $\bar{X}$= 85.47 s= 12.78	ΣX= 1275 $\bar{X}$= 85.00 s= 13.66	ΣX= 6343 $\bar{X}$= 70.48 s= 22.29
Above Ave Readers R3 N=90	ΣX= 916 $\bar{X}$= 61.07 s= 19.42	ΣX= 892 $\bar{X}$= 59.47 s= 16.68	ΣX= 1206 $\bar{X}$= 80.40 s= 8.79	ΣX= 1085 $\bar{X}$= 72.33 s= 13.32	ΣX= 1280 $\bar{X}$= 85.33 s= 11.10	ΣX= 1376 $\bar{X}$= 91.73 s= 13.05	ΣX= 6755 $\bar{X}$= 75.06 s= 18.54
	N= 90 ΣX= 4780 $\bar{X}$= 53.11 s= 20.61		N= 90 ΣX= 6019 $\bar{X}$= 66.88 s= 20.13		N= 90 ΣX= 7406 $\bar{X}$= 82.29 s= 16.55		
	Males N= 135 ΣX= 9225 $\bar{X}$= 68.33 s= 20.46			Females N= 135 ΣX= 8980 $\bar{X}$= 66.52 s= 24.06			

and reading ability, was not rejected. As Figure 4 indicates, probably no significant interaction effects existed among the group means and, therefore, no change in group mean relationships occured when subjects were grouped by reading ability, grade level, and gender except for the average first grade male reader group which scored higher than average first grade readers, above average first grade male readers, and the above average first grade female readers. Since the F-value was not significant, no further analysis was necessary. This analysis was reported in Table 11, page 100.

Hypothesis #9 concerned the pronunciability of two-letter, three-letter, and four-letter phonograms when subjects are grouped according to grade, gender, and reading ability. To test this hypothesis it was necessary to determine the correct number of responses for the 37 two-letter phonograms (digrams), 65 three-letter phonograms (trigrams), and 17 four-letter phonograms (quadragrams) for each subject and to compute mean scores of digrams, trigrams, and quadragrams for each of the eighteen groups in the study. Because the data cards had a "1" for correct responses and a "2" for incorrect responses, a program was written to convert total correct responses for each type of phonogram to mean scores for each subject. The possible range of mean scores was from 1.0 where all responses were correct to 2.0 where all responses were incorrect.

Mean scores for the three levels of the dependent variable (digrams, trigrams, and quadragrams) were compared

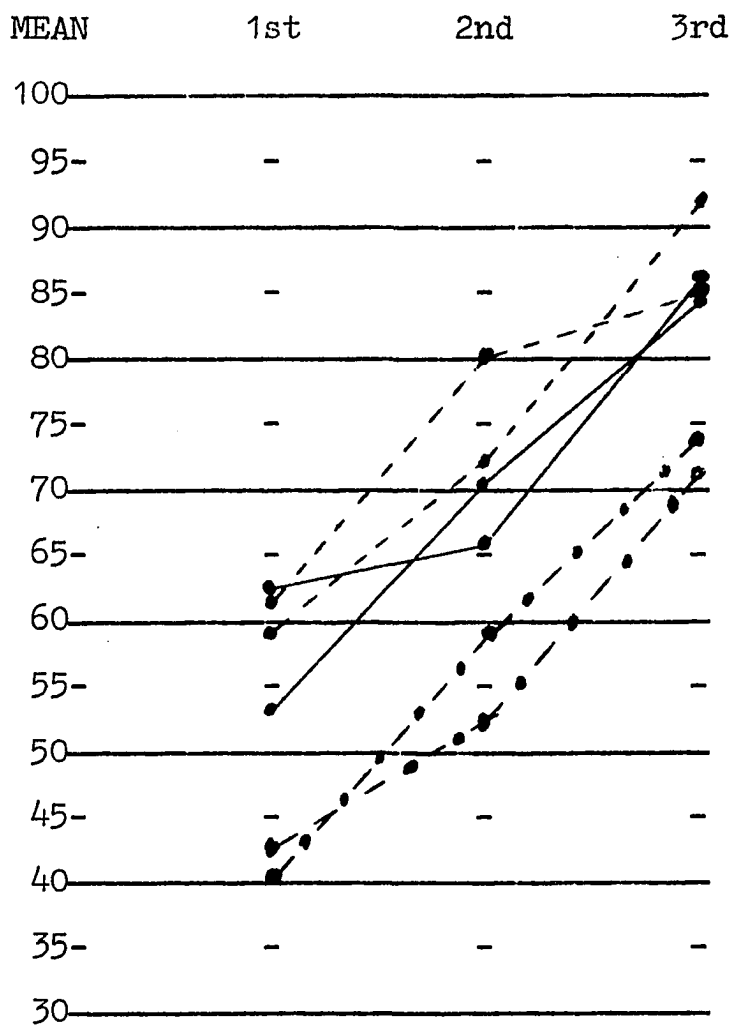

Fig. 4 --INTERACTION RxGxS -- SUBJECTS GROUPED BY READING ABILITY, GRADE LEVEL, AND GENDER

with the three independent variables of grade, reading ability, and gender for all eighteen groups. The type of statistic necessary to compute an analysis to test differences was a repeated measures analysis of variance. This was accomplished

with the data cards and the BMD08V Biomedical computer program.The mean digram, trigram, and quadragram scores for each of the eighteen groups was calculated in order to be used in the statistical comparison and are presented in Table 20.

A Repeated Measures ANOVA was computed to test the null hypothesis of no significant difference to determine if the observed differences among the fifty-four group means were significant. An F-value pf 1.556 (df = 8/504) was obtained which failed to reach the criterion for significance at the .05 level (1.96; df = 8/504). Therefore, the $Ho_{9:0}$, which predicted no significant interaction among mean two-letter, three-letter, and four-letter phonogram test scores when subjects are grouped according to grade, reading ability, and gender, was not rejected. Since the F-value was not significant, no further analysis was necessary. This analysis was reported in Table 21.

Further evaluation of Table 21 indicates that, although the factors of grade, reading ability, gender, and phonograms did not produce significant interaction when mean scores were compared, other significant effects did occur. The Repeated Measures ANOVA calculation identified the three levels of phonograms as having significant differences in mean scores. The obtained F-value was 633.0 (df = 2/504) which exceeded the criterion for significance at the .01 level (4.66; df = 2/504). Therefore, difference among mean two-letter, three-letter, and four-letter phonogram test

TABLE 20

MEAN DIGRAM, TRIGRAM, AND QUADRAGRAM TEST SCORES FOR SUBJECTS GROUPED ACCORDING TO GRADE, GENDER, AND READING ABILITY

		First Grade (N = 90)		Second Grade (N = 90)		Third Grade (N = 90)		Totals (N=270)
		M1	F2	M1	F2	M1	F2	M&F
Below Average Readers	D	1.510	1.476	1.387	1.436	1.295	1.322	1.404
	T	1.683	1.680	1.505	1.578	1.391	1.413	1.710
	Q	1.922	1.890	1.714	1.757	1.502	1.478	1.710
Average Readers	D	1.303	1.443	1.317	1.301	1.265	1.209	1.413
	T	1.488	1.563	1.466	1.413	1.253	1.297	1.413
	Q	1.776	1.757	1.651	1.620	1.428	1.408	1.607
Above Average Readers	D	1.375	1.353	1.252	1.308	1.257	1.214	1.293
	T	1.488	1.516	1.316	1.383	1.273	1.218	1.366
	Q	1.725	1.761	1.514	1.612	1.376	1.309	1.548
Totals	D	1.396	1.424	1.319	1.348	1.272	1.248	1.335
	T	1.553	1.586	1.429	1.458	1.306	1.310	1.440
	Q	1.808	1.803	1.626	1.663	1.435	1.396	1.622

scores were significantly different.

Since the resulting F-value was significant, it was necessary to compare mean two-letter, three-letter, and four-letter phonogram test scores in order to determine which means differed significantly from the others. The Scheffe method of multiple comparisons, the S-method, was used to compare mean digram, trigram, and quadragram scores. Results of the comparisons are reported in Table 22.

TABLE 21

SUMMARY OF REPEATED MEASURES ANALYSIS OF VARIANCE, COMPARING MEAN TWO-LETTER, THREE-LETTER, AND FOUR-LETTER PHONOGRAM TEST SCORES AMONG GENDER, GRADE, AND READING LEVEL FOR 270 SUBJECTS

Source of Variation	df	Sum of Squares	Mean Square	F	p
Gender (S)	1	.021	.021	.021*	
Grade (G)	2	9.653	4.826	81.826*	.01
Reading (R)	2	3.252	1.626	27.559*	.01
Gender/Grade	2	.097	.048	.808*	
Gender/Reading	2	.0015	.0007	.0117*	
Grade/Reading	4	.094	.0235	.392*	
Gender/Grade/Read	4	.285	.071	1.183*	
Error for People (S/G/R)	252	15.057	.060		
Phonograms (P)	2	11.394	5.697	633.0**	.01
P/Gender	2	.0217	.0109	1.211**	
P/Grade	4	1.345	.336	37.333**	.01
P/Reading	4	.120	.030	3.336**	.05
P/Gender/Grade	4	.0198	.0049	.5444**	
P/Gender/Reading	4	.0299	.0075	.833**	
P/Grade/Reading	8	.0339	.0042	.4667**	
P/S/G/R	8	.114	.014	1.556**	
Error for People/ Phonograms/S/G/R	504	4.514	.009		
TOTAL	809	46.8988			

* F (df= 1/252) = 3.89 at .05 ; 6.76 at .01
(df= 2/252) = 3.04 at .05 ; 4.71 at .01
(df= 4/252) = 2.41 at .05 ; 3.41 at .01

**F (df= 2/504) = 3.01 at .05 ; 4.66 at .01
(df= 4/504) = 2.39 at .05 ; 3.36 at .01
(df= 8/504) = 1.96 at .05 ; 2.55 at .01

TABLE 22

COMPARISON OF MEAN DIGRAM, TRIGRAM, AND QUADRAGRAM SCORES OF 270 SUBJECTS

Comparisons	Means	D	S	p
Digrams	1.335	172.86	6.04	< .05
Trigrams	1.440			
Digrams	1.335	1,201.43	6.04	< .05
Quadragrams	1.622			
Trigrams	1.440	462.86	6.04	< .05
Quadragrams	1.622			

The comparison of means between digrams and trigrams indicate a significant difference (D = 172.86; S = 6.04). Differences between digram and quadragram means were also significant (D = 1,201.43; S = 6.04), as were the differences between the trigrams and quadragrams (D = 462.86; S = 6.04). Without the consideration for the independent variables of grade, reading ability, and gender, the statistical analysis has indicated that highly significant differences existed among mean digram, trigram, and quadragram scores.

A second statistical difference was found with the interaction of grade levels and the three types of phonograms. Mean scores of first, second, and third grade digrams, trigrams,

and quadragrams are presented in Table 23.

TABLE 23

MEAN DIGRAM, TRIGRAM, AND QUADRAGRAM TEST SCORES FOR SUBJECTS GROUPED ACCORDING TO GRADE LEVEL

	First Graders (N=90)	Second Graders (N=90)	Third Graders (N=90)	Totals N = 270
Digrams	1.410	1.333	1.260	1.335
Trigrams	1.570	1.443	1.308	1.440
Quadragrams	1.805	1.644	1.416	1.622
Totals	1.595	1.474	1.328	1.465

The order of achievement ranged from digrams for third graders, 1.260, to a low score of 1.805 for quadragrams at the first grade level. The Repeated Measures ANOVA obtained an F-value of 37.333 (df = 4/504) which exceeded the criterion for significance at the .01 level (3.36; df = 4/504). Therefore, the observed relationship among the mean digram, trigram, and quadragram scores for the three grade levels were significantly changed by the multiple factor grouping. The mean scores for digrams, trigrams, and quadragrams were significantly different when they were arranged according to grade level. The results of this analysis were reported in Table 21.

Since the resulting F-value was significant, the

Scheffe tests were computed to compare mean digram, trigram, and quadragram scores when arranged by grade level to determine which groups differed from the others. The results of the comparison are presented in Table 24.

Among mean comparisons within the first grade, the difference between digram and trigram means was not sigficant (D = 12.8; S = 19.12). However, there were significant differences between digram and quadragram means (D = 80.0; S = 19.12) and between trigram and quadragram means (D = 28.8; S = 19.12). At the second grade level the same pattern was computed. While no significant difference occurred between digram and trigram means (D = 6.05; S = 19.12), significant differences did occur between digram and quadragram means (D = 48.05; S = 19.12) and between trigrams and quadragrams (D = 20.0; S = 19.12). At the third grade level no significant differences existed between digram and trigram means (D = 1.25), digram and quadragram means (D = 12.8), and between trigram and quadragram means (D = 6.05) when the criterion level for significance was .05 (S = 19.12).

When comparing the pronunciability of digrams among first, second, and third graders, there were no significant differences in mean scores between first and second grade means (D = 3.2), first and third grade means (D = 11.25), or second and third grade means (D = 2.45) at the .05 level of significance (S = 19.12). The comparison of trigram mean scores among first, second, and third grade groups indicated no significant differences between first and second grade

TABLE 24

COMPARISON OF SCALED MEANS OF PHONOGRAM TEST SCORES FOR PUPILS GROUPED ACCORDING TO GRADE LEVEL AND TYPE OF PHONOGRAM (DIGRAM, TRIGRAM, QUADRAGRAM)

	1st Grd Digram 1.410	1st Grd Trigram 1.570	1st Grd Quadgrm 1.805	2nd Grd Digram 1.333	2nd Grd Trigram 1.443	2nd Grd Quadgrm 1.644	3rd Grd Digram 1.260	3rd Grd Trigram 1.308	3rd Grd Quadgrm 1.416
1st Grade Digram 1.410	-----	12.8	* 80.0	3.2	-----	-----	11.25	-----	-----
1st Grade Trigram 1.570	-----	-----	* 28.8	-----	8.45	-----	-----	* 33.8	-----
1st Grade Quadgram 1.805	-----	-----	-----	-----	-----	* 50.17	-----	-----	* 76.05
2nd Grade Digram 1.333	-----	-----	-----	-----	6.05	* 48.05	2.45	-----	-----
2nd Grade Trigram 1.443	-----	-----	-----	-----	-----	* 20.0	-----	8.45	-----
2nd Grade Quadgram 1.644	-----	-----	-----	-----	-----	-----	-----	-----	* 24.2
3rd Grade Digram 1.260	-----	-----	-----	-----	-----	-----	-----	1.25	12.8
3rd Grade Trigram 1.308	-----	-----	-----	-----	-----	-----	-----	-----	6.05
3rd Grade Quadgram 1.416	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Exceeds critical level for significance (S = 19.12) at .05

means (D =8.450 and second and third grade means (D = 8.45). However, there was a significant difference between first and third grade means (D = 33.8) at the .05 level (S = 19.12). The comparison of quadragram mean scores among first, second, and third grade groups indicated significant differences between first and second grade quadragram means (D = 50.17), first and third grade quadragram means (D = 76.05), and second and third grade quadragram means (D = 24.2) at the .05 level (S = 19.12).

