# A STUDY OF GENERAL READING ABILITY IN RELATION TO LANGUAGE PERCEPTION PATTERNS AND A DIAGNOSTIC OR NON-DIAGNOSTIC APPROACH TO READING INSTRUCTION

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# THE PROBLEM

## Introduction

The development of reading skills is necessary for formal education today. The teaching of reading is a primary responsibility of teachers in the American school system. Smith and Dechant define reading and stress its importance in the American school curriculum:

> It is through perception that the graphic achieves meaning . . . . The individual's experiences cumulated through the interaction of his physiology with his environment results in his conceptual development. An abstract level of perception requires the summing up of a vast number of sensory impingements. Yet only at this level of perceptual development does one take sufficient meaning to the printed page to allow for true communication via reading (Smith and Dechant, 1961, pp. 20-44).

These authors also stress the need for application of research findings and theories to classroom situations.

The individual's ability to respond to the visual clues of the printed page is his most basic tool for future learning in all discipline areas; yet one of the greatest problems in education today is that many students do not develop the competency in reading required to do satisfactory work in school. The fact that large numbers of students are not learning sufficient reading skills to function in the average classroom is further evidenced by the federal government's financial aid programs for remedial reading.

Even though the appeal for instruction geared toward individual abilities is great, few suggestions are offered for implementing such a reading program. Little has been said about the choice of instructional materials based on a theory of the reading process and its relationship to the student's currently functioning reading skills. Most reference to the choice of instructional materials revolves around the quantity and quality of materials required to develop specific reading skills. Haskew and McLendon (1968) stress the need for a greater professional choice of materials. Since all students do not learn and perform reading skills at the same rate and with the same intensity, all of them cannot be taught with the same materials nor the same methods. This implies the need for a diagnostic approach to reading instruction.

The Substrata-Factor Theory of Reading infers the possibility of breaking down and diagnosing the reading process and provides a reading-process model upon which to build a reading instructional program that will bridge the gap between a program based on the amount and variety of materials and one based on a choice of materials related to reading process and the individual's reading-skill patterns. Holmes and Singer (1960) theorize that general-reading ability is composed of two major components, speed and power of reading, and each of these components is composed of a multiplicity of related measureable factors.

They also theorize that groups of students mobilize different subabilities to achieve success in reading. The individual's total reading-working system is dependent upon the order of and subsequent content stored in the substrata factors. They theorize that the improvement of a related substrata factor results in improved reading ability.

The theory states that the sequential input of information gives a differentiated structure to the individual's reading-working system; therefore, different individuals may perform the same reading task by drawing upon a different set of subabilities. The improvement of a relevant substrata factor of reading interfacilitates the efficiency of reading ability which in turn increases perceptual discrimination of printed symbols.

In order to measure these reading factors, a diagnostic test battery related to these factors must be administered and evaluated. This need for a diagnostic test battery and diagnostic teaching is stressed by Della-Piana (1969). He states that a test battery is probably the best instrument to identify the strengths and weaknesses of a reader's reading-skill patterns. These skill patterns need to be a focal point for instruction in reading. The Language Perception Test Series developed by Singer (1967) based on the Substrata-Factor Theory developed by Singer (1967) assumes this recommended identification of the major components of the reading process and provides a cluster-pattern performance of the individual's strengths and weaknesses in these components. Thus, according to the theory, a pre-instructional identification of the student's reading-cluster profile can be made. The cluster-profile will then serve as a foundation for implementing an instructional program based on both group and individual differences in reading. This cluster-profile can also provide a basis for choice of instructional materials based on a theory of the reading process and the status of the individual's current reading-skill patterns.

The importance of evaluating the student's patterns of learning to read are also expounded by Austin, Rush, and Huebner (1961). They

concluded that "unless a program of testing and follow-up is carried on, students and teachers remain unaware that some part of the sequential pattern of learning to read has been missed." They also hypothesized that a tabulation of errors made by individuals and groups with similar difficulties is needed to provide instruction geared to their needs. The need for a theoretical basis for choice of reading instructional materials is inferred.

Wilson (1967) reports the need for a single test battery based on the theory of the reading process. Strang (1964) implies the probability of a hierarchical sequence of reading skills and advocates the need for specific appraisal and diagnostic procedures.

Present methods of instruction and choice of instructional materials which overlook a theory of the reading process seem to be inadequate for a large percent of students. Authorities in the field of reading suggest that a more effective approach to reading instruction is likely to be one that provides an instructional program based on a pre-instructional diagnosis of reading-patterns. It seems feasible that a diagnostic approach to teaching reading in which the student's reading matrix is identified and an instructional program based on developmental and corrective measures of this matrix will improve general reading ability.

Since language-perception patterns and their relationship to general-reading ability have been introduced by past research, further investigation is needed concerning their relationship to teaching method and choice of instructional materials.

## Statement of the Problem

The application of theory to classroom practice is greatly neglected. Dawson (ed. 1967) reviews past practices and says that much attention has been given to terminology to "label children with reading problems," and proposes further that little has been done to "translate research findings into practice."

The major purpose of this experiment is to study the changes in general reading ability in relation to teaching method, preinstructional diagnosis, and choice of instructional materials. Changes in language-skill patterns will be observed.

A second purpose of this study is to apply theory to classroom practice by investigating a diagnostic-teaching technique in which the choice of instructional materials and a prescribed instructional program are based upon a preinstructional diagnosis of the student's language-perception patterns. A follow-up evaluation of the change in language-perception patterns will be made.

The diagnosis of language-perception patterns will be analyzed and evaluated in relation to the Substrata-Factor Theory of reading and The Language Perception Test Series based upon this theory. This investigation examines the following hypotheses:

1. There are no significant differences in vocabulary, comprehension, and general-reading ability when students are taught by a diagnostic approach or nondiagnostic approach to reading instruction.

2. There is no significant difference between the experimental group's pretest-posttest language-perception patterns and/or cluster domains of Basic Visual Skills, Visual Word Attack Skills, Auditory Word Skills, Analytical Word Attack, and Total domains as measured by The Language Perception Test Series.

3. There is no significant difference between the control group's pretest-posttest language-perception patterns and/or cluster domains of Basic Visual Skills, Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total domains as measured by The Language Perception Test Series.

4. There is no significant difference between mean scores of the experimental and control groups in relation to language-perception patterns and/or cluster domains of Basic Visual Skills, Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total domains as measured by The Language Perception Test Series.

5. There are no significant posttest changes in language-perception patterns and/or cluster domains Basic Visual Skills, Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total domains of individual students within experimental and control groups as measured by The Language Perception Test Series.

6. There are no significant posttest changes in language-perception patterns and/or cluster domains Basic Visual Skills, Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total domains of experimental and control groups as measured by The Language Perception Test Series.

7. There are no significant posttest changes in percentage-ratio differences in language-perception patterns and/or cluster domains Basic Visual Skills, Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total domains for experimental and control groups; subgroups when categorized by sex and intelligence levels.

## Delimitations of the Study

There are certain delimitations of this study that need to be considered. The major limitation is the use of intact groups which cannot be assigned at random. The choice of instructional materials is an arbitrary selection of reading-skill exercises based on the language-perception patterns and/or cluster-domain patterns measured by The Language Perception Test Series. The diagnostic skills of the

individual making this choice will influence the results of the experiment. The reading process model used in this study is limited to the model developed by Holmes and Singer. The Substrata Factor Theory of Reading Level I criterion may be unrelated to levels II and III factors. Data from a single test may not support the individual's present perceptual ability (Wark, 1966).

## Definition of Terms

The following definitions of terms are used in this report:

Diagnostic Approach to Reading Instruction is an approach to teaching reading in which preinstructional analyses of vocabulary, comprehension, total general-reading ability, and language-perception patterns and/or cluster-domain patterns are made for individuals within instructional groups. Subgrouping for instruction, instructional materials, and skill-development methods are differentiated within groups in accordance with these preinstructional analyses. This subgroup analysis consists of a survey of the grade-placement score range of the total group in total general-reading ability. Vocabulary and comprehension are subdivisions of this total score. Students with similar general-reading ability levels are grouped for small-group instruction on the basis of this grade-placement instructional level. The language-perception patterns of each student within these subgroups are analyzed. These patterns are based on cluster-domains I, II, III, and IV as measured by The Language Perception Test Series. Cluster-domains below the 35th percentile standard norm score are considered for instructional development. Those above this percentile score are considered to be the student's and subgroup's present mode of reading

performance. The student's and subgroup's basic reading program is chosen to utilize and facilitate this identified present mode of performance in reading. A supplementary reading program is given to the group to develop the language-perception patterns identified as underdeveloped. An enrichment program is also given to the group to interfacilitate all the language-perception skills and to expand the informational background of the students. Daily progress charts are kept of each student's performances of the instructional program. This instructional program is adjusted immediately according to the student's progress or lack of progress in reading-skill performance.

Nondiagnostic Approach to Reading Instruction is an approach to teaching reading in which no preinstructional analyses of general readability levels and language-perception patterns are made and no individual or group differentiations are made of materials and methods of reading instruction.

General-Reading Ability is the composite vocabulary meaning and comprehension from context raw score performance under time on the Nelson-Denny Reading Test, Form A, Grades 3-9 (Houghton Mifflin Company, 1962). It includes both speed and power of reading.

Speed of Reading is the rate the individual comprehends the printed page.

Power of Reading is the ability to comprehend or compare and contrast incoming information with relevant information already stored from past experience.

Language-Perception Patterns and/or Cluster Domains are the language-perception skills and/or cluster domains I, II, III, IV, and V standard score performances as measured by The Language Perception

Test Series, E-J (Psychological-Educational Services Association, 1966).

Cluster-domains are the four language-perception patterns measured by The Language-Perception Series. These patterns include Basic Visual Skills (I); Visual Word Attack Skills (II); Auditory Word Attack Skills (III); Analytical Word Attack Skills (IV); and Total domains (V).

## Assumptions of the Study

It is assumed that testing conditions of this study will encounter no more chance situations than any testing situation.

It is assumed that the same teacher for experimental and control group condition will encounter no more change situations than any teaching situation.

## Significance of the Study

This study is an investigation into the importance of the selection of reading instructional materials and methods based on a preinstructional diagnosis of language-perception patterns and their relation to the improvement of general-reading ability. The findings of this study will have significance for those involved in classroom reading instruction, teacher training programs, and clinical diagnosis of reading difficulties.

This observation of pretest instructional language-perception patterns is an addition to previous studies mentioned in this report. It presents specifically observed cases of individual and group differences in reading-process component performances. It further presents observations of applications of these differentiated patterns by groups

and individuals in the performance of the reading task at similar general-reading ability levels.

Since any reading instruction program needs to be adapted to the individual abilities of students, this study should help answer questions related to the diagnosis of reading-development patterns, reading-error patterns, and the establishment of an instructional approach to nurture these individual reading-ability patterns.

## Organization of the Study

Chapter I introduces the background for the study, the statement of the problem, the hypotheses to be tested, and the significance of the study for reading teachers, teacher trainers, and reading clinicians.

Chapter II relates a review of the literature related to development of the Holmes-Singer reading-process model, the construction of the test battery to measure the model, and the hypotheses of the Substrata Factor Theory of reading.

Chapter III presents the design and sample of the study, the test instruments used to test the hypotheses, materials and method of instruction used in the experiment, and the statistical treatment of the data.

Chapter IV reviews analysis of data, statistical evaluation, and testing of hypotheses.

Chapter V gives a summary of the study, presents conclusions drawn from the experiment, and makes recommendations for future research.

## Summary

Recent research has moved into the area of reading-process model development and statistical measurements of the language-perception patterns within the components of this process. This chapter has presented a background study of the research in this area.

The stated purpose of this study is to investigate a diagnostic-teaching technique, language-perception patterns based on the Holmes-Singer reading model, and their relation to general-reading ability. It proposes to make a follow-up evaluation of language-perception pattern changes.

Seven hypotheses are presented for examination, assumptions and definition of terms for the study are reviewed, and the significance of the study for teacher and reading clinicians is posed.

In Chapter II a review of research related to the development of the Holmes-Singer reading model and its relevance to this study will be presented.

## CHAPTER II

## STATEMENT OF THE THEORY

Holmes' Substrata-Factor Theory of Reading attempts to explain individual differences in reading ability and provides a theoretical basis for diagnosing general-reading ability. The theory holds that reading is a process in which a hierarchy of substrata factors or neurological memory systems stored in the brain serve as mobilized working-systems used according to the reader's purpose. These substrata factors are auditory, visual, and kinesthetic associations or modalities developed from the individual's cultural matrix that are functioning together as a working-system. They are used by the reader to reason and interpret the printed page. The individual's reading performance is sustained by the interfacilitation of these associations. This sustained reading performance is a form of general-reading ability composed of two major components called speed and power of reading. Speed and power of reading are composed of a number of factors that are related and can be measured (Holmes, 1966).

