

A CASE STUDY INVESTIGATION INTO
THE PROCESSING OF AUDITORY
PERCEPTUAL STIMULI BY TWO
SLOW READERS

A Thesis

Submitted to
the Faculty of Graduate Studies
University of Manitoba

In Partial Fulfillment
of the Requirements for the Degree
Master of Education

by

Grace Soudack

June 1975

A CASE STUDY INVESTIGATION INTO
THE PROCESSING OF AUDITORY
PERCEPTUAL STIMULI BY TWO
SLOW READERS

by

Grace Soudack

A dissertation submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
of the degree of

MASTER OF EDUCATION

© 1975

Permission has been granted to the LIBRARY OF THE UNIVER-
SITY OF MANITOBA to lend or sell copies of this dissertation, to
the NATIONAL LIBRARY OF CANADA to microfilm this
dissertation and to lend or sell copies of the film, and UNIVERSITY
MICROFILMS to publish an abstract of this dissertation.

The author reserves other publication rights, and neither the
dissertation nor extensive extracts from it may be printed or other-
wise reproduced without the author's written permission.

ACKNOWLEDGEMENTS

The writer wishes to acknowledge the contributions of all the people involved in the completion of this study.

To her adviser, Dr. Odarka Trosky, the writer extends her sincerest appreciation for her encouragement and invaluable advice throughout the course of the study; to Dr. Paul Tucker and Prof. Collin Walley for their interest and constructive criticism; and to Anna and Susan, the two learners, who unaware of being under study, contributed to the writer's understanding of the learning process.



ABSTRACT

Of the many causes postulated for reading difficulties, problems in auditory perception have been commonly submitted. Many studies of auditory perception have been made to investigate the relationship between auditory perception and reading and the effects of auditory perceptual training. Recent research has revealed a correlation between auditory perception and reading success, and various studies have shown that certain auditory abilities can be improved by training.

Competency in dealing with auditory stimuli in an academic setting is one of the abilities assumed as basic to early reading programs. It is assumed that primary grade children already have the basic aptitudes required to deal with the acoustical data in these programs, or will readily acquire them. Unfortunately many children demonstrate a lag in their auditory perceptual development or a disability in their auditory perceptual functioning.

Attempts to train such children are often made by primary grade teachers, and programs designed to provide such training are currently in existence. Investigations of such training procedures have on the whole been concerned with determining the effects they have upon auditory perception and reading. Investigations of the interaction between pupils and auditory perception teaching programs have not been undertaken. The purpose of this study was to investigate

how two pupils identified as slow readers, learned to analyze acoustical information through training in an auditory skills teaching program. The procedure followed was one of systematic observation, formulated into a case study of each of these pupils.

The training program employed in the study was the Perceptual Skills Curriculum, Auditory-motor Program. The program teaches children to analyze spoken words into their component parts--first syllables, then phonemes--and to recognize the way the parts are sequenced. As this is accomplished the child becomes increasingly familiar with the sounds of consonants and vowels within words. The rationale underlying such training is that the child who is able to analyze the acoustical elements of the spoken language will be better able to grasp the visual symbols that represent such sounds when he is learning to read.

The subjects in this study received intensive individualized treatment daily for approximately 15 minutes for a period ranging from 25 to 34 consecutive school days. One of the pupils demonstrated an overall difficulty in listening to and focusing on speech, poor recall of words and verbal instructions, and poor discrimination of vowel sounds and a tendency to mis-pronounce short vowels. The second pupil demonstrated a lack of awareness of parts within words in both her own and others' speech. Her speech was characterized by overall imprecise pronunciation.

Through the use of the program and the investigator's interpretation of the interaction of each learner and the program,

specific auditory activities were devised to meet each pupil's needs. In both cases, the program was successfully completed, but the last learning level in the Curriculum had to be supplemented by means of a multi-sensory approach. Both pupils showed improved auditory skills, stemming primarily from the following procedures:

- 1) reducing the verbal information to facilitate retention;
- 2) providing repetition of verbal stimuli to facilitate focusing;
- 3) teaching for mastery of sub-skills before progressing to more complex ones;
- 4) promoting awareness of component parts within words;
- 5) providing training in speech production; and
- 6) using a multi-sensory approach.

One implication of this study is that auditory training should be incorporated into readiness and early reading programs to enable learners to acquire the auditory abilities which are prerequisite to reading. Secondly this study suggests that a prime responsibility for the development of auditory skills in the young reader lies with the educator. Through careful diagnosis the teacher or reading clinician must determine the nature and degree of auditory deficiencies and must take immediate steps to overcome these in order to avoid or remediate certain reading problems. One way is to use the Auditory-motor Skills Curriculum, recognizing that should there be basic problems such as inadequate listening skills or difficulties in following directions, the program will have to be supplemented with appropriate activities.

The study showed that the Auditory-motor Skills Curriculum

through its hierarchical structure identified specific auditory deficiencies in two learners and helped them to overcome these problems. It is stressed, however, that no program meets all the needs of the learner; rather, careful study of the program, the pupil, and the interaction of the pupil and the program is of utmost importance to the educator to facilitate the learning process.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
Statement of the Problem	4
Definition of Terms	5
Design of the Study	6
Sample	7
Data Collecting Method	7
Assumptions	8
Limitations of the Study	8
Importance of the Study	9
II. REVIEW OF RELATED LITERATURE	11
Auditory Perceptual Skills and Reading	12
Effects of Auditory Skills Training	24
III. DESIGN OF THE STUDY	33
Pilot Study	33
Auditory-motor Skills Curriculum	34
Research Study	36
IV. CASE STUDIES I AND II	40
Case Study I	41
A Description of Susan's Progress	42
Case Study II	56
A Description of Anna's Progress	57

Chapter	Page
V. SUMMARY, CONCLUSIONS AND IMPLICATIONS	69
Summary	69
Case Study I: Susan's Initial Learning Behavior	70
Case Study I: Instructional Procedures	71
Case Study II: Anna's Initial Learning Behavior	73
Case Study II: Instructional Procedures	74
Commonalities in the Case Studies	76
The Auditory-motor Curriculum	77
Conclusions	79
Limitations of the Study	87
Implications of the Findings	88
BIBLIOGRAPHY	94
APPENDICES	
Appendix A. Summary of Behavioral Objectives	100
Appendix B. Sample of Unit Test	102
Appendix C. Diagrammatic Chart of Case Study I - Susan	104
Appendix D. Diagrammatic Chart of Case Study II - Anna	106

CHAPTER I

INTRODUCTION

The importance of auditory perceptual skills in early reading is recognized by many educators, and is the subject of many studies concerned with factors related to early reading success. In the past four decades much research has addressed itself to investigating the effects which perceptual abilities have on learning to read. While not all studies are in agreement, a large body of recent research reveals a relationship between auditory perceptual abilities, particularly auditory discrimination and auditory analysis, and reading skills. Such research has influenced educators in their teaching, and curriculum workers in program planning.

Although planners of curriculum and instructional programs take into consideration individual differences in learners, they "... make certain assumptions about the entering abilities of the students who will use their programs -- what the students are expected to know when they start, what they are expected to be able to do when they start."¹

... For example, every first-grade instructional program for unimpaired, so-called "normal" children (children whose chronological and mental ages approximate six years, whose sight and hearing are within normal ranges, who can speak intelligibly and manipulate a pencil with reasonable control) assumes that the students already know, or will readily learn how to deal with the basic visual and acoustical communication codes used in that program. Individual differences in students'

¹Jerome Rosner, Perceptual Skills Curriculum, Introductory Guide, (New York: Walker Educational Book Corporation, 1973), p. 12.

general intelligence are anticipated; indeed provisions are often built into the instructional program to accommodate these differences. On the other hand, individual differences in the basic processes of organizing the sensory data -- the media from which symbolic visual and acoustical information is constructed -- are usually of less concern. The inference is that if the children meet the criteria of the "unimpaired", they will possess these basic aptitudes.²

Thus, competency in dealing with auditory perceptual data in an academic setting, is one of the abilities assumed as basic to early reading by instructional programs used in the primary grades. However, children bring with them to the classroom perceptual abilities which are largely determined by their experiences, and their neurological makeup; and as a result, a wide range in their abilities exists. It is necessary that teachers provide instruction in those auditory skills which are prerequisite to success in early reading, to students, to the extent that they demonstrate the need.

The Perceptual Skills Curriculum, Auditory-motor Program, is a validated program designed to train children in auditory analysis skills.³ It is based on the premise that children who are competent in dealing with auditory stimuli encounter less difficulty in learning to read. A number of studies have been conducted which leave little doubt that auditory analysis skills can be effectively taught through the vehicle of this curriculum.⁴ That mastery of the skills taught in the program facilitates children's learning to read, is attested to in the findings of a further study of transfer of training.⁵

² Ibid.

³ For validation studies, see Jerome Rosner, Ibid., pp. 87-96.

⁴ Jerome Rosner, "Auditory Analysis Training with Prereaders," The Reading Teacher, XXVII, (No. 4) 1974, p. 379.

⁵ Jerome Rosner, Perceptual Skills Curriculum, Introductory Guide, (New York: Walker Educational Book Corporation, 1973), p. 91.

While attempts to train children who are deficient in auditory skills are made by teachers, and whereas programs making provision for such training exists, (i.e. Perceptual Skills Curriculum, Auditory-motor Skills), there is an ongoing need for teachers to know what programs are available, how useful they are, and how they may best be used.

On the whole, investigations of auditory perceptual training programs have concentrated on the effects of such training upon reading and upon the development of certain auditory perceptual skills. Studies of the interaction between students and auditory teaching programs have not been undertaken. Studies of this nature would be of value to researchers transmitting to teachers the usefulness of auditory training so that they may become actively involved in implementing such training programs. The teacher-researcher who has a close first-hand experience with a particular program is in a better position to impart to others the value of the program. Teachers who accept in principle the necessity of auditory training for certain students may then be amenable to implementing training procedures for those students who demonstrate the need, and to apply training for reinforcement or follow-up in the classroom for children who have been embarked on such training by resource personnel outside the classroom.

Thus, close observation of a child engaged in auditory perceptual learning may yield insights which will better enable the observer to communicate to teachers an understanding of how they may productively provide such training. Observational studies of children engaged in such pursuits may also provide direction for further research, and may enable curriculum planners to be more precise in their program planning. Therefore, it seems worthwhile to study the ways in which children integrate

auditory perceptual training.

Observation may serve a variety of research purposes. It may be used in an exploratory fashion, to gain insights that will later be tested by other techniques; its purpose may be to gather supplementary data that may qualify or help to interpret findings obtained by other techniques; or it may be used as the primary method of data collection in studies designed to provide accurate descriptions of situations or to test casual hypotheses.⁶

Statement of the Problem

The purpose of the study is to investigate how two children identified by classroom teachers as substandard readers learn to organize and analyze verbal auditory stimuli. By systematic observation of these learners' behaviors, the study seeks to come to an understanding of the kinds of meanings these learners derive from the Auditory-motor Skills Program.

Systematic observation involves a methodical and controlled observation of the conduct and behavior of the child as reflected in his activities from which is made an inference of the accompanying mental states. This method is controlled in the sense that the observer selects beforehand ... a particular situation or series of situations. The important factor in this method is to develop a technique whereby the responses made by the child can be recorded systematically. It must be noted that the behavior recorded is that which occurs naturally.⁷

This descriptive case study investigates the natural behavior of two slow readers in a controlled learning situation, that of learning to process the tasks of the Auditory-motor Skills Program.

⁶Claire Sellitz, et al., Research Methods in Social Relations, (New York: Holt, Rinehart & Winston, 1959), p. 204.

⁷William A. Kelly, Educational Psychology, (Milwaukee: The Bruce Publishing Co., 1945), p. 8.

Definition of Terms

For the purpose of this study, the following terms were defined as stated below:

Phoneme is a term referring to the individual sounds of the language. It includes all the ways in which a particular sound is made, regardless of its position in a word. For example, producing the sound "d" in "door", "saddle", and "bird", are all uses of the phoneme "d".

Graphemes are the printed symbols of an alphabetic language which represent the phonemes produced in speech. The first phoneme, for example, produced when enunciating the word "physical" is the sound "f"; the grapheme is represented in print by "ph".

Morpheme is the smallest meaningful unit of language or dialect.

Auditory perception is the process by which the ear and the brain apprehend incoming stimuli such as non-verbal sounds and speech sounds.

Auditory discrimination is the ability to differentiate between individual speech sounds or phonemes regardless of hearing adequacy. Thus an individual with unimpaired hearing, who has poor discrimination may not recognize the difference between "clothe" and "clove" when hearing these words.

Perceptual analysis is the capacity of the individual to identify a whole, and to segregate it into fragments or sub-wholes. In a task of auditory analysis of a spoken word, the individual might be called upon to pronounce a word, to pronounce it pausing between syllables or phonemes, and to isolate and pronounce any of the syllables and/or phonemes.

Perceptual synthesis or blending is the ability to reconstruct total forms from a collection of segments. With reference to verbal

behavior it is the capacity to combine phonemes into recognizable wholes or words. Synthesis or blending is the converse of auditory analysis of a spoken syllable into phonemes.

The phonics approach to learning to read is the method by which children first learn the relationship between graphemes and phonemes; then they learn to blend them into words. This ability to synthesize phonemes is related to auditory perception.

The sight approach to learning to read is the method by which children learn whole words first, and this is followed by learning short sentences incorporating these words. This approach depends upon visual perceptual abilities.

Modality is a sensory pathway through which individuals learn. Thus an audile learner is one whose strong or preferred modality is auditory; consequently his primary sensory pathway for learning is auditory. The visile learner's modality is visual; consequently his primary sensory pathway for learning is visual.

Design of the Study

The study design included two stages. The first was a pilot study conducted in order to train the teacher-researcher to, 1) be proficient in using the Auditory-motor Skills Curriculum, and 2) to develop specific procedures for collecting the data for a descriptive case study. The subject of the pilot study was a grade one student identified by the classroom teacher as "very slow to pick up the reading skills even after considerable review and individual attention." The pilot study spanned twenty-three daily lessons of fifteen to twenty minutes duration each. The second stage of the study design was the research study. Since the

intent of the study was to look at children's learning behavior, emphasis was on describing the ways students integrate specific cognitive tasks. The procedure then was one of case study, often referred to as the exploratory method. The exploratory approach was adopted because it has several features which make it an appropriate technique for summoning insights.

What features of this approach made it an appropriate procedure for the evoking of insights? A major one is the attitude of the investigator, which is one of alert receptivity, of seeking rather than of testing. Instead of limiting himself to the testing of existing hypotheses, he is guided by the features of the object being studied.

... A second feature is the intensity of the study of the individual One attempts to obtain sufficient information to characterize and explain both the unique features of the case being studied and those which it has in common with other cases.

... A third characteristic of this approach is its reliance on the integrative powers of the investigator, on his ability to draw together many diverse bits of information into a unified interpretation ... the characteristic is not necessarily undesirable when the purpose is to evoke rather than to test hypothesis. For even if the case material is merely the stimulus for the explicit statement of a previously unformulated hypothesis, it may serve a worthwhile function.⁸

Sample

The subjects in this study were two second grade pupils identified by their teachers as having problems in reading. This sample was selected from a population of primary grade pupils.

Data Collecting Method

The method of collecting data was direct note-taking and audio-taping of the students' responses to tasks posed in the Auditory-motor

⁸Claire Sellitz , et al., Research Methods in Social Relations, (New York: Holt, Rinehart & Winston, 1959), p. 60.

Skills Program, as well as comments made by the students during the lessons. Description of non-verbal behavior was added to the record at the conclusion of each lesson. The data was collected and recorded daily, during and immediately following each fifteen to twenty minute session for each individual student.

Assumptions

There are four assumptions implicit in this study. They are:

- 1) that auditory perceptual skills are related to reading success;
- 2) that such skills are teachable through the Auditory-motor Skills Program, and having been taught, facilitate the acquisition of reading skills;
- 3) that teachers' judgement of selection of children who are substandard in reading skills is valid; 4) that there is no difference between sexes in terms of how students learn auditory skills.

Limitations of the Study

1. The descriptive study provides information unique to the subjects being studied, and has therefore limited possibilities for generalization. "It must, then, become a study in depth." As such, it should lead to some understanding of the process of learning (i.e., auditory skills), which then must ultimately be tested on the wider stage of individual difference.⁹

2. To some degree the analysis of an in-depth study reflects the investigator's predisposition. However, since the purpose of this case

⁹Rosa I. McIntyre, "The Investigation of a Preschool Child's Understanding of Specific Words Selected From His Spontaneous Oral Expressions: The Implications for Classroom Teachers and Parents: A Case Study", (Ph.D. dissertation, Pennsylvania State University, 1965), p. 9.

study was to provide insights and to evoke rather than to test hypotheses, this concern is not by nature undesirable.¹⁰

3. Observational studies lead to insights and may lead to hypotheses but they do not test them.¹¹

4. When the data gathering instrument is the human observer, there is some danger that he will be variable during the course of his observations.¹² (Therefore standardization of procedures of observing and recording was implemented and observed throughout the study.)

5. In this study the researcher and teacher were one, and consequently there was a possibility for bias.

6. The rapport of the teacher and/or researcher may have produced involuntary effects upon the subjects even though attempts were made to minimize personal influence by staying as closely as possible within the confines of the Auditory-motor Skills Curriculum.

7. Few investigations of case studies which describe students' processing of auditory skill learning exist, therefore data for comparison and for modelling purposes were severely limited.

Importance of the Study

This study has significance in that it may guide the educator and researcher to greater understanding of how primary grade students acquire auditory perceptual skills which are related to primary grade reading. Thus the study described in detail the behavior of particular children

¹⁰ Claire Stellitz, et al., Research Methods in Social Relations, (New York: Holt, Rinehart & Winston, 1959), p. 60.

¹¹ Ibid., p. 65.

¹² Eugene J. Webb, Donald T. Campbell, and Richard D. Schwartz, Unobtrusive Measurement: Non-Reactive Research in the Social Sciences, (Chicago: Rand McNally & Co., 1967), p. 39.

as they were taught to analyze speech sounds. "An ability to analyze speech sounds into consonants and vowels may be particularly critical for children who are learning to read an alphabetic form of writing. If a child is unable, for whatever reason, to hear constituent phonemic elements, he will be mystified about what the printed letters are supposed to correspond to."¹³ The Auditory-motor Skills Curriculum trains children to hear and analyze speech sounds into their component parts, and thus is being used to train subjects whose reading skills are substandard.

By gaining knowledge of how particular students acquire the new learnings of the Auditory-motor program, the observer is better able to convey to teachers, changes perceived in the students, why the program is workable, and what its usefulness is for substandard readers; and thereby how and why teachers should initiate the program. Furthermore it may serve as a general background for further experiments into the auditory perceptual learning of poor readers who are in need of auditory training within the ages covered in the study; and should be of value to all those who teach auditory skills.

The ability to organize auditory sensory data is a basic component in early reading programs. This study may influence educators and curriculum developers to be more cognizant of the concept that, whereas the ability to organize sensory data is a basic component in early programs, children display a wide range in such organizational abilities. Recognition of how children differ in their abilities to organize auditory stimuli may lead curriculum planners to re-examine existing programs in terms of whether or not they make provision for training children who are deficient in auditory processing skills.

¹³ George A. Miller, ed., Linguistic Communication Perspectives for Research, (Delaware: International Reading Association, 1973), p. 32.

CHAPTER II

REVIEW OF RELATED LITERATURE

An examination of the literature investigating auditory perception and its relationship to reading skills reveals a concern with two major questions: 1) Is there a relationship between auditory perception and reading disability? 2) Can skills of auditory perception be taught, and if so, does this contribute to reading improvement? While not all of the research is in agreement regarding these questions, an overwhelming number of studies support the theory that deficiencies in auditory functioning contribute to reading difficulties, and that corrective measures should be undertaken for children who demonstrate deficiencies in auditory perceptual skills.

Bond (1935) was one of the first to suggest that poor auditory discrimination is related to reading disability.¹⁴ During the two decades following his research, little investigation was carried out concerning the relationship of adequate auditory perception and reading. Recently, however, there has been a renewal of interest primarily with regard to primary grade reading, and particularly in matching instruction to learning modality.

The following review of literature which concentrates on the last two decades is divided into two sections. The first section presents the

¹⁴ Guy L. Bond, "Auditory and Speech Characteristics of Poor Readers," Teachers College Contributions to Education, No. 567 (1935), cited by Robert Dykstra, Reading Research Quarterly, I (Spring 1966) pp. 5-34.

findings of studies which have investigated relationships between auditory perceptual skills and reading abilities. The second section presents studies of the effects of auditory perceptual training. Both sections include investigations related to the Auditory-motor Skills Curriculum which provides the basic instructional materials for the case studies in this thesis. Because the case studies describe the behavior of students during training in this curriculum, the rationale and theory underlying this program are offered as a conclusion for this chapter.

Auditory Perceptual Skills and Reading

Auditory perception affects early reading through its relationship to the speech patterns learned by the child and to his overall language development. Thus studies which hold that auditory perceptual abilities directly facilitate phonological development in young children, and indirectly facilitate the reading process as well, have received wide attention from researchers. During the past four decades numerous studies, using a variety of approaches and measures, have investigated the role of auditory perception in reading. The question of the relationship of auditory perception to reading continues to arouse interest at the present. While most of the research reported from the forties to the present appears to support the existence of a relationship, not all researchers have found this to be the case.