Figure 5 illustrates that, probably, some interaction effects existed among the group means. Because the lines approach non-parallel and the distances between means increase from digrams to quadragrams, the trends imply that, to a degree, pronunciability become more difficult between digrams and trigrams and between trigrams and quadragrams. While first graders experienced significant differences in their ability to pronounce digrams (1.41), trigrams (1.57), and quadragrams (1.80), the difference among mean scores for the third graders were considerably less than significant.

The final interaction which the Repeated Measures ANOVA identified as significant was the comparison of mean differences among reading ability and phonogram types. Table 25 presents the mean digram, trigram and quadragram scores grouped according to below average, average, and above average readers. The F-value calculated among these means was 3.336 (df = 4/504) which exceeded the criterion for significance at the .05 level (2.39; df = 4/504).

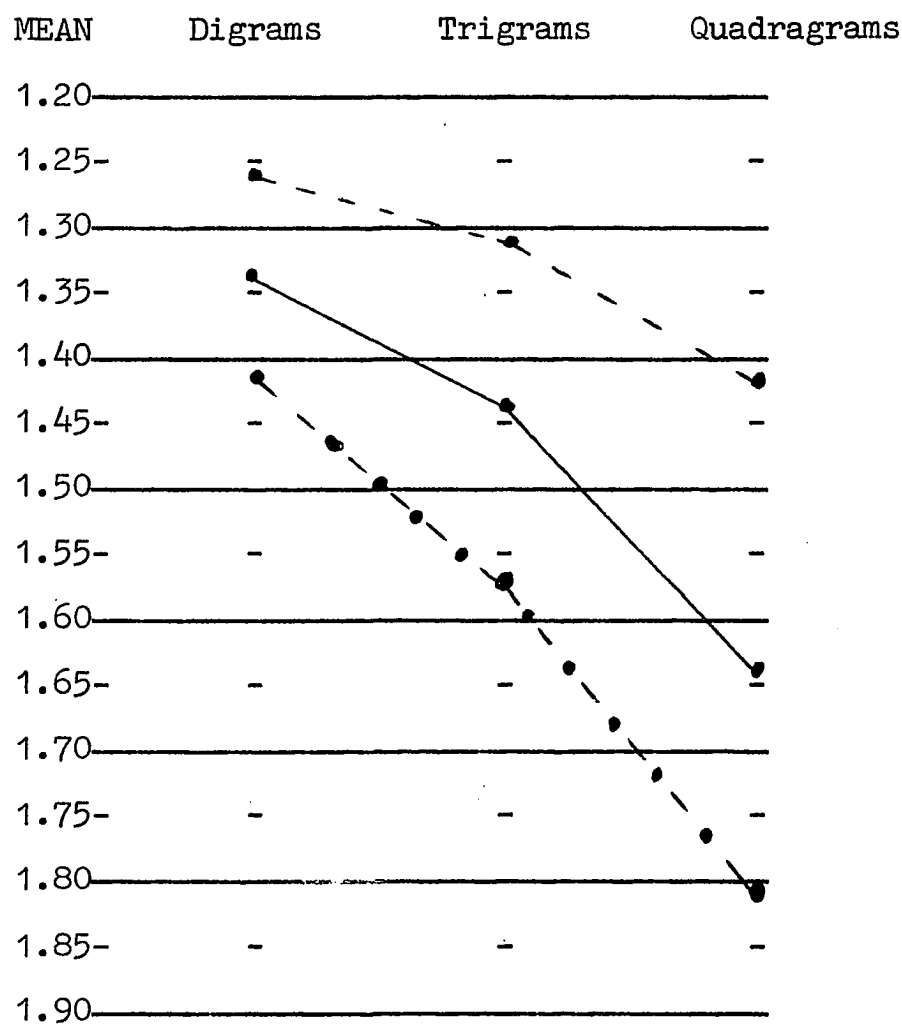

Fig. 5 -- INTERACTION PxG-- PHONOGRAMS GROUPED ACCORDING TO TYPE AND GRADE LEVEL

This analysis was reported in Table 21, page 118. Because the F-value was significant the conclusion is clear there are significant differences in the pronunciability of digrams, trigrams, and quadragrams when they are grouped according to

TABLE 25

MEAN DIGRAM, TRIGRAM, AND QUADRAGRAM TEST SCORES FOR SUBJECTS GROUPED ACCORDING TO READING ABILITY

Phonogram Type	Below Average Readers (N=90)	Average Readers (N=90)	Above Average Readers (N=90)	Totals (N=270)
Digrams	1.404	1.306	1.293	1.335
Trigrams	1.542	1.413	1.366	1.440
Quadragrams	1.710	1.607	1.548	1.622
Totals	1.552	1.442	1.402	1.466

grade level.

In order to determine which groups differed significantly from the others, the Scheffé tests were computed in order to compare digram, trigram, and quadragram means among below average, average, and above average readers. The results of these comparisons are presented in Table 26.

The comparison of phonogram types among below average readers indicated that significant differences did occur between mean scores for digrams and trigrams (D= 98.0), trigrams and quadragrams (D=480.5), and trigrams and quadragrams (D=144.5) at the .05 level of significance (S= 19.12). Among average readers significant differences occured in mean scores between digrams and trigrams (D=50.0), trigrams

TABLE 26

COMPARISON OF MEAN PHONOGRAM TEST SCORES FOR PUPILS GROUPED ACCORDING TO READING ABILITY AND TYPE OF PHONOGRAM (DIGRAM, TRIGRAM, QUADRAGRAM)

	Below A Digram 1.404	Below A Trigram 1.542	Below A Quadgm 1.710	Average Digram 1.306	Average Trigram 1.413	Average Quadgm 1.607	A Ave Digram 1.293	A Ave Trigram 1.366	A Ave Quadgm 1.548
Below A Digram 1.404	-----	* 98.0	* 480.5	* 40.5	-----	-----	* 60.5	-----	-----
Below A Trigram 1.542	-----	-----	* 144.5	-----	* 84.5	-----	-----	* 144.5	-----
Below A Quadgm 1.710	-----	-----	-----	-----	-----	* 50.0	-----	-----	* 128.0
Average Digram 1.306	-----	-----	-----	-----	* 50.0	* 450.0	2.0	-----	-----
Average Trigram 1.413	-----	-----	-----	-----	-----	* 200.0	-----	8.0	-----
Average Quadgm 1.607	-----	-----	-----	-----	-----	-----	-----	-----	18
Above A Digram 1.293	-----	-----	-----	-----	-----	-----	----	* 32.0	* 338.0
Above A Trigram 1.366	-----	-----	-----	-----	-----	-----	-----	-----	* 162.0
Above A Quadgm 1.548	-----	-----	-----	-----	-----	-----	-----	-----	-----

* Exceeds critical level for significance (S = 19.12) at .05

and quadragrams (D=200.0), and between digrams and quadragrams (D=450.0). Among above average readers differences among mean digram, trigram, and quadragram acores were significant between digrams and trigrams (D= 32.0), digrams and quadragrams (D= 338.0), and between trigrams and quadragrams (D=162.0). All comparisons were calculated at the .05 level of significance (S= 19.12).

The comparison of digrams among below average, average, and above average readers indicated that differences in mean scores were significant between below average and average digrams (D=40.5), below average and above average digrams (D=60.5),but not between average and above average digrams (D=2.0) at the .05 level of significance (S=19.12). Differences in mean trigram scores among readers indicated significance between below average and average trigrams (D=84.5), below average and above average trigrams (D=144.5), but not between average and above average trigrams (D=8.0) at the .05 level of significance (S= 19.12). Differences in mean quadragram scores among readers indicated that significant differences existed between below average and average quadragrams (D=50.0), below average and above average quadragrams (D=128.0), but not between average and above average quadragrams (D=18.0).

Figure 6 illustrates the fact that, probably, little interaction exists among means. While trigrams are more difficult to pronounce than digrams among below average, average, and above average readers and quadragrams are more

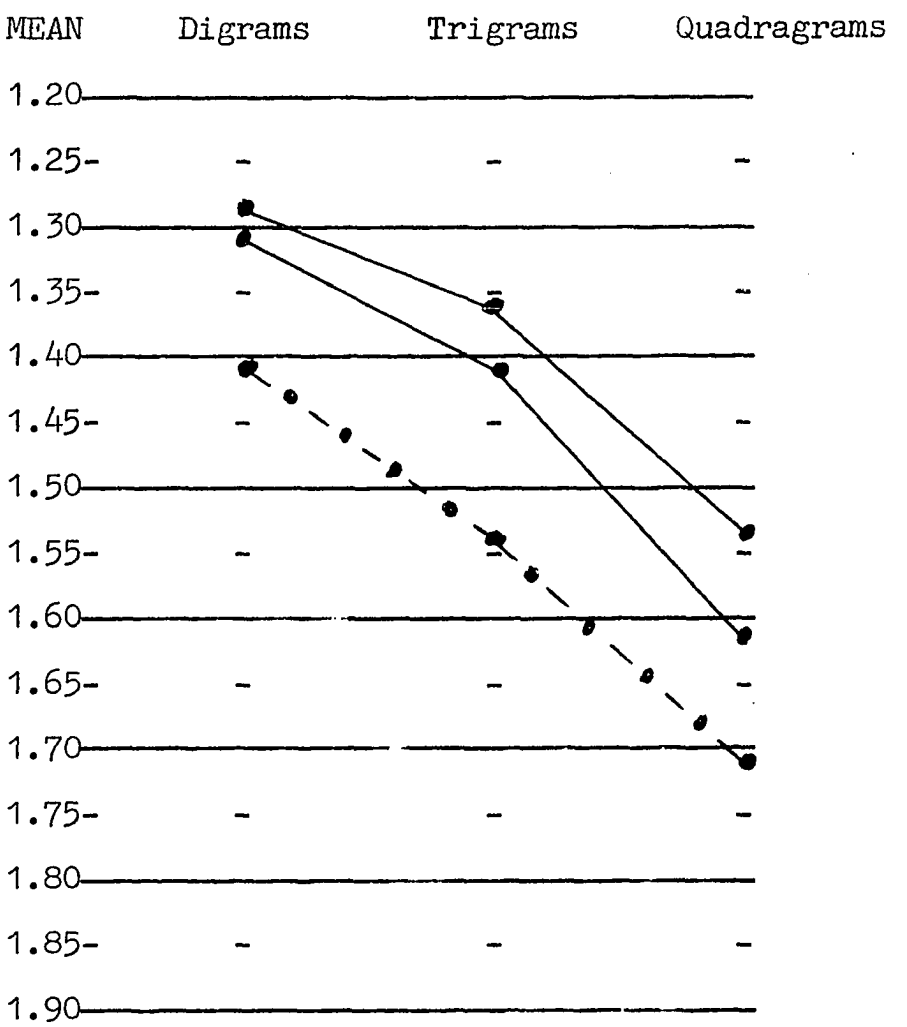

Fig. 6 --INTERACTION PxR --PHONOGRAMS GROUPED ACCORDING TO TYPE AND READING ABILITY

difficult to pronouce than trigrams among below average, average, and above average readers, the variability in the pronunciability of digrams, trigrams, and quadragrams decreases from below average to average and from average to above average readers.

SUMMARY OF FINDINGS

The first analysis necessitated establishing frequency counts, rank order of difficulties, and item difficulty rating on twenty-one groups and sub-groups of the study. The primary purpose for establishing rank orders was to test internal validity for the pupils in the study and to compare rank orders with the one established by Glass through teachers' opinion. Correlation coefficients were obtained by comparing rank orders between male and female groups within grades, male and females for the entire study, between reading ability groups, between the three grade levels, and between the total study group and the Glass rank order. Coefficients obtained were .86 or higher except when the study rank order was compared to Glass' rank order. This coefficient was .38 but still higher than the value needed (.25) for significance. Those particular phonograms having rank order differences of twenty-five points or more were illustrated.

The next major task was to analyze the mean number of correctly pronounced phonograms for each of the eighteen groups in the study and to make comparisons of these means by grouping the means in various combinations. Sum of scores, mean scores, and standard deviations were computed for each group compared. A Factorial Analysis of Variance (ANOVA) was computed to determine whether or not there were significant differences among the mean scores compared. When the obtained F-value exceeded the criterion value of signi-

ficance at or beyond .05, Scheffe tests were computed in order to determine which of the mean scores contributed significantly to the difference.

Results of these analyses indicated that mean differences in the phonogram test scores were significant when subjects were grouped according to grade level and according to reading ability. There was no significant difference in pronunciability when subjects were arranged by gender. The interaction effects between grade and gender, between grade and reading ability, between reading ability and gender and among grade, reading ability, and gender were not significant. The computation of the many analyses indicated clearly that grade level and reading ability had the primary effects on pronunciability of phonograms. Thus grade and reading ability determined to be significant predictors and/or discriminators of performance on the phonogram test.

The final analyses involved the comparison of mean digram, trigram, and quadragram scores when subjects were grouped according to reading ability, grade level, and gender. The BMD:08V Computer program and the data cards were utilized to compute a Repeated Measures ANOVA. Results of this analysis indicated there are significant differences in the pronunciability of digrams, trigrams, and quadragrams. The two factors which contributed significantly to this difference were grade levels and reading levels. Comparisons of gender upon phonograms were not significant. The interaction of gender and grade, gender and reading, grade and

reading, or gender, grade, and reading with the phonogram types were not significant.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

In 1972 Dr. Gerald Glass revived a long-used teaching method called "drill", identified 117 vowel phonograms and 2 consonant phonograms taken from primary basal readers, ranked these phonograms in order of difficulty according to a teachers' opinion survey, packaged the program and called it Glass Analysis for Perceptual Conditioning. A search of the literature indicated that the Glass-Method produced three published research studies on the Glass Method, two of which were performed by Glass.