The theory further states that as an individual learns to read he acquires an interwoven mental structure that is organized and operates on three hierarchical levels. Each hierarchical level is composed of stored elements developed from learning and instruction of defined areas in the reading process. These neurological subsystems are categorized as input, mediational, and output system. In conjunction with

memory processes these systems can be mobilized into a variety of working-systems for attaining speed and power of reading (Holmes and Singer, 1964).

Analyses of speed and power of reading show that three sequential levels of substrata factors are mobilized by the reader to perform the reading act. Both of these components have different amounts of the same factors. The Level I order is the culmination of Levels II and III. It is the working-system used by the mature reader. The reading process is developed by the reader beginning with Level III substrata factors. These Level III factors are underlying, supporting, and contributing factors for Level II. Both Levels II and III are underlying factors related to Level I. Figure 1 shows this hierarchical structure of the three levels for speed and power of reading.

The factors not accounted for in speed and power of reading may be related to the individual's value system. In the speed of reading, these factors may be related to motivational habit or desire for speed. In the power of reading, these factors may be related to the effort needed or desire to know the information (Holmes and Singer, 1966).

Figure 2 shows quantitative changes that occur in the substrata factors for the power of reading in grades 3 through 6. It shows a developmental integration of a subsystem for the power of reading in these grades (Singer, 1964).

Singer (1964) presents trends in the developmental model for the power of reading. Figure 3 shows the Level I substrata factors in the power reading at the sixth grade, high school, and college levels. It makes a comparison of these first level substrata factors for these levels.

| Component | Level I | Level II | Level III |
|---|---|---|---|
| Speed | Word Sense<br>Word Discrimination<br>Span of Recognition<br>Factors Not Accounted For | Word Sense<br>Intelligence<br>Spelling<br>Vocabulary in Context | Phonetics<br>Vocabulary in Context<br>Span of Recognition<br>Residual from Word Sense |
| Power | General Information<br>Phonetics<br>Word Discrimination<br>Suffixes<br>Residual from Vocabulary in Isolation | General Information<br>Vocabulary in Isolation<br>Prefixes<br>Residual from Vocabulary in Context | Perception of Verbal Relationships<br>Intelligence<br>Vocabulary in Context<br>Fixations<br>Factors Not Accounted For |

Figure 1. Substrata Factors Underlying Speed and Power of Reading (Holmes and Singer, 1966)

| Grade | Direct Contribution | Indirect Contribution |
|---|---|---|
| 3 | Syllabication<br>Consistency | ----- |
| 4 | Visual Verbal<br>Conceptualization | Syllabication<br>Consistency |
| 5 | Word Recognition<br>in Context | Visual Verbal<br>Conceptualization<br><br>Syllabication<br>Consistency |
| 6 | Visual Verbal Meaning | Word Recognition<br>in Context |

Figure 2. A Subsystem for Power of Reading for Grades Three Through Six (Singer, 1964)

| Grade | Level I Substrata Factors |
|---|---|
| 6 | Visual Verbal Meaning<br>Meaning of Affixes<br>Matching Sounds in Words |
| High School | Vocabulary in Context<br>Vocabulary in Isolation<br>Visual Verbal Meaning<br>Verbal Analogies<br>Auding<br>Tonal Intensity<br>Mechanical Interest<br>Effective Study Plan |
| College | Vocabulary in Context<br>Perception of Verbal Relationships<br>Intelligence<br>Fixations (Fewer Fixations per Hundred Words) |

Figure 3. A Comparison of First Level Substrata Factors for Power in Reading at the Sixth Grade, High School, and College Levels (Singer, 1964)

These substrata-factor patterns indicate that reading is an "audio-visual verbal processing skill of symbolic reasoning" (Holmes and Singer, 1961), but at the sixth grade level auding ability is a more abstract organization; the direct contribution of vocabulary abilities increases past the sixth grade; but Affixes and Matching Sounds in Words are subordinate with other factors at the high school and college levels (Singer, 1964).

## Statements of Postulates, Hypotheses, and Assumptions of the Theory

The major postulate of the theory is the gradient-shift postulate. It states that as a student matures in reading the substrata-factor working-systems will change. His hierarchy of substrata factors will be reorganized and reflect the action of his physical, psychological, and educational developmental stages; the organization and nature of instructional materials read; the instructional methods used; and his present value system.

Three major hypotheses of the theory are, first, the mutual-reciprocal causation hypothesis which states that the improvement of a substrata factor will improve reading ability and efficiency of the working-system. This interfacilitating action in turn improves the content of the substrata factors and perceptual discrimination of printed symbols (Holmes, 1966).

Second, the theory hypothesizes that the mobilizers are value-systems, and these value-systems select the individual's working-system that maximizes success in solving a specific problem and maximizes the realization of self-fulfillment (Holmes, 1966).

Third, the theory hypothesizes that the power of the working-system is dependent upon the sequential input and substantive content of the material stored in each substrata factor, therefore, an intellectual problem can be solved in a variety of ways. Consequently, different individuals will solve the same problem with different working-systems. Thus the initial approach to reading instruction will direct the interfacilitating process of the individual's reading working-system. Different initial approaches to reading instruction will produce different learning products (Holmes, 1966).

Findings from research related to the Substrata-Factor Theory have produced some minor hypotheses. These hypotheses state that the integration of substrata factors for speed and power of reading continues throughout all grades. At grade six the vocabulary domain has a mature organization, but auding skills have shifted from a concrete to an abstract organization at the high-school level. At the higher school levels, visual modality of response is dominant over the auditory modality of response (Singer, 1964). Intelligence and power of reading have some common elements, but factors measured by intelligence tests are not those measured by reading tests. The same factors may not be mobilized by the reader in performances on the two types of tests. It is necessary to teach a hierarchy of reading skills to bright students as well as all students if they are to attain power in reading (Singer, 1964).

The Substrata-Factor Theory of Reading has two basic assumptions. The first assumption assumes that each substrata factor is composed of subsystems. Each system has microsystems formed together into a hierarchy of comprehensive working-systems. Each substrata has a function

of its own and also contributes to a larger working-system. The second assumption is that the mutual-reciprocal interaction of substrata factors need not be equal in both directions (Holmes, 1966).

These postulates, hypotheses, and assumptions are presented in Figure 4.

## Studies Related to the Theory

A series of research studies have been developed around the Substrata-Factor Theory of Reading and provide a background for statistical measurement of reading subabilities. Holmes (1948) divided the two major components, speed and power of reading, into underlying factors. His research findings revealed that at the college level speed and power of reading are both dependent upon a constellation of abilities. Both components are sustained by varying portions of the same factors. It is evident, therefore, that an instructional program which includes a combination of all these supporting factors would be more effective than a program that stresses isolated elements.

Holmes (1954) attempted to factor the reading process and develop a set of tests to measure speed and power of reading. In order to assess these subfactors, 400 high school students were administered 56 separate tests which included the diverse elements of mental and linguist abilities; visual-verbal and auditory perception; listening comprehension, academic-attitude habits and interests; emotional and social problems; and musicality. The research results indicate that the power of reading relies on word knowledge, manipulation of verbal concepts, and auding ability. It also indicates that the groups studied utilized varying degrees of the subabilities of the reading act.

| Postulates | Major Hypotheses | Minor Hypotheses | Assumptions |
|---|---|---|---|
| Gradient-Shift--As a student matures in reading the substrata factor working-system changes | Mutual-Reciprocal Causation--the improvement of a substrata factor improves reading ability and efficiency of the working-system. Interfacilitation improves content of substrata factors and perceptual discrimination.<br><br>Mobilizers are value systems that select working-systems that maximize success in problem solution and self-fulfillment.<br><br>The power of the working-system depends upon the sequential input and substantive content of substrata factor. Intellectual problems can be solved in a variety of ways. | The integration of substrata factors for speed and power in reading continues throughout all grades.<br><br>At the higher school levels, visual modality of response is dominant over the auditory modality of response.<br><br>Intelligence and power have some common elements, but factors measured by intelligence tests are not those measured by reading tests.<br><br>It is necessary to teach a hierarchy of reading skills to bright students as well as all students. | Each substrata factor is composed of subsystems. Each system had microsystems formed into a hierarchy of working-systems. Each substrata has a function of its own and contributes to a larger working-system.<br><br>Mutual-reciprocal interaction of substrata factors need not be equal in both directions. |

Figure 4. The Postulates, Hypotheses, and Assumptions of the Substrata Factor Theory of Reading Used in This Study (Singer, 1964; Holmes, 1966)

Holmes' (1954) research with select subgroups revealed that speed was greater for girls but power was the same for both girls and boys. Both boys and girls used different combinations of substrata factors in reading. To gain power in reading, bright students used visual-verbal meaning predominately while dull students utilized auditory-visual and linguistic perception predominately. In the speed component, the bright group differed from the dull group in visual verbal meaning. The dull group differed in vocabulary in context and word sense. Holmes also made a factoral analysis of these two major components and their subabilities and provided a statistical model of the reading process at the high school level.

Another series of research related to the Substrata-Factor Theory of Reading was made by Singer (1960). The three broad categories of word meaning, word recognition, and reasoning in context were established at the fourth-grade level. His study also indicated that shifts in the reading task at the fourth-grade level requires a reorganization of the reader's reading working-system. Holmes and Singer (1961) developed a reading model for both components at the fourth-grade level. The series of tests developed to make these assessments of known groups' present reading abilities made possible future diagnoses of individual reading-skill patterns.

Singer (1960) supported the substrata-factor hypothesis of Holmes by his study of conceptual ability at the fourth-grade level. He developed a statistical percentage model of speed and power of reading and it revealed at the elementary fourth-grade level basic elements contributing to variances of both components. From this study, it was concluded that visual and aural factors complement each other in the

speed and power of reading. Figures 5 and 6 show these substrata factors of speed and power of reading the fourth grade level in diagram form (Spache and Spache, 1969).

Figure 5 shows the subabilities of the speed of reading. Mental Age and Chronological Age are subabilities of Conceptual Ability. Conceptual Ability and Auding Memory for Stories are subabilities of Auding Vocabulary. Spelling Recognition and Visual Verbal Abstraction are combined subabilities of Word Perception Discrimination, while Word Recognition in Context and Word Perception Discrimination are subabilities of Phrase Discrimination. Mental Age, Auding Vocabulary, and Phrase Perception Discrimination combine into speed of reading at the highest level.

Figure 6 shows that in the power of reading the use of Prefixes, Spelling Recognition, and Spelling Recall make up the subskill of Word Recognition in Context. Mental Age, Suffixes, and Word Recognition in Context contribute to the subskill of Vocabulary in Isolation. Spelling Recall and Blending Word Sounds are subabilities of Matching Sounds in a Word. At the highest level, Mental Age, Suffixes, Vocabulary in Isolation, and Matching Sounds in a Word together combine into power and comprehension in reading.