Poling (1935) found no relationship between poor reading and discrimination errors when she divided a group of 78 poor elementary grade readers into two groups for study, those with poor auditory discrimination and those who exhibited adequate auditory discrimination abilities. Her results indicated that the former group was no more likely to make vowel, consonant, or reversal errors than the latter. Poling concluded that

auditory discrimination is not a widespread cause of inefficient word recognition.¹⁵

Reynolds (1935) tested elementary grade students for blending and word pair discrimination. While blending abilities were found not to be highly related to reading, word pair discrimination was found to be somewhat related. When mental age was eliminated, however, the correlations were found to be insignificant; as a result, Reynolds concluded that none of the measures of auditory discrimination added significantly to mental age for prediction purposes.¹⁶

Templin (1954) found low correlations between auditory discrimination and reading ability in a study of 318 fourth grade students who were administered various tests of auditory discrimination and a test of general reading ability. Correlation coefficients between reading ability as measured by reading tests, and a number of auditory discrimination tests ranged from .22 to .47. The correlation coefficients of the tasks in which the students had to recognize a word containing a given sound were .44 and .47 respectively.¹⁷

Similarly, Wheeler and Wheeler (1954) found low correlations between auditory perceptual tests and tests of silent reading ability in a

¹⁵ Dorothy L. Poling, "Auditory Deficiencies of Poor Readers," in Clinical Studies in Reading II. (Chicago: University Reading Clinics, 1953), pp. 107-111.

¹⁶ Maynard Clinton Reynolds, "A Study of the Relationships Between Auditory Characteristics and Specific Silent Reading Abilities," Journal of Educational Research, LVI (February, 1953), pp. 439-449.

¹⁷ Mildred C. Templin, "Phonic Knowledge and its Relation to the Spelling and Reading Achievement of Fourth Grade Reading Pupils," Journal of Educational Research, XLVII (1954), pp. 441-454.

study of 188 fourth grade students. They found a correlation of .43 between auditory blending tests and word recognition tests. Auditory discrimination tests showed only slightly higher relationships with all aspects of reading achievement, and were therefore not considered significant.¹⁸ In support of this finding, Dykstra (1962) found correlations between auditory discrimination and reading in the same range as Wheeler and Wheeler and also concluded that developing auditory discrimination of pupils will not ensure improved reading.¹⁹

In a later study, Dykstra (1966), comparing the predictive precision of auditory tasks, indicated that good readers differ from poor readers in their auditory functioning. This study encompassed 632 primary grade children from three socioeconomic levels, and reported small positive correlations (.30 to .40) between auditory discrimination and reading achievement.²⁰ Seven auditory discrimination measures were used, and all were later found related to reading achievement, however, "... a combination of these measures still left a great deal to be desired as far as predicting the reading achievement of individual students was concerned."²¹ Thus the investigator makes it clear that caution must be exercised in making interpretations and inferences based upon such findings. This

¹⁸L.R. Wheeler and Viola D. Wheeler, "A Study of the Relationship of Auditory Discrimination to Silent Reading Abilities," Journal of Educational Research, XLVIII (1954), pp. 103-113.

¹⁹S. Jay Samuels, "Success and Failure in Learning to Read," Reading Research Quarterly, III (Winter, 1973), pp. 200-239, citing unpublished Ph.D. dissertation, Robert Dykstra.

²⁰Robert Dykstra, "Auditory Discrimination Abilities and Beginning Reading Achievement," Reading Research Quarterly, I (Spring, 1966), pp. 5-34.

²¹Ibid., p. 31.

assertion by Dykstra is reinforced by Weiner. In discussing studies on auditory discrimination as a correlate of reading success, Weiner (1967) states that the results of these studies are inconclusive and may even suggest that a systematic inferiority to discriminate speech sounds is not correlated with poor reading.²²

In a critique of the literature concerned with success and failure in learning to read, Samuels (1973) cautions the reader to be aware of procedural shortcomings which may exist within investigations. He points out, for example, that when young children are tested for auditory discrimination over a period of several days, their performance is frequently better after the first test. Some of the children may not have understood the instructions, others may have required practice in making "same-different" judgements; nevertheless auditory discrimination tests are generally administered once. Use of restricted populations and lack of control for socioeconomic status may limit the possibility of drawing general conclusions from studies. The absence of factor analysis of skills imposes further restraints. Auditory perceptual tests, for example, may be testing intelligence or other functions. Drawing conclusions from research is further complicated since different studies employ different measures for auditory perception and for reading achievement.²³

There are, on the other hand, numerous studies which indicate a relationship between poor auditory skills and poor reading; and which appear to reflect the theory that deficiencies in auditory functioning

²²Paul S. Weiner, "Auditory Discrimination and Articulation," Journal of Speech and Hearing Disorders, XXXII (February, 1967), pp. 19-28.

²³S. Jay Samuels, "Success and Failure in Learning to Read: A Critique of the Research," Reading Research Quarterly, XXX (Winter, 1973), pp. 200-239.

"... may be a major contributor to reading difficulties and that remediation should be early and aural."²⁴ The literature reviewed in the remainder of this section is a sample of the large number of studies which support the existence of a correlation between auditory abilities and reading.

In support of the position that auditory perception plays a major part in learning to read, Leeds (1971) pointed out that although reading is primarily a visual task, several auditory integrities are prerequisite if the individual is to succeed.²⁵

... Among the skills required for successful reading are: the ability to distinguish between similarities and differences in sounds, to perceive a sound within a word, to synthesize sounds into words and to divide the sounds into syllables. If a child is not able to perform these functions, he will have difficulty in learning to read. Some children who have had reading problems since the beginning of their school career have a history of speech or language problems, but this is not universal in nature. Hearing is the primary channel for language acquisition and interpersonal communication. The child, in order to repeat what he has heard, and subsequently translate what he reads, must be able to re-auditorize. Failure to be successful in this process results in imperfect reading.²⁶

That the child must be able to hear and identify the separate sounds in spoken words was demonstrated by Durrell and Murphy (1953). They investigated the ability of children in grades one, two, and three, to identify sounds in spoken words in relation to their reading

²⁴Robert D. Chester, "The Psychology of Reading," Journal of Educational Research, LXVII (May, June, 1974), p. 404.

²⁵Donald S. Leeds, "Physical Factors in Reading Disabilities," Journal of the Reading Specialist, XI (October, 1971), pp. 71-86.

²⁶Ibid., p. 75.

achievement. Correlations between these auditory analysis abilities and reading achievement were .56, .52, and .52 in grades one, two and three, respectively. On the basis of this study, and in conjunction with other studies, these investigators concluded that auditory discrimination abilities are significantly related to reading achievement.²⁷ Harrington and Durrell (1955) in a study of 500 second grade students divided them into "good" and "poor" readers and matched them on phonics, visual discrimination and mental age. The auditory discrimination instrument used tested the child's ability to notice initial consonant sounds, rhyming at the ends of words, final consonants, and a combination of initial and final consonants in words spoken by the examiner. The investigation found significant differences between good and poor readers in auditory discrimination.²⁸

Each of a group of 80 first graders and 76 second graders was divided into three levels in a study by Wepman (1960). The division was based on the pupils' scores on the Wepman Auditory Discrimination test and on articulation tests. One level consisted of those whose auditory discrimination and articulation were adequate for their age; the second level included those whose scores indicated inadequate discrimination for their age while their articulation was adequate; and the third level was composed of children who were found to be inadequate in both discrimination and articulation. The data showed that children with poor discrimination

²⁷D.D. Durrell and Helen A. Murphy, "The Auditory Discrimination Factor in Reading Readiness and Reading Disability," Education, LXXIII (May, 1953), pp. 556-560.

²⁸Sister Mary James Harrington and D.D. Durrell, "Mental Maturity Versus Perceptual Abilities in Primary Reading," Journal of Educational Psychology, XLVI (1955), pp. 375-380.

regardless of articulation abilities, made significantly lower achievement gains than the other two levels on the total score of a reading achievement test. At the end of the school year, the first graders with poor auditory discrimination had attained a combined mean score of 1.9 on reading achievement tests, while their classmates reached 2.2. In grade two, the combined mean score for those with poor auditory discrimination was 2.8; for their classmates it reached 3.5.²⁹

Chall, Roswell and Blumenthal (1963) considered auditory integration, the sounding out and blending of phonemes, in terms of prediction of reading success. They found a substantial relationship between blending abilities and reading competence. Auditory blending ability, whether tested in grades one, two, three, or four, was found to be positively correlated with oral reading, silent reading, and most highly with word analysis skills through the fourth grade.³⁰

Christine and Christine (1964) in a study of three groups of children (27 in grades one to three, reading at or above grade level; 15 reading below grade level and possessing normal speech; and 11 in special remedial classes for speech disorders), tested all subjects on the Wepman Auditory Discrimination Test. On the basis of differences found in auditory discrimination between those reading at or above grade level and those reading below grade level, they concluded that poor auditory discrimination is one causal factor in reading disabilities.³¹

²⁹Joseph M. Wepman, "Auditory Discrimination, Speech, and Reading," Elementary School Journal, (March, 1960), pp. 325-333.

³⁰Jeanne Chall, Florence G. Roswell, and Susan Hahn Blumenthal, "Auditory Blending Ability: A Factor in Success in Beginning Reading," Reading Teacher, XVII (1963), pp. 113-118.

³¹Dorothy Christine and Charles Christine, "The Relationship of Auditory Discrimination to Articulatory Defects and Reading Retardation," Elementary School Journal, LXV (1964), pp. 97-100.

Twenty-five boys were divided into two groups based on reading abilities in a study by Zigmond (1966). Those considered "dyslexic" were on the average 2.7 years retarded in reading. The "non-dyslexic" readers were within one year of the norm for their mental age. The groups were matched for average intelligence, adequate hearing, vision, and motor skills, and no problems in emotional adjustment and opportunities for learning in school. Auditory functioning was measured using six tests of auditory memory and one of auditory discrimination. The results showed the "dyslexic" group inferior to the "non-dyslexic" on all auditory measures.³²

Morency views early reading as a decoding process including two stages which are both interwoven with phonological development in the child, and which are facilitated by discrimination and recall of speech sounds.

... The child first learns that the symbols that appear on a printed page represent and correspond to his spoken language. In other words, the initial stage of reading consists of decoding orthography into previously learned speech patterns. The second stage involves comprehension through arousal of associations to effect a meaningful state derived from verbal learning. The ability to discriminate fine differences in speech sounds and to recall them facilitates the phonological development in very young children of language acquisition and articulation accuracy.³³

Thus Morency (1967) conducted an investigation into the significance of auditory discrimination and auditory memory to early reading. In this

³² Naomi Zigmond, "Intrasensory and Intersensory Processes in Normal and Dyslexic Children," (unpublished Doctoral dissertation, Northwestern University, 1966).

³³ Anne Morency, "Auditory Modality -- Research and Practise," (paper presented at the International Reading Association Conference, Seattle, May, 1967). (ERIC ED 014 383)

longitudinal study, 177 children were administered the Wepman Auditory Discrimination test and a test of auditory memory at the beginning of grade one. At the end of grade three they were administered a reading achievement test. Both auditory measures correlated significantly with those of the achievement test. Morency concluded that existing auditory perceptual difficulties may contribute to the level of school achievement for as long as three years.³⁴ A later and similar longitudinal study is reported by Wepman and Morency (1971). They investigated the relationship between the auditory perceptual abilities of 120 first grade children and their reading achievement test scores at the end of each grade through grade six.³⁵ On the basis of their findings they inferred that, "lags in (perceptual) development are seen to have a continuing relationship to school achievement throughout the elementary grades."³⁶

Other recent research which explored the efficacy of matching instruction to modality has provided some insights into the relationship between reading achievement and auditory functioning. Two such studies attempted to differentiate instruction (according to phonic and sight) and tailor it to learner modality (auditory and visual) in order to determine whether such procedures would result in differences in reading achievement. The first study by Bateman (1968) found that by the end of grade one, subjects taught by the phonic method, whether audile or visile learners, made significant improvement in comparison to those taught by the sight

³⁴Ibid., pp. 1-26.

³⁵ Joseph M. Wepman and Anne S. Morency, "School Achievement as Related to Speech and Perceptual Handicaps," (Illinois: Chicago University, June, 1971). (ERIC ED 057 539)

³⁶Ibid., p. 27.

approach. Furthermore, those who scored 2.9 and above on reading achievement tests were almost entirely audile; those who scored below 2.9 were by and large visile.³⁷ Robinson's study (1972) was a longitudinal study which followed grade one students through grade three to determine whether long range differences in reading instruction would be observed between groups of subjects taught by phonic or sight method. This study revealed that auditory discrimination had a very significant effect upon all reading scores in grades one and three on all reading achievement tests administered regardless of the teaching method employed.³⁸

Auditory functioning has been assessed primarily by tests which present spoken word pairs and require the pupil to indicate if the words of a pair are the same or different. This in turn has led to instruction which trains children who are deficient in discriminating among word pairs. In support of this procedure, de Hirsch, Jansky, and Langford point out that undifferentiated auditory discrimination causes the child to misinterpret what he hears. Thus it is advocated that auditory discrimination be practised on the basis that it clarifies auditory perception for those children whose "auditory perception is diffuse."³⁹ Thus far, with some exceptions, the measures used to test auditory skills have not required behavior more complex than "same-different" responses

³⁷ Barbara Bateman, "The Efficacy of an Auditory and a Visual Method of First Grade Reading Instruction with Auditory and Visual Learners," in Perception and Reading, ed. by Helen Smith (Vol. 12, part 4; Delaware: I.R.A., 1968), pp. 105-112.

³⁸ Helen M. Robinson, "Visual and Auditory Modalities Related to Methods for Beginning Reading," Reading Research Quarterly, III (Fall, 1972), pp. 7-39.

³⁹ Katrina de Hirsch, Jeannette J. Jansky, and William S. Langford, Predicting Reading Failure, (New York: Harper and Row, 1966), p. 89.

to spoken word pairs. That tests of discrimination which involve "same-different" judgements to spoken words or syllable pairs may not be extensive enough was considered by Lindamood and Lindamood (1972). They devised a test to gather data on the emergence of more inclusive auditory abilities in children in kindergarten through grade four. A very wide range of scores was found to exist through grade two, and in particular in kindergarten. The study indicated that the degree of development of these functions varies greatly among children of a given age. The investigators stress that testing (and teaching) of auditory perceptual skills must go beyond discrimination and must include testing (and teaching) the ability to conceptualize auditory pattern changes, and the sequential and temporal nature of phonemic sounds in words.⁴⁰

Aware that many of the tests of auditory discrimination provide a minimum of information concerning the auditory abilities of children, Rosner and Simon (1971) constructed a test to analyze the processes that contribute to auditory perception as it is related to reading. The Auditory Analysis Test tests the degree to which a child is able to sort, order, and synthesize the perceptual elements of auditory information. Its purpose is to embrace the overall aspect of auditory perception in order to identify those who require teaching in any of the sub-skills of auditory perception.⁴¹ In the test the child is asked to remember and

⁴⁰Charles H. Lindamood and Patricia C. Lindamood, "Conceptualization of Auditory Patterns," (paper presented at the I.R.A. Conference, Calif., May, 1972). (ERIC ED 044 253)

⁴¹Jerome Rosner and Dorothea P. Simon, "The Auditory Analysis Test: An Initial Report," Journal of Learning Disabilities, IV (August-September, 1971), pp. 40-48.

analyze spoken sounds and to demonstrate these auditory analysis abilities in his oral responses.

The term "auditory analysis" as used here refers to the resolution of spoken words into their phonemic elements. Hence, the goal of auditory analysis training is to teach the child a process for identifying the acoustical elements of the reading-spelling code as heard in the context of spoken language. As the goal is achieved, two basic concepts become accessible to the child: 1) certain phonemes differ when they are heard as isolated sounds in contrast to when they are heard in a spoken word - for example, the 'b' sound in isolation is not the same as the 'b' sound in the word "bat"; 2) the phonemic elements in a word have specific temporal organization - that is, the blended sounds of a spoken word occur in a precise sequence, from first phoneme to last.⁴²

Using the Auditory Analysis Test to measure the auditory analysis abilities of 284 children in kindergarten through grade six, Rosner and Simon (1971) found a wide performance range within and between the various age groups. In addition, the test scores were found related to scores obtained by the children on reading achievement tests. The correlations were relatively high, particularly in grades one and three, accounting for 39 to 70 percent of the variance in scores.⁴³ Subsequent to this investigation, the Auditory Analysis Test and a reading achievement test was administered to 215 first graders and 219 second graders by Rosner. For the children in this study, the data indicated a significant relationship between achievement and auditory perception, with correlations ranging from

⁴²Jerome Rosner, "Auditory Analysis Training with Prereaders," Reading Teacher, XXIV (1974), p. 379.

⁴³Jerome Rosner and Dorothea P. Simon, "The Auditory Analysis Test: An Initial Report," Journal of Learning Disabilities, IV (August-September, 1971), pp. 40-47.

.50 to .65.⁴⁴

In summary, much of the research indicates that learning to read is related to auditory perceptual skills. "In recent years authorities have called attention to the importance of ... auditory discrimination, and receptive language in readiness for reading. Lags in these areas seriously impair readiness to read ... researchers report that many children in kindergarten and grade one lack these important developmental skills."⁴⁵ Deficiencies in experiences at home or at school, neurological dysfunctions, and slow developmental growth are often regarded as the causes of lags in developmental skills such as auditory perception. Teachers have long been aware of such deficiencies in children within their classrooms, and have incorporated into their classroom procedures - auditory training for pre-readers, for primary grade children in general, and for those deficient in auditory skills in particular. Recent research in the area of auditory perception has addressed itself to the effectiveness of such training. It has focused upon the hypothesis that auditory skills can be improved by training, and that training of auditory skills affects reading achievement.

Effects of Auditory Skills Training

As a preliminary step to reading and in conjunction with early reading, it is desirable that children are made aware of the acoustical elements of their language, and with the concept that words in sentences

⁴⁴Jerome Rosner, "Language Arts and Arithmetic Achievement, and Specifically Related Perceptual Skills," American Educational Research Journal, X (Winter, 1973), pp. 59-68.

⁴⁵Raymond Prendergast, "Pre-Reading Skills Developed in Montessori and Conventional Nursery Schools," Elementary School Journal, XX (December, 1964), pp. 135-141.

and phonemes in words are discrete from each other. The theory appears to be that "... discrete word awareness may not have developed in some children when initial reading instruction is begun, nor is word awareness a skill that is acquired automatically."⁴⁶ Similarly, awareness of discrete sounds within words (phonetic analysis), a skill linked to reading success, may not have developed. "Accurate phonetic analysis is presumed to require understanding by the child that the sound patterns of a word are divisible into small units and that these units are common to the sound patterns of other words."⁴⁷ Thus, early reading programs include training according to individual needs for children who are identified as having limited auditory analysis abilities. While the exact degree of auditory functioning necessary for learning to read is not known, Gates (1947) observed that "other things being equal -- the more familiar the child is with the sound characteristics of words and the more skillful he is in identifying and blending the sound units of words, the better he is equipped to utilize the phonetic techniques."⁴⁸

Studies which hold that auditory blending abilities are related to success in learning to read have led to studies designed to test the feasibility of teaching auditory blending to young children. In one such study, Mayo (1971) reported the results of an experiment designed to increase auditory blending ability involving 117 randomly selected kinder-

⁴⁶ George McNinch, "Auditory Perceptual Factors and Measured First Grade Reading Achievement," Reading Research Quarterly, VI (Summer, 1971), p. 475.

⁴⁷ John D. Stone and Janis Stone, "Note on Teaching Children to Hear Separate Sounds in Spoken Words," Journal of Educational Psychology, LVI (1965), p. 13.

⁴⁸ Arthur I. Gates, The Improvement of Reading, (3rd ed., N.Y.: MacMillan, 1947), p. 231.

garten children divided into three groups. One group received eighteen lessons in auditory blending employing a phonics approach; the second received eighteen lessons in auditory blending using a linguistic approach; while the third or control group listened to stories during the eighteen lesson periods. Post-tests indicated that the two experimental groups achieved significantly better results on a test of auditory blending than the control group. The results suggest, therefore, that auditory blending can be taught to young children (whether the teaching methods are phonic or linguistic).⁴⁹

Many primary grade children experience difficulty in discriminating auditorily among phonemes, and in abstracting the sounds of consonants and vowels from words. This leads to later difficulties in using graphemes as cues to words when such children are embarked on reading programs. Smith stresses early auditory discrimination training to facilitate the decoding of the early reading process.⁵⁰ Other authorities in the field of reading advocate auditory perceptual training during the period of phonological development prior to reading and/or along with reading instruction. "Skills in auditory perception can be improved by training. The kinds of discrimination that need to be developed are very much like those needed in visual perception. The child needs to be able to distinguish whether two sounds are alike or somewhat different; and to notice particular sounds in words."⁵¹

⁴⁹Jean Mayo, "Two Techniques of Teaching Auditory Blending Skills to Kindergarten Children" (Summary of a Doctoral dissertation. University of Colorado, 1971). (ERIC ED 054 915)

⁵⁰Nilia Banton Smith, "Strategies for Improving the Teaching of Decoding Skills" (paper presented at the I.R.A. Conference, Anaheim, California, May, 1970). (ERIC ED 043 468)

⁵¹Albert J. Harris, Effective Teaching of Reading, (New York: David McKay Co., Inc., 1963), p. 39.