This study investigated the 119 phonograms used by Glass and attempted to find out how an empirically-based rank order would compare to the teachers' opinion rank order and to determine to what extent grade level, reading ability and gender affected pronunciability of these 119 phonograms. A third purpose was to determine whether or not there were significant differences in the pronunciability of two-letter, three-letter, and four-letter phonograms; significant difference that Glass claimed would not exist.

The population for the study consisted of 390 first, second, and third graders from six elementary schools in

Moore, Oklahoma, School System, who qualified for the study from the testing of more than 1,300 pupils. From the 390 qualified students, 270 were randomly selected to fill eighteen groups, fifteen pupils per group. These groupings consisted of three grade levels (first, second, and third), three reading levels within each grade (below average, average, and above average), and two gender groups within each reading ability group (male and female).

Each of the 270 were tested individually with a phonogram test containing the 119 phonograms identified in the Glass Method. The phonograms were randomly arranged in the test and each student had five seconds per phonogram to pronounce it correctly and/or go to the next phonogram. Raw scores were tabulated based on the correct response to each phonogram. Correct responses were used to prepare rank order to difficulty lists. The total number of correct responses for each student were tabulated, mean scores were computed, and analysis of variance was computed between means to determine differences in pronunciability among various groups.

The analysis of the data resulted in the following findings:

1. There was a significant correlation between the rank order of difficulty for the 119 phonograms tested in the study and the rank order of difficulty for the same 119 phonograms established by Gerald Glass through teachers' opinions ($r = .38$; $df = 269$; $p < .01$).

2. There were significant differences in mean phonogram test scores when subjects were grouped according to grade level ($F = 60.104$; $df = 2/252$; $p < .01$).

3. There were significant differences in mean phonogram test scores when subjects were grouped according to reading ability ($F = 25.627$; $df = 2/252$; $p < .01$).

4. There was no significant difference in mean phonogram test scores when subjects were grouped according to gender ($F = < 1$; $df = 1/252$; $p > .05$).

5. There was no significant interaction among mean phonogram test scores when subjects were grouped according to grade and reading ability ($F = < 1$; $df = 4/252$; $p > .05$).

6. There was no significant interaction among mean phonogram test scores when subjects were grouped according to grade level and gender ($F = < 1$; $df = 2/252$; $p > .05$).

7. There was no significant interaction among mean phonograms test scores when subjects were grouped according to reading ability and gender ($F = < 1$; $df = 2/252$; $p > .05$).

8. There was no significant interaction among mean phonogram test scores when subjects were grouped according to grade level, reading ability, and gender ($F = 1.233$; $df = 4/252$; $p > .05$).

9. There were significant differences among phonogram test scores when grouped according to digram, trigram, and quadragram ($F = 633.0$; $df = 2/504$; $p < .01$).

10. There were significant differences among phonogram test scores when grouped according to phonogram type

and grade level ($F = 37.333$; $df = 4/504$; $p < .01$).

11. There were significant differences among phonogram test scores when grouped according to type of phonogram and reading ability ($F = 3.336$; $df = 4/504$; $p < .05$).

12. There was no significant difference among phonogram test scores when grouped by type of phonogram and gender ($F = 1.211$; $df = 2/504$; $p > .05$).

13. There was no significant difference in mean phonogram test scores when grouped according to type of phonogram, gender, and grade ($F < 1$; $df = 4/504$; $p > .05$).

14. There was no significant difference in mean phonogram test scores when grouped according to type of phonogram, gender, and reading ability ($F < 1$; $df = 4/504$; $p > .05$).

15. There was no significant difference among mean phonogram test scores when grouped according to type of phonogram, grade level, and reading ability ($F < 1$; $df = 8/504$; $p > .05$).

16. There was no significant difference among mean phonogram test scores when grouped according to type of phonogram, grade level, reading ability, and gender. ($F = 1.556$; $df = 8/504$; $p > .05$).

Conclusions

The following conclusions were made as a result of the analysis of the data obtained in the study:

1. While the correlation coefficients obtained

between the empirical rank order of difficulty and the Glass rank order was high enough to be significant, it is clear that many discrepancies exist between the rank orders raising questions concerning the validity of the rank order established by Glass. Some of the questions include:

A. Are teachers' opinions of the phonogram rank order reliable enough to base a teaching sequence for poor decoding students?

B. Is difficulty which is based on pronunciability (such as the study) the same as difficulty which is based on "learnability" (teachers' opinions)?

C. Will changing the sequence of difficulty to conform with the results of the study effect the learning rate and/or the relevance of the teaching order?

2. There are significant differences in pronunciability of phonograms between first, second, and third graders.

3. While there are significant differences in the pronunciability of phonograms between below average and average readers and between below average and above average readers, there is no significant difference in pronunciability between average and above average readers.

4. No significant difference was achieved in pronunciability between males and females. No difference was found between males and females within each of the grade levels and for the total study.

5. There appears to be a reduction in pronunciability between the above average readers of one grade and the below average readers of the next higher grade. There are, apparently, variables that were not controlled for in this study which caused below average readers in each grade level to drop in mean test scores even though the below average group read higher, according to the oral reading test used in the study. Perhaps, the relationship that rank and status have on the performance of an individual should be investigated more thoroughly.

6. The largest gains in mean test scores within each grade level always occurred between the below average and the average reading groups. At the first and third grade levels very little increase occurred between the average and above average reading groups.

7. Eighteen percent of the phonograms were difficult to pronounce at the above average third grade level, using an item difficulty rating of 50 or less as the criterion for considering a phonogram difficult. Twenty-two phonograms in the above average third grade list had item difficulty ratings of 50 or less. Since the phonogram were supposedly taken from primary basal readers, the research would indicate that about eighteen percent of phonograms encountered by above average third grade readers will be difficult to pronounce.

8. There are significant differences in the pronunciability of two-letter, three-letter, and four-letter

phonograms. The effects of grade levels and reading ability were the only two variables which contributed significantly to the differences. While these significant differences were evident with all three grade levels, there were indications that third graders had less difficulty making distinctions between digrams, trigrams, and quadragrams, than did second or first graders.

9. While the study did not investigate the pronunciability of single-letter phonograms, there are some clear implications the claim made by Glass that three- and four-letter phonograms are as easily recognized and pronounced as single-letter phonograms is not empirically founded and does not exist among first, second, and third grade children. Although this may be true among the adult population, further research would be needed to verify this assumption.

Recommendations

The following recommendations are offered on the basis of this study:

1. There appears to be some justification for making adjustments to the rank order of difficulty for the 119 phonograms. Since fifty-nine phonograms tested showed rank order differences of fifty points or more, a new rank order of difficulty could be established reflecting the results of empirical research. A suggested list of phonograms, Table 27, is divided into ten categories. The first

nine correspond to the reading levels within the study. Each list contains the phonograms, ranked in order of difficulty, which received an Item Difficulty Score of 75 or more. The criterion of 75 is to insure that all phonograms are within an instructional learning capability. List #10, Appendix A, contains all of the phonograms which did not fall within the Item Difficulty range of 75 - 100. Each List contains words which were mastered by pupils reading within the range identified on the list. Each list assumes that previous lists are prerequisite learning experiences.

2. Because eighteen percent of the phonograms were rated lower than 50 (item difficulty) with the above average third grade readers, it is recommended that the study, if replicated, include subjects at the intermediate level.

3. Further investigations should include a closer look at performance discrepancies between below average second and third grade readers; and above average first and second grade readers in an attempt to determine the reasons that above average students in the second grade who are reading between grade levels 2.7 and 2.9, perform better on a phonogram test than below average third grader who is reading between grade levels 3.0 and 3.3.

4. Future investigation should attempt to control for additional variables such as intelligence, actual performance in the classroom, and the level of the basal reader being used by the student at the time of the investigation.

5. The differences in pronunciability between real words which are often found within larger words and nonsense but pronounceable phonograms which are found with a high degree of frequency within words needs further investigation.

6. The list of phonograms chosen by Glass needs further investigation. An important question concerning the validity and relevance of the particular phonograms chosen should be opened for further research.

7. The identification of "important" phonograms in primary basal readers should receive additional investigation. With the many actively used basal reading systems, research into the frequency of appearance for phonograms across several basal readers might aid in the development of a universally useful set of phonograms having relevance to all major basal systems or other reading systems.

TABLE 27

ONE HUNDRED AND NINETEEN PHONOGRAMS RANKED IN ORDER OF DIFFICULTY WITHIN GRADE AND READING LEVELS BASED ON FIELD TESTING. CRITERION FOR INCLUDING PHONOGRAMS WITHIN EACH LIST IS AN ITEM DIFFICULTY INDEX OF 75 OR MORE.

List #1 Reading Level 1.0 - 1.3		List #2 Reading Level 1.4 - 1.6		List #3 Reading Level 1.7 - 1.9		List #4 Reading Level 2.0 - 2.3	
Phono-gram	Item Diff	Phono-gram	Item Diff	Phono-gram	Item Diff	Phono-gram	Item Diff
on	97	on	100	ee	100	on	100
and	97	and	100	too	100	and	100
too	97	it	100	it	100	too	100
it	97	up	98	up	100	it	100
up	93	too	97	in	100	up	100
in	87	at	97	on	97	at	100
at	83	in	97	and	97	out	97
all	77	us	90	out	97	in	97
		all	87	at	97	all	93
		ip	83	us	97	old	90
		ee	83	un	87	en	90
		old	80	all	87	us	87
		un	80	ip	80	or	83
		out	77	iff	77	cook	83
				or	77	un	80
				old	77	ing	80
				en	77	an	80
				an	77	ip	77
						iff	77
						ice	77

TABLE 27 - Continued

List #5 Reading Level 2.4 - 2.6		List #6 Reading Level 2.7 - 2.9		List#6 (Cont)		List #7 Reading Level 3.0 - 3.3	
Phono-gram	Item Diff	Phono-gram	Item Diff	Phono-gram	Item Diff	Phono-gram	Item Diff
on	100	on	100	uff	87	on	100
and	100	and	100	cook	83	and	100
too	100	old	100	fire	83	cook	100
at	100	too	100	most	83	too	100
in	100	it	100	air	80	it	100
or	97	all	100	ape	80	out	100
it	97	at	100	am	80	up	100
out	97	in	100	oke	80	in	100
up	97	or	97	ave	77	old	97
old	93	ee	97	em	77	all	97
all	93	up	97	ush	77	at	97
ee	90	ice	97	ick	77	owl	93
us	90	ing	97	ast	77	fire	93
ing	87	saw	97			ice	93
cook	83	out	93			us	93
ay	83	an	93			saw	93
ish	83	iff	90			an	93
ip	80	en	90			most	93
ate	80	tea	90			um	90
iff	80	eat	90			air	90
eat	80	um	87			ee	90
un	80	ip	87			en	90
ice	80	ate	87			eat	87
saw	80	owl	87			ing	87
an	80	ink	87			am	87
owl	74	ish	87			or	83
ink	77	un	87			ank	83
ast	77	us	87			tone	83
am	77	ash	87			ink	80
						em	80

TABLE 27 - Continued

List #7 (Continued)	
Phono-grams	Item Diff
ut	80
ash	80
ug	77
age	77
ish	77
un	77
ull	77

List #8 Reading Level 3.4 - 3.6	
Phono-gram	Item Diff
on	100
cook	100
old	100
too	100
un	100
out	100
up	100
at	100
saw	100
in	100
air	97
and	97
eat	97
all	97
ice	97
ate	93
ee	93
en	93
fire	93
it	93
ing	93
an	93
most	93
ash	93
um	90
ape	90
ug	90
tea	90
able	87
owl	87
or	87

List #8 (Continued)	
Phono-gram	Item Diff
ank	87
em	87
ear	87
tone	87
care	87
us	87
ip	83
ame	83
ent	83
ast	83
ish	83
iff	83
ink	80
fur	80
age	80
ub	80
uff	80
oat	80
op	77
ev	77
ap	77
ay	77
ore	77
ong	77
ut	77
oke	77

List #9 Reading Level 3.7 - 3.9	
Phono-gram	Item Diff
ate	100
and	100
cook	100
ee	100
tea	100
too	100
it	100
an	100
up	100
all	100
at	100
ing	100
saw	100
in	100
most	100
on	97
owl	97
old	97
eat	97
care	97
out	97
ice	97
an	97
air	93
ame	93
or	93
en	93
fire	93
ink	93
em	93
ent	93

TABLE 27 - Continued

List #9 (Continued)		List 10 Reading Level 4.0 & Above		List #10 (Continued)	
Phono-gram	Item Diff	Phono-gram	Item Diff	Phono-gram	Item Diff
us	93	ot	73	om	60
um	90	few	73	boil	60
tone	90	ad	73	ade	57
am	90	uff	73	eck	57
oke	90	ub	70	ind	57
ash	90	ove	70	ob	57
ight	87	ull	70	ell	57
ank	87	ore	67	est	53
ap	87	ang	67	tow	53
act	87	eam	67	ite	53
ear	87	ong	67	ale	53
ush	87	tass	67	ab	53
ish	87	ut	67	cue	53
ound	83	ag	67	ace	50
able	83	ud	63	ane	50
ip	83	ide	63	et	50
ake	83	tar	63	affy	47
iff	83	ave	63	al	47
ug	83	oss	63	oll	47
ill	83	eal	63	auto	47
ick	83	od	63	olly	43
ast	83	ock	63	im	40
ape	80	iss	63	tion	40
oat	80	og	60	fir	40
ay	80	op	60	deal	37
fur	80	aid	60	cure	33
her	80	ig	60	id	30
age	80	ack	60	ture	17
ev	77	ess	60		
ed	77	ied	60		

*Item Diff for List #10 is based on Above Average 3rd Graders

BIBLIOGRAPHY

Books

Bateman, B. "The Efficacy of an Auditory and a Visual Method on First Grade Reading Instruction with Auditory and Visual Learning." In Perception and Reading. Edited by H.K. Smith. Newark, Delaware: International Reading Association, 1968.

Bond, Guy L., and Tinker, Miles A. Reading Difficulties, Their Diagnosis and Correction. 2nd ed. New York: Appleton - Century - Crofts, 1967.

Bronstein, Arthur J., and Bronstein, Elsa. "A Phonetic - Linguistic View of the Reading Controversy." In Reading Instruction: Dimensions and Issues. Edited by William K. Durr. Boston: Houghton Mifflin, 1967.

Buros, Oscar K. Mental Measurement Yearbook. 7th ed. Highland Park, New Jersey: The Gryphon Press, 1971.

Buros, Oscar K. Tests in Print II. Highland Park, New Jersey: The Gryphon Press, 1974.