A reading-skill pattern analysis was made by Singer (1960). He made a profile analysis of a five-and-a-half-year-old precocious reader and compared it with the performance of an average fourth-grade reader's performance in speed and power of reading. The subjects were also compared with the sixteen most powerful readers and the sixteen least powerful readers at the fourth-grade level. The results showed that profile trends of average fourth-graders indicate even development in

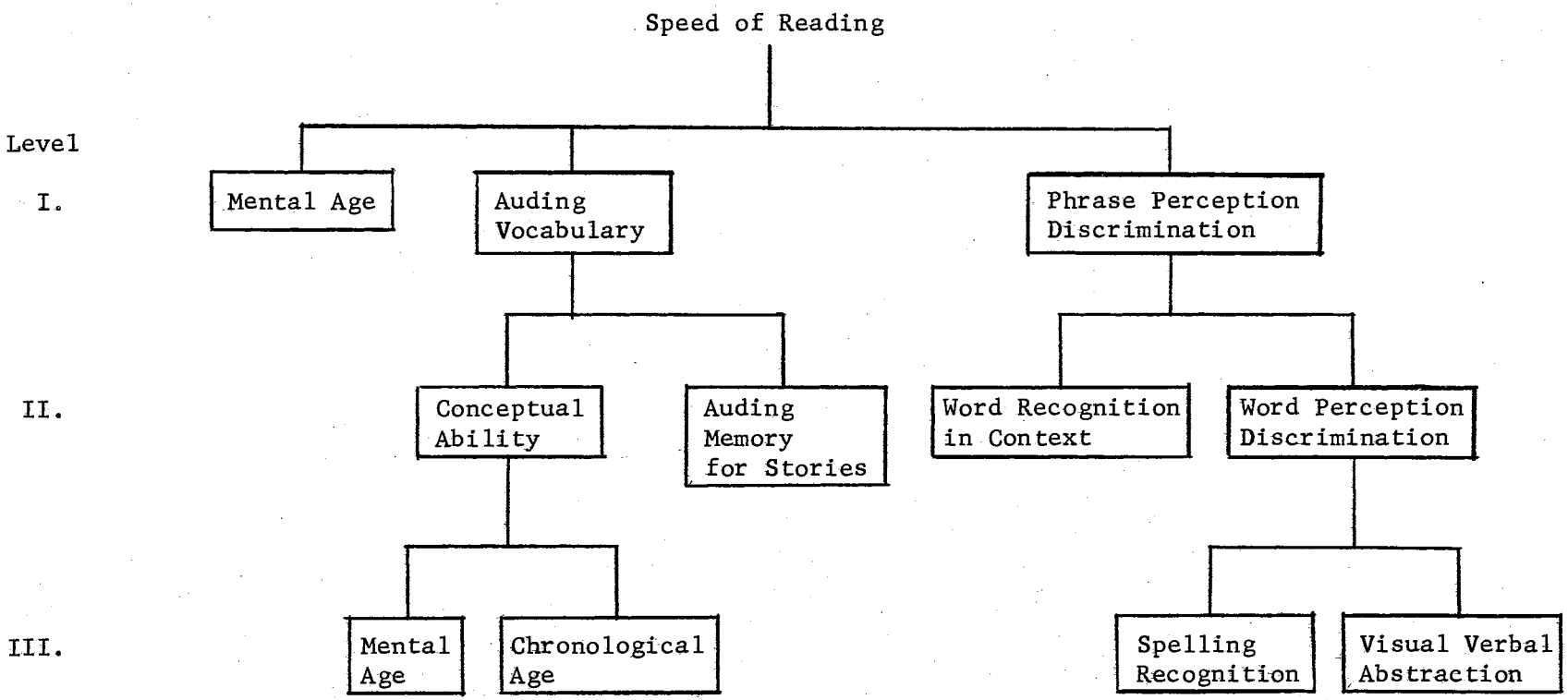


Figure 5. Substrata Factors in Speed of Reading at the Fourth Grade Level (Spache and Spache, 1969, p. 32)

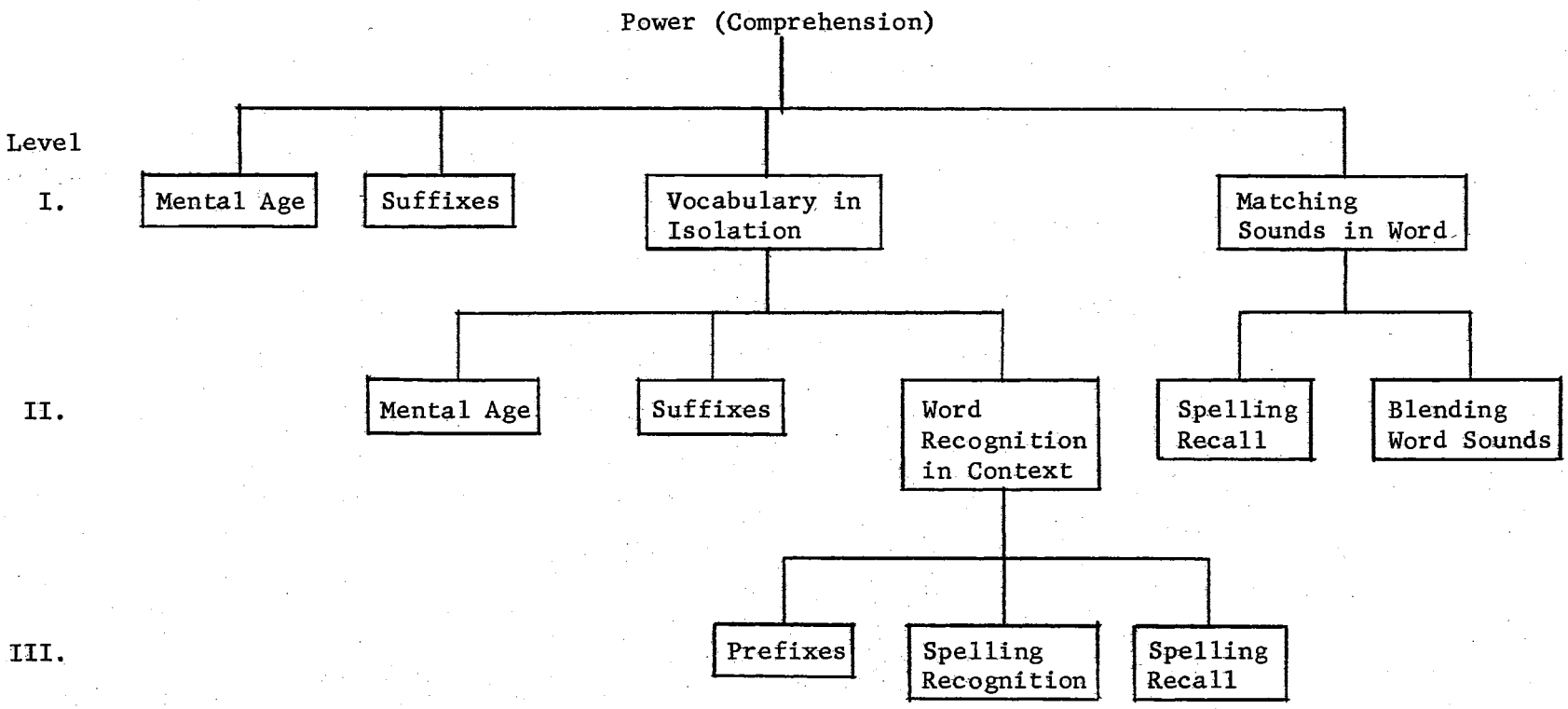


Figure 6. Substrata Factors in Power of Reading at the Fourth Grade Level (Spache and Spache, 1969, p. 33)

the components. The study further showed the precocious reader's profile to be uneven with highly developed auditory-visual perceptual skills and word recognition abilities but lesser developed word meaning and reasoning in context. This study brought the concept of readiness into a new focus--a specific level of readiness in each substrata-factor of reading instead of a general readiness level. It was further hypothesized that instruction in a specific substrata level could be started at any grade level as soon as the student developed a readiness for it. This hypothesis implies the need for preinstructional diagnosis of the substrata-factors of reading for a class group as well as for individuals within the class. It also implies a sequential selection of teaching materials. Singer (1963) supported this hypothesis by predicting that the interaction of intra-individual learning capabilities and methods of utilizing these capabilities will result in an uneven profile of reading-skill patterns.

Singer (1964, 1965) tested the major developmental hypothesis of the Substrata-Factor Theory of Reading. He administered a battery of reading variables to 250 pupils in each grade three through six. The hypothesis was supported and a developmental model was made of an average individual's general working-system for attaining speed and power of reading at these grade levels. The component of speed in reading was discovered to undergo a developmental change from predominance in visual perceptual abilities at the third grade to a more equal organization of visual perceptual abilities and word meaning factors at the sixth grade.

A second study of conceptual ability was made by Singer (1965). He theorized an interaction of "perceptual process and conceptualization

reinforced by successful practice." He stated that a coherent and flexible system develops in which all the parts are compounded and recompounded into working-systems. He concluded that to attain speed and power in reading an individual forms a working-system that is composed of his own unique strengths and weaknesses. He also concluded that if an individual is to attain speed and power in reading, he must put into action a minimum amount of certain common subsystems. Thus each individual acquires a basic developmental working-system around which his own unique system varies. He called this common route conceptual flexibility.

Singer (1966, 1967) developed a rationale for the classroom use of national norms for The Language Perception Test Series and an Instructional Materials Index for grades three through nine. Examples proposed for preinstructional cluster-profile analyses of a ninth-grade remedial reading class are presented and suggested plans for diagnostic teaching in relation to language-perception patterns are proposed. A plan for preinstructional diagnosis, profile-grouping, and instructional materials is suggested, but the implementation of such a plan is omitted.

The Laycock study (1966) supported the hypothesis that flexibility in reading may be the interfacilitation of visual sensitivity and word meaning. Laycock reports that above the sixth grade a balance between these two factors will occur. Previous research had stressed visual sensitivity as important below the third-grade while at the sixth-grade level word meaning is predominant.

A contribution to the formation of statistical reading-process models was made by Kling (1966) when he made a substrata analysis of

power in reading. He developed a schema depicting the three order levels of power of reading. Three subsystems at Level I accounted for 73.84% of the power of reading. These factors were Vocabulary in Isolation, Geography, and Arithmetic Reasoning. Implications are that future training will need to facilitate working-systems of one content field which in turn will be interfacilitated with differentiated knowledge from other fields. Figure 7 shows the substrata factors of the content areas operating in the power of reading at the ninth-grade level. It supports the need for enrichment of subject matter in reading.

A review of past research reveals the development of a model of the reading process that can be statistically measured and analyzed. A rationale for studying general-reading ability as a process has been developed. This rationale maintains that individuals develop a hierarchy of working-systems and use these systems to meet the present purpose of the reader. Factor analyses of the basic components of reading have been made; subabilities of some reading skills with their percentages of contributions to the reading components have been statistically factored out and identified; and unique patterns of conceptual ability have been studied. Slight progress has been made in the development of skill-pattern models within the content areas. A background of general information has been identified as important for the development of concepts within the various content areas. The research suggests that content areas seem to stimulate and facilitate each other. Out of the previous mentioned factoral analysis of the reading act, The Language Perception Test Series have been developed to identify grade norms and individual language-perception patterns for grades three through

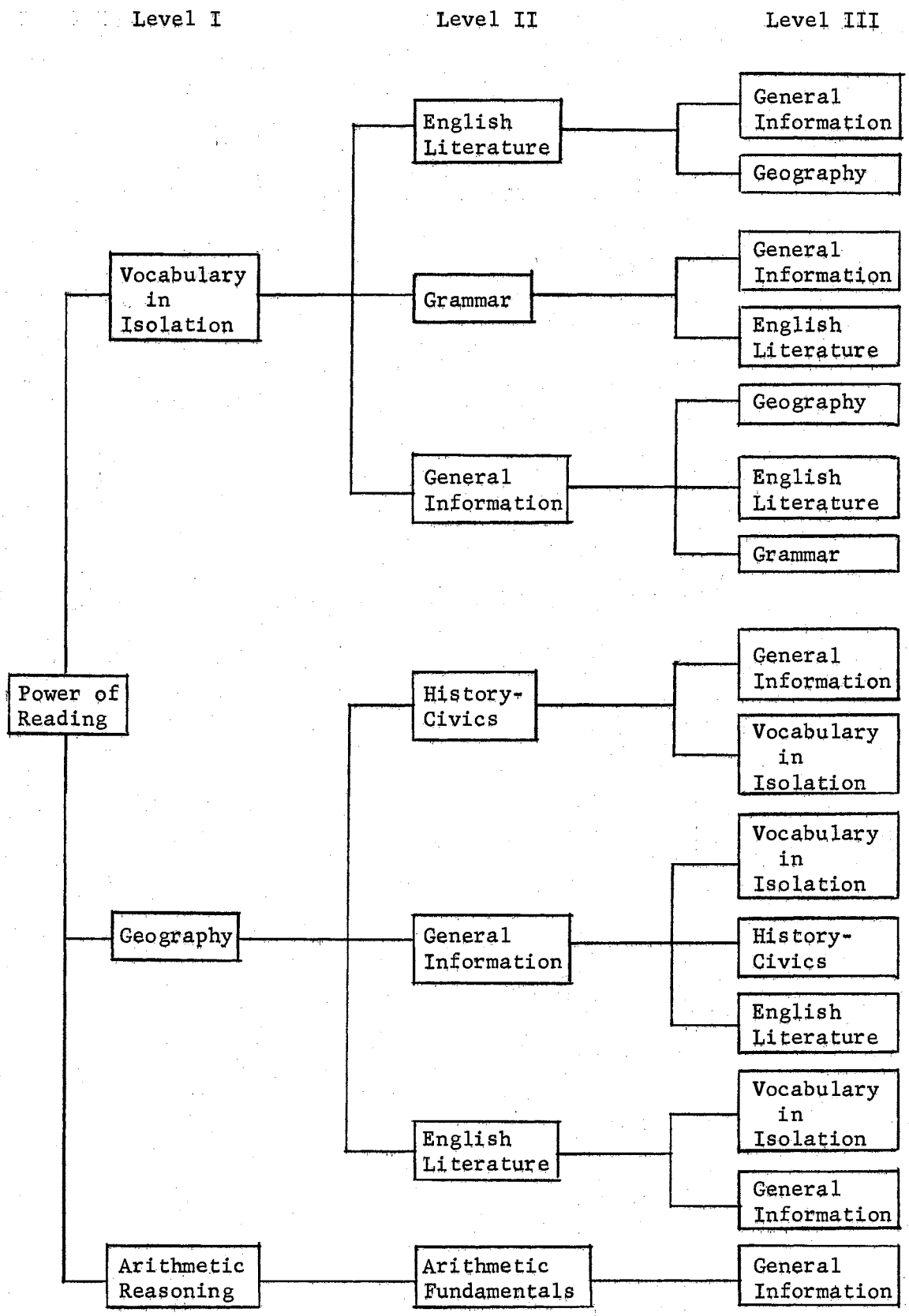


Figure 7. Substrata Factors in the Power of Reading (Kling, 1966)

college. A profile analysis has been made of a preschool precocious reader's reading patterns as compared with an average fourth-grade student's profile. A model for intact-group profile analysis has been developed and this model has been supplemented with instructional materials indexes for diagnostic instruction. The research findings of Laycock and Kling support the hypotheses presented by the Substrata-Factor Theory of Reading.