Silvaroli and Wheelock (1966) investigated a program designed to train children to discriminate between like and unlike word pairs. The study involved 120 randomly chosen kindergarten children in three schools, from low socioeconomic groups, half of whom received daily auditory discrimination training for five weeks. The children who had received training all showed improved abilities to discriminate speech sounds after the training. The results showed that auditory discrimination is teachable.⁵²

McNeil and Coleman (1967) tested the hypothesis that children who are taught to hear and designate separate sounds in spoken words will achieve greater success in learning to analyze printed words. The subjects were 90 kindergarten children, predominately Mexican Americans and Negroes. The training was exclusively auditory, thus visual stimuli were not employed; it was then followed by programmed lessons in reading. The learners in this program effectively improved their skills for analyzing printed words. Auditory training on specific phonemes helped the children associate graphemes with phonemes even when the latter were different from those in the training procedures.⁵³

Fast and Cosens (1970) attempted to determine the effect of auditory discrimination training upon children who scored low on an auditory discrimination test. Sixty first graders were randomly divided into two groups. The experimental group received training consisting of word pair

⁵²Nicholas Silvaroli and Warren H. Wheelock, "An Investigation of Auditory Discrimination Training for Beginning Readers," Reading Teacher, XX (December, 1966), pp. 247-251.

⁵³John D. McNeil and James C. Coleman, "Auditory Discrimination Training in the Development of Word Analysis" (report No. BR - 5-0503, California University, 1967). (ERIC ED 018 344)

exercises for ten minutes a day for four weeks, while the control group listened to taped exercises. The training resulted in improved ability of the experimental group in auditory discrimination of word pairs. Although training did not result in improved reading achievement scores, correlations between silent reading and auditory discrimination were significant.⁵⁴

Mottola (1970) investigated the development of auditory discrimination skills as a result of a twelve-week training program at the kindergarten level. The subjects included a control group of 176 children and an experimental group of 179 children. At the close of the study, the experimental group's mean reduction in error scores in auditory discrimination and their phoneme test scores were significantly better than those of the control group.⁵⁵

The studies cited thus far have focused mainly on one area of auditory functioning, namely discrimination. However, effective auditory perception is based on other skills such as sequencing, memory, and kinesis as well. Beery explains that sequencing includes the child's ability to handle the order of sounds in words (so that he does not say "backs" for "bask"), and the order of words in sentences (so that he does not produce scrambled sentences).⁵⁶ Memory is involved, for the "... child who has a reservoir of words and phrases against which incoming auditory patterns may be compared has a tremendous advantage over one

⁵⁴Delores J. Fast and Grace V. Cosens, "Effect of Socioeconomic Status and Auditory Discrimination Training on First Grade Reading Achievement," Alberta Journal of Educational Research, XVI (September, 1970), pp. 165-178.

⁵⁵Richard Albert Mottola, "The Development of Auditory Discrimination Skills in Kindergarten Children" (Ph.D. dissertation, University of Connecticut, 1970). (ERIC ED 057 047)

⁵⁶Mildred Freburg Beery, Language Disorders of Children, (New York: Appleton-Century-Crofts, 1969), pp. 60-61.

who holds a few words in memory." Auditory discrimination rests upon kinesthetic discrimination in that speech sounds "... assume sharp profiles, 'faces', in auditory comprehension because motor speech and its motor feedback help to provide them. It is a process of analysis by syntheses in which the child makes use of the articulatory gestures that are involved in the production of speech."⁵⁷

One program which explored several such auditory skills was developed by Lindamood (1969). She suggested that the ability to discriminate among word pairs correctly as to sameness and difference is often grasped by learners who nevertheless lack the ability to indicate how or when the patterns are different. The ability to conceptualize auditory patterns in greater detail is crucial to learning to read. On this basis Lindamood has developed teaching procedures which effectively train students to discriminate individual phonemes and to track their temporal relationships as oral patterns vary, as well as to discriminate among word pairs.⁵⁸

An instructional program designed to teach sound analysis and synthesis that transfers to reading has been designed by Rosner. Implicit in this program is the concept that the most effective training procedures for auditory analysis skills require constructed auditory motor responses from the child, so that he must produce sequences of phonemes, not merely indicate whether sounds are the same or different. Thus sequencing,

⁵⁷Ibid., p. 119.

⁵⁸Patricia C. Lindamood, "Facilitation of Language and Literacy Development through Intensive Auditory Training" (paper presented at the 3rd Annual TESOL Convention, March, 1969), (ERIC ED 028 430)

memory, and kinesthetic responses are involved. The program, identified as the Auditory-motor Skills Curriculum teaches the child to analyze "... acoustical patterns according to specific attributes and to display those skills by acoustical production rather than by recognition and discrimination responses alone."⁵⁹ A series of validation studies were conducted to investigate the effectiveness of the Auditory-motor Skills Curriculum in terms of success in teaching auditory skills and in terms of transfer effects to reading. In one study, the subjects were 16 non-readers in grade one, randomly selected. Half of them, the experimental group, received daily 15 minute auditory analysis sessions outside the classroom for 37 days. The experimental and control groups both received reading instruction in their classrooms along with their peers. The mean I.Q. of the experimental group was 105.4; the mean I.Q. of the control group was 106.9. All subjects were pre-tested and post-tested with auditory tests. Post-testing showed a markedly significant improvement in auditory skills in those children who received training.⁶⁰ The study was replicated one month later, and with a different group of 16 grade one children, and the results were much the same as in the earlier study, indicating that auditory perceptual skills can be improved through instruction.⁶¹

To investigate the transfer effects of training in auditory

⁵⁹ Jerome Rosner, Perceptual Skills Curriculum: Introductory Guide, (N.Y.: Walker Educational Book Corporation, 1973), p. 81

⁶⁰ Jerome Rosner, The Development and Validation of an Individualized Perceptual Skills Curriculum, (University of Pittsburgh: Learning Research and Development Center, 1972), pp. 52-55.

⁶¹ Ibid., p. 54.

perceptual skills in the study cited above, both groups were administered a word recognition test upon completion of the training sessions. The results showed a marked superiority in the ability of the trained group to read words which were part of their in-class reading program. An even greater advantage existed in their ability to read unfamiliar words.⁶² Replication studies revealed similar results providing further support that the program is a viable one for facilitating reading success in a grade one program.⁶³

The most recent of the validation studies made in connection with the Auditory-motor Skills Curriculum investigated the extent to which auditory analysis skills could be taught to pre-readers. Insofar as auditory analysis training had proved effective with substandard readers, it was deemed worthwhile to train children in advance of reading instruction, "... if only because they would then have more time to become familiar with the acoustical elements of the reading-spelling code before being expected to associate the sounds to printed symbols."⁶⁴ Thus the auditory analysis skills of an inner city pre-school group of 26 children at the end of the school year (in which they had been trained in the Auditory-motor Skills Curriculum) was compared with an inner-city kindergarten group of 62 children (which had had no previous auditory analysis training) at the beginning of their school year. In terms of means, the younger but trained children showed a distinct advantage over the older untrained children.⁶⁵

⁶²Jerome Rosner, Perceptual Skills Curriculum: Introductory Guide, (N.Y.: Walker Educational Book Corporation, 1973), p. 91.

⁶³Ibid., p. 91.

⁶⁴Idem, "Auditory Analysis Training with Prereaders," Reading Teacher, XXVII (1974), p. 380.

⁶⁵Ibid., pp. 379-384.

Resulting from such research, the Auditory-motor Skills Curriculum was developed. The rationale underlying this program is that the ability to analyze the acoustical elements of the spoken language is crucial to satisfactory reading performance. The curriculum, therefore, makes available to the teacher a procedure for diagnostic testing in auditory perception and for the teaching of those areas which appear to be in need of improvement. It is designed to be used with all students who demonstrate the need for such training, especially those identified as having reading problems. "Its origins, in fact, are there (in remedial settings). Segments of it have been used successfully for many years by educational specialists providing prescriptive treatment programs for children with 'learning disabilities' and 'perceptual dysfunction'. In such a situation the approach is different; no child is identified until his unsatisfactory school performance makes him obvious. Only then are his basic abilities assessed; only then are diagnosis and intervention attempted."⁶⁶ It is precisely in such a remedial setting that the Auditory-motor Skills Curriculum has been utilized for the subjects in this case study.

⁶⁶Idem, Perceptual Skills Curriculum: Introductory Guide, (N.Y.: Walker Educational Book Corporation, 1973), p. 8.

CHAPTER III

DESIGN OF THE STUDY

The study was conducted in two stages: the pilot study, and the research study. The description of the pilot study is presented in terms of: population, procedures, conditions under which the study was undertaken, the data collecting method, and a description of the training program used in the pilot study (and subsequently in the research study) -- the Auditory-motor Skills Curriculum. The second section of the chapter is a description of the research study in terms of: the population, the case study environment, the period of time of the investigation, and the methods for collecting and analyzing the data.

Pilot Study

The purposes of the study were to establish standard procedures for obtaining, compiling, analyzing and charting the data, and to train the investigator to use the Auditory-motor Skills Curriculum and any other materials required. In order to achieve the first objective it was necessary to undertake an actual case study and to develop procedures as an immediate and direct consequence. The subject was a six year old girl in grade one in an elementary school in a large urban school division. She had been referred to the resource teacher by her classroom teacher who found the subject "slow to pick up reading skills even after considerable review and practice." In addition, the classroom teacher found her to be very shy and quiet.

The pilot study spanned twenty-three daily sessions of ten to fifteen minute duration during which the investigator carried out the testing-teaching steps of the Auditory-motor Skills Curriculum. Each day the student came to the resource room at 11.30 A.M. Student and teacher sat at opposite sides of a table with the curriculum materials and the tape recording equipment between them.

In collecting the data, the verbal behaviour of the subject was preserved in its original sequence and completeness through tape recordings and transcriptions of all sessions. The verbal transcriptions were then transformed in three ways: 1) A diary was kept which specified the tests and training procedures employed and the subject's responses - along with evaluation of these; and also included were general comments made by the subject related to the tasks. 2) Exact responses to test questions were recorded onto test sheets provided in the curriculum. 3) Tasks which were successfully completed, and diagnoses and treatment applied when test criteria were not fulfilled, were indicated on a chart designed for that purpose. This information became the material upon which analyses were made at a later date.

Auditory-motor Skills Curriculum

The training of the investigator in the program necessitated a thorough understanding of the program entitled the Auditory-motor Skills Curriculum. It contains two components, the Introductory Guide, and the syllabus itself. The Introductory Guide provides a brief history of the development of the curriculum, the rationale, and the data on validation studies of the curriculum concerning auditory perception and transfer effects. The Introductory Guide discusses the seven major advantages of

the curriculum: 1) It is developmental in nature. 2) It is organized according to skill levels and is therefore appropriate for any child regardless of age or grade who cannot perform a task anywhere along the continuum of levels from the uppermost to the lowest level of the program. 3) It provides the conditions in which such children can enter the program at any point in which they demonstrate the need, and can proceed at their own rate. 4) It is a readily managed program of tests and related learning activities. 5) It is constructed around a hierarchy of goals stated as behavioral objectives. A criterion referenced test accompanies each behavioral objective to ensure that any given skill has been mastered when the test is passed. 6) It is comprehensive in the phonic approach to word recognition; it focuses on teaching the overall processes of phonemic analysis and sequential organization that can be applied in a variety of learning situations including sound discrimination and primary grade reading lessons. 7) It is designed for general classroom use and for remedial settings. To the degree that he or she demonstrates the need, it is intended for any child - culturally disadvantaged, learning disabled, mentally retarded, and "normal".

The second component, the syllabus, provides the teacher with the structural plan and materials for developing in students the basic abilities used in analyzing and organizing the acoustical patterns of verbal sounds. The structure of the program consists of 33 behavioral objectives arranged in a sequence of eight levels of increasing complexity, a test for each of the objectives, an inventory of learning activities coded to specific objectives, and suggestions for management and record-keeping procedures for the regular classroom, as well as for a resource-room setting - or any other setting where individual attention on a one-

to-one basis is involved.

Within the behavioral objectives,⁶⁷ beginning levels focus on syllables - first as one-syllable words, later as sub-components of multi-syllable words. The more advanced levels encompass phonemes as they occur in the initial, medial, and final positions, and finally as part of consonant blends. Within each level, activities are arranged in sequential units: for example, the simplest task at Level A - Unit 1, asks the child to clap hands in time to march music; the most complex task at Level H - Unit 9, asks him to substitute one sound for another in a given word.

In working with the pupil described earlier, the investigator became thoroughly familiar with the use of the program so that she could use discretion in the research study as to time, pacing, reinforcement, and testing within the program.

Research Study

The research study consists of two case study investigations of pupils requiring help in auditory perceptual skills. The studies describe the progress of these pupils in the program and provide insights into the manner in which these learners, who had been identified as sub-standard readers, learned to organize and analyze verbal stimuli.

The two pupils were selected for the study on the following basis: 1) each was in the second primary grade, 2) each was identified and referred by the classroom teacher on the basis of having evidenced problems in reading, and 3) each was found by the investigator to be in need of

⁶⁷See Appendix A, "Summary of Behavioral Objectives."

improvement in auditory analysis skills after having encountered difficulties in various tasks of the Auditory-motor Skills Curriculum.

The research study took place in the resource room of an elementary school in a large urban area. The investigator instructed the pupils individually for a daily lesson of approximately twenty minutes. At the time of the study the investigator served in the capacity of resource teacher and as such was known to the students of the school in general, but not until the investigation was instituted had there been direct contact with the pupils in the research study.

The data for the first case study - Case Study I - was collected from January 1, 1975, to February 19, 1975, a total of 35 school days. The resource teacher interviewed the pupil on the first day; on the remaining 34 days the pupil came to the resource teacher at 9:30 A.M. for the daily lesson. The data for the second case study - Case Study II - was collected from January 31, 1975, to March 1, 1975, a total of 26 school days. Again the resource teacher interviewed the pupil on the first day; on the remaining 25 days the pupil came to the resource teacher at 10:45 A.M. for the daily lesson.

In each case the pupil and the investigator sat at opposite sides of a table with the Curriculum materials and the tape recording equipment between them. The pupil was administered a unit test, and her responses were recorded. If she demonstrated mastery, the next unit test was administered; on the other hand, if the pupil failed to master test objectives, then one of two procedures was followed: 1) if the daily tutoring time had expired, the pupil left the room and a diagnosis of the problems was then made; 2) if the tutoring time had not expired, immediate and simple diagnoses were made and appropriate learning activities were

implemented. In either event, unsuccessful performances in tests and in learning activities were thoroughly studied and careful diagnoses were made at the completion of each session. The Curriculum literature offered suggestions which gave direction for diagnosis, but the ultimate diagnoses in the study were based on the investigator's interpretation of the performance of the pupil. Re-diagnosis was advanced when treatment procedures did not yield success, new prescriptions were prepared, and activities congruent with the prescriptions were undertaken until the particular unit was mastered.⁶⁸ Tests and activities were all derived from the Auditory-motor Curriculum (with activities adapted as required).

In collecting the data, the daily lessons were recorded in their entirety on a cassette tape recorder (Rheem-califone, AV20), and were transcribed later by the investigator. A daily diary was kept for each pupil which was based on the transcriptions and which specified the tests and the treatment procedures followed, the responses of the pupils to the tasks in the Curriculum, as well as general comments related to tasks. During the lessons, pupil responses were marked on the test sheets provided in the Curriculum materials, and notes were made of non-verbal behavior related to the lessons. A chart was compiled for each pupil indicating tasks which the pupil successfully completed and diagnoses and teaching procedures applied when test criteria were not met.

The accumulative body of data encompassing each pupil's learning behavior as observed during the investigation, and the day to day teaching procedures undertaken, were formulated into two case studies which are presented in the following chapter. In each case the analysis

⁶⁸See Appendices B and C for diagrammatic charts of these procedures.

of the pupil's ability to organize and analyze verbal stimuli was drawn from: pupil performance on Curriculum tests and learning activities, and diagnoses based on such performance. The pupil behaviors were analyzed to delineate progress in auditory perceptual skills in relation to the program of instruction.

CHAPTER IV

CASE STUDIES I AND II

This chapter contains a detailed description of each case study. The accumulative body of data, drawn from the day-to-day instructional procedures followed during the investigation, are submitted for Case Study I -- Susan, and Case Study II -- Anna. Each study opens with pertinent background information: data gathered from teachers, school records, and the initial investigator-pupil interview; and program placement data.

This material is followed by a description of the pupil's progress level by level including: a statement of the skill objective of each unit and the pupil performance in each; and a description of the pupil's interaction with treatment procedures - including difficulties and learning behavior observed as the pupil worked towards mastery. At the conclusion of each level a summary of pupil progress in relation to teaching procedures is submitted, which is based on observations by the investigator. Changes in pupil behavior reported by the classroom teacher are also included at the appropriate levels.

CASE STUDY I

Name: Susan
Age: 7 years, 11 months
Grade: 2
Referred by: Classroom teacher

Reason for Referral: The teacher stated that Susan's difficulties in reading were primarily in phonic skills, particularly in applying knowledge of letter sound to attack new words, and for sound blending. In addition Susan was confused about sound placement. When asked if a given word begins with a specific phoneme, she would reply in the affirmative even if that phoneme was in a medial or final position. In particular, she seemed to "hang on" to final phonemes. Susan had a short attention span and was easily distracted when listening. She impulsively raised her hand to questions and called out any answer.

Contact with School Principal: Consistent with existing school policy, the principal approved the acceptance of the pupil into the resource program once the referral was made.

Contact with Parents: The parents were in full agreement that Susan receive any remedial assistance deemed necessary by the resource teacher. They displayed utmost cooperation, perhaps because they had had earlier contact with the resource program when their son had received remedial tutoring in grade one.

Medical and Educational History: School records indicated, and the parents confirmed, that the pupil was in good health and had completed kindergarten and grade one satisfactorily and with good attendance.

Initial Interview: The purpose of the initial meeting was for the resource teacher and the pupil to become acquainted. This was no problem, for the former is a familiar figure in the school; children of all grades came to work with her in the resource room, and she spent portions of each day in various classrooms working with groups and individuals. In addition, the pupil was a friendly outgoing child. During the initial interview she commented, "I know you, you worked with my brother last time."

It was explained to the pupil that she would be working each day on activities which would be helpful for school work. The general nature of the activities was briefly described, but the pupil did not listen too closely for any length of time, and interrupted frequently. She was cooperative and eager to begin training, but simply was unable to attend closely. The pupil was encouraged to look at the books and aids in the room which had been attracting her attention. This interest lasted only a few minutes. The resource teacher explained the mechanics of the tape

recorder, and that all lessons would be taped. The pupil asked to sing and record Silent Night and play it back. Having done this, she appeared very pleased.

Program Placement Data: At the start of the study, the pupil was tested at Level D - Unit 8 in the Curriculum. This is a mid-point in the hierarchy of skills set forth in the Curriculum and is recommended as a starting point for all pupils. (Those who do not meet the criteria of 100 percent accuracy at this point are then tested downwards in the hierarchy of skills - that is Level C, then B if necessary, then A if necessary.) The pupil in this study met the criteria of the terminal objective of Level D which is Unit 8 (indicating that she can do all that is represented by the objectives of Level D and below). She was then tested at the terminal objective of the next level upwards in the hierarchy of skills, Level E. Performance at this point was not successful, consequently she was placed at the beginning of Level E for training.

Having failed to meet the criteria of the final unit of Level E, the pupil began training at the first unit of this level and proceeded through all the remaining objectives (units) of the program. Level E contains units 4, 5, 6, 7, and 8, and focuses on syllables as sub-components of multisyllable words. Level F contains 6, 7, and 8, and focuses on single phonemes at the beginning of a word. Level G contains units 6, 7, 8, and 9, and is concerned mainly with single phonemes as they occur at the end of a word. Level H contains units 6, 7, 8, and 9, and deals with phonemes as they occur in the middle of a word and as part of consonant blends.

In each test and activity the investigator expected 100 percent mastery before proceeding to the next level.

A Description of Susan's Progress

Progress through Level E

Level E - Unit 8 Test⁶⁹

Skill Objective: Given a spoken 3-syllable word, repeat the word omitting a designated syllable.

Pupil Response: Except for one correct response, Susan repeated the words in their entirety or replied, "I get mixed up."

Diagnosis: The pupil found three syllables too long a length to deal with at this level at this time.

Procedures: The pupil was placed in Level E - Unit 4 for testing and teaching.

⁶⁹ See Appendix D for sample of unit test.

Level E - Unit 4 Test

Skill Objective: Given a spoken 3- or 4-syllable word, say and clap simultaneously with each syllable.

Pupil Response: Susan responded correctly to all test items, but responses were not automatic. She asked to have each word repeated before responding.

Diagnosis: The problem appeared to be one of auditory discrimination and/or memory because the pupil required repetition of verbal stimuli in order to process it adequately.