Downie, N.M. and Heath, R.W. Basic Statistical Methods. Third ed. New York: Harper and Row, 1970.

Durkin, Delores. Teaching Them to Read. Boston: Allyn and Bacon, 1970.

Durr, William K. "Developing Reading Independence in the Primary Grades." In Reading Instruction: Dimensions and Issues. Edited by William K. Durr. Boston: Houghton Mifflin, 1967.

Durr, William (ed.). Reading Instruction: Dimensions and Issues. Boston: Houghton Mifflin, 1967.

Fishbein, Justin, and Emans, Robert. A Question of Competence: Language, Intelligence, and Learning to Read. Chicago: Science Research Associates, 1972.

Flesch, Rudolf. Why Johnny Can't Read. New York: Harper and Row, 1955.

Fortenberry, Warren D. "An Investigation of the Effectiveness of a Special Program Upon the Development of Visual Perception for Word Recognition of Culturally Disadvantaged First Grade Students." In Reading: Process and Pedagogy, Nineteenth Yearbook of the National Reading Conference. (1970): 141-145.

Fries, Charles C. Linguistics and Reading. New York: Holt, Rinehart and Winston, 1962.

Fry, Edward B. Reading Instruction for Classroom and Clinic. New York: McGraw Hill, 1972.

George, John E. "Variables in Beginning Reading Instruction." In Improving Reading Ability Around the World, Proceedings of the Third International Reading Association's World Congress, Sydney, Australia, August 7-9, 1970. Newark, Delaware: International Reading Association, 1970.

Gibson, E.J. Principles of Perceptual Learning and Development. New York: Appleton - Century - Crofts, 1969.

Glass, Gerald G. "Decoding Only?" In Some Persistent Questions on Beginning Reading. Edited by Robert C. Aukerman. Newark, Delaware: International Reading Association, 1972.

Glass, Gerald G. Teaching Decoding as Separate From Reading. Garden City, New York: Adelphi University Press, 1973.

Glass, Gerald. "Teaching of Word Analysis Through Perceptual Conditioning." In M.A. Dawson, Teaching Word Recognition Skills. Newark, Delaware: International Reading Association, 1971.

Harris, Albert J., and Sipary, Edward R. Effective Teaching of Reading 5th ed. New York: David McKay Co., 1971.

Jones, John Paul. "Intersensory Transfer, Perceptual Shifting, Modal Preference, and Reading." In Reading Information Series: Where Do I Go? Newark, Delaware: ERIC/CRIER and International Reading Association, 1972.

Karlin, Robert. Teaching Elementary Reading: Principles and Strategies. New York: Harcourt Brace Jovanovich, 1971.

Kephart, Newell C. The Slow Learner in the Classroom. Columbus, Ohio: Charles E. Merrill, 1960.

Klapper, Paul. Teaching Children to Read. New York: Appleton - Century - Crofts, 1926.

Malmquist, Eve. "Problems of Reading and Readers: An International Challenge." In Improving Reading Ability Around the World, Proceedings of the Third International Reading Association's World Congress, Sydney, Australia, August 7-9, 1970. Newark, Delaware: International Reading Association, 1970.

McCullough, Constance M. "Vital Principles in Need of Application." In A Decade of Innovation: Approaches to Beginning Reading, Vol. 12, Part 3. Proceedings of the Twelfth Annual Convention, International Reading Association, 1968.

Robinson, Helen M. "Perceptual Training - Does It Result in REading Improvement?" In Some Persistent Questions on Beginning Reading. Edited by Robert Aukerman. Newark, Delaware: International Reading Association, 1972.

Singer, Harry. "Substrata-Factor Theory of Reading: Theoretical Design for Teaching Reading," in J.A. Figurel (ed.), Challenge and Experiment in Reading Newark, Delaware: International Reading Association, 1962.

Singer, Harry. "Theories, Models, and Strategies for Learning to Read," in The Literature of Research in Reading with Emphasis on Models. Project N. 0-9030, Final Report to the U.S. Office of Education. New Brunswick, New Jersey: Rutgers University, 1971.

Smith, Nila Banton. "What Have We Accomplished in Reading? A Review of the Past Fifty Years." In Reading Instructions: Dimensions and Issues. Edited by William K. Durr. Boston: Houghton Mifflin, 1967.

Spache, George D. Diagnosing and Correcting Reading Disabilities. Boston: Allyn and Bacon, Inc., 1976.

Spache, George D., and Spache, Evelyn B. Reading In The Elementary School. 2nd ed. Boston: Allyn and Bacon, 1969.

Staats, A.W. "Integrated Functional Learning Theory for Reading," in A.J. Kington (ed.), Use of Theoretical Models in Research. Newark, Delaware: International Reading Association, 1969.

Strang, Ruth. "Skillful Teaching: Theory and Practice." In Forging Ahead in Reading. Edited by J.A. Figurel. Newark, Delaware: International Reading Association, 1968.

Thorndike, E.L. Teacher's Word Book. New York: Teacher's College Press, Columbia University, 1931.

Thorndike, E.L. The Teacher's Word Book of 20,000 Words. New York: Teacher's College Press, Columbia University, 1941.

Thorndike, E.L. and Lorge, I.D. The Teacher's Word Book of 30,000 Words. New York: Teacher's College Press, Columbia University, 1944.

Wepman, Joseph M. "Modalities and Learning." In Coordinating Reading Instruction. Edited by Helen M. Robinson, Glenview, Illinois: Scott Foresman, 1971. pp. 177-198.

Periodicals

Allen, James E., Jr. "The Right to Read - Target for the 70's." Journal of Reading (Nov 1969): 95-101.

Balow, Bruce. "Perceptual - Motor Activities in the Treatment of Severe Reading Disabilities." Reading Teacher 24 (March 1971): 513-525, 542.

Barrett, Thomas C. "The Relationship Between Measures of Pre-Reading Visual Discrimination and First Grade Reading Achievement: A Review of the Literature." Reading Research Quarterly 1 (Fall 1965): 51-76.

Beery, J.W. "Matching of Auditory and Visual Stimuli by Average and Retarded Readers." Child Development 38 (1967) 827-33.

Birch, H.G., and Belmont, L. "Auditory - Visual Integration in Normal and Retarded Readers." American Journal of Orthopsychiatry 34 (1964): 852-61.

Cohen, Alice, and Schwartz, Elaine. "Interpreting Errors in Word Recognition." The Reading Teacher 28 (March 1975): 534-37.

Cohen, Ruth I. "Remedial Training of First Grade Children with Visual Perceptual Retardation." Educational Horizons 45 (Winter 1966): 60-63.

Dolch, Edward A., and Bloomster, Maurine. "Phonics Readiness." Elementary School Journal 38 (Nov 1937): 201-205.

Duggins, Lydia A. "Experimental Studies in Auditory Perception in Beginning Reading." In Auditory Perception in the Beginning Reading Program, College Bulletin, Southeastern Louisiana College. 13 (Jan 1956): 12-18.

Gates, Arthur I. "A Study of the Role of Visual Perception, Intelligence, and Certain Associative Processes in Reading and Spelling." Journal of Educational Psychology 19 (Oct 1926): 433-45.

Gentry, Larry A. "A Clinical Method in Classroom Success - Kinesthetic Teaching." The Reading Teacher 28 (December 1974): 298-300.

Gibson, E.J. "Learning to Read." Science 148 (1965): 1068.

Gibson, E.J., Bishop, C.H., Schiff, W., and Smith, J. "Comparison of Meaningful and Proniciability as Grouping Principles in the Perception and Retention of Verbal Materials." Journal of Experiemental Psychology 67 (1964): 173-82.

Gibson, E.J., Osser, H., and Pick, A.D. "A Study in the Development of Grapheme-Phoneme Correspondences." Journal of Verbal Learning and Verbal Behavior 2 (1963): 142-46.

Jacobs, J.N., Wirthlin, Lenora D., and Miller, C.B. "A Follow-Up Evaluation of the Frostig-Visual Perceptual Training Program." Educational Leadership 26 (Nov 1968): 169-175.

Jeffrey, W.E. and Samuels, S.J. "The Effect of Method of Reading Training on Initial Reading and Transfer." Journal of Verbal Learning and Verbal Behavior 6 (1967): 354-358.

Kahn, D., and Birch, H.G. "Development of Auditory - Visual Integration and Reading Achievement." Perceptual and Motor Skills 27 (1968): 459-468.

Karnes, Merle B., et al. "An Evaluation of Two Pre-School Programs for Disadvantaged Children." Exceptional Children 34 (May 1968): 667-676.

King, Ethel M. "Effects of Different Kinds of Visual Discrimination Training on Learning to Read Words." Journal of Educational Psychology 55 (December 1964): 325-333.

Muehl, S., and Kremenak, S. "Ability to Match Information Within and Between Auditory and Visual Sense Modalities and Subsequent Reading Achievement." Journal of Educational Psychology 57 (1966): 230-239.

Rosen, Carl L. "An Experimental Study of Visual Perceptual Training and Reading Achievement in First Grade." Perceptual and Motor Skills 22 (June 1966): 979-986.

Samuels, S.J. "Relationship Between Formal Intralist Similarity and the Von Restorff." Journal of Educational Psychology 59 (1968): 432-37.

Samuels, S.J., and Jeffrey, W.D. "Discriminability of Words and Letter Cues Used In Learning to Read." Journal of Educational Psychology 57 (1966): 337-40.

Stetson, Elton G. "The State Textbook Committee Explores Basal Reading." The Oklahoma Reader VIII (Winter, 1972): 10-12.

Wheelock, N.J. and Silugual, J. "An Investigation of Visual Discrimination Training for Beginning Readers." Journal of Typographical Research (September 1967): 50-57.

Reports

Conant, James Bryant. "Learning to Read: A Report of a Conference of Reading." A conference called of reading experts by the Carnegie Corporation of New York, September 22-23, 1961.

Corder, R. The Information Base for Current Assumptions Regarding the Status of Instruction and Achievement in Reading in the United States. Project N. 0-9031. Final Report to U.S. Office of Education. Educational Testing Service, 1971.

Deutsch, Cynthia P., and Feldman, Shirley C. "A Study of the Effectiveness of Training for Retarded Readers in the Auditory Skills Underlying Reading." Title VII, Project N. 1127, Grant of the U.S. Department of Health, Education, and Welfare, Office of Education, Institute for Developmental Studies, New York Medical College, 1966.

Report of the Secretary's (HEW) National Advisory Committee on Dyslexia and Reading Disorders (Washington, D.C., August, 1969), p. 7.

Unpublished Materials

Bruinink, R.H. "Relationship of Auditory and Visual Perceptual Strengths to Methods of Teaching Word Recognition Among Disadvantaged Negro Boys." Unpublished doctoral dissertation, George Peabody College for Teachers, 1968.

Cripe, A.G. "Auditory and Visual Learning Related to Illinois Test of Psycholinguistic Abilities Sensory Channels." Unpublished doctoral dissertation, Purdue University, 1966.

Evans, Jackie Merion. "The Development of Auditory Discrimination in Third Grade Students by Use of Tape Recorded Materials." Unpublished doctoral dissertation, North Texas State University, 1965.

Jones, J.P. "A Study of the Relationship Among Intersensory Transfer, Intersensory Perceptual Shifting, Modal Preference, and Reading Achievement at the Third Grade Level." Unpublished doctoral dissertation, University of Georgia, 1971.

Rembert, E.W. "Teaching Word Analysis to Fifth Graders Using SMOG Grading." Unpublished doctoral dissertation, Syracuse University, 1972.

Searfoss, Lyndon W. "A Comparison of Two Strategies Designed to Teach Basic Decoding Skills To Selected Fourth Grade Readers." Unpublished doctoral dissertation, Syracuse University, 1973.

Other Materials

Daily Oklahoman, May 18, 1973, p. 14.

Dixon, W.J. (ed). BMD: Biomedical Computer Programs. Berkley: University of California Press, 1970.

Glass, Gerald G. "Decoding Only? The Effectiveness of Two Programs, (One Developmental, One Remedial, Designed Specifically to Teach Decoding Utilizing a Decoding Only Strategy)." Paper presented to the International Reading Association Convention, Atlantic City, May, 1971.

Ringler, L.H., Smith, I.L., and Cullinan, B.E. "Modality Preference, Differentiated Presentation of Reading Tasks, and Word Recognition of First-Grade Children." A paper presented to the Annual Convention of the International Reading Association, 1971.

Slosson, Richard L. Slosson Oral Reading Test (SORT). East Aurora, New York: Slosson Educ. Pub., Inc., 1963.