## Summary

This review of the literature investigates the various developmental stages of the Holmes-Singer reading model and the methods of statistical measurements of the model. It reveals evidence of the existence of differential patterns of performances of the sequential stages of the model by individuals and groups. Research to date has not presented specific observations into the nature of these language-perception changes.

Various studies have been made into the components of general-reading ability, but further study is needed into the diagnosis of readiness levels of the subabilities of these components. The nature of growth in general-reading ability related to language-perception pattern shifts has not been investigated. This warrants the necessity for an investigation into a diagnostic approach to reading instruction and a follow-up study of individual and group language-perception pattern changes.

The review of the literature presents a review of the Substrata-Factor Theory of Reading and related research. Chapter III presents the methodology and design for this study.

# CHAPTER III

## METHODOLOGY AND DESIGN

The purpose of this experiment was to study the changes in general-reading ability in relation to teaching, method, preinstructional diagnosis, and choice of instructional materials. Changes in language-perception patterns were also observed. This chapter discusses the design of the study, population and instrumentation used to test hypotheses, methods of subject selection of the study, and materials and instructional techniques used in the experiment. Statistical procedures for treatment of the data are also discussed.

### The Population and Design of the Study

The population selected for this study was the seventh-grade students in a southeastern Oklahoma town with a population of 11,000 people. This population was selected because of its convenience and the willingness of the school personnel to permit this experimental study.

This study used two groups of seventh-grade reading classes. The classes were equalized on the basis that both groups consisted of students regularly enrolled in seventh-grade reading classes and no special grouping methods were used to form the classes. At the beginning of the study the experimental group contained 30 pupils--13 boys and 17 girls. The control group contained 30 pupils--16 boys and 14 girls.

At the end of the experiment the total membership in each group was 25 for the experimental group--10 boys and 15 girls--and 26 for the control group--12 boys and 14 girls. The loss of membership in both groups was due to student dropout or transfer to other school systems.

## Selection of Subjects for the Study

The pretesting and posttesting for this experiment occurred in October, 1968 and March, 1969. At both pretest and posttest periods each was administered a series of tests which included the Otis-Lennon Mental Ability Test, the Nelson-Denny Reading Test, and The Language Perception Test Series. This group testing was done in the regular seventh-grade reading classroom with the assistance of the regular classroom teacher. Pretest and posttest periods each required approximately two weeks of one-hour daily testing sessions. Regular testing procedures and time schedules suggested in the test examiner's manual were followed.

In order to equate both groups according to verbal intelligence, the Otis-Lennon Mental Ability Test, Form J, Grades 4-12, was administered. A Deviation Intelligence Quotient (DIQ) measurement was assessed. Table I shows the pretest comparison of the Deviation scores made on the Otis-Lennon test by the experimental and control groups. This comparison indicated no significant difference in verbal intelligence for the two groups at the .05 level of significance.

Table II summarizes the pretest comparative results of general-reading ability as measured by the Nelson-Denny test. This comparison indicates no significant differences at the .05 level in vocabulary, comprehension, and total general-reading ability.

TABLE I

A COMPARISON OF MEAN SCORES FOR VERBAL INTELLIGENCE PRIOR TO A TWELVE-WEEK INSTRUCTIONAL PERIOD

| Group | Sample Number | Mean | Standard Deviation |
|---|---|---|---|
| Experimental | 25 | 100.2 | 11.7 |
| Control | 26 | 101.1 | 11.1 |
| t-value* | | -0,27 | |

*Formula for difference between two groups, separate group variance, unequal size. t-value 2.01 significant at the .05 level.

TABLE II

A COMPARISON OF MEAN SCORES FOR GENERAL-READING ABILITY PRIOR TO A TWELVE-WEEK INSTRUCTIONAL PERIOD

| Group | Group Number | Vocabulary | | Comprehension | | Total | |
|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Experimental | 25 | 51.1 | 9.7 | 40.7 | 9.8 | 91.8 | 18.6 |
| Control | 26 | 50.4 | 11.5 | 41.2 | 10.2 | 91.7 | 20.8 |
| t-value* | | 0.21 | | -0.19 | | 0.01 | |

*Formula for differences between two groups, separate group variance, unequal size. t-value 2.01 significant at .05 level.

Prior to the experiment, pretest data for the independent variable, language-perception patterns and/or cluster domains, were analyzed to equate the experimental and control groups in this variable. A t-test was used for this purpose. Table III reports this comparison. This analysis shows no significant difference in the two groups at the .05 level as measured by The Language Perception Test Series.

## Instruments Used and Their Applications to the Study

### Otis-Lennon Mental Ability Test, Form J (1965)

This test was used to measure verbal intelligence. It was developed to test students in grades 4 through 12. The purpose of the test was to equate experimental and control groups in verbal intelligence prior to the study. Its Deviation Intelligence Quotient (DIQ) is a normalized standard with a mean of 100 and a standard deviation of 16 points as stated in the examiner's manual (1967). The split-half reliability coefficient for this test to assess verbal intelligence for the normative group ranged from .94 to .96 by grades. The concurrent validity coefficients for this test established between the Otis Quick-Scoring Mental Ability Tests and the Lorge-Thorndike Intelligence Tests were .88 and .89 respectively.

### Nelson-Denny Reading Test, Revised Edition, Form A (1962)

This test was used to measure pretest and posttest differences in Vocabulary, Paragraph Comprehension, and Total reading ability. It was devised to measure these reading skills for students in grades 3

TABLE III

A COMPARISON OF THE EXPERIMENTAL AND CONTROL GROUPS' LANGUAGE PERCEPTION PATTERNS AND/OR CLUSTER DOMAINS PRIOR TO A TWELVE-WEEK INSTRUCTIONAL PROGRAM

| | I Basic Visual Skills | | II Visual Word Attack Skills | | III Auditory Word Attack Skills | | IV Analytical Word Attack Skills | | V Total I, II, III, and IV | |
|---|---|---|---|---|---|---|---|---|---|---|
| Group | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Experimental | 84.1 | 26.9 | 77.8 | 16.2 | 73.8 | 15.4 | 89.8 | 15.1 | 325.6 | 61.4 |
| Control | 82.2 | 17.8 | 74.6 | 17.1 | 78.6 | 13.9 | 90.5 | 15.8 | 326.1 | 52.0 |
| t-value* | 0.29 | | 0.68 | | -1.18 | | -0.15 | | -0.02 | |

*Formula for difference between two groups of unequal size with separate variance. t-value 2.01 significant at .05 level.

through 9. For this study, the total score was used to determine changes in the speed and power of reading. The vocabulary and paragraph comprehension sections were used to measure power of reading. Since both of these tests were timed, speed of reading is subsumed in the total score. The alternate-forms reliability coefficient for the normative group by grades was from .84 to .89 in Vocabulary; .80 to .88 in Paragraph Comprehension, and .88 to .93 in Total reading score. The subtest congruent validity for Form A of this test with the Iowa Test of Basic Skills, Grades 4, 6, and 8 were Vocabulary .70, .73, and .88 respectively; Paragraph Comprehension .62, .76, and .69 respectively.

The Language Perception Test Series, E-J, Form A (1965)

This test series is based upon the Substrata Factor Theory of reading and data from the related research mentioned in Chapter II. Thus it statistically measured the four basic language-perception patterns and/or cluster domains and the sixteen variables within these clusters as hypothesized by the Theory:

I. Basic Visual--Word Embedded; Figure and Ground; Cue Symbol Closure; and Total

II. Visual Word Attack Skills--Reversals; Word Discrimination; Phrase Discrimination; Recognition of Prefixes, Suffixes, and Roots; and Total

III. Auditory Word Attack Skills--Blends; Auditory Abstractions; Matching Sounds; Syllabication; and Total

IV. Analytical Word Attack Skills--Word in Context; Phonics; Spelling; Prefix-Suffix Meaning; Conceptual Ability; and Total

V. Total Domains I, II, III, and IV

These language-perception patterns and/or cluster domains were used for group and individual reading-skill diagnoses and profile analyses of pattern changes for both groups and individuals.

## Materials and Instructional Techniques Used in the Study

The test results from the Nelson-Denny Reading Test and The Language Perception Test Series were used for the preinstructional diagnosis of reading-skill patterns and/or cluster domains for the experimental group. The control group received no preinstructional diagnosis from the test data.

The diagnostic procedure for the experimental group was as follows: Grade-placement scores on the Nelson-Denny Reading Test were used for subgrouping and establishing instructional levels for the subgroups. The Language Perception Test Series raw norm scores were converted to standard norm scores. Language-perception patterns and/or cluster domains were established from these standard scores. A standard norm score of 46 or below was the arbitrary point of division for below average performance in total cluster-domains. This score of 46 was chosen because it fell below the 35th percentile of the seventh-grade norm group. Lyman (1963) uses a descriptive scale of 25 to 75 percentile as average, satisfactory, or fair performance on a test. The 50 percentile score is the midpoint of this average performance range. The 35 percentile score is below the midpoint of this average performance range, therefore the 35 percentile score indicates a potential deficiency in the variable tested.

The selection of instructional materials was determined by the grade-placement composite score made in general-reading ability as

measured by the Nelson-Denny Reading Test. This composite score was used to establish the instructional levels for the subgroups and individuals within each subgroup. This instructional level was considered to be the grade-placement readability levels of performance at which the students could be expected to read with from 75 to 90 percent accuracy in vocabulary and comprehension skills. Materials with an approximate three-tenths to five-tenths of a grade-placement range below and above this readability level were used to provide work at the student's independent-level performance and ceiling-level performance. The independent-level performance is from 90 to 100 percent accuracy in reading-skill performance and the ceiling-level performance is at approximately 50 percent accuracy. Students with instructional ranges 9.0 grade-placement or above were assigned materials for horizontal enrichment rather than vertical enrichment. This was done because the interest of these students seemed to decline as the reading difficulty of the materials was extended beyond the 9.5 grade-placement level. The ceiling level was used to determine new skills to be introduced to the group and partially acquired skills that needed reinforcement.

Table XVI (Appendix) shows the preinstructional diagnosis of intelligence levels, general-reading ability grade-placement scores, and language-perception patterns and/or cluster domains for the experimental group. The class was divided into subgroups primarily by grade-placement score levels in general-reading ability as measured by the Nelson-Denny Reading Test, and language-perception patterns and/or cluster domains standard scores as measured by The Language-Perception Test Series. A standard score of 46 was used as a dividing point for strengths and weaknesses in the cluster domains. These language-

perception patterns are Basic Visual Skills (I); Visual Word Attack Skills (II); Auditory Word Attack Skills (III); Analytical Word Attack Skills (IV); and Total domains I, II, III, and IV. The control group received no preinstructional diagnosis in relation to these variables.

A basic developmental reading program based on the individual student's and subgroup's instructional level was presented to the experimental group. This basic program included work in vocabulary development, comprehension skills, and rate builders. A supplementary program was taught to reinforce the variables within the cluster domains that fell below the standard score of 46. The grade-placement level of difficulty of the supplementary exercises was determined by the regular grade level at which this skill is normally taught. The selection of instructional materials for the experimental and control groups is presented in Chapter V.