Procedures: The first lesson focused on exercises using only 2-syllable words to ensure success. (The pupil had earlier exhibited success with 2-syllable words in Level D - Unit 8.) Later, when 3- and 4-syllable words were re-introduced, the pupil initially required each word to be repeated by the investigator and by herself. Finally, repetition was dispensed with and all criteria were met.

Mastery occurred after 2 lessons.

Level E - Unit 5 Test

Skill Objective: Given a 3-syllable word, write the syllables with dashes and read any syllable (dash) requested.

Pupil Response: Before writing dashes, Susan frequently requested that the stimulus word be repeated. She then wrote the dashes quickly in conjunction with the spoken syllables. However, before 'reading' back required dashes, she requested the word be repeated again.

Diagnosis: As in E-4, the problem was one of recall and/or discrimination, and the pupil required auditory reinforcement.

Procedures: Auditory reinforcement was provided by re-statement of each word by the investigator before the pupil 'read' the dashes to help her compare what was being said with her own inner speech.⁷⁰

Mastery occurred after 1 lesson.

Level E - Unit 6 Test

Skill Objective: Given a spoken 3-syllable word, indicate the presence or absence of the specified syllable.

⁷⁰The listener who "... actively participates in producing speech as well as in listening to it ... may compare his internal utterances with the incoming one." See Franklin S. Cooper in, "How is Language Conveyed by Speech?" in Language by Eye and by Ear, ed. by James F. Kavanagh and Ignatius G. Mattingly, (Cambridge: The M I T Press, 1972), p. 42.

Pupil Response: Susan asked to have each word repeated, then mouthed or repeated the specified syllable before responding. Where the specified syllable and the word (glass - grasshopper) began with consonant blends (/gl/ - /gr/), the pupil mouthed the sounds of the blends as well. All responses were correct but slow.

Diagnosis: Responses were not automatic because the pupil needed to work through each syllable - thus while responses were correct, she was working at a frustration level. The pupil required her own auditory-motor feedback as well as repetition by the investigator to enhance recall.

The difficulty appeared at first as a discrimination problem with blends but when requested, the pupil was able to produce her own words which begin with the sounds /gr/ and /gl/. The difficulty appeared to be in determining which part of the blend is first.

Procedures: Each time a word was introduced, the pupil was advised to "listen carefully to the beginning". Teaching procedures included repetition of words by the investigator. In addition the pupil was encouraged to repeat the specified syllable. This practice served the pupil's need to monitor incoming stimuli for auditory reinforcement and after a short time was discontinued.

Mastery occurred after 2 lessons.

Level E - Unit 7 Test

Skill Objective: Given a spoken 3-syllable word, then 2 of the syllables, say which syllable was omitted.

Pupil Response: When the initial syllable was omitted (i.e. "Pa/ja/ma/, leave out /ja/ma/, now say what's left."), Susan repeated the whole word or did not respond. When the task required giving back the last syllable (i.e. "car/pen/ter/, leave out /car/pen/, now say what's left."), responses were correct.

Diagnosis: By the time all three syllables had been stated for the pupil, she appeared to have forgotten the word, or the first syllable, while the latter part clung to her memory. (This appeared to confirm teacher's observation that Susan tended to hang on to final sounds and was confused about sound placement.)

Procedures: The first lesson began with 2-syllable words, initially by leaving out the first syllable. The pupil gave back the second syllable quickly and said, "Now you can't trick me." Later she was successful in giving back the first syllable. (Smiling brightly, she said, "I told you you won't trick me.") Later teaching returned to 3-syllable words. The first of these was bi/cy/cle, and the pupil was required to omit /cy/cle/ and say what was left. She asked, "You mean leave out what's in the middle?" The question revealed a growing awareness of sequence of syllables from first to last, and indicated that the pupil was attending to parts other than final. (The investigator congratulated the pupil for thinking about parts in words, and advised her to listen again, for

her comment was "almost correct.") The first word bi/cy/cle/ was presented again, followed by numerous other words. All responses were then correct regardless of the position of the omitted syllable.

Mastery occurred after 2 lessons

Level E - Unit 8 Test

Skill Objective: Given a spoken 3-syllable word, repeat the word omitting the designated syllable. (This was the test that Susan failed during placement testing.)

Pupil Response: Susan paid very close attention, mouthed or whispered each word and syllable after saying the word aloud, and then responded correctly.

Diagnosis: Kinesthetic support from within (in this case sub-vocalization) was required by the pupil to recall a word well enough to omit a designated syllable.

Procedures: The pupil was encouraged to whisper or repeat words and syllables. (Investigator: "It's O.K. to repeat. That way you feel the sounds your mouth is making, and soon you will be able to do this without repeating.") After sufficient practice of this kind, the extra reinforcement was discontinued.

Mastery occurred after 1 lesson.

Observations in Level E

The pupil required considerable help in auditory analysis of multi-syllable words. She was helped in the following ways:

1) Repetition of stimulus words by the investigator helped the pupil to focus on verbal sounds so that listening skills were improved, as evidenced by greater attentiveness.⁷¹

2) Use of the kinesthetic component wherein the pupil was encouraged to "feel" the words as she formed them, helped her to monitor incoming stimuli. Thus sub-vocalizing and repeating of words and syllables enhanced recall.⁷²

3) Returning to levels previously mastered, prepared the pupil for the next level of complexity and at the same time, by ensuring success at each level, readied her for the next stage.

⁷¹The viewpoint that there is no listening without specific focusing on incoming stimuli is presented by Herman K. Goldberg and Gilbert B. Schiffman in Dyslexia, (New York: Greene and Stratton, 1972), pp. 101-103.

⁷²See supra, p. 102, for discussion of memory training in relation to auditory perception.

4) Time limits were eliminated completely enabling the student to pursue the goal of mastery.

Classroom Teacher Observations During Level E

At the time of training in Level E - Unit 8, the classroom teacher reported an improvement in Susan's overall listening behavior. It was particularly noticeable when members of Susan's reading group were reading and she was listening.

Progress through Level F

Level F - Unit 6 Test

Skill Objective: Given 2 spoken words and a designated sound, indicate which word begins with that sound.

Pupil Response: Before responding to most test items, Susan first repeated the words, and then sounded the phonemes. (i.e. "Mat, cat, m-a-t, c-a-t.") In addition, errors were present in "thank-tank", "egg-after", "Indian-animal", and "there-tear".)

Diagnosis: Errors in response to "thank-tank" and "there-tear" may have been caused by confusion because they are rhyming pairs. When given unrhymed word-pairs beginning with the phonemes /t/ and /th/, the pupil was able to identify the correct phoneme. (Many young children confuse the task of rhyming with that of identifying initial sounds.)

The errors in words beginning with vowels appeared to be a problem of auditory discrimination of vowel sounds.

The need to sound out the stimulus words before responding to test items may have been due to the fact that the task requirement included too much information to be processed as a whole. The pupil needed to think of beginning, middle, and final sounds to determine, for example, if and where she heard /m/ (sound) in "mat". Then she had to analyze the contrasting word in a similar way. Poor auditory memory may have caused the problem.

Procedures: Because the task was a very demanding one for this student, it was divided into two sections. The first section focused on words beginning with consonants, for this is an easier task for many children.⁷³ Thus

⁷³Reference to research which indicates that consonant sound perception may be greater than vowel sound perception is made by Donald Shankweiler and Isabelle Y. Liberman in "Misreading: A Search for Causes", in Language by Eye and by Ear, ed. by James F. Kavanagh and Ignatius T. Mattingly (Cambridge: The M I T Press, 1972), p. 312.

training in analysis of words beginning with vowels was discontinued at this time.

In the first lesson, the amount of information to be processed at one time was reduced (i.e. instructions were simplified to: "Listen to these words and tell me if they begin with /m/ (sound).")

When this simplified task was mastered, more complex procedures were introduced to prepare the pupil for the original criteria of this unit. The pupil was now required to give more than a yes-no response. She was asked, "What sound do these words begin with?" Thus she had to hold a given word in mind while isolating and producing the first phoneme. By the final lesson the pupil responded correctly to the original test criteria.

During training the following auditory problems were revealed and were dealt with as they occurred:

1) The pupil was confused with sound placement. (This problem had been noted in the teacher's referral.) When asked, for example, if designated words such as "don't", "steak", and "pint" begin with /t/, the pupil replied in the affirmative. Having done so she sensed that she had erred and asked to replay the tape. She was requested to indicate which words contained /t/ in any position, while she listened to the replay. The pupil did so, and then corrected her mistakes.

One lesson was used to test-teach if the pupil understood the concept of beginning (first), middle, and last (end). The activities covered beginnings, middles, and ends of items in a row, of dots and dashes on paper, of spoken words in short sentences; and revealed that the pupil understood the concept. This appeared to confirm the diagnosis of a difficulty in auditory sequential memory of spoken words.

To overcome the difficulty, the investigator stated words and requested the pupil to construct them with alphabet cards and then sound the initial phoneme. Thus the auditory and visual channels complemented each other.

2) The pupil had difficulty in separating blends such as /st/ and /gl/, and r controlled blends as /br/ and /gr/ in order to identify the initial phonemes.* To overcome this, the blends were presented in printed form to provide audio-visual association.

3) The pupil confused several graphemes with their respective phonemes. When asked if words begin with /b/ or /d/, she made several errors. However, when asked to produce words beginning with these phonemes, she was successful. Thus the problem was not one of discrimination, but appeared due to a confusion of the printed letters b and d. (Subsequent to this, the classroom teacher indicated that Susan interchanged b and d in writing words and in reading.)

A similar problem appeared when asked, "Do these words begin with /s/?" The pupil replied, "Do you mean /ch/?" The pupil seemed to be confusing the sound of the grapheme c with the phoneme /s/. (This supported the observation of the classroom teacher who noted that Susan was confusing the graphemes c and s.)

* See Pupil Response in Level E - Unit 6 Test, for a similar problem with "grass" and "glass".

When asked what do you hear at the beginning of "gate" - of "judge", the pupil gave the letter name g. She frequently had to be reminded, "What sound do you hear?"

One lesson was devoted to reviewing the difference between letter name and sound, and the sound and symbol of those mentioned above were re-taught. (Recommendations were made to the classroom teacher to continue such training in the classroom.)

Mastery of Level F - Unit 6, employing consonants in initial position occurred after 5 lessons.

Teaching and testing of the skills of Level F - Unit 6 with vowels in initial position was then resumed. The sub-test, employing vowels in initial position, follows.

Level F - Unit 6 Sub-Test: Employing Vowels in Initial Position

Skill Objective: Given 2 spoken words each beginning with a vowel, and a designated vowel sound, indicate which word begins with the sound.

Pupil Response: Susan made many errors. In particular, short a and short e were confused and, to a lesser degree, short o and short u. In words beginning with a short a or short e, followed by a "continuing consonant" (i.e. m, n, r), the pupil stated the consonant as the initial sound, (i.e. when asked, "What sound does 'amber' begin with?", she replied, "/m/ (sound)"). When given multisyllable words, Susan frequently segmented them by repeating the first syllable before discriminating the initial phoneme.⁷⁴

Diagnosis: The pupil's poor vowel sound perception caused difficulties in word discrimination. The pupil's poor vowel sound discrimination may have been connected to her own imprecise pronunciation of vowels in words. For example, during testing when she pronounced "bag", it sounded like "big", "elephant" was pronounced like "aliphant", and the e in "egg" resembled a long a.

The pupil tended to "hear" a continuing consonant sound rather than the vowel preceding it as the initial sound. Continuing consonants stand out clearly and may cause the preceding vowel to "fade out" or be too brief for the listener who has poor vowel sound perception.

The pupil's awareness of the discreteness of morphemes and syllables appeared to be more developed than her awareness of phoneme discreteness and thus she needed to segment words into syllables before segmenting initial phonemes.

⁷⁴That the syllable is a more natural, more easily perceived unit than the phoneme is a conclusion of research by Lila R. Gleitman and Paul Rozin in, "The Use of a Syllabary", in Reading Research Quarterly, VIII (Summer 1973), pp. 447-463.

Procedures: Beginning procedures were simplified (as they were in words beginning with consonants). The pupil was now asked, "What sound does this word begin with?" For words with short a in the initial position, she gave the letter name, revealing a confusion with letter name and sound. However, after a brief lesson reviewing the concept of vowel letter sounds, particularly of short a, this was overcome.

Since Susan had demonstrated insecurity in dealing with minimal contrasts in vowel-beginning words, the first lesson did not include word pairs with minimal contrasts. Later when such pairs were introduced, the pupil was encouraged to repeat them in unison with the investigator. This support was applied in order that the pupil would not have to produce by herself, words that were not clearly distinguishable to her. Later training consisted of the investigator articulating a word very clearly while emphasizing the vowel sound, and requesting the pupil to repeat it at once. This training - speech modelling, called the pupil's attention to the uniqueness of vowel sounds.

The training described thus far was introduced at the multi-syllable level, after sufficient practice with 1-syllable words. With the introduction of multisyllable words, the pupil was encouraged to repeat the first syllable before identifying its initial vowel sound.

Mastery of Level F - Unit 6, employing vowels in initial position, occurred after 5 lessons.

Level F - Unit 7 Test

Skill Objective: Given a spoken 1-syllable word, then the word with the initial sound omitted, identify the omitted sound.

Pupil Response: Susan responded correctly to all test items.

Mastery was demonstrated in this activity.

Level F - Unit 8 Test

Skill Objective: Given a spoken 1-syllable word, repeat the word omitting the initial sound.

Pupil Response: Susan responded correctly to all test items.

Mastery was demonstrated in this activity.

Observations in Level F

The pupil required a great deal of help in analyzing single phonemes at the beginning of a word, particularly in comparing word pairs and in discriminating vowels. She was helped in the following ways:

1) Tasks were divided into small sequential steps, easier levels were returned to when necessary, and they were reviewed frequently.

2) Special attention was paid to presenting tasks which were difficult for the pupil. Vowel practice was discontinued until the pupil was secure in mastery of test criteria with phonemes other than vowels. Confusing tasks, such as presenting rhyming pairs when teaching initial sounds, were eliminated. Words with minimal contrasts (according to the pupil's perception) were not taught until the pupil had mastered sounds which seemed less similar to her.

3) Repetition by the investigator facilitated recall and made incoming stimuli more distinct.

4) The pupil's verbal or sub-vocal repetition of words and word components fulfilled her need for kinesthetic and auditory-motor feedback.

5) Unison reciting and the practice of the investigator articulating words very clearly and having the pupil immediately repeat the pronunciation served as a form of speech modelling. This type of modelling appeared to facilitate precise speech and pronunciation as it helped the pupil focus on sounds, and vice versa.

6) For tasks which contained too much material for the pupil to process, the number of items to be carried in the short term memory were reduced, and gradually increased as the student showed mastery.

Progress through Level G

Level G - Unit 6 Test

Skill Objective: Given 2 spoken words and a designated consonant sound, indicate which word ends with the sound.

Pupil Response: Susan responded correctly to all test items.

Mastery was demonstrated in this activity.

Level G - Unit 7 Test

Skill Objective: Given a spoken 1-syllable word, then the word with the final sound omitted, identify the omitted sound.

Pupil Response: Susan responded correctly to all items.

Mastery was demonstrated in this activity.

Level G - Unit 8 Test

Skill Objective: Given a spoken 1-syllable word, repeat this word omitting the final sound.

Pupil Response: Susan responded correctly to all items. Only once did she ask to have an item repeated. Her behavior was characterized by greater

attentiveness than at any other time thus far.

Mastery was demonstrated in this activity.

Level G - Unit 9 Test

Skill Objective: Given a spoken 1-syllable word, substitute the beginning or ending sound with another designated sound.

Pupil Response: Susan was unable to substitute final consonants. Her responses included giving a rhyming word, repeating the word, and most frequently, adding the designated sound to the existing word. (i.e. When asked to substitute /t/ (sound) in bait with /s/ (sound), she replied "baits".) This was a very difficult task, and the pupil requested repetition of words, sometimes two and three times. To those test items which required substitution of beginning sounds, Susan's responses were correct.

Diagnosis: The task required dealing with segmentation and substitution as a whole, and this appeared to be too much for the pupil to process. In Level G - Unit 8, she had demonstrated the ability to deal successfully with one aspect of this task: segmenting by omitting final phonemes.

Procedures: In the first lesson the test criteria were applied to segmenting and substituting final syllables. In Level E, a previous level, Susan dealt with syllable tasks reasonably well. This procedure, therefore, presented no problem. However, it did not appear to assist Susan when she was retested in applying this skill to final phonemes.

In the next lessons the task was broken up into small units so that Susan had one sub-skill to deal with at a time. These sub-skills, exclusive of the final one, had already been mastered individually in earlier unit lessons. Thus, at first the pupil was told to repeat a word. Then she was asked what the final sound was. Then she had to say the word omitting that sound. Finally she had to substitute the end sound. Thus the pupil was not required to segment and substitute in one step.

After considerable practice, during which sub-skills were gradually combined, Susan mastered the task, and final response words were blended smoothly. For example, when transforming "bat" to "bag", she progressed from saying "ba (pause) g", to "bag". The pupil expressed delight when she realized that she was putting sounds together to make real words with comments like, "Bag, oh, like a paper bag!"

Mastery occurred after 3 lessons.

Observations in Level G

The pupil required help only in one aspect of this level, the substitution of final phonemes. She was helped in the following ways:

- 1) The number of items to be carried in the short term memory were

reduced, and gradually increased as the pupil showed mastery.⁷⁵

2) Time to master any sub-skill within an objective was never limited.⁷⁶ At every step of the way, the pupil was given as much time as required for mastery.

Classroom Teacher Observations during Level G

At the time of training in Level G - Unit 8, the classroom teacher reported that Susan was becoming more attentive during word study periods. (This was in keeping with the investigator's findings of greatly improved overall attention by the pupil.) At the conclusion of training in Level G - Unit 9, the classroom teacher stated that Susan was guessing less at words in reading. She was now attempting blending, and with reasonable success.

Progress through Level H

Level H - Unit 6 Test

Skill Objective: Given 2 spoken words and a designated medial sound, identify the word that contains the designated sound.

Pupil Response: Susan responded correctly to all test items.

Mastery was demonstrated in this activity.

Level H - Unit 7 Test

Skill Objective: Given a spoken word with a 2-consonant blend, then the word with one sound omitted, identify the omitted sound.

Pupil Response: Susan requested the investigator to repeat each word pair, sometimes twice. In addition she repeated the word-pairs, but none of the items was correctly dealt with. For example, when asked what was taken away from "smash" to make "mash", the pupil first responded "/sh/", and later when asked what else was left, she replied "/sm/".

⁷⁵James P. Tortelli stresses that: "An overloading of the short-term memory results in a forgetting of information processed. A reduction of information to be processed at a given time tends to strengthen the acquisition and retention of meaning . . .," in The Reading Teacher, XXVIII, (November, 1974), pp. 211-212.

⁷⁶For an excellent discussion of the importance of time for individuals to master subordinate skills as a pre-requisite to criterion performance, see S. Jay Samuels and Patricia R. Dahl in "Relationships Among IQ, Learning Ability and Reading Achievement", in Literacy for Diverse Learners, ed. by Jerry L. Johns (Delaware: I R A, 1973), pp. 33-35.

Diagnosis: The pupil was unable to separate the parts of a blend. (It may be recalled that difficulties in dealing with blends occurred in Level E - Unit 6, and Level F - Unit 6.)

Procedures: At first the pupil was presented with a card on which were printed several letters. She was asked to indicate the letter that was omitted when a word such as "stab" was re-stated as "tab". Responses were slow but correct. Later alphabet cards were used. The pupil was instructed to repeat a given word, then construct it and read it back. She was then told to change the word (i.e. "slap" to "sap"). The pupil managed this task with occasional help in constructing words and reading them back (sometimes the blend had to be sounded for her); and grew proficient in it after three lessons.

When retested without the visual aid of cards, the pupil was unsuccessful. Thus another procedure was introduced which incorporated guidelines from the Curriculum with further elaboration by the investigator. Each of the word pairs was compared phoneme by phoneme as follows:

Investigator: "Say smash. Say mash."
 Pupil: "Smash, mash."
 Investigator: "Do they both have /s/?"
 Pupil: "No." (After repeating both words for recall.)
 Investigator: "Do they both have /m/?"
 Pupil: "No." (After repeating again.)
 Investigator: "Do they both have /a/?"
 Pupil: "Yes."
 Investigator: "Do they both have /sh/?"
 Pupil: "Yes."
 Investigator: "What does /mash/ not have?"
 Pupil: "/s/."
 Investigator: "What did we take away from /smash/ to make /mash/?"
 Pupil: "/s/."

This procedure appeared very tedious for the pupil, and was not easily mastered. Even after two lessons with this kind of support, she showed no improvement in the original skill objective. Therefore, to avoid frustration and a sense of failure, the purely auditory presentation was discontinued and the alphabet cards were re-introduced.

Mastery occurred after one further lesson with the use of the alphabet cards. Thus a multi-sensory approach seemed essential.

Level H - Unit 8 Test

Skill Objective: Given a spoken word beginning with a consonant blend, repeat the word omitting one sound of the blend.