APPENDIX A

LIST 1

FREQUENCY COUNT, RANK ORDER, AND ITEM DIFFICULTY ON THE PHONOGRAM TEST FOR 90 FIRST GRADERS ARRANGED BY BELOW AVERAGE, AVERAGE, AND ABOVE AVERAGE READING ABILITY

	Below Average First (N=30)			Average First (N=30)			Above Average First (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ight	1	112	3	9	97	30	6	103.5	20
affy	1	112	3	4	115.5	13	2	113.5	7
ound	0	117.5	0	8	100	27	2	113.5	7
on	29	2.5	97	29	9	97	30	2	100
ot	7	75	23	7	104	23	8	98	27
um	17	20.5	57	22	22.5	73	22	16.5	73
og	6	82.5	20	8	100	27	7	99.5	23
able	3	103.5	10	7	104	23	6	103.5	20
op	15	29.5	50	18	39	60	15	61	50
ore	3	103.5	10	12	83	40	9	95.5	30
ip	17	20.5	57	24	14	80	25	10.5	83
olly	5	91	17	6	107.5	20	5	107	17
ake	11	46.4	37	16	52	53	16	52	53
ture	1	112	3	2	117.5	7	1	117	3
air	5	91	17	12	83	40	13	73.5	43
ate	5	91	17	20	31.5	67	12	81.5	40
ame	7	75	23	15	59.5	50	14	68	47
iff	16	25	53	23	17	77	22	16.5	73
im	17	20.5	57	19	34.5	63	19	26.5	63
ape	10	55	33	17	45.5	57	17	41.5	57
tion	0	117.5	0	0	117	0	1	117	3
and	29	2.5	97	29	9	97	30	2	100
owl	6	82.5	20	17	45.5	57	17	41.5	57
ud	16	25	53	10	93.5	33	16	52	53
ace	0	117.5	0	9	97	30	6	103.5	20
ave	10	55	33	16	52	53	16	52	53
oss	7	75	23	10	91.5	33	13	76	43
ev	6	82.5	20	3	111	10	18	39	60

LIST 1 (Continued)

	Below Average First (N=30)			Average First (N=30)			Above Average First (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
aid	9	62.5	30	10	91.5	33	7	104	23
fir	1	112	3	4	109	13	4	111.5	13
ane	4	97.5	13	13	73.5	43	12	83	40
ade	7	75	23	14	68	47	12	83	40
or	15	19.5	50	20	23	67	23	17	77
ug	19	15	63	21	19.5	70	19	34.5	63
tar	3	103.5	10	4	109	13	4	111.5	13
ide	10	55	33	19	26.5	63	20	31.5	67
cook	8	69	27	17	41.5	57	22	22.5	73
est	4	97.5	13	9	95.5	30	14	68	47
oat	8	69	27	15	61	50	15	59.5	50
ee	21	10.5	70	25	10.5	83	30	3.5	100
old	15	29.5	50	24	12.5	80	23	17	77
eck	1	112	3	4	109	13	9	97	30
ill	16	25	53	17	41.5	57	17	45.5	57
en	21	10.5	70	22	16.5	73	23	17	77
fire	4	97.5	13	17	41.5	57	16	52	53
ink	12	40	40	16	52	53	15	59.5	50
ank	12	40	40	16	52	53	12	83	40
ig	13	35	43	18	31.5	60	13	76	43
ap	18	17.5	60	18	31.5	60	16	52	53
ed	6	82.5	20	13	73.5	43	18	39	60
act	8	69	27	6	103.5	20	7	104	23
tea	8	69	27	17	41.5	57	13	76	43
eat	17	20.5	57	22	16.5	73	21	27.5	70
two	3	103.5	10	6	103.5	20	3	115	10
em	11	46.5	37	18	31.5	60	13	76	43
ink	8	69	27	11	88	37	11	38	37
ite	10	33	33	17	41.5	57	14	68	47
eal	7	75	23	15	61	50	15	59.5	50
too	29	2.5	97	29	5	97	30	3.5	100
ay	6	82.5	20	16	52	53	15	59.5	50

LIST 1 (Continued)

	Below Average First (N=30)			Average First (N=30)			Above Average First (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
eam	11	46.5	37	15	68	50	12	83	40
ack	9	62.5	30	15	68	50	13	76	43
it	29	2.5	97	30	2	100	30	3.5	100
ear	13	35	43	15	61	50	18	39	60
ang	13	35	43	12	81.5	40	7	104	23
deaf	2	107.5	7	7	99.5	23	5	109	17
fur	6	82.5	20	12	81.5	40	11	89	37
her	4	97.5	13	12	81.5	40	16	52	53
ush	11	46.5	37	18	31.5	60	18	39	60
al	13	35	43	15	61	50	14	68	47
age	0	117.5	0	2	113.5	7	3	115	10
tone	6	82.5	20	13	73.5	43	13	76	43
oll	12	40	40	12	81.5	40	14	68	47
ale	8	69	27	17	41.5	57	11	89	37
ink	11	46.5	37	13	73.5	43	17	45.5	57
ad	9	62.5	30	18	31.5	60	14	68	47
ess	3	103.5	10	9	95.5	30	12	83	40
ab	9	62.5	30	12	81.5	40	11	89	37
tass	5	91	17	12	81.5	40	17	45.5	57
few	4	97.5	13	2	113.5	7	3	115	10
ied	10	55	33	14	68	47	14	68	47
ent	14	32	47	13	73.5	43	15	59.5	50
et	6	82.5	20	12	81.5	40	13	76	43
ove	5	91	17	10	91.5	33	11	89	37
id	13	25	43	17	41.5	57	16	52	53
om	15	29.5	50	20	23	67	22	22.5	73
ong	10	55	33	11	88	37	10	93.5	33
care	5	91	17	12	81.5	40	6	107.5	20
ock	9	62.5	30	15	61	50	18	39	60
ast	12	40	40	15	61	50	18	39	60

LIST 1 (Continued)

	Below Average First (N=30)			Average First (N=30)			Above Average First (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
od	9	62.5	30	16	52	53	10	93.5	33
cue	3	103.5	10	10	91.5	33	8	100	27
ub	10	55	33	14	68	47	15	59.5	50
ish	11	46.5	37	16	52	53	20	31.5	67
ob	5	91	17	12	81.5	40	14	68	47
un	21	10.5	70	24	12.5	80	26	12.5	87
out	20	13	67	23	14	77	29	9	97
up	28	5	93	28	7	93	30	3.5	100
all	23	8	77	26	9	87	26	12.5	87
at	25	7	83	29	5	97	29	9	97
ull	16	25	53	18	31.5	60	17	45.5	57
cure	1	112	3	6	103.5	20	2	117.5	7
iss	12	40	40	14	68	47	14	68	47
ag	19	15	63	16	52	53	14	68	47
boil	1	112	3	0	119	0	4	111.5	13
oce	8	69	27	17	41.5	57	22	22.5	73
ut	18	17.5	60	21	19.5	70	20	31.5	67
ing	10	55	33	17	41.5	57	21	27.5	70
us	21	10.5	70	27	8	90	29	9	97
saw	6	82.5	20	9	95.5	30	16	52	53
am	11	46.5	37	20	23	67	21	27.5	70
in	26	6	87	29	5	97	30	3.5	100
oke	11	46.5	37	18	31.5	60	21	27.5	70
an	15	25	53	20	23	67	23	17	77
auto	1	112	3	1	117	3	0	119	0
most	4	97.5	5	11	88	37	10	93.5	33
ask	10	55	33	18	31.5	60	22	22.5	73
uff	19	15	63	20	23	67	22	22.5	73
ell	6	82.5	20	17	41.5	57	15	59.5	50

LIST 2

FREQUENCY COUNT, RANK ORDER OF DIFFICULTY, AND ITEM DIFFICULTY FOR THE PHONOGRAM TEST BY 90 FIRST GRADE SUBJECTS ARRANGED BY PUPIL GENDER

	First Grade Males (N=45)			First Grade Females (N=45)			Total First Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ight	11	100	24	5	109	11	16	103	18
affy	4	113.5	9	3	115	7	7	114	8
ound	6	107.5	13	4	112	9	10	110	11
on	45	1.5	100	43	5.5	96	88	3	98
ot	13	93	29	9	100	20	22	97.5	24
um	33	16	73	28	22	62	61	17	68
og	12	97	27	9	100	20	21	100	23
able	6	107.5	13	10	98	22	16	103	18
op	28	25	62	20	53.5	44	48	34.5	53
ore	13	93	29	11	96.5	24	24	94.5	27
ip	36	12.5	80	30	17	67	66	13.5	73
olly	10	102.5	22	6	106.5	13	16	103	18
ake	25	35.5	56	18	65	40	43	45.5	48
ture	0	118.5	0	4	112	9	4	117	4
air	17	78	38	13	89.5	29	30	85	33
ate	21	54	47	16	75	36	37	67.5	41
ame	21	54	47	15	80.5	33	36	71.5	40
iff	35	14	78	26	26.5	58	61	17	68
im	29	23	64	26	26.5	58	55	25	61
ape	23	42.5	51	21	46.5	47	44	43.5	49
tion	1	117	2	0	119	0	1	119	1
and	44	3	98	44	2.5	98	88	3	98
owl	19	66.5	42	21	46.5	47	40	56	44
ud	22	47.5	49	20	53.5	44	42	49	47
ace	8	104.5	18	7	104.5	16	15	105	17
ave	21	54	47	21	46.5	47	42	49	47
oss	18	73	40	12	93.5	27	30	85	33

LIST 2 (Continued)

	First Grade Males (N=45)			First Grade Females (N=45)			Total First Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ev	13	93	29	14	85.5	31	27	89.5	30
aid	13	93	29	13	89.5	29	26	91.5	29
fir	6	107.5	13	3	115	7	9	112	10
ane	14	88.5	31	15	80.5	33	29	87.5	32
ade	16	82	36	17	70	38	33	75	37
or	27	27.5	60	31	14.5	69	58	23	64
ug	32	18.5	71	27	24	60	59	21	65
tar	6	107.5	13	5	109	11	11	109	12
ide	27	27.5	60	22	42	49	49	32.5	54
cook	22	47.5	49	25	30	56	47	37.5	52
est	19	66.5	42	8	102.5	18	27	89.5	30
oat	14	88.5	31	24	34.5	53	38	61.5	42
ee	39	9	87	37	9	82	76	9	84
old	32	18.5	71	30	17	67	62	15	69
eck	5	111	11	9	100	20	14	106.5	15
ill	25	35.5	56	25	30	56	50	30	55
en	33	16	73	33	13	73	66	13.5	73
fire	18	73	40	19	60	42	37	67.5	41
ink	21	54	47	22	42	49	43	45.5	48
ank	22	47.5	49	18	65	40	40	56	44
ig	23	42.5	51	21	46.5	47	44	43.5	49
ap	23	42.5	51	29	19.5	64	52	26.5	58
ed	20	61	44	17	70	38	37	67.5	41
act	13	93	29	8	102.5	18	21	100	23
tea	20	61	44	18	65	40	38	61.5	42
eat	29	23	64	31	14.5	69	60	19	66
tow	5	111	11	7	104.5	16	12	108	13
em	18	73	40	24	34.5	53	42	49	47
ind	15	85.5	33	15	80.5	33	30	85	33
ite	20	61	44	21	46.5	47	41	53	45
eal	20	61	44	17	70	38	37	67.5	41
too	43	4.5	96	45	1	100	88	3	98

LIST 2 (Continued)

	First Grade Males (N=45)			First Grade Females (N=45)			Total First Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ay	18	73	40	19	60	42	37	67.5	41
eam	19	66.5	42	19	60	42	38	61.5	42
ack	21	54	47	16	75	36	37	67.5	41
it	45	1.5	100	44	2.5	98	89	1	99
ear	21	54	47	25	30	56	46	40.5	51
ang	16	82	36	16	75	36	32	77.5	35
deaf	8	104.5	18	6	106.5	13	14	106.5	15
fur	15	85.5	33	14	85.5	31	29	87.5	32
her	16	82	36	16	75	36	32	77.5	35
ush	27	27.5	60	20	53.5	44	47	37.5	52
al	21	54	47	21	46.5	47	42	49	47
age	2	116	4	3	115	7	5	115.5	5
tone	12	97	27	20	53.5	44	32	77.5	35
oll	18	73	40	20	53.5	44	38	61.5	42
ale	17	78	38	19	60	42	36	71.5	40
ick	21	54	47	20	53.5	44	41	53	45
ad	24	38.5	53	17	70	38	41	53	59
ess	12	97	27	12	93.5	27	24	94.5	27
ab	18	73	40	14	85.5	31	32	77.5	35
tass	19	66.5	42	15	80.5	33	34	74	38
few	5	111	11	4	112	9	9	112	10
ied	20	61	44	18	65	40	38	61.5	42
ent	24	38.5	53	18	65	40	42	49	47
et	16	82	36	15	80.5	33	31	81.5	34
over	14	88.5	31	12	93.5	27	26	91.5	29
id	23	42.5	51	23	39	51	46	40.5	51
om	31	20.5	69	26	26.5	58	57	24	63
ong	18	73	40	13	89.5	29	31	81.5	34
care	11	100	24	12	93.5	27	23	96	25
ock	22	47.5	49	20	53.5	44	42	49	47
ast	25	35.5	56	20	53.5	44	45	42	50
od	19	66.5	42	16	75	36	35	73	39

LIST 2 (Continued)

	First Grade Males (N=45)			First Grade Females (N=45)			Total First Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
cue	10	101.5	22	11	96.5	24	21	100	23
ub	16	82	36	23	39	51	39	58	43
ish	23	42.5	51	24	34.5	53	47	37.5	52
ob	17	78	38	14	85.5	31	31	81.5	34
un	36	12.5	80	35	11	78	71	12	79
out	37	10.5	82	35	11	78	72	11	80
up	43	4.5	96	43	5.5	96	86	5	95
all	37	10.5	82	38	8	84	75	10	83
at	40	8	89	43	5.5	96	83	7	92
ull	27	27.5	60	24	34.5	83	51	28	57
cure	4	113.5	9	5	109	11	9	112	10
iss	25	35.5	56	15	80.5	33	40	56	44
ag	26	31.5	58	23	39	51	49	32.5	54
boil	3	115	7	2	117.5	4	5	115.5	5
ice	21	54	47	26	26.5	58	47	37.5	52
ut	31	20.5	69	28	22	62	59	21	65
ing	26	31.5	58	22	22	49	48	34.5	53
us	42	6.5	93	35	11	78	77	8	85
saw	14	88.5	31	17	70	38	31	81.5	34
am	23	42.5	51	29	19.5	64	52	26.5	58
in	42	65	93	43	55	96	85	6	94
oke	26	31.5	58	24	34.5	53	50	30	55
an	29	23	64	30	17	67	59	21	65
auto	0	118.5	0	2	117.5	4	2	118	2
most	12	97	27	13	89.5	29	25	93	28
ash	26	31.5	58	24	34.5	53	50	30	55
uff	33	16	73	28	22	62	61	17	68
ell	19	66.5	42	19	60	42	38	61.5	42

LIST 3

FREQUENCY COUNT, RANK ORDER OF DIFFICULTY, AND ITEM DIFFICULTY FOR () SECOND GRADE SUBJECTS GROUPED ACCORDING TO BELOW AVERAGE, AVERAGE, AND ABOVE AVERAGE READING ABILITY

	Below Ave 2nd Grade (N=30)			Average 2nd Grade (N=30)			Above Ave 2nd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ight	9	85.5	30	15	76.5	50	13	99	43
affy	7	96	23	10	102	33	9	112.5	30
ound	4	111	13	13	87.5	43	14	89	47
on	30	3.5	100	30	3	100	30	4.5	100
ot	13	61	43	12	92.5	40	17	72	57
um	22	23	73	22	31.5	73	26	25.5	87
og	8	90.5	27	17	64	57	13	99	43
able	7	96	23	11	96	37	20	56	67
op	17	38.5	57	21	34	70	22	46	73
ore	13	61	43	16	70.5	53	16	78	53
ip	23	19	77	24	21.5	80	26	25.5	87
olly	6	102	20	11	96	37	11	107.5	37
ake	12	69.5	40	19	43.5	63	19	61	63
ture	0	118.5	0	1	119	3	2	118	7
air	15	48.5	50	22	31.5	73	24	35.5	80
ate	15	48.5	50	24	21.5	80	26	25.5	87
ame	7	96	23	20	37	67	22	46	73
iff	23	19	77	24	21.5	80	27	18.5	90
im	12	69.5	40	18	53.5	60	17	72	57
ape	7	96	23	19	43.5	63	24	38.5	80
tion	0	118.5	0	2	117	7	1	119	3
and	30	3.5	100	30	3	100	30	4.5	100
own	22	23	73	23	27.5	77	26	25.5	87
ud	11	76	37	17	64	57	18	66	60
ace	5	107	17	5	113.5	17	14	89	47
ave	9	85.5	30	15	76.5	50	23	40	77
oss	6	102	20	15	76.5	50	16	78	53