As suggested in the Instructional Materials Index for The Language Perception Test Series (Singer, 1967), the following materials were selected for the experimental group to develop, correct, and reinforce variables within the specific cluster domains. Table XVIII (Appendix) lists the materials used for each variable within the cluster domains and subgroup-student assignments for instructional materials.

All students in Groups IV, VI, and VII received a basic program as stated in Table XVII (Appendix) plus enrichment programs in critical reading skills. The MacMillan Advanced Skills in Reading, Book 2, was used for this purpose.

Sixty 55-minute instructional sessions were used for both groups. The same regular classroom teacher instructed both experimental and control groups. The researcher made the preinstructional diagnosis

for the experimental group. The classroom teacher and the researcher worked as a team in lesson planning and progress chart evaluation for the experimental group. An ongoing instructional diagnosis for the experimental group was made by the use of percentage scores made on each exercise. When the student's percentage score on a specific reading skill fell below 75 for five consecutive times, the skill was retaught. When the student's percentage score on a specific reading skill reached 90 or above for five consecutive times, the instructional materials for this skill were changed to a higher level of difficulty. No progress charts or ongoing instructional diagnoses were made for the control group.

The instructional period for the experimental group was divided into three 15- to 18-minute activities. Each student received three practice exercises each instructional period. This daily assignment was a combined practice of the basic program exercises, and the cluster-domain exercises as mentioned in Table XVIII (Appendix). The control group received no such rotation in skill practice. This group followed the sequential steps of the basal program.

Table XVIII (Appendix) presents the reading instructional materials selections based on the data presented in Table XVI used with the experimental group to develop the variables within each language-pattern and/or cluster domain as measured by The Language Perception Test Series. It also lists the materials assigned to each subgroup and individual student within the experimental group.

At the end of the sixty instructional sessions, posttests were administered to both groups. The Nelson-Denny Reading Test and The Language Perception Test Series were administered as posttests. The

same procedure for test administration in pretesting was performed in posttesting.

## Statistical Treatment of the Data

A series of statistical analyses were made on the pre-test data to equate the groups in the independent variable, language-perception patterns, as measured by The Language Perception Test Series, and the dependent variable, general-reading ability as measured by the Nelson-Denny Reading Test. A series of t-tests between total raw score means were used for this purpose.

An analysis between pretest and posttest performance of the experimental group in general-reading ability was made by a t-test between total raw scores performed on the sections of the Nelson-Denny Reading Test. This same intra-group pretest and posttest analysis was made for the control group.

Further inter-group analyses were made by performing a series of t-tests on mean differences of experimental-control pretest and experimental-control posttest performances on this same variable. Pretest to posttest changes in grade-placement score differences on the Nelson-Denny were analyzed to measure changes in basic instructional levels for an instructional-materials, post-instructional diagnosis.

Another pretest to posttest inter-group analysis was made for the experimental and control groups in relation to performance on the independent variable, language-perception patterns and/or cluster domains as measured by The Language Perception Test Series. Statistical analyses of t-tests between raw score means were used for this purpose.

Profile analyses of individual, group, and subgroup changes in language-perception and/or cluster domains were made in the following manner: Since standard T-scores were used for this analysis, individual student raw scores for both experimental and control groups were converted to standard T-scores of 50 and a standard deviation of 10. Language-perception pattern changes from pretest to posttest performances were analyzed by the establishment of the standard error of measurement of these standard T-scores for each cluster domain.

Individual student and group cluster-domain total posttest T-scores that fell one standard error of measurement above or below the pretest standard T-score were considered significant at the 68 percent confidence limit. Profile patterns were established as an increase pattern if the T-score rose above this 68 percent confidence interval; a decrease pattern if it fell below this confidence interval; and a no-change pattern if it fell within this confidence interval. In order to establish this standard error of measurement, a split-half Pearson Product-Moment correlation of odd and even items for both experimental and control groups was made on pretest raw scores of The Language Perception Test Series cluster domains. This Pearson "r" was used in the formula to determine the standard error of measurement for each cluster. Table IV summarizes the results of this statistical analysis. A positive correlation was found for all five domains.

## Summary

This chapter has described the population and sample of the study; testing procedures; materials and instructional techniques used in the study; the preinstructional diagnosis and subgrouping of the

experimental group; and the statistical treatment of the data. Chapter IV will present the results and findings of the experiment.

TABLE IV

A SUMMARY OF THE SPLIT-HALF PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENTS AND STANDARD ERRORS OF MEASUREMENT FOR THE LANGUAGE PERCEPTION TEST SERIES

| | Cluster Domain | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| Pearson Product-Moment "r"* | .91 | .87 | .84 | .85 | .96 |
| Standard Error of Measurement | 2.9 | 3.6 | 4.5 | 3.7 | 1.7 |

*Positive correlation .50 or above.

# CHAPTER IV

# RESULTS

## Introduction

As stated in Chapter I, the purpose of this study is to investigate a diagnostic approach to reading instruction and its relationship to general reading ability and reading-skill patterns and/or language-perception patterns. The diagnostic technique included a choice of instructional materials based on a preinstructional diagnosis of general reading ability and language-perception patterns. Following a twelve-week instructional period, changes in general-reading ability and language-perception patterns were evaluated in relation to a non-diagnostic approach to reading instruction. The analyses of the data were based upon changes in pretest and posttest performances on the Nelson-Denny Reading Test, Form A, Grades 3 through 9, and The Language Perception Test Series, Form E-J.

## Presentation of Findings

A series of t-tests were performed to determine significant differences between pretest and posttest means of the experimental and control groups in relation to general-reading ability. The summary of data in Table V shows the pretest and posttest changes in general-reading ability for the experimental group and Table VI gives the same comparison for the control group.

TABLE V

A SUMMARY OF CHANGES IN EXPERIMENTAL GROUP IN GENERAL-READING ABILITY FOLLOWING A TWELVE-WEEK INSTRUCTIONAL PERIOD

| | Vocabulary | | Comprehension | | Total | |
|---|---|---|---|---|---|---|
| Test | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Pretest | 51.1 | 9.7 | 40.7 | 9.8 | 91.8 | 18.6 |
| Posttest | 57.6 | 10.1 | 47.1 | 11.3 | 104.7 | 19.7 |
| t-value* | -0.40 | | -0.48 | | -0.44 | |

*Formula for difference between two groups, separate group variance, equal size, t-value 2.06 significant at the .05 level.

TABLE VI

A SUMMARY OF CHANGES FOR THE CONTROL GROUP IN GENERAL-READING ABILITY FOLLOWING A TWELVE-WEEK INSTRUCTIONAL PERIOD

| | Vocabulary | | Comprehension | | Total | |
|---|---|---|---|---|---|---|
| Test | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Pretest | 50.4 | 11.5 | 41.2 | 10.2 | 91.7 | 20.8 |
| Posttest | 57.1 | 12.9 | 46.1 | 12.0 | 103.3 | 23.6 |
| t-value* | -0.43 | | -0.38 | | -0.41 | |

*Formula for difference between two groups, separate group variance, equal size. t-value 2.06 significant at the .05 level.

Table VII presents comparisons of experimental and control groups' posttest performances in general-reading ability. The hypothesis tested in this series of t-tests was:

> There are no significant differences in vocabulary, comprehension, and total general-reading ability when students are taught by a diagnostic or nondiagnostic approach to reading instruction.

TABLE VII

A SUMMARY OF POSTTEST CHANGES FOR THE EXPERIMENTAL AND CONTROL GROUPS IN GENERAL-READING ABILITY FOLLOWING A TWELVE-WEEK INSTRUCTIONAL PERIOD

| | Vocabulary | | Comprehension | | Total | |
|---|---|---|---|---|---|---|
| Method | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Experimental | 57.6 | 10.1 | 47.1 | 11.3 | 104.7 | 19.7 |
| Control | 57.1 | 12.9 | 46.1 | 12.0 | 103.3 | 23.6 |
| t-value* | 0.12 | | 0.28 | | 0.21 | |

*Formula for difference between two groups, separate group variance, unequal size. t-value 2.01 significant at .05 level.

The t-value differences in vocabulary, comprehension, and total general-reading ability for the experimental group were all less than the 2.06 t-value required for significant differences at the .05 level. The null hypothesis was not rejected (Table V). The data present, however, slight gains for the experimental group in vocabulary,

comprehension, and total general-reading ability.

A summary of changes for the control group in the dependent variable, general-reading ability, is presented in Table VI. The group's t-values in vocabulary, comprehension, and total general-reading ability were all less than the 2.06 t-value required for significance at the .05 level. The null hypothesis was not rejected. Slight gains were made in vocabulary, comprehension, and total. The control group showed slightly less gain in comprehension than in vocabulary and total.

Comparisons of experimental and control posttest performances in general-reading ability are presented in Table VII. The t-value comparisons in vocabulary, comprehension, and total were all below the 2.01 t-value required for significance at the .05 level. The null hypothesis was not rejected. Table VII, however, shows observed trends toward slightly greater pretest-posttest gains for the experimental group in vocabulary, comprehension, and total with a slightly greater gain in comprehension.

Observed trends in grade-placement score gains in total general-reading ability are summarized in Tables VIII, IX, and X. The differences in grade-placement score gains are shown for the experimental and control groups, male and female groups, and the upper-intelligence and lower-intelligence groups.

The total grade-placement gain in general-reading ability for the experimental group is 1.12, while the total gain for the control group is 1.03. The difference of .09 grade-placement score indicates a slight gain for the experimental group over the control group in total general-reading ability. This difference is too small to indicate a significant difference for the experimental group.

TABLE VIII

GRADE-PLACEMENT SCORE GAINS IN GENERAL-READING ABILITY FOR TOTAL EXPERIMENTAL AND CONTROL GROUPS

| Method | N | Total Gain |
|---|---|---|
| Experimental | 24* | 1.12 |
| Control | 23* | 1.03 |
| Grade-placement gain difference | | .09 |

*Sample number represents students who scored within the grade-placement ceiling of the test.

The males in the experimental group show a 1.11 grade-placement gain in total general-reading ability, while the females of the same group show a 1.12 gain. The males in the control group show 1.21 gains, while the females show 0.77 gains. The grade-placement gain difference between males in the experimental and control group is -.10 with the control group making the highest gain. The female grade-placement gain between the two groups is .35 with the females in the experimental group making the highest gain.

The upper-half intelligence and lower-half intelligence groups are also analyzed in relation to grade-placement gains in total general-reading ability. Table X reviews these results. The upper-half grade-placement gain differences are 1.45 for the experimental and 1.53 for the control group. The grade-placement gain difference between the experimental and control groups is -.08. The control group shows a

TABLE IX

GRADE-PLACEMENT SCORE GAINS IN GENERAL-READING ABILITY FOR MALES AND FEMALES IN EXPERIMENTAL AND CONTROL GROUPS

| Method | N | Males | N | Females |
|---|---|---|---|---|
| Experimental | 9* | 1.11 | 15 | 1.12 |
| Control | 11* | 1.21 | 12* | 0.77 |
| Grade-placement Gain Differences | | -.10 | | .35 |

*Sample number represents students who scored within the grade-placement ceiling of the test. Grade-placement scores represent tenth of a year units.

TABLE X

GRADE-PLACEMENT SCORE GAINS IN GENERAL-READING ABILITY FOR UPPER-HALF AND LOWER-HALF INTELLIGENCE GROUPS

| Method | N | Upper-Half | N | Lower-Half |
|---|---|---|---|---|
| Experimental | 10* | 1.45 | 14 | .88 |
| Control | 11* | 1.53 | 12* | .56 |
| Grade-placement Gain Differences | | -.08 | | .32 |

*Sample number represents students who scored within the grade-placement ceiling of the test.

slightly larger gain. The lower-half gain difference is .88 for the experimental group and .56 for the control group. The grade-placement gain difference between the two groups is .32. The experimental group shows a larger gain.

The observed trends indicated by the data listed in Tables IX, X, and XI are related to the first hypothesis of the study which states there are no significant differences in vocabulary comprehension, and general-reading ability when students are taught by a diagnostic approach or nondiagnostic approach to reading instruction. Observed slight differences between the two groups are indicated.

The next series of statistical analyses tested data concerning differences in language-perception patterns. Table XI lists the data related to the testing of the following hypothesis:

> There is no significant difference between the experimental group's pretest-posttest reading-skill patterns and/or cluster domains of Basic Visual Skills, Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total domains as measured by The Language Perception Series.