Pupil Response: Susan had extreme difficulty in dealing with this task. For example, when asked to say "grow" without /g/, she replied "/ow/". For "blast" without /b/, she replied "/ast/".

Diagnosis: As in Level H - Unit 7, the pupil could not omit a phoneme because of a problem in segmenting consonant blends.

Procedures: The alphabet card procedure of Level H - Unit 7 was used in reverse. While in some cases the investigator had to construct the word, the pupil succeeded in re-stating the new word. For example, she was able to say "steam" without /t/ because of the visual support. When re-tested without the cards, she had only very limited success, and only when each phoneme was sounded out for her by the investigator. In addition after 3 lessons, frustration was becoming obvious. On the other hand, each time the alphabet cards were re-introduced, progress was notable and sounding out was unnecessary.

Because the pupil was unable to dispense with the "sounding out" support given by the investigator after three lessons, this activity was discontinued. In the final lessons, the alphabet cards were re-introduced to avoid further frustration, and the procedures ended on a note of success.

Mastery was demonstrated with this multi-sensory approach after 2 lessons.

Level H - Unit 9 Test

Skill Objective: Given a spoken word, substitute any sound with another designated sound.

Pupil Response: In those test items requiring the pupil to substitute one vowel sound for another, Susan was successful. However she was unable to substitute one consonant of a two-consonant blend.

Diagnosis: As in Level H - Unit 7 where the pupil had difficulty in taking /c/ away from /clap/ to make /lap/, and in Level H - Unit 8 where she could not say "steal" without /t/ unless each morpheme was sounded out, the problem in this task was again that of segmenting blends. Testing to determine if the pupil perceived a blend as composed of two phonemes revealed that she did. The difficulty appeared to be one of output - the pupil could not transform spoken words by separating blends, or of input - in that she could not separate the phonemes of a blend mentally.

Procedures: Insofar as work in Level H revealed great frustration and little success when auditory stimuli alone were presented, the visual aid of alphabet cards was used along with the auditory.

After 4 lessons the pupil demonstrated proficiency with the use of the alphabet cards.

Observations in Level H

The pupil did not achieve mastery in the consonant-blend-analysis-skills of Level H, Units 7, 8, and 9. Attempts to deal with this task at the auditory level as suggested in the Curriculum syllabus brought little improvement and much frustration to the pupil. To offset this frustration

and to avoid the negative effects of loss of self-confidence, the training procedures were re-arranged to include the alphabet cards as recommended in the program. These procedures were found to yield successful experiences for the student. As a result, it was decided that henceforth the visual modality would be included in the training in Level H.

With the inclusion of combined auditory and visual techniques, the pupil's progress was dramatic. Proficiency in Level H was acquired, and it represented a breakthrough in terms of grasping the concept that a consonant blend consists of two segments.

Proficiency in this level was achieved in the following ways:

- 1) Constant repetition of words and sounds was employed to enhance recall.
- 2) A sound by sound analysis was conducted so that the pupil could make auditory comparisons of words in a pair.
- 3) A deliberate sounding of words by the investigator made the pupil more sensitive to each component in a blend.
- 4) The use of the alphabet cards brought in the visual component and helped the pupil to become aware of the subtle changes in corresponding spoken words. Thus a multi-sensory approach was crucial in this case.

CASE STUDY II

Name: Anna

Age: 7 years, 4 months

Grade: 2

Referred by: Classroom Teacher

Reason for Referral: The teacher stated that Anna's difficulties centered in oral reading activities. In addition to hesitant oral reading, certain word attack skills were poor. The latter problem was specifically reflected in confusion of short e with short i, and in difficulties in sound blending. Sight vocabulary appeared to be satisfactory, and "seatwork was superior to oral work".

Contact with School Principal: Consistent with school policy, the principal approved the acceptance of the pupil into the resource program once the referral was made.

Contact with Parents: The mother was in full agreement that the pupil receive any remedial assistance; she had felt that Anna's reading was poor "even in grade one", but that she was a bright child. Anna's mother described her as a stubborn child who insisted on having things her own way.

Medical and Educational History: School records indicated, and the mother confirmed that the pupil was in good health and had completed kindergarten and grade one satisfactorily and with good attendance.

Initial Interview: The purpose of the initial meeting was to establish rapport. Anna and the resource teacher were not strangers, for the latter had spent several periods each week with children in Anna's classroom during the first months of school. During the school year, children of all grades came to the resource room and this was known throughout the school. Anna appeared to be a shy and reserved child, but was comfortable during the interview with the investigator.

It was explained to the pupil that she would be working each day on activities which would be helpful for school work. The general nature of the activities was briefly described and Anna was most attentive. She was eager to begin, and in fact, asked if she could start that day. The mechanics of the tape recorder were explained, and Anna was asked if she would like to record and operate the machine. She spent a few minutes at this, and then the meeting time was set for the next day.

Program Placement Data: At the start of the study the pupil was tested at Level D - Unit 8 in the Curriculum. This is a mid-point in the hierarchy of skills set forth in the Curriculum and is recommended as a starting point for all pupils. Those who do not meet the criteria of 100 percent accuracy at this point are then tested downwards in the hierarchy of skills - that is Level C, then B if necessary, and finally A, if so

indicated. Those who meet the criteria of the terminal objective of Level D, which is Unit 8 (indicating that they can do all that is represented by the objectives of Level D and below) are then tested at the terminal objective of the next level upwards in the hierarchy of skills - Level E, Unit 8.

Anna's responses in Level D - Unit 8 were correct, but because they were very softly given and because she mispronounced one word, there was a slight doubt as to how successful she would be in Level E - Unit 8. As a result, she was tested in the beginning of Level E (Unit 4). Performance was successful, therefore she was tested in Level E - Unit 5, where she revealed difficulties. Thus having failed to meet the criteria of Level E - Unit 5, the pupil began training at this unit and proceeded through all the remaining objectives (units) of the program. Level E contains units 4, 5, 6, 7, and 8, and focuses on syllables as sub-components of multisyllable words. Level F contains units 6, 7, and 8, and focuses on single phonemes at the beginning of a word. Level G contains units 6, 7, 8, and 9, and is concerned mainly with single phonemes as they occur at the end of a word. Level H contains units 6, 7, 8, and 9, and deals with phonemes as they occur in the middle of a word and as part of consonant blends.

In each test and activity the investigator expected 100 percent mastery before proceeding to the next level.

A Description of Anna's Progress

Progress through Level E

Level E - Unit 5 Test

Skill Objective: Given a spoken 3-syllable word, write the syllables with dashes while saying the word, and read any syllable (dash) requested.

Pupil Response: For a few test items, Anna said the word first, and only then wrote it. Responses written incorrectly were 3-syllable utterances that contained two words such as "living room" and "Santa Claus". For example, she said and wrote one dash for /San/, said /ta/ but wrote no dash, and said and wrote one dash for /Claus/. Correct responses were slow, and dashes were read back hesitantly.

Diagnosis: The pupil appeared to have some difficulty in remembering the instructions. The task of writing and saying at the same time appeared to be too much to remember. A lack of familiarity with the approach may have made it difficult.

Further analysis suggested that the writing of 2 dashes for 3-syllable words, and hesitation in reading back syllables implied a lack of awareness that the sound patterns of words are divisible into smaller units.

Procedures: The total task was divided into sub-skills. In the first lesson, the motor component (rhythmic clapping) of Level E - Unit 4 was

re-introduced. Many 3- and 4-syllable words were presented.

Following successful saying and clapping by the pupil, the investigator gave several demonstrations of writing and saying at the same time, and only then was the pupil required to demonstrate her grasp of the task.

Later the pupil was required to give the sounds for the designated dashes in 2-syllable words. Finally when 3-syllable groupings were introduced (including those containing 2 words as "fairy land"), the pupil said and wrote at the same time, and pronounced any dash correctly.

During training it was observed that the pupil pronounced the final syllable in "Winnipeg" as /pig/. This confirmed the classroom teacher's observation that Anna confused short e with short i.

Mastery occurred after 3 lessons.

Level E - Unit 6 Test

Skill Objective: Given a spoken 3-syllable word, indicate the presence or absence of a specified syllable.

Pupil Response: In repeating the stimulus words, Anna had some difficulty in dividing syllables as required. She sometimes divided the word in the wrong place, but corrected herself when this was pointed out. She had no difficulty in indicating the presence or absence of a designated syllable, except in one instance. When asked if /lo/ is part of the word Hal/lo/ween, she replied in the negative.

Diagnosis: In the case of "Halloween", the pupil appeared not to perceive the middle syllable because of her own imprecise pronunciation which was "Hallween". The general problem of imprecise syllable division seemed to result from a lack of awareness of syllable boundaries in her own speech.

Procedures: Clear pronunciation by the investigator of each word, emphasizing syllables by distinct pauses between them, facilitated the pupil's correct division of syllables.

Mastery occurred after 1 lesson.

Level E - Unit 7 Test

Skill Objective: Given a spoken 3-syllable word, then only 2 of the syllables, pronounce the syllable.

Pupil Response: After pronouncing the stimulus word car/pen/ter, the syllables car/pen/ were given. When asked what was omitted, Anna replied car/pen/. She was then directed to say: pa/ja/ma - ja/ma , and tell what was left out. Anna asked to have the word repeated, then appeared to think it through syllable by syllable, and then gave a correct response. For bi/cy/cle without cy/cle, she replied "bike".

Diagnosis: One consideration was that the pupil was uncertain of the

concept "left out" in the context of syllable sounds. In addition, the difficulty in syllable segmentation seemed to be due to poor auditory sequential memory. On the other hand, the response word "bike" may have been due to her thinking in terms of words rather than syllables, a tendency that occurred in previous units.

Procedures: Three types of stimuli were used to test awareness of the concept of "leaving out": groups of objects, symbols written on paper, and spoken words were presented. Each time one component was omitted, the pupil was asked, "What did we leave out?" Her replies demonstrated an understanding of this concept.

Later the skill objective of this unit was practiced at the 2-syllable level (as in Level D - Unit 7). Before going on to 3-syllable words, clapping was re-introduced to focus on syllables rather than words. Then the words "pajama", "bicycle", and "carpenter" (followed by numerous other 3-syllable words) were given, and all responses were correct.

It was noted that the pupil pronounced the final syllable in "handkerchief" as "chip".

Mastery occurred after 2 lessons.

Level E - Unit 8 Test

Skill Objective: Given a spoken 3-syllable word, repeat the word omitting a designated syllable.

Pupil Response: In performing this task, Anna was slow and thoughtful and seemed to be thinking through each whole word before responding. For several words she gave back only one of the two syllables which were omitted. Once she said, "I always forget."

It was noted that Anna pronounced "dinosaur" as "dinosword", "anyway" as "inyway", and "vacation" as "thacation". When asked to listen closely and repeat the three words exactly as pronounced, she repeated them correctly.

Diagnosis: The problem appeared not to be one of discrimination for when she was given "new ways" of saying words, the pupil "heard" correctly, and stated the designated sounds with relative ease. Nor did it appear to be one of lack of word meanings, for when asked to tell the meaning of "dinosaur" and "vacation", the pupil could do so.

The problem seemed to be one of poor auditory sequential memory, and a lag in receptive and/or expressive language reflected in poor speech habits. 77

⁷⁷ Lags in receptive language and in perceptual skills may be attributed to slow developmental growth or deficiencies in home experiences, and may subsequently impair readiness to read. This is discussed by Raymond Prendergast in "Pre-Reading Skills Developed in Montessori and Conventional Nursery Schools," Elementary School Journal, LXX (December, 1969), pp. 135-141.

Procedures: The task of this skill was practiced with 2-syllable words as in Level D - Unit 8, and the pupil was successful.

With a return to 3-syllable words, each time a word part was mispronounced, it was repeated immediately by the investigator, and the pupil was instructed to repeat what she heard.

Mastery occurred after 1 lesson.

Observations in Level E

The pupil required help in segmenting multi-syllable words accurately. She was also given help in the area of improving poor speech habits, for it was felt that her lack of competence in dealing with some aspects of the program appeared to be rooted in a difficulty in processing verbal information, somewhere between the reception and encoding of words. By consistently exposing the pupil to "other ways" to say words, she showed improvement in word pronunciation, and in the skills of Level F.⁷⁸

The pupil was helped in the segmenting tasks of the Units in the following ways:

- 1) Returning to levels previously mastered provided self-confidence and prepared the pupil for the next level of complexity.
- 2) Tasks were divided so that mastery of sub-skills was completed before attempting to master whole skills.
- 3) Demonstrations by the investigator helped the pupil understand task requirements.
- 4) The use of rhythm through the motor act of clapping, and the consistent and clear repetition of words emphasizing their syllabic division made the pupil aware of syllable discreteness and helped her to designate the sounds of syllables.⁷⁹
- 5) Providing the correct model and requesting the pupil to repeat at once any mispronounced syllables, resulted in greater awareness of

⁷⁸Cynthia P. Deutsch contends that "... it is only through experience which involves consistent exposure to particular auditory stimuli that a child comes to discriminate sounds and to recognize words, "... and that this exposure has a positive influence on reading in "Auditory Discrimination and Learning Social Factors", Merrill-Palmer Quarterly of Behavior and Development, X (1964), p. 278.

⁷⁹Children can be taught to hear and designate separate sounds in spoken words and doing this facilitates success in tasks associated with analysis of printed words. This is discussed by John D. McNeil and James C. Coleman in Auditory Discrimination Training in the Development of Word Analyses, California University, Los Angeles. (ERIC ED 018 344)

sound units within words.⁸⁰

Progress through Level F

Level F - Unit 6 Test

Skill Objective: Given 2 spoken words and a designated sound, indicate which word begins with that sound.

Pupil Response: All responses were correct except that Anna stated that "thank" begins with /t/.

(This problem was not dealt with within the framework of the program. It was left for future treatment for it had been observed that in speaking, Anna often said /t/ for /th/ even though she could articulate /th/.)

Mastery was demonstrated in this activity.

Level F - Unit 7 Test

Skill Objective: Given a spoken 1-syllable word, then the word with the initial sound omitted, identify the omitted sound.

Pupil Response: Anna had no difficulty in identifying what had been omitted, but frequently gave the letter name rather than the letter sound. When reminded to "give the sound", she thought for a moment, then gave the correct sound.

Diagnosis: Although the pupil had knowledge of letter sounds, it appeared that she tended to think in terms of letter names only, or may have been reluctant to use letter sounds.

Procedures: No training was required in the objective of this unit - identifying initial sounds. However time was devoted to helping the pupil grow confident in pronouncing letter sounds.⁸¹

⁸⁰"Can it be that the child's level of awareness of minimal units in speech is part of his problem in learning to read?" He may not have an awareness "... of the phonetic units of speech, especially his own speech. If so, perhaps learning to read comes second to learning to speak and listen with awareness." Franklin S. Cooper in, "How is Language Conveyed by Speech?" in Language by Eye and by Ear, ed. by James F. Kavanagh and Ignatius G. Mattingly, (Cambridge: The MIT Press, 1972), p. 42.

⁸¹Children with a knowledge of letter sounds showed superior performance in reading skills than those trained only in letter names. This is reported by S. Jay Samuels in, "Research Design in Reading," Reading Teacher, XXII (January, 1969), pp. 346-349.

At first, sound production was explained in a general way. Then pupil and investigator produced sounds by clapping, tapping on the table, rattling keys, and so on. Later, vocal sounds were made by humming and whistling, and finally words and phonemes were uttered. The pupil was taught that just as we put letters together to print a word, we put sounds together to say a word.

The letter-sound concept was grasped by the pupil with no difficulty but it took some time before she used it regularly. (In subsequent lessons she was frequently reminded to "give the sound".)

Mastery occurred after 1 lesson.

Level F - Unit 8 Test

Skill Objective: Given a spoken 1-syllable word, repeat the word omitting the initial sound.

Pupil Response: All responses were correct except that Anna said "sad" for the stimulus word "sand", and therefore, when omitting the initial phoneme, she was left with "ad". This was corrected as soon as Anna was told to listen and say exactly what she heard.

Diagnosis: It was felt that this mispronunciation, as those in earlier lessons, was due to poor speech habits. This was confirmed by the evidence that the pupil always improved her pronunciation after exposure to the correct model.

Thus it was decided that mastery was demonstrated in the specific skill of this activity. (Attention to improved pronunciation is to be continued in subsequent activities.)

Observations in Level F

The pupil did not require much help in analyzing single phonemes in initial position; however she did require guidance in becoming aware of letter sounds, and practice in using such sounds. This was provided during training in Level F, and in subsequent units as the need arose.

Progress through Level G

Level G - Unit 6 Test

Skill Objective: Given 2 spoken words and a designated consonant sound, indicate which word ends with that sound.

Pupil Response: Anna responded correctly to all test items.

Mastery was demonstrated in this activity.

Level G - Unit 7 Test

Skill Objective: Given a spoken 1-syllable word, then the word with the final sound omitted, identify the omitted sound.

Pupil Performance: Anna responded correctly to all test items.

Mastery was demonstrated in this activity.

Level G - Unit 8 Test

Skill Objective: Given a spoken 1-syllable word, repeat this word omitting the final sound.

Pupil Response: Anna was successful in omitting final sounds, but gave only the initial part of the word. Thus when asked to say "roam" without /m/ she said "/r/"; for "seat" without /t/ she said "/s/".

Diagnosis: The pupil was able to segment, but appeared to be "word-bound"; she tended to think in terms of real words. She tended to state only a remaining initial consonant (a skill she had recently mastered) rather than utter a nonsense word.

Procedures: The behavioral objectives of Level G, Units 6 and 7 were practiced in a step by step procedure as follows, as recommended in the Curriculum:

1. "Which word ends with /p/ - 'rope' or 'rode'?"
2. "What is the ending sound in 'rope'?"
3. "Say 'row'. Now say 'rope'. What sound did we add?"
4. "Say 'rope'. Now say 'row'. What sound is missing?"
5. "Say 'rope' without /p/ sound."

Mastery occurred after 2 lessons.

Level G - Unit 9 Test

Skill Objective: Given a spoken 1-syllable word, substitute the beginning or ending sound with another designated sound.

Pupil Response: When Anna was required to substitute /m/ with /s/ in the spoken word "mat", she grew very thoughtful. She said /at/ to herself, whispered /s/, started to work through it again, but finally replied "mats" - adding instead of substituting. Similarly she became confused when required to substitute a final consonant sound - she either omitted it without fusing the new sound, or made no response.

Diagnosis: The pupil appeared to comprehend that an initial or final sound was being 'removed'. Therefore segmentation of these sounds posed no problem. Thus the problem seemed to be an inability to blend, causing

confusion in pronunciation, or a difficulty in holding in mind an entire segmented utterance to be synthesized.⁸²

Procedures: Thus because the task of phoneme blending appeared a very demanding one for this pupil, it was decided to discontinue it at this time and to concentrate on an easier task - that of blending of syllables.⁸³ Re-statement of the skill objective follows.

Level G - Unit 9 Sub-Test: Employing Syllables

Skill Objective: Given multisyllable words, substitute the beginning or ending syllable with another designated syllable.

Pupil Response: At first when given a two syllable word, i.e. "steam/boat", and requested instead of "steam" to say "row", Anna replied, "row". When required to substitute /walk/ in walk/ing for /talk/, she gave "/talk/". Later she confused the sequence of the syllables. For example, when requested to change /mark/ in book/mark to /case/, she gave "case/mark". It was observed, however, that syllable breaks were clear and correct at this time.

Diagnosis: The pupil segmented successfully, but could not blend, perhaps due to poor auditory memory. Several times she appeared on the verge of a correct response: she whispered the designated syllable and the one to which it was to be blended, but then she grew confused. She seemed unable to retain the syllables in her mind long enough to blend them.

Procedures: Clapping hands to the syllables, then sounding the words in unison with the investigator, was performed with each stimulus word. Then the pupil stated the designated syllable. Having done this she was instructed: "Think if we are changing the beginning or the end"; thereby regularly reminding her to use her memory faculties.

Mastery occurred after 2 lessons. Testing and teaching procedures of original test criteria were then resumed.

⁸²"... in blending it is impossible to produce a meaningful response (word) unless the entire segmented utterance can be held in memory and then synthesized. Blending, which appears to be a higher-level, more complex skill than segmentation, is also more highly related to reading achievement than segmentation." Madeline Hardy, R.G. Stennett, and P.C. Smythe, "Auditory Segmentation and Auditory Blending," Alberta Journal of Educational Research, XIX (June, 1973), pp. 156-157.

⁸³Syllable blending is generally considered easier to deal with than phoneme blending. "The greater familiarity of the syllable, as a unit, probably accounts for this finding." (See supra, footnote 82.)

Level G - Unit 9 (Resumed)

Skill Objective: Given a spoken 1-syllable word, substitute the beginning or ending sound with another designated sound.

Pupil Response: Anna substituted and blended initial sounds correctly; with final sounds there were some hesitations and a few errors. A final sound was added rather than substituted in some cases.

Diagnosis: The pupil was very close to mastery, and appeared in need of more practice to overcome an apparent confusion of final-sound substitution with initial-sound substitution.

Procedures: More practice was provided beginning with word-families. Thus the pupil had to blend a final sound to a regularly repeated word part. (i.e. Say "rat". Change /t/ to /m/. Change /m/ to /g/, etc., /ra/ remaining constant.)