LIST 3 (Continued)

	Below Ave 2nd Grade (N=30)			Average 2nd Grade (N=30)			Above Ave 2nd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ev	6	102	20	18	53.5	60	14	89	47
aid	10	80.5	33	12	92.5	40	14	89	47
fir	1	116	3	6	111.5	20	4	116	13
ane	4	111	13	10	102	33	13	99	43
ade	5	107	17	11	96	37	13	99	43
or	25	13.5	83	29	7.5	97	29	11.5	97
ug	17	38.5	57	19	43.5	63	22	46	73
tar	5	107	17	10	102	33	15	82.5	50
ide	13	61	43	13	87.5	43	22	46	73
cook	25	13.5	83	25	16	83	25	32	83
est	13	61	43	15	76.5	50	13	99	43
oat	13	61	43	18	53.5	60	17	72	57
ee	21	26	70	27	12.5	90	29	11.5	97
old	27	10.5	90	28	10.5	93	30	4.5	100
eck	7	96	23	8	109	27	10	110	33
ill	17	38.5	57	18	53.5	60	21	51.5	70
en	27	10.5	90	22	31.5	73	27	18.5	90
fire	19	30	63	20	37	67	25	32	83
ink	17	38.5	57	23	27.5	77	26	25.5	87
ank	16	43	53	19	43.5	63	21	51.5	70
ig	15	48.5	50	17	64	57	22	46	73
ap	18	34	60	20	37	67	18	66	60
ed	13	61	43	17	64	57	17	72	57
act	11	76	37	9	107.5	30	11	107.5	37
tea	13	61	43	18	53.5	60	27	18.5	90
eat	22	23	73	24	21.5	80	27	18.5	90
tow	9	85.5	30	10	102	33	14	89	47
em	15	48.5	50	15	76.6	50	23	40	77
ind	13	61	43	10	102	33	18	66	60
ite	8	90.5	27	15	76.5	50	18	66	60
eal	11	76	37	17	65	57	21	51.5	70
too	30	3.5	100	30	3	100	30	4.5	100

LIST 3 (Continued)

	Below Ave 2nd Grade (N=30)			Average 2nd Grade (N=30)			Above Ave 2nd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ay	14	54	47	25	16	83	20	56	67
eam	11	76	37	10	102	33	14	89	47
ack	15	48.5	50	13	87.5	43	14	89	47
it	30	3.5	100	29	7.5	97	30	4.5	100
ear	18	34	60	19	43.5	63	19	61	63
ang	12	69.5	40	10	102	33	15	82.5	50
deaf	5	107	17	5	113.5	17	7	114	23
fur	7	96	23	12	82.5	40	13	99	43
her	19	30	63	18	53.5	60	18	66	60
ush	10	80.5	33	18	53.5	60	23	40	77
al	14	54	47	14	82.5	47	16	78	53
age	3	113.5	10	6	111.5	20	10	110	33
tone	12	69.5	40	17	64	57	20	56	67
oll	11	76	37	10	102	33	16	78	53
ale	9	85.5	30	13	87.8	43	13	99	43
ick	16	43	53	19	43.5	63	23	40	77
ad	12	69.5	40	18	53.5	60	22	46	73
ess	10	80.5	33	16	70.5	53	13	99	43
ab	9	85.5	30	15	76.5	50	14	89	47
tass	8	90.5	27	16	70.5	53	14	82.5	50
few	4	111	13	10	102	33	10	110	33
ied	8	90.5	27	12	92.5	40	12	105.5	40
ent	20	27.5	67	17	64	57	22	46	73
et	10	80.5	33	17	64	57	14	89	47
ove	9	85.5	30	7	110	23	12	105.5	40
id	16	43	53	15	76.5	50	17	72	57
om	18	34	60	20	37	67	19	61	63
ong	12	69.5	40	13	87.5	43	15	82.5	50
care	6	102	20	14	82.5	47	19	61	63
ock	12	69.5	40	19	43.5	63	20	56	67
ast	19	30	63	23	27.5	77	23	40	77
od	6	102	20	13	87.5	43	13	99	43

LIST 3 (Continued)

	Below Ave 2nd Grade (N=30)			Average 2nd Grade (N=30)			Above Ave 2nd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
cue	7	96	23	9	107.5	30	16	78	53
ub	13	61	43	17	64	57	20	56	67
ish	18	34	60	25	16	83	26	25.5	87
ob	5	107	17	14	82.5	47	13	99	43
un	24	16	80	24	21.5	80	26	25.5	87
out	29	7.5	97	29	7.5	97	28	15.5	93
up	30	3.5	100	29	7.5	97	29	11.5	97
all	28	9	93	28	10.5	93	30	4.5	100
at	30	3.5	100	30	3	100	30	4.5	100
ull	14	54	47	16	70.5	53	19	61	63
cure	3	113.5	10	2	117	7	5	115	17
iss	14	54	47	18	53.5	60	17	72	57
ag	14	54	47	18	53.5	60	17	72	57
boil	1	116	3	4	115	13	9	112.5	30
ice	23	19	77	24	21.5	80	29	11.5	97
ut	16	43	53	20	37	67	21	51.5	70
ing	24	16	80	26	14	87	29	11.5	97
us	26	12	87	27	12.5	90	26	25.5	86
saw	18	34	60	24	21.5	80	29	11.5	97
am	20	27.5	67	23	27.5	77	24	35.5	80
in	29	7.5	97	30	3	100	30	4.5	100
oke	16	43	53	19	43.5	63	24	35.5	80
an	24	16	80	24	21.5	80	28	15.5	93
auto	1	116	3	2	117	7	3	117	10
most	22	23	73	18	53.5	60	25	32	83
ash	22	23	73	22	31.5	73	26	25.5	87
uff	15	48.5	50	18	53.5	60	26	25.5	87
ell	12	69.5	40	14	82.5	47	13	99	43

LIST 4

FREQUENCY COUNT, RANK ORDER OF DIFFICULTY, AND ITEM DIFFICULTY FOR PHONOGRAM TEST BY 90 SECOND GRADE SUBJECTS ARRANGED ACCORDING TO GENDER

	Second Grade Males (N=45)			Second Grade Females (N=45)			All Second Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ight	24	64	53	13	108	29	37	89.5	41
affy	20	86.5	44	6	114.5	13	26	108	29
ound	13	108	29	18	83.5	40	31	101.5	34
on	45	2.5	100	45	3.5	100	90	2.5	100
ot	21	81	47	21	72.5	47	42	73.5	47
um	39	14.5	87	31	33	69	70	25.5	78
og	20	86.5	44	18	83.5	40	38	85.5	42
able	22	76	49	16	94	36	38	85.5	42
op	31	38.5	69	29	37.5	64	60	35	66
ore	26	56	58	19	78	42	45	71	50
ip	37	23.5	82	36	21	80	73	21.5	81
olly	15	104	33	13	108	29	28	105.5	31
ake	27	52.5	60	23	66	51	50	56	55
ture	1	118.5	2	2	118.5	4	3	118.5	3
air	33	32.5	73	28	42.5	62	61	34	68
ate	31	38.5	69	34	25.5	76	65	31	72
ame	25	59	56	24	61	53	49	60.5	54
iff	38	19	84	36	21	80	74	19.5	82
im	23	70.5	51	24	61	53	47	68	52
ape	24	64	53	26	49.5	58	50	56	55
tion	1	118.5	2	2	118.5	4	3	118.5	3
and	45	2.5	100	45	3.5	100	90	2.5	100
owl	34	29.5	76	37	17	82	71	23.5	79
ud	24	64	53	22	69	49	46	70	51
ace	10	111	22	14	104.5	31	24	110.5	27
ave	22	76	49	25	54	56	47	68	52
oss	18	94.5	40	19	78	42	37	89.5	41

LIST 4 (Continued)

	Second Grade Males (N=45)			Second Grade Females (N=45)			All Second Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ev	20	86.5	44	18	83.5	40	38	85.5	42
aid	19	91	42	17	89.5	38	36	92	40
fir	4	116	9	7	113	16	11	115	12
ane	12	109	27	15	99.5	33	27	107	30
ade	15	104	33	14	104.5	31	29	104	32
or	42	11.5	93	41	11.5	91	83	11	92
ug	28	49	62	30	35	67	58	41	64
tar	15	104	33	15	99.5	33	30	103	33
ide	25	59	56	23	66	51	48	65	53
cook	38	19	84	37	17	82	75	19	83
est	23	70.5	51	18	83.5	40	41	76.5	45
oat	23	70.5	51	25	54	56	48	65	53
ee	39	14.5	87	38	13.5	84	77	14	85
old	42	11.5	93	43	8.5	96	85	10	94
eck	15	104	33	10	110	22	25	109	28
ill	22	70.9	51	33	28	73	56	46.5	62
en	38	19	84	38	13.5	84	76	16	84
fire	32	35	71	32	30.5	71	64	33	71
ink	35	27	78	31	33	69	66	29	73
ank	32	35	71	24	61	53	56	46.5	62
ig	29	45.5	64	25	54	56	54	46.5	62
ap	29	45.5	64	27	47	60	56	46.5	62
ed	25	59	56	22	69	49	47	68	52
act	16	100	36	15	99.5	33	31	101.5	34
tea	30	42	67	28	42.5	62	58	41	64
eat	38	19	84	35	23.5	78	73	21.5	81
tow	18	94.5	40	15	99.5	33	33	95	37
em	26	56	58	27	47	60	53	51	59
ink	24	64	53	17	89.5	38	41	76.5	45
ite	22	76	49	19	78	42	41	76.5	45
eal	23	70.5	51	26	49.5	58	49	60.5	54
too	45	2.5	100	45	3.5	100	90	2.5	100

LIST 4 (Continued)

	Second Grade Males (N=45)			Second Grade Females (N=45)			All Second Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ay	32	35	71	27	47	60	59	37.5	65
eam	19	91	42	16	94	36	35	93.5	39
ack	21	81	47	21	72.5	47	42	73.5	47
it	44	6.5	98	45	3.5	100	89	5.5	99
ear	28	49	62	28	42.5	62	56	46.5	62
ang	21	81	47	16	94	36	37	89.5	41
deaf	9	113	20	8	112	18	17	113	19
fur	17	97.5	38	15	99.5	33	32	98	35
her	26	56	58	29	37.5	64	55	49	61
ush	27	52.5	60	24	61	53	51	53.5	57
al	21	81	47	23	66	51	44	72	49
age	10	111	22	9	111	20	19	112	21
tone	24	64	53	25	54	56	49	60.5	54
oll	19	91	42	18	83.5	40	37	89.5	41
ale	20	86.5	44	15	99.5	33	35	93.5	39
ick	30	42	67	28	42.5	62	58	41	64
ad	27	52.5	60	24	54	56	52	52	58
ess	17	97.5	38	22	69	49	39	81.5	43
ab	20	86.5	44	18	83.5	40	38	85.5	42
tass	18	94.5	40	21	72.5	47	39	81.5	43
few	10	111	22	14	104.5	31	24	110.5	27
ied	18	94.5	50	14	104.5	31	32	98	35
ent	34	29.5	76	25	54	56	59	37.5	65
et	23	70.5	51	18	83.5	40	41	76.5	45
ove	15	104	33	13	108	29	28	105.5	31
id	24	64	53	24	61	53	48	65	53
om	28	49	62	29	37.5	64	57	43.5	63
ong	20	86.5	44	20	75.5	44	40	79	44
care	22	76	49	17	89.5	38	39	81.5	43
ock	27	52.5	60	24	61	53	51	53.5	57
ast	34	29.5	76	31	33	69	65	31	73
od	16	100	36	16	94	36	32	98	35

LIST 4 (Continued)

	Second Grade Males (N=45)			Second Grade Females (N=45)			All Second Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
cue	14	107	31	18	83.5	40	32	98	35
ub	29	45.5	64	21	72.5	47	50	56	55
ish	37	23.5	82	32	30.5	71	69	27	76
ob	16	100	36	16	94	36	32	98	35
un	37	23.5	82	37	17	82	74	19.5	82
out	44	6.5	98	42	10	93	86	8.5	95
up	44	6.5	98	44	7	98	88	7	98
all	43	9.5	96	43	8.5	96	86	8.5	95
at	45	2.5	100	45	3.5	100	90	2.5	100
ull	29	45.5	64	20	75.5	44	49	60.5	54
cure	5	115	11	5	116	11	10	116	11
iss	21	81	47	28	42.5	62	49	60.5	54
ag	24	64	53	25	84	56	49	60.5	54
boil	8	114	18	6	114.5	13	14	114	15
ice	39	14.5	87	37	17	82	76	16	84
ut	33	32.5	73	24	61	53	57	43.5	63
ing	43	9.5	96	36	21	80	79	12.5	88
us	38	19	84	41	11.5	91	79	12.5	88
saw	36	26	80	35	23.5	78	71	23.5	79
am	34	29.5	76	33	28	73	67	28	74
in	44	6.5	98	45	3.5	100	89	5.5	99
oke	31	38.5	69	28	42.5	62	59	37.5	65
an	39	14.5	87	37	17	82	76	16	84
auto	3	117	7	3	117	7	6	117	7
most	31	38.5	69	34	25.5	76	65	31	72
ash	37	23.5	82	33	28	73	70	25.5	78
uff	30	42	67	29	37.5	64	59	37.5	65
ell	22	76	49	17	89.5	38	39	81.5	43

LIST 5

FREQUENCY COUNT, RANK ORDER OF DIFFICULTY, AND ITEM DIFFICULTY FOR PHONOGRAM TEST BY 90 THIRD GRADE SUBJECTS ACCORDING TO BELOW AVERAGE, AVERAGE, AND ABOVE AVERAGE READING