These t-test analyses for significant differences in pretest and posttest performances in language-perception patterns and/or cluster domains I, II, III, IV, and V for the experimental group show no significant differences at the .05 level. The t-values between mean scores for all domains were below the 2.06 t-value required for significant differences at the .05 level. The null hypothesis was not rejected; therefore, no significant difference was found between the pretest-posttest language-perception patterns for the experimental group.

TABLE XI

A COMPARISON OF THE EXPERIMENTAL GROUP'S LANGUAGE-PERCEPTION PATTERNS FOLLOWING A TWELVE-WEEK INSTRUCTIONAL PERIOD

| | I Basic Visual Skills | | II Visual Word Attack Skills | | III Auditory Word Attack Skills | | IV Analytical Word Attack Skills | | V Total I, II, III, and IV | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Pretest | 84.1 | 26.9 | 77.8 | 16.2 | 73.8 | 15.4 | 89.8 | 15.1 | 325.6 | 61.4 |
| Posttest | 124.9 | 28.1 | 93.7 | 19.5 | 81.6 | 12.9 | 93.8 | 14.1 | 394.0 | 60.7 |
| t-value* | -1.28 | | -0.62 | | -0.34 | | -0.14 | | -0.64 | |

*Formula for difference between two groups of equal size with separate group variance. t-value 2.06 significant at .05 level.

The same above hypothesis was tested for the control group's pretest and posttest language-perception pattern differences. This comparison is shown in Table XII. The t-values between mean scores for domains I, II, III, IV, and V all were below the 2.06 t-value required for significance at the .05 level. The null hypothesis was not rejected; therefore, no significant difference was found in pretest-posttest language-perception patterns for the control group.

Table XIII also shows a comparison of the experimental and control groups in relation to differences in mean scores for the five domains measured by The Language Perception Test Series. The following hypothesis was tested:

> There is no significant difference between the mean scores of the experimental and control groups in relation to reading-skill patterns and/or cluster domains of Basic Visual Skills, Visual Work Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total domains as measured by The Language Perception Test Series.

A significant difference in Basic Visual Skills, domain I, at the .05 level was found for the experimental group. The t-value for this domain was larger than the 2.01 t-value required for significance at this level. The t-values for domains II, III, IV, and V were below this value. The null hypothesis was rejected.

The next series of statistical analyses for this study required a series of preliminary analyses. This preliminary analysis was required to test hypotheses five and six in relation to language-perception and/or cluster-domain pattern changes for both experimental and control groups. This final series established total group, subgroup, and individual profile analyses for independent variable, Language-Perception Patterns measured by the Language Perception Test Battery, Form E-J.

TABLE XII

A COMPARISON OF THE CONTROL GROUP'S LANGUAGE-PERCEPTION PATTERNS FOLLOWING A TWELVE-WEEK INSTRUCTIONAL PERIOD

| | I Basic Visual Skills | | II Visual Word Attack Skills | | III Auditory Word Attack Skills | | IV Analytical Word Attack Skills | | V Total I, II, III, and IV | |
|---|---|---|---|---|---|---|---|---|---|---|
| Test | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Pretest | 82.2 | 17.8 | 74.6 | 17.1 | 78.6 | 13.9 | 90.5 | 15.8 | 326.1 | 52.0 |
| Posttest | 109.7 | 24.5 | 87.3 | 17.8 | 82.6 | 15.5 | 93.8 | 17.8 | 373.6 | 62.3 |
| t-value* | -1.00 | | -0.55 | | -0.17 | | -0.13 | | -0.48 | |

*Formula for difference between two groups of equal size with separate group variance. t-value 2.06 significant at the .05 level.

TABLE XIII

A COMPARISON OF THE EXPERIMENTAL GROUP'S AND THE CONTROL GROUP'S LANGUAGE-PERCEPTION PATTERNS FOLLOWING A TWELVE-WEEK INSTRUCTIONAL PERIOD

| | I Basic Visual Skills | | II Visual Word Attack Skills | | III Auditory Word Attack Skills | | IV Analytical Word Attack Skills | | V Total I, II, III, and IV | |
|---|---|---|---|---|---|---|---|---|---|---|
| Group | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Experimental | 124.9 | 28.1 | 93.7 | 19.5 | 81.6 | 12.9 | 93.8 | 14.1 | 394.0 | 60.7 |
| Control | 109.7 | 24.5 | 87.3 | 17.8 | 82.6 | 15.5 | 93.8 | 17.8 | 373.6 | 62.3 |
| t-values* | 2.05 | | 1.22 | | -0.26 | | -0.01 | | 1.18 | |

*Formula for difference between two groups of unequal size with separate variance. t-value 2.01 significant at the .05 level.

In order to calculate the profile data, the raw scores made by both groups on the five cluster-domains were converted to standard T-scores with a mean of 50 and a standard deviation of 10. These T-scores were used for profile analyses. The standard error of measurement for each pretest cluster-domain I through V was calculated and used as the statistical measure for significant differences in pretest-posttest performance of the five cluster-domains by the total experimental and control groups; subgroups male, female, upper-half intelligence, lower-half intelligence groups; and individual students within the experimental and control groups.

In order to calculate these standard errors of measurement, a split-half Pearson-Product Moment "r" correlation coefficient was calculated between the odd and even raw scores made by both experimental and control groups on the Language Perception Test Battery pretest. The "r" determined by this calculation was substituted in the formula used to establish the standard errors of measurement for Cluster-Domains I, II, III, IV, and V (see Chapter II).

A confidence unit of real difference from pretest to posttest was established for each cluster-domain. This confidence interval sets the limits of a 68 percent degree of confidence that the sample mean will embrace the population mean (Garrett, 1958). The 68 percent confidence limit or interval means that 68 of 100 sample means will fall within plus or minus one standard deviation of the population mean or a probability of .68 that the sample mean does not miss the population mean. An individual student's posttest T-score determined outside this established confidence level was considered a significant shift in language-perception patterns. These significant differences in pretest-posttest

T-scores were classified as a plus shift (+), a minus shift (-), and a no-change shift (0). The "plus" represented an increased performance of the cluster; the "minus" represented a decreased performance of the cluster; and the "no-change" symbol represented no change in performance. Table XIV categorizes the changes in language-perceptions for the experimental and control groups and presents data for testing the hypotheses:

> There are no significant posttest changes in cluster domains I, II, III, IV, and V of individual students within experimental and control groups as measured by The Language Perception Test Series.
>
> There are no significant posttest changes in cluster domains Basic Visual Skills (I), Visual Word Attack Skills (II), Auditory Word Attack Skills (III), Analytical Word Attack Skills (IV), and Total domains (V) of experimental and control groups as measured by The Language Perception Test Series.

Both null hypotheses were rejected at the 68 percent confidence limits. In the experimental group, students 1, 2, 4, 7, 15, 18, 20, and 25 show significant combined increase and no-change profile patterns with each student having a different combination of these shifts. Students 3, 6, 9, 10, 14, 16, 17, 22, 23, and 24 present combined patterns of increases, decreases, and no-change patterns in cluster-skill performance with each student presenting different combinations. Student 12 shows a pattern of increases and no-change on all domains except the Total (V) domain which shows a decrease. Students 5, 8, 11, 13, and 19 show diverse decrease and no-change combination patterns. Student 21 presents a decrease-increase pattern with an increase on the Total (V) domain.

In the control group, student 24 presents an increase in domains I, II, III, and V with a decrease pattern in IV. Student 4 shows a

TABLE XIV

A CLASSIFICATION OF CHANGES IN LANGUAGE-PERCEPTION PATTERNS FOR EXPERIMENTAL AND CONTROL GROUPS FOLLOWING A TWELVE-WEEK INSTRUCTIONAL PERIOD

| | Cluster Domains | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Experimental Group | | | | | Control Group | | | | |
| Student | I | II | III | IV | V | I | II | III | IV | V |
| 1 | + | + | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | + | 0 | + | 0 | 0 | 0 | + | 0 |
| 3 | + | - | 0 | 0 | + | - | - | 0 | 0 | - |
| 4 | 0 | + | 0 | + | + | - | - | + | - | - |
| 5 | 0 | 0 | - | 0 | 0 | 0 | + | + | - | - |
| 6 | - | - | + | 0 | 0 | - | - | - | - | - |
| 7 | + | + | 0 | 0 | + | 0 | 0 | 0 | + | 0 |
| 8 | 0 | 0 | 0 | 0 | - | 0 | + | 0 | - | + |
| 9 | - | + | 0 | 0 | + | - | 0 | - | 0 | - |
| 10 | 0 | 0 | + | 0 | - | 0 | 0 | 0 | + | 0 |
| 11 | - | 0 | 0 | 0 | 0 | - | - | 0 | 0 | - |
| 12 | 0 | + | 0 | + | - | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | - | 0 | - | - | - | + | 0 | - | - |
| 14 | + | 0 | 0 | 0 | + | 0 | 0 | - | 0 | - |
| 15 | + | 0 | + | + | + | - | + | - | 0 | 0 |
| 16 | - | + | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | + | + | 0 | - | + | 0 | - | + | 0 | - |
| 18 | + | 0 | 0 | 0 | + | 0 | - | 0 | 0 | - |
| 19 | - | 0 | 0 | 0 | - | 0 | - | 0 | + | + |
| 20 | 0 | + | 0 | 0 | + | + | + | 0 | 0 | 0 |
| 21 | + | - | - | + | + | - | 0 | 0 | 0 | - |
| 22 | 0 | - | + | + | + | - | 0 | 0 | 0 | - |
| 23 | - | 0 | + | 0 | - | - | - | 0 | 0 | - |
| 24 | + | + | 0 | - | + | + | + | + | - | + |
| 25 | 0 | + | + | + | + | - | + | 0 | 0 | + |
| 26 | | | | | | 0 | - | 0 | 0 | - |

Symbols represent significant pattern changes at the 68 percent confidence limits; (+) increase; (-) decrease; (0) no change.

different pattern with decrease patterns in I, II, IV, and V, but an increase pattern of III. Students 3, 9, 11, 14, 18, 21, 22, 23, and 26 indicate diverse decrease patterns or no-change patterns in all the cluster-domains. Students 5, 8, 13, 15, 17, 19, and 25 show mixed patterns with some increase, decrease, and no-change patterns within each student profile. Students 2, 7, 10, and 20 show either increase or no-change cluster patterns. Their combinations are also diverse. Students 1, 12, and 16 show no-change in all cluster-domains, but student 6 indicates a decrease in all five domains.

Student cluster-analysis for both groups presents diverse patterns of language-perception shifts. The shift pattern for the experimental group was predominately a combined increase or no-change pattern, while the control group shift pattern is predominately a decrease or no-change pattern. A diversity of inter-group, intra-group, inter-individual, and intra-individual patterns is indicated.

Total and select subgroup shifts in language-perception skills are compared by percentage-ratio changes. A percentage number for plus, minus, and no-change patterns was established for each experimental, control and select subgroup. These percentage numbers were used for percentage-ratio comparisons. Table XV summarizes these ratio comparisons for the total experimental group and control group and tests the following hypothesis:

> There are no significant posttest changes in percentage-ratio differences in language-perception skills patterns and/or cluster domains I, II, III, IV, and V for experimental and control groups, subgroups categorized by sex, and subgroups categorized by intelligence levels.