Mastery occurred after 2 lessons

Observations in Level G

The pupil required help in omitting final sounds first, and later in substituting initial and final sounds. She was helped in the following ways:

- 1) Practising the skill objective at a level in which the pupil had demonstrated mastery (syllable work) before proceeding to the more difficult task of single phonemes facilitated mastery in phoneme substitution.
- 2) Cues in the form of reminders were provided to ensure recall. ⁸⁴
- 3) Time to master any sub-skill within an objective was unlimited.
- 4) Use of word families for analysis in beginning procedures helped the pupil grow secure in analyzing word combinations.
- 5) Practice leading to mastery of sub-skills helped the pupil to deal ultimately with a whole skill.

Classroom Teacher Observations during Level G

1) At the time of training in Level G, the classroom teacher reported that Anna was showing marked improvement in using blending skills to attack new words.

2) After training in Level G, the classroom teacher reported a change in Anna's behavior during USSR* periods each morning. Previously

⁸⁴ See Case Study I, page 52, footnote 76.

* "Uninterrupted Sustained Silent Reading" period during which students are free to read in silence whatever they choose.

the pupil had been selecting books beyond her reading level, and had looked at the pictures; now she was observed to be selecting easy books, and appeared to be reading them intently.

Progress through Level H

Level H - Unit 6 Test

Skill Objective: Given 2 spoken words and a designated medial sound, identify the word that contains the designated sound.

Pupil Response: All responses were correct. However, when asked which has /s/, "most" or "mushy", she said, "The first one"; and for /s/ in "Boston" or "bushy", she replied "bustle".

Diagnosis: The pupil appeared to possess the necessary discrimination abilities and verified it when tested with many word pairs. The miscalled word and the 'forgotten' word seemed a result of poor pronunciation.

Thus it was decided that mastery was demonstrated in the specific skill of this activity. (Attention to problems in pronunciation is continued in subsequent activities.)

Level H - Unit 7 Test

Skill Objective: Given a spoken word with a 2-consonant blend, then the word with one sound omitted, identify the omitted sound.

Pupil Response: Anna made two mistakes. She was unable to state the omitted consonant in the pairs "sting-sing" and "stun-sun".

Diagnosis: At first it seemed that the difficulty was unique to the blend /st/; however further testing revealed an overall problem in separating consonant blends.

Procedures: In the first lesson a procedure (adapted from the Curriculum by the investigator) in which each of the word pairs was compared phoneme by phoneme was introduced as follows:

Investigator: "Say 'bent'. Say 'bet'."

Pupil: "Bent. Bet."

Investigator: "Do they both have /b/?"

Pupil: "Yes."

Investigator: "Do they both have /e/?"

Pupil: "Yes."

Investigator: "Do they both have /n/?"

Pupil: "No."

Investigator: "Do they both have /t/?"

Pupil: "Yes."

The pupil found this procedure confusing at first, and painstaking as a whole, but she finally mastered it. However, after two lessons she was unable to dispense with the step-by-step breakdown and became frustrated when presented with the original test criteria again.

To facilitate the work of this unit, alphabet cards were used. The pupil had no difficulty in constructing a designated word, saying it, then repeating it with one of the consonant blends omitted. However, when the alphabet cards were removed, and the task requirements were purely auditory, there was failure and frustration.

After 2 lessons using the alphabet cards, the pupil could identify any omitted consonant of a blend with the aid of the cards. Thus a multi-sensory approach seemed essential.

Level H - Unit 8 Test

Skill Objective: Given a spoken word beginning with a consonant blend, repeat it, omitting one sound of the blend.

Pupil Response: This task was very difficult for Anna. She did not respond at all to some items, or she tried sounding out the stimulus word, and then either omitted the wrong sound, or omitted an entire blend.

Diagnosis: As in Level H - Unit 7, the pupil could not omit a phoneme because of the difficulty in segmenting a consonant blend. Testing to determine if the pupil perceived a blend as composed of two phonemes revealed that she did.

Procedures: As in the previous unit, the sound-by-sound procedure was used in two lessons; but when omitted there was no mastery, and frustration was apparent. Thus the alphabet card procedure of Level H - Unit 7 was used. For example, after constructing the word "steam", the pupil was required to omit /t/ and say "seam" or omit /s/ and say "team".

The pupil mastered this procedure easily in 1 further lesson. When retested without the cards, there was again failure and frustration and thus it was discontinued; this confirmed that the multi-sensory approval was necessary and would need to continue.

Level H - Unit 9 Test

Skill Objective: Given a spoken word, substitute any sound with another designated sound.

Pupil Response: Anna had partial success in substituting one vowel sound for another, and was unsuccessful in substituting one consonant of a two-consonant blend.

Diagnosis: As in Level H - Units 7 and 8, the pupil appeared unable to hold a word in mind long enough to change a sound, particularly if it

required separating parts of a consonant blend. The difficulty appeared to be one of output - the pupil could not transform words by substituting a part of a blend, or of input - in that she could not separate the parts of a blend mentally.

Procedures: Insofar as work in Level H revealed great frustration and little success when auditory stimuli alone were presented, the visual aid of alphabet cards was included along with the auditory.

After 2 lessons the pupil demonstrated proficiency when using alphabet cards.

Observations in Level H

The pupil did not achieve mastery in the consonant-blend-analysis-skills of Level H, Units 7, 8, and 9 as outlined in the curriculum syllabus; attempts to deal with this task at the auditory level as required in the curriculum brought limited improvement and considerable frustration to the pupil. To offset this frustration and to avoid the negative effects of loss of self-confidence, the training procedures were re-arranged to include a multi-sensory approach through the use of alphabet cards as recommended in the syllabus.

After sufficient practice which involved the combined auditory and visual techniques, pupil progress was dramatic. The visual component of "the look of consonant blends within words" helped the pupil to grow aware of the subtle changes in corresponding spoken words. Proficiency in Level H was acquired, and it represented a breakthrough in terms of grasping the concept that a consonant blend consisted of two segments. Thus a multi-sensory approach was crucial in this case.

CHAPTER V

SUMMARY, CONCLUSIONS AND IMPLICATIONS

Summary

Early reading procedures demand of the child a certain degree of competence in the general process of phonemic analysis and sequential organization. Research has documented that there exists a correlation between such competence and early reading success. The pupil who is able to organize and analyze verbal stimuli is thus aware of sound "segments" embedded in spoken words and will be better able to grasp the visual symbols or printed words that represent such sounds when he is learning to read.

The purpose of this study was to investigate how two pupils, identified as substandard readers, learned to analyze and organize verbal stimuli. The learning behavior of the subjects, two second grade pupils, was observed as each interacted with the skills of the Auditory-motor Curriculum. Thus this chapter begins with a summary of each case study - presenting an overview of the learning deficiencies each pupil exhibited in auditory perception. Since improved ability was demonstrated by each pupil in dealing with the required auditory tasks, summaries of the instructional procedures are included. The final part of the summary presents a description of the problems in learning common to both pupils along with the related instructional measures, as well as observations regarding the structure and usefulness of the program.

The second section is devoted to the conclusions derived from the

study. It presents commonalities in learning behavior which the subjects of this study shared with other such learners as documented in the literature, and instructional procedures implemented to foster auditory perceptual development as evidenced by literature.

The final section in this chapter is devoted to implications for educators and curriculum developers, and for further research.

Case Study I : Susan's Initial Learning Behavior

Susan's learning behavior was characterized by a general difficulty in listening and attending. She often blurted out a response impulsively before a statement or an instruction was completed, confirming the classroom teacher's observations of the pupil's impulsive behavior and/or short attention span. Susan appeared unable to concentrate on any verbal stimuli beyond several minutes and seemed to have difficulty in focusing on speech sounds. Because progress was so dependent upon concentrated listening, considerable attention was devoted to this problem throughout each phase of instruction in her program.

This problem of poor listening was compounded by poor recall as evidenced by the pupil's requests for repetition of instructions and stimulus words, by a difficulty in remembering two pieces of information (such as a stimulus word and instructions - regardless of order) and parts of three and four syllable words. Thus emphasis on having Susan repeat items, which would develop memory faculties, had to be incorporated into her training program.

In the area of reading skills Susan tended to confuse letter name and sound, confirming the classroom teacher's observation that the pupil showed inadequacy in applying letter sound to attack unknown words. Diagnosis of the problem revealed that in addition to confusion of letter

name and sound, the pupil had incomplete knowledge of letter sounds.

It was also noted that during activities with sound discrimination, Susan revealed poor discrimination of vowel sounds and a tendency to mispronounce short vowels in consonant-vowel-consonant words. Further, Susan experienced difficulty in tasks requiring her to identify and substitute an initial or final phoneme. A close look at the tasks revealed that they required the pupil to hold in mind both instructions and word pairs, long enough to submit an initial or final phoneme; this was indeed a very demanding task for a pupil who was demonstrating poor recall.

The most difficult area of the instructional program for Susan centered on consonant blends. A lack of discrimination of the two consonants in a blend surfaced several times during training in various units of the program. When exposed to the Curriculum units which focused specifically on analysis of blends, Susan evidenced failure and frustration. The problem appeared to be due to poor discrimination, but only in part; the conclusion was that a lack of perception of the distinctness of the consonants in the blend and a difficulty in segmenting the blend verbally was the basic problem.

Case Study I : Instructional Procedures

Teaching procedures emphasized the need to focus on and recall verbal stimuli; one of the major methods employed was to break down skills into smaller units, and gradually build up again, while another was to re-word statements so that there was less for the pupil to hold in her mind.

Susan became increasingly able to deal with the syllable skills as a result of reinforcement of auditory stimuli: frequent repetitions of words and syllables were made by the investigator, and the pupil was

encouraged to provide her own verbal reinforcement by mouthing, whispering, or pronouncing stimulus words as often as she wished. To help the pupil to deal with multisyllable tasks, activities concentrated on two syllable words until such time as the pupil acquired confidence and readiness to accommodate words of three and four syllable length.

To facilitate organization of verbal information in relation to vowel sound discrimination, practice was given in listening for vowel sounds and in immediately repeating words pronounced by the investigator.

As overall improvement in organization of verbal stimuli became evident, it paved the way for progress in analysis tasks such as identification of initial and final phonemes. In these latter tasks, instruction centered on breaking the large skill into its smaller units. Once mastered, these sub-skills were combined and then recombined. Again, frequent repetition of words and phonemes by both the investigator and the pupil brought improved ability in phoneme identification skills.

To help the pupil develop proficiency in letter-sound usage, teaching procedures concentrated on reinforcing understanding of grapheme-phoneme correspondence, teaching those phonemes which were uncertain, and encouraging the pupil to "give the sound" in discrimination tasks on a regular basis.

Finally, in the consonant blends activities, the pupil was provided with alphabet cards. A multi-sensory approach was thus pursued, combining the auditory stimuli with the visual stimuli. In this way the pupil was able to see and hear the consonant blend analysis.

In summary, the deficiencies Susan revealed in auditory organization skills appeared to stem from poor focusing-listening skills and poor recall of verbal information, and this in turn appeared to underlie most

other problems. The Curriculum literature suggests that learners may demonstrate problems in listening, however, the nature and degree of the problem of attending to verbal information had to be assessed by the investigator independently. Because this problem was so basic, constant attention was given to it throughout the program. The one element of instruction which received most emphasis was auditory reinforcement in order to assimilate verbal information. As this need was met, the pupil demonstrated progress in sound discrimination and in the auditory analysis skills of letter-sound usage, and identification, omission, and substitution of single phonemes.

At the time of writing this report, Susan appeared quite confident in sound discrimination and letter sound usage skills, and is making considerable progress in analysis of single phonemes. She is continuing work in analysis of consonant blends, and improved listening skills.

Case Study II : Anna's Initial Learning Behavior

In contrast to Susan, Anna's listening behavior was characterized by close attention to instructions and thoughtful consideration of stimulus words. She evidenced no problems in remembering and following instructions, however she demonstrated a difficulty in the recall of multisyllable words and the sequencing of their component parts. Diagnosis revealed that this was related to a lack of awareness of parts within words in speech - her own and that of others.

Anna did not attend analytically to spoken language which was further reflected in her own speech production. Her speech and pronunciation were characterized by overall carelessness of pronunciation: omitting syllables, mispronouncing or dropping word endings, and imprecise

pronouncing of vowels within words. On the other hand when alerted to a mispronunciation and requested to repeat words exactly as stated, she pronounced them correctly. Thus attention to the processing of verbal information upon receiving it, was incorporated into her training program and was continually emphasized.

During training Anna also demonstrated that she could not use letter sounds; she tended to think only in terms of letter names. Further analysis revealed that she was cognizant of the sounds for the letters of the alphabet but appeared unaccustomed to using them. Support was found in her classroom teacher's reference that Anna experienced difficulties in blending letter sounds.

Tasks of identification and omission of final phonemes presented little difficulty, but Anna was unsuccessful when identified phonemes were to be substituted by different phonemes; it appeared that the act of fusing a final phoneme to a word part was so confusing that in the process the pupil forgot the phoneme or the word part. These difficulties in turn were evidenced in pronouncing and in analyzing consonant blends, the latter skill proving to be the most difficult for Anna. The conclusion was that a lack of perception of the distinctness of the two components in a blend and/or a difficulty in verbally segmenting the blend was the basic problem.

Case Study II : Instructional Procedures

Teaching procedures throughout the program emphasized an awareness of syllable and phoneme discreteness in words. Rhythm-like procedures within the context of auditory skills were most helpful; a rhythm-motor activity of clapping to syllables - and the listening to

and restating of multisyllable words in rhythm-fashion with distinct pauses between syllables, facilitated an awareness of syllable discreteness and sequence. These procedures were practised first with two-syllable words, and as Anna mastered these, words of longer length were gradually introduced and the motor-rhythm support was slowly eliminated.

Along with emphasis on syllable discreteness, teaching procedures focused on providing correct speech models. Each time Anna mispronounced a word, it was pronounced correctly and immediately by the investigator, and the pupil was instructed to pronounce what she had just heard. This practice was supplemented with pronouncing words in unison to increase the awareness of clear expression.

To help the pupil to "think" in terms of phonemes, she was reminded to "give the sound" whenever she responded with a letter name in program tasks. To assist the pupil in blending final phonemes, substitution and blending were practised first at the syllable level, and verbal cues such as, "think if we are changing the beginning or the end" were given. As Anna developed confidence in blending syllables, tasks requiring substituting and blending of phonemes were re-introduced. The acquired skill of blending syllables transferred to that of blending phonemes.

In tasks focusing on consonant blends, the pupil had to be provided with alphabet cards. By combining auditory stimuli with visual stimuli, a multi-sensory approach was used. In this way the pupil was able visually and auditorily to analyze consonant blends.

In summary, Anna's improvement in the auditory skills of the program were demonstrated as she mastered the activities and tasks within the program. She made progress in applying her knowledge of letter

sounds and in blending and analyzing phonemes. These problems, however, were subordinate to a greater deficiency: an inadequacy in attending analytically to spoken language. The Curriculum literature suggests that learners may demonstrate this kind of inadequacy; however, the nature and degree of the problem had to be assessed by the investigator independently. This deficiency required attention throughout much of the program, thus the instructional techniques concentrated on the awareness of syllables within words and phonemes within syllables.

At the time of writing this report, Anna appeared quite confident in letter-sound usage, and considerable progress in analyzing words into syllables and phonemes has been noted. Practise is continuing in sound blending and clear articulation.

Commonalities in the Case Studies

While it is dangerous to draw generalizations from case studies, certain commonalities were observed in the problems and in the corrective procedures undertaken.

Early in the program, both pupils revealed problems in dealing with verbal information and both showed inadequacy in using letter sounds: Susan demonstrated that she did not know all the sounds and that she confused letter name with sound, while Anna appeared unversed in the use of letter sounds. Due attention was paid to this problem: practice in letter-sound relations was implemented and the pupils were encouraged to "give the sound" whenever they failed to do so.

The most striking commonality of problems was in focusing on consonant blends: analysis of consonant blends proved decidedly difficult and frustrating for both pupils. This task appeared in the last units of

the final level of the program and as such represented the most complex acoustical pattern in it.⁸⁵ Since these units require the pupil to analyze the phonetic construction of a word precisely enough to be able to identify, delete, or substitute a designated consonant of a two-consonant blend, it was not surprising that these pupils, weak in auditory skills, found this skill so difficult. Both pupils displayed frustration and failure when this skill was pursued on a purely auditory basis, thus a multi-sensory approach was followed: each pupil was given alphabet cards so that the visual and auditory modalities could be applied together to analyze consonant blends. Mastery of the skill on a purely auditory basis was not achieved by either pupil, hence the decision to postpone pursuit of this complex auditory skill until a later time. Support for this decision was derived from Wepman who also found that auditory perceptual skills for some children mature as late as the end of the child's eighth year, and instruction should be delayed accordingly.⁸⁶

The Auditory-motor Curriculum

Close observation of the pupil-program interaction over an extended period has produced an ancillary result of providing a clearer understanding of the program particularly in its structure. Generally

⁸⁵Jerome Rosner, Perceptual Skills Curriculum: Program II, Auditory-motor Skills, (New York: Walker Educational Book Corporation, 1973), p. II-1.

⁸⁶Wepman, "Auditory Discrimination," p. 326.

speaking, the structure consists of a hierarchy of skills which proceed from simple to complex and from the concrete to the abstract with regard to two underlying concepts:⁸⁷ 1) At the lowest level, words and syllables are taught and only when these are mastered are single phonemes introduced. This is in accordance with research which demonstrated that the syllable as a unit is more readily perceived and easier to deal with than the phoneme.^{88,89} 2) In the initial stages of phonemes, the pupil is taught to segment -- to identify and omit phonemes. Not until these skills are mastered is the pupil required to substitute and blend phonemes. Again there is evidence that blending is a higher-level skill than segmenting, and instruction should reflect this sequence.⁹⁰

The Auditory-motor Skills Curriculum is designed as a preventive one, aimed to prepare all pupils for certain aspects of reading. It is also an individualized corrective program for those pupils who have demonstrated the need for corrective measures. It is the latter function which was enlisted in this investigation. In this capacity the program has the following features which are grounded in research:

1. It provides systematic procedures for testing the general processes of phonemic analysis, making it possible to assess the pupil's entering behavior: the pupil is taken from whatever stage he is at, preventing relearning what he already knows, thus boredom is avoided and

⁸⁷ Robert M. Gagne stresses the principle of proceeding from the simple to the complex, and from the concrete to the abstract in teaching for mastery in Conditions of Learning, (New York: Holt, Rinehart and Winston, Inc., 1965).

⁸⁸ Gleitman and Rozin, "The Use of a Syllabary," p. 447.

⁸⁹ Hardy, Stennett, and Smythe, "Auditory Segmentation," p. 157.

⁹⁰ Ibid., pp. 156-157.

progress is ensured. In summary, the effectiveness of the training program is dependent upon accurate assessment of the prior learning of each pupil.⁹¹

2. It is a developmental program - it meets the pupil at his skills level rather than at his grade level. Thus the program is designed to meet the pupil's particular auditory needs regardless of age or grade. It also provides a variety of learning activities within every stage, as well as many exemplars for each learning activity. In this way, the program facilitates mastery whether the setting is developmental or remedial.⁹²

3. It assigns no limits in time to master the various skills, thus avoiding an obstacle to skill mastery by stipulating a time limit or a "time-to-learn" for pupils.⁹³

4. It teaches those auditory perceptual skills which appear to be related to reading skills. As the pupil learns to organize speech sounds, he learns to analyze them in terms of segments and sequence of segments in preparation for reading. Such skills facilitate success in tasks of analysis of printed words.⁹⁴

Conclusions

Auditory processes play a major part in learning to read and in readiness for reading. "If a child is unable to receive phonemes clearly,

⁹¹Robert M. Gagne, "Some Views of Learning and Instruction," Phi Delta Kappan, Vol. LI (May, 1970), pp. 468-472.

⁹²Guy L. Bond and Miles A. Tinker, "Reading Difficulties: Their Diagnosis and Correction," (New York: Appleton-Century-Crofts, Inc., 1967), p. 468.

⁹³Samuels and Dahl, "IQ, Learning Ability, and Reading," pp.33-35.

⁹⁴McNeil and Coleman, "Auditory Discrimination Training."

respond to them discretely, retain them in accurate sequences, and organize them into linguistic signs, he is likely to encounter formidable difficulties in learning to read."⁹⁵ Disturbances in these processes in two pupils have been delineated in this investigation. Whereas it is dangerous to draw conclusions on the basis of auditory disturbances in only two pupils, some understandings about the nature of the observed problems can be derived when they are placed within a greater context of other learners. Thus the findings of this investigation are presented against the background of literature related to other pupils with auditory perceptual problems to portray commonalities.

Anna's difficulties in attending analytically to spoken language appeared to correspond to those learners with reading problems in not attending to the phonological aspects of language as they "hear" them.⁹⁶ Because of this problem her speech production was distorted - a manifestation common to those children who do not "listen accurately."⁹⁷ Anna's language was imprecise - she dropped word endings, miscalled words, transposed sounds, and confused the sequence in multisyllable words. Pupils like Anna, lacking an awareness of the auditory characteristics of words, "... readily miscall or mispronounce words, substitute or transpose sounds or syllables in words, and have trouble with complex or

⁹⁵ Richard M. Flower, "The Evaluation of Auditory Abilities in the Appraisal of Children with Reading Problems," in Perception and Reading, Vol. XII, Part 4, ed. by Helen K. Smith (Delaware: I.R.A., 1968), p. 21.