	Below Ave 3rd Grade (N=30)			Average 3rd Grade (N=30)			Above Ave 3rd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ight	17	68	57	22	60.5	73	26	41	87
affy	11	98.5	37	16	97	53	14	109.5	47
ound	15	75	50	20	76	67	25	49	83
on	30	4.5	100	30	5.5	100	29	19.5	97
ot	14	83	47	22	60.5	73	22	63.5	73
um	27	205	90	27	27	90	27	35	90
og	12	94.5	40	21	67.5	67	18	89	60
able	21	48	70	26	34	84	25	49	83
op	18	63.5	60	23	53.5	77	18	89	60
ore	18	63.5	60	14	105	47	20	72	67
ip	22	41	73	25	41	83	25	49	83
olly	11	98.5	37	13	108.5	43	13	112	43
ake	19	57	67	22	60.5	73	25	49	83
ture	1	119	3	5	118	17	5	119	17
air	27	20.5	90	29	13	97	28	28	93
ate	22	41	73	28	20	93	30	8	100
ame	14	83	47	25	41	83	28	28	93
iff	22	41	73	24	46.5	80	25	49	83
im	14	83	47	18	87.5	60	12	114	40
ape	19	57	63	27	27	90	24	56.5	80
tion	2	118	7	5	118	17	12	114	40
and	30	4.5	100	29	13	97	30	8	100
owl	28	15	93	26	34	87	29	19.5	97
ud	19	57	63	20	76	67	19	80	63
ace	9	107	30	14	105	47	15	106	50
ave	14	83	47	20	76	67	19	80	63
oss	18	635	60	20	76	67	19	80	63

LIST 5 (Continued)

	Below Ave 3rd Grade (N=30)			Average 3rd Grade (N=30)			Above Ave 3rd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ev	19	57	63	23	53.5	77	23	60.5	77
aid	9	107	30	17	91.5	57	18	89	60
fir	5	117	17	10	113.5	33	12	114	40
ane	6	119.5	20	14	105	47	15	106	50
ade	9	107	30	19	83	63	17	96	57
or	25	27	83	26	34	87	28	28	93
ug	23	35	77	27	27	90	25	49	83
tar	9	107	30	15	101.5	50	19	80	63
ide	15	75	50	21	67.5	70	19	80	63
cook	30	4.5	100	30	5.5	100	30	8	100
est	14	83	47	16	97	53	16	101.5	53
oat	12	94.5	40	24	46.5	80	24	56.5	80
ee	27	20.5	90	28	20	93	30	8	100
old	29	10	97	30	5.5	100	29	19.5	97
eck	9	107	30	14	105	47	17	96	57
ill	16	70.5	53	20	76	63	25	49	83
en	27	20.5	90	28	20	93	28	28	93
fire	28	15	93	28	20	93	28	28	93
ink	24	30.5	80	27	27	80	28	28	93
ank	25	27	83	26	34	87	26	41	87
ig	21	48	70	21	67.5	70	18	89	60
ap	18	63.5	60	23	53.5	77	26	41	87
ed	17	68	57	20	76	67	23	60.5	77
act	13	90	43	19	83	63	26	41	87
tea	22	41	73	27	27	90	30	8	100
eat	26	24	87	29	13	97	29	19.5	97
tow	16	70.5	53	16	97	53	16	101.5	53
em	24	30.5	80	26	34	87	28	28	93
ind	10	10.2	33	16	97	53	17	96	57
ite	14	83	47	19	83	63	16	101.5	53
eal	19	57	63	21	67.5	70	19	80	63
too	30	4.5	100	30	5.5	100	30	8	100

LIST 5 (Continued)

	Below Ave 3rd Grade (N=30)			Average 3rd Grade (N=30)			Above Ave 3rd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ay	22	41	73	23	53.5	77	24	56.5	80
eam	11	98.5	37	16	97	53	20	72	67
ack	18	63.5	60	15	101.5	50	18	89	60
it	30	4.5	100	28	20	93	30	8	100
ear	22	41	73	26	34	87	26	41	87
ang	13	90	43	20	76	67	20	72	67
deaf	15	75	50	8	115	27	11	116	37
fur	20	52.5	67	24	46.5	80	24	56.5	80
her	19	57	63	21	67.5	70	24	56.5	80
ush	21	48	70	22	60.5	73	26	41	87
al	15	75	50	14	105	47	14	109.5	47
age	23	35	77	24	46.5	80	24	56.5	80
tone	25	27	83	26	34	87	27	35	90
oll	15	75	50	17	91.5	57	14	109.5	47
ale	10	102	33	22	60.5	73	16	101.5	53
ick	14	83	47	18	87.5	60	25	49	83
ad	21	48	70	22	60.5	73	22	63.5	73
ess	8	112.5	27	10	113.5	33	18	89	60
ab	9	107	30	16	97	53	16	101.5	53
tass	12	94.5	40	21	67.5	70	20	72	67
few	13	90	43	19	83	63	22	63.5	73
ied	14	83	47	17	91.5	57	18	89	60
ent	21	48	70	25	41	83	28	28	93
et	9	107	30	12	111	40	15	106	50
ove	13	90	43	23	53.5	77	21	67	70
id	14	83	47	16	97	53	9	118	30
om	19	57	63	21	67.5	70	18	89	60
ong	12	94.5	40	23	53.5	77	20	72	67
care	22	41	73	26	34	87	29	19.5	97
ock	13	90	43	21	67.5	70	19	80	63
ast	21	48	70	25	41	83	25	49	83
od	10	102	33	17	91.5	57	19	80	63

LIST 5 (Continued)

	Below Ave 3rd Grade (N=30)			Average 3rd Grade (N=30)			Above Ave 3rd Grade (N=30)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
cue	8	112.5	27	12	111	43	16	101.5	53
ub	17	68	57	24	46.5	80	21	67	70
ish	23	35	77	25	41	83	26	41	87
ob	15	73	50	18	87.5	60	17	96	57
un	23	35	77	30	5.5	100	30	8	100
out	30	4.5	100	30	5.5	100	29	19.5	97
up	30	4.5	100	30	5.5	100	30	8	100
all	29	10	97	29	13	97	30	8	100
at	29	10	97	30	5.5	100	30	8	100
ull	23	35	77	19	83	63	21	67	70
cure	6	115.5	20	6	116	20	10	117	33
iss	20	52.5	67	20	76	67	19	30	63
ag	11	98.5	37	13	108.5	43	20	72	67
boil	8	112.5	27	12	111	40	18	89	60
ice	28	15	93	29	13	97	29	19.5	97
ut	24	30.5	80	23	53.5	77	20	72	67
ing	26	24	87	28	20	93	30	8	100
us	28	15	93	26	34	87	28	28	93
saw	28	15	93	30	5.5	100	30	8	100
am	26	24	87	18	87.5	60	27	35	90
in	30	4.5	100	30	5.5	100	30	8	100
oke	18	63.5	60	23	53.5	77	27	35	90
an	28	15	93	28	20	93	29	19.5	97
auto	8	112.5	27	5	118	17	14	109.5	47
most	28	15	93	28	20	93	30	8	100
ash	24	30.5	80	28	20	93	27	35	90
uff	21	48	70	24	46.5	80	22	63.5	73
ell	15	75	50	20	76	67	17	96	57

LIST 6

FREQUENCY COUNT, RANK ORDER OF DIFFICULTY, AND ITEM DIFFICULTY FOR PHONOGRAM TEST BY 90 THIRD GRADE STUDENTS ARRANGED ACCORDING TO GENDER

	Third Grade Males (N=45)			Third Grade Females (N=45)			All Third Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ight	31	60	69	34	50.5	76	65	56	72
affy	20	103.5	44	21	102.5	47	41	103.5	45
ound	30	66	67	30	67.5	67	60	63.5	66
on	44	10	98	45	4.5	100	89	6.5	99
ot	26	84.5	58	32	60.5	71	58	70.5	64
um	42	18.5	93	39	32.5	87	81	25	90
og	24	90.5	53	27	75	60	51	85.5	57
able	34	46.5	76	38	36	84	72	39.5	80
op	27	79	60	32	60.5	71	59	67	65
ore	29	72.5	64	23	95	51	52	83.5	58
ip	35	42	78	37	39	82	72	39.5	80
olly	14	114	31	23	98	51	37	109	41
ake	34	46.5	76	32	60.5	71	66	54	73
ture	4	119	9	7	119	16	11	119	12
air	42	18.5	93	42	21.5	93	84	18.5	93
ate	38	34	84	42	21.5	93	80	26	89
ame	34	46.5	76	33	54.5	73	67	51.5	74
iff	33	50.5	73	38	36	84	71	42.5	79
im	18	107	40	26	80	58	44	98	49
ape	37	36.5	82	33	54.5	73	70	45	78
tion	9	118	20	10	118	22	19	118	21
and	45	4.5	100	44	10.5	98	89	6.5	99
owl	41	25	91	42	21.5	93	83	22	92
ud	29	72.5	64	29	69.5	64	58	70.5	64
ace	21	100	47	17	113.5	38	38	107.5	42
ave	27	79	60	26	80	58	53	80,5	59
oss	31	60	69	26	80	58	57	74	63

LIST 6 (Continued)

	Third Grade Males (N=45)			Third Grade Females (N=45)			All Third Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ev	30	66	67	35	45.5	78	65	56	72
aid	23	94	51	21	102.5	47	44	98	49
fir	13	115.5	29	14	115.5	31	27	115.5	30
ane	18	107	40	17	113.5	38	35	113	39
ade	21	100	47	24	90	53	45	96	50
or	39	31.5	87	40	28	89	79	28.5	88
ug	36	39	80	39	32.5	87	75	35	83
tar	23	94	51	20	108.5	44	43	101	48
ide	31	60	69	24	90	53	55	76.5	61
cook	45	4.5	100	45	4.5	100	90	2.5	100
est	21	100	47	25	85	56	46	94	51
oat	32	54.5	71	28	71.5	62	60	63.5	66
ee	45	4.5	100	40	28	89	85	15.5	94
old	43	13	96	45	4.5	100	88	10.5	98
eck	19	105	42	21	102.5	47	40	105	44
ill	26	84.5	58	35	45.5	78	61	61	68
en	42	18.5	93	41	25	91	83	22	92
fire	41	25	91	43	15.5	96	84	18.5	93
ink	40	29	89	39	32.5	87	79	28.5	88
ank	42	18.5	93	35	45.5	78	77	33.5	85
ig	29	72.5	64	31	65.5	69	60	63.5	66
ap	32	54.5	71	35	45.5	78	67	51.5	74
ed	30	66	67	30	67.5	67	60	63.5	66
act	27	79	60	31	65.5	69	58	70.5	64
tea	36	39	80	43	15.5	96	79	28.5	88
eat	41	25	91	43	15.5	96	84	18.5	93
tow	30	66	67	18	112	40	48	90.5	53
em	41	25	91	37	39	82	78	31.5	86
ind	23	94	51	20	108.5	44	43	101	48
ite	26	84.5	58	23	95	51	49	88.5	54
eal	26	84.5	58	33	54.5	73	59	67	65
too	45	4.5	100	45	4.5	100	90	2.5	100

LIST 6 (Continued)

	Third Grade Males (N=45)			Third Grade Females (N=45)			All Third Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ay	34	46.5	76	35	45.5	78	69	46.5	76
eam	20	103.5	44	27	75	60	47	92	52
ack	26	84.5	58	25	85	56	51	85.5	57
it	44	10	98	44	10.5	98	88	10.5	98
ear	34	46.5	76	40	28	89	74	37	82
ang	27	79	60	26	80	58	53	80.5	59
deaf	15	111.5	33	19	111	42	34	114	38
fur	36	39	80	32	60.5	71	68	48.5	75
her	32	54.5	71	32	60.5	71	64	58	71
ush	34	46.5	76	35	45.5	78	69	46.5	76
al	22	97	49	21	102.5	47	43	101	48
age	32	54.5	71	39	32.5	87	71	42.5	79
tone	42	18.5	93	36	41.5	80	78	31.5	86
oll	24	90.5	53	22	98	49	46	94	51
ale	23	94	51	24	85	56	48	90.5	53
ick	29	72.5	64	28	71.5	62	57	74	63
ad	31	60	69	34	50.5	76	65	56	72
ess	15	111.5	33	21	102.5	47	36	111	40
ab	21	100	47	20	108.5	44	41	103.5	45
tass	29	72.5	64	24	90	53	53	80.5	59
few	27	79	60	27	75	60	54	78	60
ied	25	88.5	56	24	90	53	49	88.5	54
ent	38	34	84	36	41.5	80	74	37	82
et	16	109	36	20	108.5	44	36	111	40
ove	30	66	67	26	75	60	57	74	63
id	18	107	40	21	102.5	47	39	106	43
om	32	54.5	71	26	80	58	58	70.5	64
ong	32	54.5	71	23	95	51	55	76.5	61
care	37	36.5	82	40	28	89	77	33.5	85
ock	26	84.5	58	27	75	60	53	80.5	59
ast	38	34	84	33	54.5	73	71	42.5	79
od	21	100	47	25	85	56	46	94	51

LIST 6 (Continued)

	Third Grade Males (N=45)			Third Grade Females (N=45)			All Third Grade Subjects (N=90)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
cue	15	111.5	33	21	102.5	47	37	111	40
ub	30	66	67	32	60.5	71	62	60	69
ish	40	29	89	34	50.5	76	74	37	82
ob	25	88.5	56	25	85	56	50	87	55
un	41	25	91	42	21.5	93	83	22	92
out	45	4.5	100	44	10.5	98	89	6.5	99
up	45	4.5	100	45	4.5	100	90	2.5	100
all	43	13	96	45	4.5	100	88	10.5	98
at	44	10	98	45	4.5	100	89	6.5	99
ull	29	72.5	64	34	50.5	76	63	59	70
cure	11	117	24	11	117	24	22	117	24
iss	30	66	67	29	69.5	64	59	67	65
ag	23	94	51	21	102.5	47	44	98	49
boil	15	111.5	33	23	95	51	38	107.5	42
ice	43	13	96	43	15.5	96	86	13.5	95
ut	35	42	78	32	60.5	71	67	51.5	74
ing	42	18.5	93	42	21.5	93	84	18.5	93
us	40	29	89	42	21.5	93	82	24	91
saw	45	4.5	100	43	15.5	96	88	10.5	98
am	33	50.5	73	38	36	84	71	42.5	79
in	45	4.5	100	45	4.5	100	90	2.5	100
oke	31	60	69	37	39	82	68	48.5	75
an	42	18.5	93	43	15.5	96	83	15.5	94
auto	13	115.5	29	14	115.5	31	27	115.5	30
most	42	17.5	93	44	10.5	98	86	13.5	95
ash	39	31.5	87	40	28	89	79	28.5	88
uff	35	42	78	32	60.5	71	67	51.5	74
ell	28	76	62	24	90	53	52	8315	58