The null hypothesis was rejected for total subgroups. Table XV indicates the percentage ratio changes in Basic Visual Skills (I) for

TABLE XV

A SUMMARY OF PERCENTAGE-RATIO CHANGES IN LANGUAGE-PERCEPTION SKILL PATTERNS FOR THE EXPERIMENTAL AND THE CONTROL GROUPS AND SELECT SUBGROUPS

| | Domain Pattern | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| Group | (+ - 0) | (+ - 0) | (+ - 0) | (+ - 0) | (+ - 0) |
| Total | | | | | |
| Experimental | (36 24 40) | (40 20 40) | (28 8 64) | (28 12 60) | (56 24 20) |
| Control | ( 8 42 50) | (27 35 38) | (15 15 70) | (15 23 62) | (15 54 31) |
| Males | | | | | |
| Experimental | (60 20 20) | (60 30 10) | (10 10 80) | (40 20 40) | (60 10 30) |
| Control | ( 8*33*58) | (33*41*25) | (16* 8*75) | ( 8*33*58*) | (66*16*16*) |
| Females | | | | | |
| Experimental | (20 26*53*) | (26*13*60) | (40 6*53*) | (20 7 73) | (53*43*13*) |
| Control | ( 7 50 43) | (22 28 50) | (14 22 64) | (14 14 72) | (14 43 43) |
| Upper-Half Intelligence** | | | | | |
| Experimental | (27 9 64) | (64 18 18) | (18 0 82) | (27 18 55) | (64 27 9) |
| Control | (16*33*50) | (16*33*50) | (25 16*58*) | ( 0 25 75) | (25 41*33*) |
| Lower-Half Intelligence** | | | | | |
| Experimental | (43 36 21) | (21 21 58) | (36 14 50) | (29 7 64) | (50 22 28) |
| Control | ( 0 50 50) | (14 50 36) | ( 7 14 79) | (29 21 50) | (21 43 36) |

*Fraction percentages were omitted.
**Deviation Intelligence Quotient (DIQ) Median 102.

the experimental and control group respectively (fraction percentages omitted). Thirty-six percent of the experimental group's Basic Visual Skill changes were an increase pattern, while 8 percent of the control group's Basic Visual Skill changes were an increase pattern. The percentage ratios for decrease patterns in Basic Visual Skills were 24 for the experimental and 42 for the control group. The percentage ratios for no-change patterns in Basic Visual Skills were 40 for the experimental group and 50 for the control group. The experimental group shows an increase-shift in Basic Visual Skills performance, while the control group shows a decrease-shift pattern. The ratio change for Visual Word Attack Skills (II) was 40:27 increase, 20:35 decrease, and 40:38 no change. The experimental group showed a slightly greater increase in Visual Word Attack Skills (II), but the control group shows a decrease in its use. The Auditory Word Attack Skills (III) present ratio changes of increase 28:15, decrease 8:15, and no change 64:70.

The experimental group shows a greater increase-change, while the control group shows greater decrease and no-change patterns. However, these 17 changes were slight and not significant. The groups show performance changes in Analytical Word Attack Skills (IV) of increase 28:15, decrease 12:23, and no change 60:62. The experimental presents a greater increase change pattern while the control group presents greater decrease and no-change patterns. The Total (V) language perception skill performances show ratios of 56:15, 24:54, and 20:31. The experimental group shows a greater increase-change or shift toward increased performance of all cluster-domains, while the control groups show greater shifts toward decreased and no-change performances in total domains.

A comparison of experimental and control group males is presented in Table XV. The shifts in language-perception patterns for males in the experimental and control groups show 60:8 increase patterns, 20:33 decrease patterns, and 20:58 no-change patterns in Basic Visual Skills (I); 60:33 increase patterns, 30:41 decrease patterns, 10:25 no-change patterns in Visual Word Attack Skills (II); 10:16 increase pattern, 10:8 decrease pattern, 80:75 no-change patterns in Auditory Word Attack Skills (III); 40:8 increase patterns, 20:33 decrease patterns, and 40:58 no-change patterns in Analytical Word Attack Skills (IV); 60:66 increase patterns, 10:16 decrease patterns, and 30:16 no-change patterns in Total (V). The males in the experimental group present greater increase-patterns in domains (I), (II), and (IV); a greater no-change pattern in (III); a predominate increase-pattern within its own group; but a slightly smaller increase-change than the control group. Males in both groups made predominate increase-change patterns in Total (V).

Female subgroup comparisons for the experimental and control groups indicate pattern shifts of Basic Visual Skills (I) 20:7 increase patterns, 26:50 decrease patterns, 53:43 no-change patterns; Visual Word Attack Skills (II) 26:22, 13:28, 60:50 increase, decrease, and no-change patterns respectively; Auditory Word Attack Skills (III) 40:14 increase patterns, 6:22 decrease patterns, 53:64 no-change patterns; Analytical Word Attack Skills (IV) 20:14, 7:14, 73:72 increase, decrease, and no-change patterns respectively; and Total (V) 53:14 increase patterns, 43:43 decrease patterns, and 13:43 no-change patterns. The females in the experimental group indicated greater increase patterns than the control group in domains (I), (II), (III), (IV), and (V).

The control group females showed greater decrease patterns than the experimental group females in domains (I), (II), (III), and (IV). Greater no-changes were shown by experimental group females in domains (I) and (II), with a slightly greater no-change pattern in domain (IV). The control group females showed greater decrease patterns in domains (I), (II), (III), and (IV), with equal decrease patterns for both groups in domain (V). The control group females show a predominate no-change pattern for Total (V), while the experimental group females present a predominate increase pattern for the same domain.

Cluster-domain patterns for the upper-half intelligence (median 102) group were analyzed for both experimental and control groups. Language-perception increase, decrease, and no-change patterns for both groups respectively are Basic Visual Skills (I) 27:16, 9:33, 64:50; Visual Word Attack Skills (II) 64:16, 18:33, 18:50; Auditory Word Attack Skills (III) 18:25, 0:16, 82:58; Analytical Word Attack Skills (IV) 27:0, 18:25, 55:75; Total (V) 64:25, 27:41; 9:33. The experimental upper-intelligence subgroup shows greater increase patterns than the control upper-intelligence subgroup in domains (I), (II), (IV), and (V) with greater no-change patterns in domains (I) and (III). The control group shows greater decrease patterns in all five domains. Domain (III) shows no decrease patterns for the experimental group, and Domain (IV) shows no increases for the control group.

Cluster-Domain patterns for the experimental and control lower-half intelligence subgroups are analyzed in Table XV. Language-perception increase, decrease, and no-change patterns for both groups respectively are Basic Visual Skills (I) 43:0, 36:50, 21:50; Visual Word Attack Skills (I) 21:14, 21:50, 58:36; Auditory Word Attack Skills (III) 36:7,

14:14, 50:79; Analytical Word Attack Skills (IV) 29:29, 7:21, 64:50; and Total (V) 50:21, 22:43, 28:36. The experimental lower-intelligence subgroup shows greater increase patterns in domains I, II, III, and V, with a greater no-change pattern in domains II and IV. The control lower-intelligence subgroup shows greater decrease patterns in domains I, II, IV, and V. The decrease patterns in domain III are equal for both experimental and control subgroups.

## Summary of Findings

A summary of the significant findings of this study demonstrates that in relation to Hypothesis One:

1. No significant difference (.05 level) in total general-reading ability was found for groups taught by a diagnostic method and a nondiagnostic method at the end of a twelve-week instruction period. However, slightly greater gains were indicated for the diagnostic group in vocabulary, comprehension, and total general-reading ability.

Findings related to Hypothesis Two are:

2. No significant difference (.05 level) was found between pretest-posttest performances for the experimental group in general-reading ability. Slight gains in Vocabulary, Comprehension, and Total reading were observed.

Findings related to Hypothesis Three are:

3. The control group showed no significant difference (.05 level) in pretest-posttest performances in general-reading ability. Slight gains were made in Vocabulary, Comprehension, and Total general-reading ability. The control group made less gain in

Comprehension than the experimental group.

Findings related to Hypothesis Four are:

4. A significant difference (.05 level) in Basic Visual Skills language-perception pattern was found for the diagnostic group.

Findings related to Hypothesis Five are:

5. Inter-total, intra-total group, inter-subgroup, intra-subgroup, inter-individual, and intra-individual change patterns show diverse combinations of increase, decrease, and no-change patterns for all five cluster domains. The predominate pattern for the diagnostic group was toward greater increase changes, while the predominate pattern for the nondiagnostic group was toward a decrease change.

Findings related to Hypothesis Six are:

6. No significant differences (.05 level) were found between the diagnostic and nondiagnostic groups in Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total language-perception patterns.

Findings related to Hypothesis Seven are:

7. Male performances in Basic Visual Skills indicate a significant difference at the 68 percent confidence limit for the diagnostic group with a predominately increase pattern. The nondiagnostic group had a predominately no-change pattern with greater minus changes than the diagnostic group.
8. Male changes in Total cluster-domain patterns indicate slightly greater increase and decrease changes for the nondiagnostic group.

9. Female changes in Total cluster-domain patterns show a greater change for the diagnostic group; a combined pattern of increase and decrease changes with a slightly predominate increase pattern. The nondiagnostic group had a predominate decrease pattern change.
10. Total cluster-domain pattern changes for the upper-half intelligence subgroups show greater increase changes for the diagnostic and greater decrease changes for the nondiagnostic group.
11. Lower-half intelligence subgroups indicate greater changes in Total cluster-domain patterns for the diagnostic group. The diagnostic group shows a predominate increase pattern change, while the nondiagnostic group shows a predominate decrease change.

Observed trends show that grade-placement score gains in general-reading ability for both subgroups and total groups show slightly larger gains for males in the nondiagnostic group; females in the diagnostic group; upper-half intelligence in the nondiagnostic group, and lower-half intelligence in the diagnostic group. The total diagnostic group made slightly greater grade-placement gains than the nondiagnostic group. An observed difference was also found for the diagnostic group in Visual Word Attack Skills and Total reading-skill patterns. The nondiagnostic group showed an observed difference in Auditory Word Attack Skills. The least observed difference between the two groups was in Analytical Word Attack Skills.

## Summary

This chapter has presented the data analyses and findings for this study. Six series of statistical analyses were tabled and interpreted for pretest and posttest performances of experimental and control groups in relation to verbal intelligence, general-reading ability, plus reading-skill patterns and/or cluster domains of language perception skills. Chapter V will present the conclusions and recommendations derived from these findings.

# CHAPTER V

## SUMMARY AND CONCLUSIONS

The primary purpose of this study was to measure individual differences in general-reading ability and language-perception patterns of intact reading groups in order to observe the changes in these two variables in relation to a diagnostic and a nondiagnostic method of reading instruction. In this study a preinstructional diagnosis of reading-skill patterns was made for the diagnostic group, while the nondiagnostic group received no preinstructional diagnosis. Instructional materials for the diagnostic group were chosen according to the results of this preinstructional diagnosis. The nondiagnostic group used the school-adopted basal series program for instruction.

The fact that large numbers of students in American classrooms fail to develop efficient reading skills demands change in present-day approaches to reading-skill development. In Chapter II a review was made of past attemps to measure and understand the uniqueness of individual reading-skill patterns. This review indicated that efforts had been made to measure the various aspects of the reading process, but little had been done to identify and utilize these unique individual differences in classroom instruction. A development or remedial-reading program may leave many untaught gaps in the reading-process when these individual differences are not identified prior to instruction. The future goals will need to be directed toward the development

of instructional programs that are developed and adjusted intermittently as the student progresses or fails to progress in the reading process. This adjustment of instructional procedures to ongoing individual learning performances is more pertinent than the impossible task of eliminating individual differences in reading-skill patterns.

In Chapter II, a review was made of the Holmes-Singer reading-process model which provided the theoretical background for this study. Two hypotheses proposed by Holmes' Substrata-Factor Theory (1954) were tested by this experiment. The first hypothesis states that the power of an individual's total reading working system is dependent upon the order of content and subsequent content stored in the substrata factors. The second hypothesis states that the improvement of a related substrata factor results in improved reading ability, and the sequential input of information gives a differentiated structure to the individual's working system. These two hypotheses provided a theoretical basis for a diagnostic approach to reading instruction. The Language Perception Test Series by Singer (1967) based on the hypotheses of the substrata-Factor Theory of reading provided a statistical measurement of student reading-skill patterns within the reading-process model. Singer's (1960) study of a precocious reader revealed an uneven intra-individual pattern in reading skills. He suggested a new concept in reading readiness--from a general readiness for reading to a specific readiness in each component of the reading process. This suggests a choice of reading materials based on the individual's readiness to learn the next hierarchical reading-skill component and infers a diagnostic approach to teaching reading.

Prior to a twelve-weeks instructional program, two intact seventh grade reading classes were equated in verbal intelligence, general-reading ability, and language-perception patterns. Statistical t-values between mean performances of the two groups in these variables revealed no significant difference between experimental and control groups at the .05 level in these variables.

The preinstructional diagnosis for the experimental group established an intra-total group, intra-subgroup, and intra-individual student profile. Grade-placement scores from the Nelson Denny Reading Test were used to establish the eight subgroups within the diagnostic group. Language Perception Test Battery standard T-scores were used to determine subgroup and individual student language-perception patterns. The standard norm T-scores above the 35 percentile were considered strong; those below the 35 percentile were considered weak. The control group received no preinstructional diagnosis and used the school-adopted basal series plus word clue drills.

A series of statistical analyses were used to determine significant differences in the two groups following the experiment. A t-value between mean differences was used to determine significant difference at the .05 level in general-reading ability as measured by the Nelson-Denny Reading Test, Form A. The pretest standard error of measurement was determined and used to establish the 68 percent confidence limits. This confidence internal for each cluster-domain was used to determine significant posttest differences between the diagnostic and nondiagnostic group in language-perception patterns as measured by the Language Perception Test Series, Form E-J. A posttest standard T-score on the Language Perception Test Series above the 68 percent confidence limit

was considered as an increase pattern; a standard score below this confidence limit was considered as a decrease pattern; and a standard score within the established confidence limits was considered as a no-change pattern.