⁹⁶ Gleitman and Rozin, "The Use of a Syllabary," p. 455.

⁹⁷ Alex Bannatyne, "The Transfer from Modality Perceptual to Modality Conceptual," in Perception and Reading, Vol. XII, Part 4, ed. by Helen K. Smith (Delaware: I.R.A., 1968), p. 15.

polysyllabic words."⁹⁸ In the course of a conversation the listener often makes allowances for such mispronunciations, thus it is not a serious handicap to effective communication. In reading, however, mispronunciations can create severe problems -- the reader may not recognize a word in print for it is unlike his own pronunciation "...because the distortion of phonemes creates even more chaos and irregularity with grapheme processing."⁹⁹

In dealing with multisyllable words, Anna had difficulty in segmenting, blending, and sequencing. She seemed to lack a feeling of the auditory rhythm of syllables. Thus she resembled those learners who, lacking in rhythmicity, have particular difficulty in sequencing and blending.¹⁰⁰

Because Anna lacked an awareness of auditory segments in words, she was "unaware" of the phoneme or the syllable as a discrete segment of a word. She showed inadequacy in using letter sounds, which in turn led to problems in blending. Susan, too, was insecure in letter sound usage which led to problems in blending. While the program did not require the pupils to "sound" or "blend" printed symbols, they were required to do so with phonemes in order that they would meet with greater success in blending at the grapheme level, a significant factor in learning to read according to Harris.¹⁰¹ Both pupils experienced great difficulty in blending consonants, stemming from an inability to analyze consonant blends as

⁹⁸George D. Spache and Evelyn B. Spache, Reading in the Elementary School, (Boston: Allyn and Bacon, Inc., 1973), p. 70.

⁹⁹Bannatyne, "Modality Transfer," p. 15.

¹⁰⁰A.E. Tansley, Reading and Remedial Reading, (Atlantic Highlands, N.J.: Humanities Press, 1967), p. 26.

¹⁰¹Albert J. Harris, How to Increase Reading Ability, (New York: David McKay Co., 1970), p. 223.

consisting of two separate elements. This problem of sound blending occurs for certain pupils when two or more consonants appear together.¹⁰²

In contrast to Anna, Susan did not know how to listen. In conversation she was observed to burst in - almost habitually. This did not appear to be due to rudeness, but rather to an inability to sustain attention. This listening problem was revealed during the instructional program, and seemed connected to poor recall: Susan frequently asked for words and instructions to be repeated. The program does not call attention to this problem per se, but it was considered as a serious one by the investigator from several points of view: 1) Skillful attending and listening are as important to effective communication as correct expression. 2) "Lack of attention means irretrievable loss of the speaker's ideas."¹⁰³ 3) Attention is essential to all learning,¹⁰⁴ especially to reading skills.¹⁰⁵

This inadequacy in attending to and recalling verbal stimuli appears to be grounded in the inability to focus on auditory stimuli.¹⁰⁶ To help Susan, the program was broken down into very small steps. Many learners, and in particular disabled learners such as Susan, require steps which have minimal changes between them, and which are so small that a

¹⁰² Flower, "Evaluation of Auditory Abilities," p. 24.

¹⁰³ Wayne Otto, Richard A. McMenemy, and Richard J. Smith, Corrective and Remedial Teaching, (Boston: Houghton Mifflin Co., 1973), p.314.

¹⁰⁴ Spache and Spache, Reading, p. 39.

¹⁰⁵ Sam Duker, "Listening and Reading," in Remedial Reading: An Anthology of Sources, ed. by Leo M. Schell and Paul C. Burns (Boston: Allyn and Bacon, Inc., 1968), pp. 268-269.

¹⁰⁶ Goldberg and Schiffman, Dyslexia, pp. 101-103.

correct response is almost assured.¹⁰⁷ The program also incorporated frequent repetition which is a typical feature of programs aimed at children with learning problems.¹⁰⁸

Instructional procedures drawn from the Auditory-motor Curriculum and supported by literature were implemented to correct the auditory disturbances which the two learners in this study demonstrated. First of all, once the investigator interpreted and diagnosed the focusing-listening problem demonstrated by the learners, appropriate activities were devised to meet the problem. Along with this, intensive training was applied to the specific problems in auditory perception. Though many young learners may not require intensive perceptual and readiness training,¹⁰⁹ it is generally recognized that special procedures should be adopted for children with perceptual problems.¹¹⁰ For example, the use of multi-sensory learning for most children has not been recommended,¹¹¹ but for the child in need of corrective training, it is crucial. For pupils having auditory disturbances, Bannatyne recommends the use of any visual devices, and in particular, small letter cards, to facilitate analysis and sequencing.¹¹² Thus while stress was placed on the development of the weak modality (the

¹⁰⁷ George Kaluger and Clifford J. Kolson, Reading and Learning Disabilities, (Ohio: Charles E. Merrill Co., 1969), p. 214.

¹⁰⁸ Gertrude Hildreth, "Some Principles of Learning Applied to Reading," in Remedial Reading: An Anthology of Sources, ed. by Leo M. Schell and Paul C. Burns, (Boston: Allyn & Bacon, Inc., 1968), p.205.

¹⁰⁹ Spache and Spache, Reading, p. 67.

¹¹⁰ Joseph M. Wepman, "The Modality Concept," in Perception and Reading, Vol. XII, Part 4, ed. by Helen K. Smith, (Delaware: I.R.A., 1968), p. 6.

¹¹¹ Spache and Spache, Reading, pp. 284-286.

¹¹² Bannatyne, "Modality Transfer," p. 16.

auditory) for the pupils in this investigation, another modality (the visual) was incorporated when success was not achieved. The outcome of the use of letter cards in this study was that Anna and Susan were better able to deal with consonant blends and overall blending; furthermore, frustration was averted and success was reinforced -- which is extremely important in remedial situations. "Pupils with learning problems have a special need to build a reserve of success to sustain them as they work..."¹¹³

For both pupils, instructional procedures emphasized use of letter sounds. Attention was paid to this skill on the basis of alleged correlations between knowledge of letter sounds and successful early reading performance.¹¹⁴ With letter-sound teaching implemented, the pupils were reminded and encouraged to use letter sounds thereby becoming increasingly adept in using letter sounds. Since a reduction of material to be processed at a given time facilitates retention and understanding,¹¹⁵ instructional procedures (in dealing with auditory information) which included breaking down skills into smaller skills, were implemented for Susan in particular. Other teaching strategies which enabled Susan to focus on and assimilate auditory information included repetition and over-learning, practices prescribed for children with learning problems.^{116,117} As an outcome of repetitions of instructions of words by the investigator and the pupil, Susan was helped to "tune in" and focus on incoming verbal

¹¹³ Kaluger and Kolson, Reading and Learning Disabilities, p. 214.

¹¹⁴ Samuels, "Research Design in Reading," pp. 346-349.

¹¹⁵ Tortelli, "Short Term Memory," pp. 211-212.

¹¹⁶ Kaluger and Kolson, Reading and Learning Disabilities, p. 214.

¹¹⁷ Harris, Reading Ability, p. 319.

stimuli.

When Susan demonstrated difficulty in phonemic tasks centering on multisyllable words, two-syllable words were re-introduced and reviewed. Mastery of the simpler skills, and the accompanying success, facilitated accommodation of the next level of skills. The skills were ordered systematically from the simple to the complex and the pupil proceeded to higher-order skills only after mastery of those preceding it, for "...a learner must not be moved into a skill until he has mastered the prerequisite skills."¹¹⁸

In Anna's case, teaching strategies which helped her to process words analytically and which affected improved speech production encompassed a variety of measures advanced by literature. Initially rhythm, through clapping, helped the pupil become aware of syllables; later, syllables were uttered rhythmically.¹¹⁹ Emphasis was laid on listening for syllables and their sequencing and then extended to listening to words to identify any component parts. For children with reading disabilities whose auditory processes are inadequate, there are recommendations for "... an intensive training program which emphasizes listening to words and identifying phonemes, clear phoneme articulation as in elocution, (and) the correct blending of phonemes in speech..."¹²⁰ During Anna's training program, the investigator also emphasized clearness of articulation and syllable discreteness in her own speech, and Anna demonstrated improved articulation. A form of speech modelling was thus

¹¹⁸Gerald G. Duffy and George B. Sherman, Systematic Reading Instruction, (New York: Harper Row, 1972), p. 2.

¹¹⁹Tansley, Remedial Reading, pp. 25-27.

¹²⁰Bannatyne, "Modality Transfer," p. 16.

implemented as the pupil was requested to pronounce words as the investigator did. This practice of modelling and patterning of pronunciation as displayed by the teacher to correct imprecise speech in one-to-one teaching is highly recommended in corrective programs.¹²¹ The outcome of such emphasis was a more analytic approach to spoken words, greater attention to pronunciation, and more careful speech production.

Both pupils in the study progressed in a variety of auditory skills. In particular Susan improved in listening skills and in sound discrimination and phoneme substitution. Anna developed more precise speech patterns and an awareness of phonological units in words, and improved blending skills. In general, both pupils learned to organize spoken sounds (words) into their component parts as they progressed through the program of analyzing words, syllables, and ultimately phonemes, and in recognizing the way the parts are sequenced.

Many of the strategies which enabled the pupils in this study to improve in a variety of skills have been described. These strategies can be summed up as 1) reducing the amount of verbal information to facilitate retention and meaning; 2) providing repetition of verbal stimuli to facilitate focusing; 3) teaching for mastery of simple skills and sub-skills before progressing to more complex and more all-encompassing skills; 4) promoting awareness of auditory characteristics within spoken words; 5) providing training in speech production; 6) reinforcing the weak modality; and 7) using a multi-sensory approach when necessary. Such strategies however, could only be developed and implemented after careful attention to the interaction of the learner and the program materials by the investigator.

¹²¹Spache and Spache, in Reading, p. 135.

Limitations of the Study

Any meanings and inferences that may be derived from the findings of this study are limited by the following considerations:

1. The pre-testing and post-testing measures in this investigation were drawn solely from the Auditory-motor Skills Curriculum.
2. In this study the researcher and teacher are one, and consequently there is a possibility for bias.
3. When the data gathering instrument is the human observer, there is some danger that he (she) will be variable during the course of his (her) observations. Though standardization of procedures of observing and recording data was implemented and observed throughout the study, the data analysis is nevertheless subjective. To some degree the analysis of an in-depth study reflects the investigator's predisposition. However, since the purpose of the case material of this investigation was to provide insights and to evoke rather than to test hypotheses, this concern is not by nature undesirable.
4. This study was conducted in a one-to-one teaching situation outside the classroom. Other than verbal feedback of casual observations by the classroom teachers concerning changes in pupil behavior, there were no measures of transfer of learning to the classroom situation.
5. Further, this study operated on the assumption that the instructional program of the Auditory-motor Skills Curriculum is related to performance in reading. The research related to this program indicated that a mastery of the skills within the program leads to a positive effect upon the pupils' reading performance. The effect upon reading in both case studies was not investigated, and therefore must be considered a serious limitation.

6. The descriptive study provides information unique to the subjects under study and therefore has limited possibilities for generalization. As an in-depth study, it provided some understanding of the learning behavior of two individuals, but should be ultimately tested against other findings and within broader contexts.

7. The observational and descriptive studies did lead to insights and certain hypotheses, but these were not tested.

8. Because few investigations of case studies which describe students' processing of auditory skill learning exist, data for comparison and for modelling purposes were severely limited.

In summary, any consideration of outcomes of the program must take into account the definite limitations of the study, particularly that pre-testing measures were restricted to those outlined in the program and that outcomes of instructional procedures were assessed by tests of mastery in the program. Nevertheless, on the basis of these mastery tests, the pupils in this investigation demonstrated improved auditory abilities through programming aimed at their specific auditory perceptual deficiencies.

Implications of the Findings

The findings of this study imply that the responsibility for development of perceptual skills in early education lies with the educator from the time the learner first enters school. These findings have implications for primary grade educators who accept this responsibility. Such implications can be rendered into recommendations for resource personnel, teachers, and curriculum developers, and for further research.

Low performance in auditory skills may have its basis in poor

listening skills. It is strongly recommended that in addition to the activities of a training program, attention must be given from the start, to furthering listening skills and to developing the ability to attend to directions.

It is recommended that remedial educators and resource personnel pay due attention in diagnosis to the specific auditory deficiencies demonstrated by individual learners. Low performance in auditory skills may be manifested in either sound discrimination, auditory memory, sequencing, lack of knowledge of letter-sound correspondence, or blending abilities - or as the pupils in this study demonstrated - a combination of these areas. The further implication for practice is that perceptual skill teaching must be geared to individual and specific auditory deficiencies, and should be applied as early as possible.

It is suggested that remedial educators and resource personnel make provision within tutoring schedules for a time to reflect upon what the pupil can do and cannot do -- before and after each learning activity is presented. Only on the basis of careful diagnosis of the problem and in consideration of the pupil's entering skills, is it possible to plan an effective program. An ongoing diagnosis must be carried out which then can be drawn upon to provide efficient instruction to match the learner's needs, as well as to assess the effectiveness of this instruction so that ineffective measures are not continued. An ongoing diagnosis avoids the dangers of a mindless and assembly-line processing of pupils in need of corrective teaching.

It is recommended that information regarding a pupil's auditory problems be transmitted to the teacher. Such recognition will give some

indication whether or not it is desirable that a phonics oriented program be implemented for those children who display auditory perceptual deficiencies, and if there is a need to individualize instruction. Since auditory problems are related to reading achievement, it is advisable that the teacher adjust early reading programs to pupils' capabilities once such pupils have been identified as having auditory problems.

Further, reinforcement through multi-sensory techniques is recommended for pupils weak in auditory and phonic skills. Though caution must be exercised, it is recommended that teachers and resource personnel aim instruction at strengthening the weak modality so that all possible avenues to learning be developed, and in order that the pupils' self-concept as a learner is positively affected.

Insofar as inadequate listening skills may underlie low performance in auditory skills, it is suggested that those working with primary grade children must simplify, individualize, and at times repeat instructions. It is recommended that verbal utterances should be brief, particularly for those pupils who demonstrate short attention span. Furthermore, as memory and listening skills begin to develop, there is a need to reinforce these integral features until they are secure at a certain stage, as new learning experiences are introduced.

On the other hand, the pupil whose listening behavior is characterized by inadequate focusing on verbal stimuli, may be laboring under a perceptual problem. Thus the teacher should be alert to those children who do not listen "well", and/or who exhibit poor speech while their hearing acuity and auditory discrimination are intact. It is suggested that such pupils be screened for problems in auditory perception before a corrective program is prescribed.

By the fact that the study centered on recognizing specific perceptual deficiencies and providing training to overcome them, attention was called to the individual learner. It has stressed that, at least for the child with a learning disability, educational programs can be child-centered. The implication for practice is that perceptual skill teaching must be geared to the level of functioning of the individual learner as far as possible. Thus it is strongly recommended that individual intervention be made mandatory for any pupils who exhibit inadequacy in auditory skills. Teachers suspecting children of inadequacy should seek direction for in-class corrective measures, or refer these children to other personnel qualified to deal with such problems.

Teachers must not assume that because pupils are well-established within the school system that they have acquired the skills of applying letter sound to unlock new words. Instead it is recommended that teachers frequently assess the entering behavior of pupils to determine whether they are indeed ready for the teaching procedures of primary levels - for example, children beyond the first level may be unprepared for blending or may find it very difficult.

It is suggested that the Auditory-motor Curriculum is a viable program for testing and teaching the processes of phonemic organization and analysis. It has been tested and validated in the early phases of its development and has incorporated ideas and teaching strategies from research. By demonstrating the usefulness of the program in dealing with two learners poor in auditory skills, this study finds justification for inclusion of the program or segments of it in both remedial and resource situations, as well as in the classroom. It should be noted however, that the program does not provide exercises for developing listening skills,

although it does alert the instructor to this problem. It is therefore incumbent upon the instructor to create activities to fulfill this need when necessary

For the curriculum planner, this study suggests the feasibility of the Auditory-motor Skills Curriculum for recommendation in classroom and remedial use. Attention should be drawn to its place in reading readiness programs and in specific areas of reading programs calling for the following specified skills: 1) the ability to analyze a spoken word into its component elements (syllables and phonemes); 2) the ability to interpret the temporal sequences of these elements; and 3) the ability to translate these elements into visual symbols.

Primary grade instructional programs demand that a child recognize that spoken language consists of organized series of phonemic elements (phrases, words, sounds within words) and that these are interrelated. By demonstrating that some children enter primary grades with insufficiently developed auditory skills which may be grounded in a serious deficiency -- the inability to follow verbal directions -- and thus may not meet the demands, this study suggests the importance to curriculum developers of making provision for such low performance children. Further, an instructional program must identify the auditory skills these children require and state them in performance terms; and it must be systematically ordered from the simple to the complex and include mastery tests requiring a child to complete prerequisite skills before moving ahead. The program should also provide instructional strategies for each skill identified.¹²²

This study has demonstrated that the Auditory-motor Skills Curriculum meets these criteria, except for activities for developing

¹²²Duffy and Sherman, Systematic Reading Instruction.

listening skills. It is suggested that these criteria be identified when the curriculum developers recommend a particular program, such as the Auditory-motor Skills Curriculum, so that practising teachers can appreciate the rationale underlying the recommendations.

Replication studies should be undertaken to provide accurate descriptions of pupil-program interaction. More information is required about the auditory perceptual difficulties which children encounter within the program and to provide accurate descriptions of individual learning situations and of individual learning behavior. Such case studies should lead to a greater understanding of auditory development and of auditory perceptual problems. From many such case studies it is conceivable that certain generalizations can be made. Careful clinical and case study investigations, even though they touch upon one individual, can tell us much; they may provide clues which explain parts of what occurs in a larger setting. And as investigations of this kind are replicated, the findings may be put together - and may disclose findings which throw light on the learning behavior of certain categories of children, such as the slow learner or the perceptually handicapped.

BIBLIOGRAPHY

- Bannatyne, Alex. "The transfer from Modality Perceptual to Modality Conceptual." Perception and Reading, Vol. XII, Part 4. Edited by Helen K. Smith. Delaware: I.R.A., 1968.
- Bateman, Barbara. "The Efficacy of an Auditory and a Visual Method of First Grade Reading Instruction with Auditory and Visual Learners." Perception and Reading, Vol. XII, Part 4. Edited by Helen K. Smith. Delaware: I.R.A., 1968.
- Beery, Mildred Freburg. Language Disorders of Children. New York: Appleton-Century-Crofts, 1969.
- Bond, Guy L. and Tinker, Miles A. Reading Difficulties: Their Diagnosis and Correction. New York: Appleton-Century-Crofts, Inc., 1967.
- Chall, J.; Roswell, F.; and Blumenthal, S. "Auditory Blending Ability: A Factor in Success in Beginning Reading." The Reading Teacher, Vol. XVII (1963), pp. 113-118.
- Chester, Robert D. "The Psychology of Reading." Educational Research, Vol. LXVII (May-June 1974), pp. 403-411.
- Christine, Dorothy and Christine, Charles. "The Relationship of Auditory Discrimination to Auditory Defects and Reading Retardation." The Elementary School Journal, Vol. LXV (1964), pp. 97-100.
- Cooper, Franklin S. "How is Language Conveyed by Speech?" Language by Eye and by Ear. Edited by James F. Kavanagh and Ignatius G. Mattingly. Cambridge: The MIT Press, 1972.
- Deutsch, Cynthia P. "Auditory Discrimination and Learning Social Factors." Merrill-Palmer Quarterly of Behavior and Development, Vol. X (1964), pp. 277-296.
- Duffy, Gerald G. and Sherman, George B. Systematic Reading Instruction. New York: Harper Row, 1972.
- Duker, Sam. "Listening and Reading." Remedial Reading: An Anthology of Sources. Edited by Leo M. Schell and Robert C. Burns. Boston: Allyn & Bacon, 1968.