LIST 7

FREQUENCY COUNT, RANK ORDER OF DIFFICULTY, AND ITEM DIFFICULTY ON PHONOGRAM TEST BY 270 SUBJECTS IN THE STUDY ARRANGED BY GENDER

	All Males in the Study (N=135)			All Females in the Study (N=135)			All Subjects in Study (N=270)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ight	66	78.5	49	52	98	39	118	89	44
affy	44	105	33	30	114	22	74	112	27
ound	49	102	36	52	98	39	101	101	37
on	134	1.5	99	133	4	99	267	2.5	99
ot	60	89.5	44	62	77	46	122	82.5	45
um	114	13.5	84	98	25	73	212	18.5	79
og	56	96	41	54	92.5	40	110	96.5	41
able	62	86.5	46	64	74	47	126	79	47
op	86	43	64	81	45.5	60	167	47	62
ore	68	74.5	50	53	94.5	39	121	84.5	45
ip	108	19	80	103	20	76	211	20.5	78
olly	39	110.5	29	42	107	31	81	10.9	30
ake	86	43	64	73	61	54	159	52.5	59
ture	5	119	4	13	118	10	18	119	7
air	92	35	68	83	43	61	175	40.5	65
ate	90	38.5	67	92	32.5	68	182	34	67
ame	80	55.5	59	72	63	53	151	57.5	56
iff	106	21	79	100	22.5	74	206	23	76
im	70	67.5	52	76	58	56	146	63.5	54
ape	20	84	62	80	48	59	164	50	61
tion	11	118	7	12	119	9	23	118	9
and	134	1.5	99	133	4	99	267	2.5	99
owl	94	34	70	100	225	78	194	2.5	72
ud	75	60.5	56	71	65.5	53	146	63.5	54
ace	39	110.5	29	38	111	28	77	111	29
ave	70	67.5	52	72	63	53	142	68.5	53
oss	67	77	50	57	85.5	42	125	81	46

LIST 7 (Continued)

	All Males in the Study (N=135)			All Females in the Study (N=135)			All Subjects in Study (N=270)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ev	63	84	47	67	72	50	130	73.5	48
aid	55	98.5	40	51	102	38	106	100	39
fir	23	115	17	24	115	18	47	115	17
ane	44	105	33	47	105	35	91	105	34
ade	52	101	39	55	90	41	107	99	40
or	108	19	80	112	14.5	83	220	15.5	81
ug	96	30.5	71	96	27	71	192	26	71
tar	44	105	33	40	109	30	84	108	31
ide	83	51.5	65	69	68.5	51	152	57.5	56
cook	105	22	78	107	18	79	212	18.5	79
est	63	84	47	51	102	38	114	90.5	42
oat	69	71	51	77	53.5	57	146	63.5	54
ee	123	9.5	91	115	12	85	238	10.5	88
old	117	12	87	118	105	87	235	12	87
eck	39	110.5	29	40	109	30	79	110	29
ill	74	63.5	55	93	30.5	69	167	47	62
en	113	15	84	112	14.5	83	225	14	83
fire	91	36.5	67	94	29	70	185	32	69
ink	96	305	71	92	32.5	68	188	30	70
ank	96	305	71	77	53.5	57	173	43.5	64
ig	81	54	60	77	53.5	57	158	54.5	59
ap	84	49	62	91	34.5	67	175	40.5	65
ed	75	60.5	66	69	68.4	51	144	67	53
act	56	96	41	54	92.5	40	110	96.5	41
tea	86	43	64	89	38	66	175	40.5	65
eat	108	19	80	109	17	81	217	17	80
tow	53	100	39	40	109	30	93	104	34
em	85	46	63	88	40	65	173	43.5	64
ind	62	86.5	46	52	98	39	114	90.5	42
ite	68	74.5	50	63	75	47	131	72	49
eal	69	71	51	76	58	56	145	66	53
too	133	3.5	99	135	1	100	268	1	99

LIST 7 (Continued)

	All Males in the Study (N=135)			All Females in the Study (N=135)			All Subjects in Study (N=270)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
ay	84	49	62	81	45.5	60	165	49	61
eam	58	93.5	43	62	77	46	120	86	44
ack	68	74.5	50	62	77	46	130	73.5	48
it	133	3.5	99	133	4	99	266	4	98
ear	83	51.5	61	93	30.5	69	176	37.5	65
ang	64	81.5	47	58	84	43	122	82.5	45
deaf	32	113	24	33	112	24	65	113	24
fur	68	74.5	50	61	79	45	129	76	47
her	74	63.5	55	77	53.5	57	151	59.5	56
ush	88	40.5	65	79	49.5	59	167	47	62
al	64	105	33	51	102	38	95	103	35
tone	78	57	58	81	45.5	60	159	52.5	59
oll	61	88	45	60	81	44	121	84.5	45
ale	60	89.4	44	59	83	44	119	87.5	44
ick	80	55.5	59	76	58	56	156	56	58
ad	82	53	61	76	58	56	158	54.5	59
ess	44	105	33	55	90	41	99	102	37
ab	59	91.5	44	52	98	39	111	94.5	41
tass	66	78.5	49	60	81	44	126	79	47
few	42	108	31	45	106	33	87	107	32
ied	63	84	47	56	87.5	41	119	87.5	44
ent	96	20.5	71	79	49.5	59	175	40.5	65
et	55	98.5	41	53	94.5	39	108	98	40
ove	59	91.5	44	52	98	39	111	94.5	41
id	65	80	48	68	71	50	133	71	49
om	91	36.5	67	81	45.5	60	172	45	64
ong	70	67.5	52	56	87.5	41	126	79	47
care	70	67.5	52	69	68.5	51	139	70	51
ock	75	60.5	56	71	65.5	53	146	63.5	54
ast	97	28	76	84	41.5	62	181	35	67
od	56	96	41	57	85.5	42	113	92.5	42

LIST 7 (Continued)

	All Males in the Study (N=135)			All Females in the Study (N=135)			All Subjects in Study (N = 270)		
Phono-gram	f	rank order	item diff	f	rank order	item diff	f	rank order	item diff
cue	39	110.5	29	50	104	37	89	106	33
ub	75	60.5	56	76	58	56	151	59.5	56
ish	100	25	74	90	36	67	190	28	70
ob	58	93.5	43	55	90	41	113	92.5	42
un	114	13.5	84	114	13	84	228	13	84
out	126	8	93	121	9	90	247	9	91
up	132	5	98	132	7	88	264	8	92
all	123	9.5	91	126	8	93	249	8	92
at	129	7	96	133	4	99	262	7	97
ull	85	46	63	78	51	58	163	51	60
cure	20	116	15	21	116	16	41	116	15
iss	76	58	56	72	63	53	148	61	55
ag	73	65	54	69	68.5	51	142	68.5	53
boil	26	114	19	31	113	23	57	114	21
ice	103	23	76	106	19	79	209	22	77
ut	99	26	73	84	41.5	62	183	33	67
ing	111	16	82	100	22.5	74	211	20.5	78
us	120	11	89	118	10.5	87	238	10.5	88
saw	95	33	70	95	28	70	190	28	70
am	90	38.5	67	100	22.5	74	190	28	70
in	131	6	97	133	4	99	264	5.5	98
oke	88	40.5	65	89	38	66	177	36	66
an	110	17	81	110	16	81	220	15.5	81
auto	16	117	12	19	117	14	35	117	13
most	85	46	63	91	34.5	67	176	37.5	65
ash	102	24	76	97	26	72	199	24	74
uff	98	27	73	89	38	66	187	31	69
ell	69	71	51	60	81	44	129	76	48

LIST 8

PHONOGRAM, FREQUENCY COUNT, ITEM DIFFICULTY, RANK ORDER ACCORDING TO EMPIRICAL STUDY, RANK ORDER ACCORDING TO GLASS AND RANK ORDER DIFFERENCE

Phono-gram	f	Item Diff	Empirical Rank Order	Glass Rank Order	Rank Order Difference
too	268	99	1	110	109
on	267	99	2.5	64	61.5
and	267	99	2.5	15	12.5
it	266	98	4	4	0
up	264	98	5.5	33	27.5
in	264	98	5.5	13	7.5
at	262	97	7	1	6
all	249	92	8	47	39
out	247	91	9	111	102
us	238	88	10.5	72	61.5
ee	238	88	10.5	105	94.5
old	235	87	12	20	8
un	228	84	13	12	1
en	225	83	14	28	14
or	220	81	15.5	65	49.5
an	220	81	15.5	8	8.5
eat	217	80	17	82	65
um	212	79	18.5	17	1.5
cook	212	79	18.5	68	49.5
ip	211	78	20.5	25	4.5
ing	211	78	20.5	2	18.5
ice	209	77	22	51	29
iff	206	76	23	53	30
ash	199	74	24	21	3
owl	194	72	25	71	46
ug	192	71	26	29	3
saw	190	70	28	48	20
ish	190	70	28	22	6
am	190	70	28	11	17

LIST 8 (Continued)

Phono-gram	f	Item Diff	Empirical Rank Order	Glass Rank Order	Rank Order Difference
ink	188	70	30	54	24
uff	187	69	31	59	28
fire	185	69	32	101	69
ut	183	67	33	30	3
ate	182	67	34	34	0
ast	181	67	35	80	45
oke	177	66	36	77	41
ear	176	65	37.5	102	64.5
most	176	65	37.5	88	50.5
tea	175	65	40.5	104	63.5
air	175	65	40.5	97	56.5
ap	175	65	40.5	14	26.5
ent	175	65	40.5	35	5.5
ank	173	64	43.5	45	1.5
em	173	64	43.5	32	11.5
om	172	64	45	76	31
ill	167	62	47	73	26
op	167	62	47	7	40
ush	167	62	47	60	13
ay	165	61	49	9	40
ape	164	61	50	42	8
ull	163	60	51	66	15
ake	159	59	52.5	37	15.5
tone	159	59	52.5	90	37.5
ig	158	59	54.5	24	30.5
ad	158	59	54.5	10	44.5
ick	156	58	56	52	4
ame	152	56	57.5	41	16.5
ide	152	56	57.5	38	19.5
her	152	56	59.5	63	3.5
ub	152	56	59.5	58	1.5
iss	148	55	61	63	2
oat	146	54	63.5	108	44.5

LIST 8 (Continued)

Phono-gram	f	Item Diff	Empirical Rank Order	Glass Rank Order	Rank Order Difference
im	146	54	63.5	6	57.5
ud	146	54	63.5	26	37.5
ock	146	54	63.5	39	24.5
eal	145	53	66	103	37
ed	144	53	67	23	44
ave	142	53	68.5	92	23.5
ag	142	53	68.5	19	49.5
care	139	51	70	106	36
id	133	49	71	27	44
ite	131	49	72	74	2
ev	130	48	73.5	96	22.5
ack	130	48	73.5	16	57.5
al	129	47	76	98	22
ell	129	47	76	49	27
fur	129	47	76	115	39
ong	126	47	79	46	33
able	126	47	79	61	18
tass	126	47	79	83	4
oss	124	46	81	86	5
ot	122	45	82.5	5	77.5
ang	122	45	82.5	44	38.5
ore	121	45	84.5	78	6.5
oll	121	45	84.5	89	4.5
eam	120	44	86	87	1
ale	119	44	87.5	91	3.5
ied	119	44	87.5	99	11.5
ight	118	44	89	62	27
est	114	42	90.5	36	54.5
ind	114	42	90.5	85	5.5
od	113	42	92.5	56	6.5
ob	113	42	92.5	55	37.5
ab	111	41	94.5	18	76.5
ove	111	41	94.5	78	6.5

LIST 8 (Continued)

Phono-gram	f	Item Diff	Empirical Rank Order	Glass Rank Order	Rank Order Difference
og	110	41	96.5	57	39.5
act	110	41	96.5	67	29.5
et	108	40	98	3	95
ade	107	40	99	40	59
aid	106	39	100	117	17
ound	101	37	101	112	11
ess	99	37	102	75	27
age	95	35	103	95	8
tow	93	34	104	79	25
ane	91	34	105	81	24
cue	89	33	106	109	3
few	87	32	107	100	7
tar	84	31	108	31	77
olly	81	30	109	94	15
eck	79	29	110	50	60
ace	77	29	111	43	68
affy	74	27	112	70	42
deaf	65	24	113	107	6
boil	57	21	114	119	5
fir	47	17	115	116	1
cure	41	15	116	113	3
auto	35	13	117	118	1
tion	23	9	118	69	49
ture	18	7	119	114	5

LIST 9

FIFTY-NINE PHONOGRAMS HAVING RANK ORDER DIFFERENCES OF TWENTY-FIVE POINTS OR MORE AND THE DIFFERENCES BETWEEN THE TWO RANK ORDERS

Phonogram	Rank Order in the Study	Rank Order by Glass	Difference in Rank
too	1	110	109
out	9	111	102
et	98	3	95
ee	10.5	105	94.5
ot	82.5	5	77.5
tar	108	31	77
ab	94.5	18	76.5
fire	32	101	69
ace	111	43	68
eat	17	82	65
ear	37.5	102	64.5
tea	40.5	104	63.5
on	2.5	64	61.5
us	10.5	72	61.5
eck	110	50	60
ade	99	40	59
im	63.5	6	57.5
ack	73.5	16	57.5
air	40.5	97	56.5
est	90.5	36	54.5
most	37.5	88	50.4
or	15.5	65	49.5
cook	18.5	68	49.5
aq	68.5	19	49.5
tion	118	69	49
owl	25	71	46
ast	35	80	45

LIST 9 (Continued)

Phonogram	Rank Order in the Study	Rank Order by Glass	Difference in Rank
oat	63.4	108	44.5
ad	54.5	10	44.5
ed	67	23	44
id	71	27	44
affy	112	70	42
oke	36	77	41
op	47	7	40
ay	49	9	40
og	96.5	57	39.5
fur	76	115	39
all	8	47	39
ang	82.5	44	38.5
ud	63.5	26	37.5
tone	52.5	90	37.5
ob	82.5	55	37.5
eal	66	102	37
od	92.5	56	36.5
care	70	106	36
ong	79	46	33
om	45	76	31
ig	54.5	24	30.5
iff	23	53	30
act	96.5	67	29.5
ice	22	51	29
uff	31	59	28
up	5.5	33	27.5
ight	89	62	27
ess	102	75	27
ell	76	49	27
ap	40.5	14	26.5
ill	47	73	26
tow	104	79	25