The observations of the present study were related to the hypotheses proposed in Chapter I. No significant difference at the .05 level was found between experimental and control groups in general-reading ability. Neither the experimental nor control group showed a significant gain at the .05 level in vocabulary, comprehension, or general-reading ability.

A significant difference at the .05 level in Basic Visual Skills was found for the experimental group. No significant difference at the .05 level was found between experimental and control groups in Visual Word Attack Skills, Auditory Word Attack Skills, Analytical Word Attack Skills, and Total language-perception patterns. Differential shifts in language-perception patterns were made by both groups. Select subgroups (male-female and upper-lower intelligence) showed significant shifts in inter-group, intra-group, inter-individual, and intra-individual language-perception patterns. The experimental group showed a predominate increase pattern in language-perception skills. The nondiagnostic group showed a predominate decrease pattern in language-perception skills. Individual students within both diagnostic and nondiagnostic total and subgroups presented a differential diversity of language-perception patterns.

Observed differences between the experimental and control groups indicated slight gains in vocabulary, comprehension, and total general-reading ability for both groups; however, the experimental group showed

slightly greater gains in these variables than the control group.

The control group showed slightly greater gains in Auditory Word Skills, while the experimental group showed slightly greater gains in Visual Word Attack Skills. Less observed gains were made by both groups in Analytical Word Attack Skills.

Because of the small sample, conclusions from this study cannot be generalized to a larger or general population. However, the findings of this study can be related to the basic Substrata-Factor hypotheses. The hypothesis (Holmes, 1966) that "different individuals may perform the same task with equal success by drawing upon different sets of subabilities" was supported by this study. The "gradient-shift" postulate of the theory was supported by the significant increase, decrease, and no-change patterns for all groups. The "mutual and reciprocal causation" hypothesis that "improvement of a relevant substrata factor results in improvement of reading ability and increased reading increases the "interfacilitating efficiency of the working system" and an increase in the content of the separate substrata factors and perceptual discrimination of the symbols of the printed page was also supported. The significant increase in Basic Visual Skills could be related to the predominate increase change pattern in language-perception skills and slightly greater gain in general-reading ability for the experimental group. This supported the hypothesis that it is the sequential input of information that gives a different structural configuration (pattern) to the individual's reading working system. The differential diverse patterns of total groups, subgroups, and individuals prior and following the instructional period also supported this hypothesis. These findings related to the Substrata Factor

hypotheses suggest similar findings may be found in other seventh-grade intact groups or other grade levels not used in this study.

## Conclusions and Recommendations of the Study

Conclusions related to the seven hypotheses of this study are:

1. A diagnostic or nondiagnostic approach to reading instruction makes no difference in average-group gains in general-reading ability.
2. A diagnostic approach to reading instruction makes no difference in pretest-posttest average-group gains in general-reading ability.
3. A nondiagnostic approach to reading instruction makes no difference in pretest-posttest average-group gains in average-group gains in general-reading ability.
4. A diagnostic approach to reading instruction facilitates and significantly increases average-group Basic Visual Skills over a nondiagnostic approach.
5. Individual students and select subgroups within a total group make diverse language-perception pattern changes regardless of teaching approach. This indicates a need for preinstructional diagnosis for any group instruction.
6. Average-group, language-perception pattern changes do not adequately show individual student instructional needs in reading.
7. Language-perception patterns of select groups show a diversity of changes regardless of sex and intelligence level. This also indicates a need for group preinstructional diagnosis for

reading instruction regardless of reading approach or method used.

In relation to the hypotheses presented in this study, the following recommendations are made:

1. Reading skill exercises and instructional materials which utilize and expand Basic Visual Skills can be used effectively at the seventh-grade and junior-high levels.
2. Reading skill exercises and instructional materials which utilize and expand Auditory Word Attack Skills can be used effectively at the seventh-grade and junior-high levels.
3. Analytical Word Attack Skills may need less instruction and skill practice at this grade level except for corrective purposes.
4. A preinstructional diagnosis of reading skills prior to selection of instructional materials and methods are needed to accommodate the diverse language-perception patterns within individuals and groups of students at this grade-level.
5. This diverse reading-skill pattern change within individuals and groups of students at this grade level requires a regular program of re-diagnoses of students' present reading-skill patterns to direct re-selections of instructional materials and methods of meet students' learning needs.

The conclusions based upon this study must be limited to the seventh-grade intact group used in this research, and any generalizations made must be concluded in relation to the major hypotheses of the Substrata Factor Theory of reading.

Recommendations for future research include:

1. A similar study utilizing a large, random sample is suggested.
2. Extend a similar study to other grade levels.
3. A longitudinal study of two groups selected in kindergarten and restudied at fourth grade, seventh grade, and tenth grade intervals to observe changes in general-reading ability and language-perception patterns at each succeeding grade level.
4. A depth study of inter-group and inter-individual language-perception patterns following select methods of reading instruction.
5. A depth study of intra-group and intra-individual language-perception patterns following select methods of reading instruction.
6. A longitudinal study of male and female language-perception skill patterns at the kindergarten, fourth grade, seventh grade, and tenth grades.
7. A longitudinal study of upper- and lower-intelligence groups' language-perception skill patterns at the above-mentioned intervals.
8. A study of individual student language-perception readiness patterns for each cluster-domain of the reading-process model.
9. A study of instructional materials in relation to the development of specific substrata factors in the reading process.

Future research may need to be centered more on intra-group and intra-individual differences than on inter-group and inter-individual differences.

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# APPENDIX

TABLE XVI

PREINSTRUCTIONAL DIAGNOSIS FOR THE EXPERIMENTAL GROUP DEPICTING GROUPING AND CLUSTER-DOMAIN PATTERNS IN STANDARD NORM SCORES AND GRADE PLACEMENTS LEVEL

| DIQ Level | Student Number | Gen. Read. Abi. G. P. | Cluster-Domain Scores I | II | III | IV | V |
|---|---|---|---|---|---|---|---|
| | | Group I - Instructional Level 5.1 - 6.5 | | | | | |
| L | 1 | 5.4 | 42.75* | 39.66* | 41.66* | 41.33* | 41.41* |
| L | 17 | 5.4 | 30.69* | 40.99* | 42.40* | 40.00* | 41.41* |
| L | 19 | 5.9 | 40.66* | 42.00* | 45.50* | 48.00* | 42.83* |
| L | 24 | 6.0 | 44.33* | 45.50* | 39.33* | 42.99* | 42.54* |
| | | Group II - Instructional Level 5.8 - 6.9 | | | | | |
| L | 12 | 6.3 | 51.75 | 51.75 | 46.00* | 46.00* | 49.28 |
| U | 3 | 6.4 | 41.00* | 42.75* | 47.60 | 48.75 | 51.28 |
| L | 7 | 6.4 | 47.00 | 46.50 | 41.66* | 43.00* | 45.06* |
| | | Group III - Instructional Level 6.2 - 7.3 | | | | | |
| L | 14 | 6.7 | 47.00 | 48.33 | 55.00 | 49.20 | 49.19 |
| L | 22 | 6.8 | 48.00 | 49.25 | 42.50* | 42.14* | 45.26* |
| U | 8 | 6.9 | 39.99* | 57.00 | 58.50 | 59.50 | 51.28 |
| | | Group IV - Instructional Level 6.5 - 8.3 | | | | | |
| U | 16 | 7.0 | 48.49 | 48.00 | 51.50 | 55.80 | 49.66 |
| L | 18 | 7.5 | 49.60 | 49.75 | 55.50 | 51.33 | 51.14 |
| L | 21 | 7.8 | 54.42 | 58.00 | 57.00 | 58.50 | 55.94 |
| | | Group V - Instructional Level 6.5 - 9.0 | | | | | |
| L | 11 | 7.0 | 49.00 | 57.40 | 42.40* | 48.00 | 52.00 |
| U | 15 | 8.5 | 66.00 | 51.00 | 42.40* | 48.00 | 52.00 |
| | | Group VI - Instructional Level 7.7 - 9.1 (Horizontal enrichment stressed) | | | | | |
| L | 20 | 8.2 | 54.71 | 56.00 | 55.50 | 52.00 | 54.74 |
| U | 23 | 8.5 | 53.33 | 57.60 | 50.00 | 51.50 | 53.45 |
| L | 6 | 8.5 | 61.20 | 63.00 | 51.66 | 50.00 | 57.78 |
| U | 5 | 8.6 | 49.75 | 47.00 | 58.00 | 55.40 | 51.56 |
| U | 13 | 8.6 | 49.50 | 58.99 | 58.75 | 58.50 | 56.05 |
| | | Group VII - Instructional Level 8.7 - 9.5 (Horizontal enrichment stressed) | | | | | |
| U | 4 | 9.2 | 29.18* | 54.33 | 38.60* | 49.20 | 43.25* |
| U | 10 | 9.4 | 49.00 | 57.40 | 41.66* | 51.25 | 49.38 |
| | | Group VIII - Instructional Level 8.7 - 9.5 (Horizontal enrichment stressed) | | | | | |
| U | 2 | 9.2 | 49.37 | 54.33 | 60.00 | 60.00 | 54.86 |
| U | 9 | 10.1 | 71.05 | 66.00 | 62.00 | 66.00 | 68.42 |
| U | 25 | 10.5 | 56.00 | 57.00 | 59.50 | 72.33 | 58.38 |

*Scores below the 35 percentile of standard norm scores.
U - Upper one-half of group - DIQ Score 102 or above.
L - Lower one-half of group - DIQ Score below 102.

TABLE XVII

A COMPARISON OF READING INSTRUCTIONAL PROGRAMS FOR THE EXPERIMENTAL AND CONTROL GROUPS

| Instructional Program | Experimental Group | Control Group |
|---|---|---|
| Basic Program | Science Research Associates Reading Lab Power Builders, Rate Builders, and Listening Skills (Jr. High Ed.); Tach-X exercises in words and phrases (Educational Development Laboratories, Inc.); SRA Reading for Understanding (General Ed.); Controlled Reader, Story Series D-GH (EDL); McCall-Crabb Standard Test Lessons (three-minute timed exercises, and library selections) | Seventh-grade reading text in the Ginn and Company Series, Doorways to Discovery |
| Cluster Domain Supplementary Program | Continental Press Duplicated Drills: Reading-Thinking Series, grades 3-6; Phonics and Word Analysis Skills, Levels 1 and 2; Visual Discrimination Words and Abstract Designs, Crossword Puzzles, grades 3-6; Advanced Skills in Reading (MacMillan, Book 2) | Received no work in this area |

TABLE XVIII

A REVIEW OF THE SUPPLEMENTARY EXERCISES USED WITH EXPERIMENTAL GROUP TO DEVELOP VARIABLES WITHIN THE CLUSTER DOMAINS

| Cluster Domains | Variables | Materials | Subgroup and Individual Student Assignments |
|---|---|---|---|
| I. Basic Visual Skills | Word Embedded Figure and Ground, Symbol Closure | Tach-X (EDL) Words and Phrases, Discrimination Words and Abstract Designs (Continental Press) | Total Group I, Group II-Student #3, Group III-Student #8, Group VII-Student #4 |
| II. Visual Word Attack Skills | Reversals, Word Discrimination, Phrase Discrimination, Recognizing Prefixes, Suffixes, and Roots | Controlled Reader Stories (EDL), Tach-X Words and Phrases (EDL), SRA Power Builders, Seeing Likenesses and Differences (Continental Press) | Total Group I, Group II-Student #3 |
| III. Auditory Word Attack Skills | Blends, Auditory Abstraction, Matching Sounds, Syllabication | Phonic and Word Analysis Skills (Continental Press) SRA Listening Skills | Total Groups I,V; Group II-Students #7, #12, Group III-#22, Group V-#11, #15, Group VII-#4, #10 |
| IV. Analytical Word Attack Skills | Words in Context, Phonics, Spelling, Prefix and Suffix Meaning, and Conceptual Ability | Controlled Reader Stories (EDL); Reading for Understanding (SRA); McCall Standard Test Lessons B, C, D, E; Continental Press Reading-Thinking Series, Crossword Puzzles; SRA Power Builders; Advanced Skills in Reading (MacMillan, Book 2) | Total Group I, Group II-#7, #12; Group III-#22 |
| V. Total | I, II, III, IV, and V | Used materials in all variables | Total Group I; Group II-#7; Group III-#22; Group VII-#4 |

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