- Durrell, D. D., and Murphy, Helen A. "The Auditory Discrimination Factor in Reading Readiness and Reading Disability." Education, Vol. LXXII (May 1953), pp. 556-560.
- Dykstra, Robert. "Auditory Discrimination Abilities and Beginning Reading Achievement." Reading Research Quarterly, Vol. I, No. 3 (Spring 1966), pp. 5-34.
- Fast, Dolores J., and Cosens, Grace V. "Effect of Socio-economic Status and Auditory Discrimination Training on First Grade Reading Achievement and Auditory Discrimination." The Alberta Journal of Educational Research, Vol. XVI (September 1970), pp. 165-178.
- Flower, Richard M. "The Evaluation of Auditory Abilities in the Appraisal of Children with Reading Problems." Perception and Reading, Vol. XII, Part 4. Edited by Helen K. Smith. Delaware: I.R.A., 1968.
- Gagné, Robert M. Conditions of Learning. New York: Holt, Rinehart and Winston, Inc., 1965.
- _____. "Some Views of Learning and Instruction." Phi Delta Kappan, Vol. LI (May, 1970), pp. 461-472.
- Gates, Arthur I. The Improvement of Reading. New York: MacMillan Co., 1947.
- Gleitman, Lila R., and Rozin, Paul. "The Use of a Syllabary." Reading Research Quarterly, Vol. VIII (Summer 1973), pp. 447-463.
- Goldberg, Herman K., and Schiffman, Gilbert B. Dyslexia. New York: Greene & Stratton, 1972.
- Hardy, R. G. Stennet, and Smythe, P. C. "Auditory Segmentation and Auditory Blending." Alberta Journal of Educational Research, Vol. XIX (June 1973), pp. 156-157.
- Harrington, Sister Mary James, and Durrell, D. "Mental Maturity Versus Perception Abilities in Primary Reading." Journal of Educational Psychology, Vol. XLVI (1955), pp. 375-380.
- Harris, Albert J. Effective Teaching of Reading. New York: David McKay Co., 1963.
- _____. How to Increase Reading Ability. New York: David McKay Co., 1970.
- Hildreth, Gertrude. "Some Principles of Learning Applied to Reading." Remedial Reading: An Anthology of Sources. Edited by Leo M. Schell and Paul C. Burns. Boston: Allyn & Bacon, Inc., 1968.

- Hirsch, de, Katrina; Jansky, Jeannette; Langford, William S. Predicting Reading Failure. New York: Harper & Row, 1966.
- Kaluger, George and Kolson, Clifford J. Reading and Learning Disabilities. Ohio: Charles E. Merrill Co., 1969.
- Kelly, William A. Educational Psychology. Milwaukee: The Bruce Publishing Co., 1945.
- Leeds, Donald S. "Physical Factors in Reading Disabilities." Journal of the Reading Specialist, Vol. XI, No. 1 (October 1971), pp. 71-86.
- Lindamood, Patricia C. "Facilitation of Language and Literacy Development through Intensive Auditory Perceptual Training." Paper presented at the third Annual TESOL Convention, March 1969. (ERIC ED 028 430)
- Lindamood, Charles H., and Lindamood, Patricia C. "Conceptualization of Auditory Patterns." Paper presented at the I.R.A. Conference, May 1972. (ERIC ED 044 253)
- McIntyre, Rosa Imogene. "An Investigation of a Preschool Child's Understanding of Specific Words Selected from His Spontaneous Oral Expressions." Ph.D. dissertation. Pennsylvania State University, 1965.
- McNeil, John D., and Coleman, James C. "Auditory Discrimination Training in the Development of Word Analysis." Los Angeles: California University, July 1967. (ERIC ED 018 344)
- McNinch, George. "Auditory Perceptual Factors and Measured First Grade Reading Achievement." Reading Research Quarterly, Vol. VI, No. 4 (Summer, 1971), pp. 471-492.
- Mayo, Jean. "Two Techniques of Teaching Auditory Blending Skills to Kindergarten Children." Summary of a doctoral dissertation, University of Colorado, 1971. (ERIC ED 054 915)
- Miller, George A., Linguistic Communication: Perspectives for Research. Delaware: International Reading Association, 1973.
- Morency, Anne. "Auditory Modality--Research and Practice." Paper presented at the IRA Conference, Seattle, May 1967. (ERIC ED 014 383)
- Mottola, Richard Albert. "The Development of Auditory Discrimination Skills in Kindergarten Children." Ph.D. dissertation, University of Connecticut, 1970. (ERIC ED 057 047)

- Otto, Wayne; McMenemy, Richard A.; and Smith, Richard J. Corrective and Remedial Teaching. Boston: Houghton Mifflin Co., Inc., 1973.
- Pendergast, Raymond. "Pre-Reading Skills Developed in Montessori and Conventional Nursery Schools." The Elementary School Journal, Vol. XX (December, 1964), pp. 135-141.
- Poling, Dorothy L. "Auditory Deficiencies of Poor Readers." Clinical Studies in Reading II. Chicago: University Reading Clinics, 1953, pp. 107-111.
- Reynolds, Maynard Clinton. "A study of the Relationships Between Auditory Characteristics and Specific Silent Reading Abilities." Journal of Educational Research, Vol. LVI (February, 1953), pp. 439-449.
- Robinson, Helen M. "Visual and Auditory Modalities Related to Methods for Beginning Reading." Reading Research Quarterly, Vol. III, No. 8 (Fall, 1972), pp. 7-39.
- Rosner, Jerome. "The Development and Validation of an Individualized Perceptual Skills Curriculum." University of Pittsburgh, Learning Research and Development Center, 1972, pp. 1-113.
- _____. "Language Arts and Arithmetic and Specifically Related Perceptual Skills." American Educational Research Journal, Vol. X, No. 1 (Winter, 1973), pp. 59-68.
- _____. Perceptual Skills Curriculum: Introductory Guide. New York: Walker Educational Book Corporation, 1973.
- _____. Perceptual Skills Curriculum: Program II, Auditory-motor Skills. New York: Walker Educational Book Corporation, 1973.
- _____. "Auditory Analysis Training with Prereaders." The Reading Teacher, Vol. XXVII, No. 4 (1974), pp. 379-384.
- _____, and Simon, Dorothea P. "The Auditory Analysis Test: An Initial Report." Journal of Learning Disabilities, Vol. XXVII, No. 4 (January, 1974), pp. 379-384.
- Roswell, Florence and Natchez, Gladys. Reading Disability: Diagnosis and Treatment. New York: Basic Books, Inc., 1971.
- Samuels, S. Jay. "Research Design in Reading." The Reading Teacher, Vol. III, No. 2 (January, 1969), pp. 346-349.
- _____. "Success and Failure in Learning to Read: A Critique of the Research." Reading Research Quarterly, Vol. VIII, No. 2 (Winter, 1973), pp. 200-239.

- Samuels, S. Jay, and Dahl, Patricia R. "Relationships Among IQ, Learning Ability and Reading Achievement." Literacy for Diverse Learners. Edited by Jerry L. Johns. Delaware: I.R.A. 1973.
- Sellitz, Claire; Jakoda, Marie; Deutsch, Morton; and Cook, Stuart W. Research Methods in Social Relations. New York: Holt, Rinehart & Winston, 1959.
- Shankweiler, Donald, and Liberman, Isabelle Y. "Misreading: A Search for Causes." Language by Eye and by Ear. Edited by James F. Kavanagh and Ignatius T. Mattingly. Cambridge: The MIT Press, 1972.
- Silvaroli, Nicholas, and Wheelock, Warren H. "An Investigation of Auditory Discrimination Training for Beginning Readers." The Reading Teacher, Vol. XX, No. 3 (December, 1966) pp. 247-251.
- Smith, Nila Banton. "Strategies for Improving the Teaching of Decoding Skills." Paper presented at the I.R.A. Conference, Anaheim, California, May, 1970. (ERIC ED 043 468)
- Stone, John D., and Stone, Janis. "Note on Teaching Children to Hear Separate Sounds in Spoken Words." Journal of Educational Psychology, Vol. LVI (1965), pp. 13-15.
- Spache, George D. and Spache, Evelyn B. Reading in the Elementary School. Boston: Allyn and Bacon, Inc., 1973.
- Tansley, A. E. Reading and Remedial Reading. Atlantic Highlands, N.Y.: Humanities Press, 1967.
- Teniplin, Mildred C. "Phonic Knowledge and its Relation to the Spelling and Reading Achievement of Fourth Grade Pupils." Journal of Education Research, Vol. XLVII (1954), pp. 441-454.
- Tortelli, James P. The Reading Teacher, Vol. XXVIII, No. 2 (November, 1974), pp. 211-212.
- Webb, Eugene J.; Campbell, Donald T.; and Schwartz, Richard D. Unobtrusive Measures: Non-Reactive Research in the Social Sciences. Chicago: Rand McNally and Co., 1967.
- Weiner, Paul S. "Auditory Discrimination and Articulation." Journal of Speech and Hearing Disorders, Vol. XXII, No. 1 (February, 1967), pp. 19-28.
- Wepman, Joseph M. "Auditory Discrimination, Speech, and Reading." The Elementary School Journal, (March, 1960), pp. 325-333.

Wepman, Joseph M. "The Modality Concept." Perception and Reading, Vol. XII, Part 4. Edited by Helen K. Smith. Delaware: I.R.A., 1968.

_____, and Morency, Anne S. "School Achievement as Related to Speech and Perceptual Handicaps." Illinois: Chicago University, June, 1971. (ERIC ED 057 539)

Wheeler, L. R., and Wheeler, Viola D. "A Study of the Relationship of Auditory Discrimination to Silent Reading Abilities." Journal of Educational Research, Vol. XLVIII (1954), pp. 103-113.

Zigmond, Naomi. "Intrasensory and Intersensory Processes in Normal and Dyslexic Children." Unpublished Doctoral dissertation, Northwestern University, 1966.

APPENDIX A

Summary of Behavioral Objectives

	1	2	3	4	5	6	7	8	9
H						Given 2 spoken words and designated medial sound, identify word that contains sound.	Given spoken word with a 2-consonant blend, then word with 1 sound omitted, identify omitted sound.	Given spoken word, repeat, omitting one sound of a 2-consonant blend.	Given spoken word, substitute any sound with another designated sound.
G						Given 2 spoken words and designated consonant sound, indicate which word ends with sound.	Given spoken 1-syllable word, then word with final sound omitted, identify omitted sound.	Given spoken 1-syllable word, repeat, omitting final sound.	Given spoken 1-syllable word, substitute beginning or ending sound with another designated sound.
F						Given 2 spoken words and a designated sound, indicate which word begins with sound.	Given spoken 1-syllable word, then word with initial sound omitted, identify omitted sound.	Given spoken 1-syllable word, repeat word omitting initial sound.	
E				Given spoken 3- or 4-syllable word, say and clap simultaneously with each syllable.	Given spoken 3-syllable word, 'write' syllables with dashes and 'read' dash requested.	Given spoken 3-syllable word, indicate presence or absence of specified syllable.	Given spoken 3-syllable word, then 2 of the syllables, say which syllable was omitted.	Given spoken 3-syllable word, repeat word, omitting designated syllable.	
D				Given spoken pair of 2-syllable words, say and clap simultaneously with each syllable.	Given spoken phrase of 1- and 2-syllable words 'write' syllable with dash and 'read' dash requested.	Given spoken 2-syllable word, indicate presence or absence of specified syllable.	Given spoken 2-syllable word, then only one of the syllables, say omitted syllable.	Given spoken 2-word series, repeat, omitting 1 designated word.	
C				Given spoken phrase of 1-syllable words, say each word and clap simultaneously.	Given spoken phrase of 1-syllable words, 'write' each word with dash and 'read' dash requested.	Given spoken series of 1-syllable words, indicate presence or absence of specified word.	Given spoken series of 3 1-syllable words, then same series with 1 omitted, say omitted word.		
B	Given music, changing tempo, clap in synchrony.	Given long and short claps, draw dashes in synchrony.	Given long and short claps, reproduce pattern.	Given spoken numerals, clap once for each.	Given spoken numerals, draw a dash for each numeral.				
A	Given march music, clap in synchrony.	Given series of claps, draw a dash for each.	Given series of claps, reproduce pattern.						

APPENDIX B

Sample of Unit Test

AUDITORY-MOTOR--TEST

Level E

Unit 8

Objective: Given a spoken three-syllable word, restate the word omitting a designated syllable.

Materials: None

Criterion: Must pass all items

Testing Situation

The following may be used as alternative items if the test is not conclusive:

1. SAY D I F F E R E N T (pause). NOW SAY IT AGAIN BUT LEAVE OUT ENT.
(answer: differ)
2. SAY D I N O S A U R (pause). NOW SAY IT AGAIN BUT LEAVE OUT DI.
(answer: nosaur)
3. SAY A N Y W A Y (pause). NOW SAY IT AGAIN BUT LEAVE OUT WAY.
(answer: any)

Testing Demonstration

Say: SAY C A R P E N T E R (pause). NOW SAY IT AGAIN, BUT LEAVE OUT (or DON'T SAY) C A R (pause). NOW SAY C A R P E N T E R AGAIN, BUT LEAVE OUT (or DON'T SAY) T E R (pause).

Testing Directions

1. Say: SAY T U R P E N T I N E (pause). NOW SAY IT AGAIN, BUT LEAVE OUT (or DON'T SAY) T I N E (pause).
2. SAY V A C A T I O N (pause). NOW SAY IT AGAIN, BUT LEAVE OUT (or DON'T SAY) V A (pause).
3. SAY Y E S T E R D A Y (pause). NOW SAY IT AGAIN BUT LEAVE OUT (or DON'T SAY) D A Y (pause).

Answers: 1. turpen 2. cation 3. yester

APPENDIX C

Diagrammatic Chart of
Case Study I - Susan

UNIT	MASTERY	DIAGNOSIS	PROCEDURES	MASTERY	RE-DIAGNOSIS	PROCEDURES 2	MASTERY	RE-DIAGNOSIS 2	PROCEDURES 3	MASTERY	RE-DIAGNOSIS 3	PROCEDURES 4	MASTERY
E-4		Pupil finds 3-syllable words too difficult.	Place in E-4 (see below).										
E-4		Responses were correct but slow - pupil required a great deal of time for processing.	Start with smaller units by repeating exercise with 2-syllable words.		Difficulty in responding to 3 and 4-syllable tasks without repetition. Possible sound discrimination problem.	Pupil requires oral reinforcement at the 3 and 4-syllable level. Repeat each word clearly; have pupil repeat before saying and clapping. Test without reinforcement.							
E-5		Wrote "dashes" quickly but needed each word repeated before reading back a syllable. Poor discrimination and/or too much to recall.	After pupil produces "dashes" pronounce word; have pupil repeat word, as well as syllable to be read. Test without repetitions.										
E-6		1. Continues to demonstrate poor auditory recall. 2. Poor discrimination of /gr/ and /gl/.	1. Pupil requires her own auditory-motor feedback. Have her mouth, whisper, or repeat aloud stimulus word at least once. 2. Request pupil to give words beginning with /gr/ and /gl/. Then test with 2 and 3-syllable words beginning with these blends.		Difficulty in focusing on stimulus word when required to identify which phoneme of a consonant blend comes first.	Before introducing a word, say, "Listen carefully to the beginning." Then have pupil repeat stimulus word before identifying specified sound. Test without memory cue.							
E-7		Conscious of final sounds; but by the time 3-syllables have been stated in sequence, pupil forgets the beginning.	Practice with 2-syllable words requiring pupil to give back first syllable, then second.		Progress was noted in 2-syllable words. (Thus more challenging work required.)	Practise with 2-syllable words; gradually introduce 3-syllable words according to original criteria. Test							
E-8		Very slow responses-indicating a need for more reinforcement.	Pupil continues to require kinesthetic reinforcement (see E-6 above). Encourage her to pronounce words and syllables and to "feel the sounds in your mouth". Test without kinesthetic support.										
F-6		1. Confuses discrimination task (i.e. /th/ - /t/ in rhyming pairs (i.e. thank-tank). 2. Poor vowel discrimination, particularly short a, e, i. 3. Cannot hold word pairs in mind and concentrate on their differences.	1. Give words with /th/ and /t/ which do not rhyme. 2. Omit word beginning with vowels for the present. 3. Simplify procedures so that pupil has less to recall. Give memory cues (i.e. "Does it start with /m/?"). 4. Later make task more complex, closer to original test.		1. Confusion of sounds of /b/ and /d/. 2. Insecure about phoneme placement. (i.e. "Do 'steak', and 'pint' begin with /t/?") Pupil: "Yes." 3. Confusion of letter names g and j. 4. Difficulty in isolating a consonant paired with phoneme r (i.e. /dr/, /gr/).	1. Present each sound in complete isolation. 2. Present word with designate sound in initial position only. 3. Reinforce names and sounds of g and j. 4. Teach words beginning with phoneme r, then r-controlled blends.		1. Confusion of letter names and sounds of c and s. 2. Difficulty in dealing with consonant blends in initial position.	1. Reinforce letter names and sounds of s and c. 2. Omit consonant blends until single consonants are mastered. 3. Increase complexity of task: "What do you hear at the beginning of ___?" Thus prepare pupil for original criteria.		Difficulty in identifying initial sound in a blend. (Unable to separate the phonemes mentally, and/or cannot produce them separately.)	Sound the blend emphasizing each component; request pupil to do the same. Introduce cards with printed graphemes for the blends. Gradually dispense with support as above. Test without auditory and visual reinforcement.	
F-6	Vowel Sub-test	Confuses short a and short e because of poor discrimination. Imprecise in pronouncing these sounds in words.	Avoid word pairs containing minimal contrasts at first. Articulate stimulus word clearly; instruct pupil to repeat immediately to avoid interference.		Difficulty in isolating an initial vowel followed by a "continuing consonant" in multisyllable words.	Continue procedures avoiding minimal contrasts. Emphasize short vowel sound at beginning of multi-syllable words by repeating first syllable, having subject repeat, and then repeating in unison.		Confuses letter name a with sound of short a.	Teach and reinforce concept of letter names and sounds in general, then of letter a in particular.		Improvement demonstrated in discrimination of short vowels confirming pupil's continuing need for various forms of reinforcement.	Omit request for pupil repetitions of words and phonemes. Gradually decrease unison reciting. Continue modelling by clear enunciation, reducing investigator repetitions. Test without reinforcement.	
F-7													
F-8													
G-6													
G-7													
G-8													
G-9		Difficulty in segmenting a final phoneme and then substituting it.	Provide exercises with 2-syllable words requiring pupil to segment and substitute final syllable.		The task at the phoneme level appears too much to process. (Pupil dealt successfully with syllable tasks as recommended, but this did not transfer to phoneme analysis.)	Divide task into 4 sub-skills: "1. Say 'bate'. 2. What do you hear at the end? 3. Say it without /t/. 4. Now put /s/ at the end."		Success evidenced in 4-step task, but pupil is not yet ready for original test.	Divide task into 3 sub-skills. "1. Say 'bate'. 2. What do you hear at the end? 3. Instead of /t/ say /s/."		Success evidenced in 3-step task, but hesitancy in blending noted (i.e. said "ba (pause) g" rather than "bag").	More practice required. Test according to original criteria.	
H-6													
H-7		Difficulty in identifying individual phonemes in a consonant blend.	1. Present a card with several graphemes. State a word pair. Ask pupil to indicate the phoneme omitted in one of the words. 2. Present alphabet cards. Have pupil construct words, i.e. "stab", then "tab". Ask pupil what was omitted.		Spelling is very poor; pupil evidences insecurity in using graphemes.	Continue with alphabet cards Sound the word slowly; help pupil to construct word by supplying required letter cards.		Perception of consonant blends is weak. Demonstrated need for auditory support or multi-sensory reinforcement.	Eliminate letter cards. Provide auditory support by introducing word pairs and analyzing each sound. Sound out corresponding phonemes so pupil can compare and detect difference.		Only auditory support is insufficient. Demands of the task are too great for pupil's auditory abilities as evidenced in frustration.	Reintroduce alphabet cards. Avoid testing until clear indication of confidence is evident. (Meanwhile consideration is to be given to trying H-8 because some progress has been noted.)	
H-8		As in H-7, difficulty in omitting one consonant in a blend.	Use alphabet cards as in H-7, in reverse procedure, in		1. Success is evident when multi-sensory approach is used. 2. Evidence of continuing	1. Discontinue cards 2. Give full support and		The auditory modality is insufficient, for even with	Avoid testing until greater improvement noted without alphabet cards. Re-introduce cards				

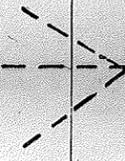
Syllables as sub-components of words

Initial phonemes

Final phonemes

Phonemes as sub-components in consonant blends

Mastery of consonants. (Vowel sub-test follows)



Syllables as sub-components of words	E-5	Wrote "dashes" quickly but needed each word repeated before reading back a syllable. Poor discrimination and/or too much to recall.	After pupil produces "dashes" pronounce word; have pupil repeat word, as well as syllable to be read. Test without repetitions.		Test before saying and clapping Test without reinforcement.															
	E-6	1. Continues to demonstrate poor auditory recall. 2. Poor discrimination of /gr/ and /gl/.	1. Pupil requires her own auditory-motor feedback. Have her mouth, whisper, or repeat aloud stimulus word at least once. 2. Request pupil to give words beginning with /gr/ and /gl/. Then test with 2 and 3-syllable words beginning with these blends.	Difficulty in focusing on stimulus word when required to identify which phoneme of a consonant blend comes first.	Before introducing a word, say, "Listen carefully to the beginning." Then have pupil repeat stimulus word before identifying specified sound. Test without memory cue.															
	E-7	Conscious of final sounds; but by the time 3-syllables have been stated in sequence, pupil forgets the beginning.	Practice with 2-syllable words requiring pupil to give back first syllable, then second.	Progress was noted in 2-syllable words. (Thus more challenging work required.)	Practise with 2-syllable words; gradually introduce 3-syllable words according to original criteria. Test															
	E-8	Very slow responses-indicating a need for more reinforcement.	Pupil continues to require kinesthetic reinforcement (see E-6 above). Encourage her to pronounce words and syllables and to "feel the sounds in your mouth". Test without kinesthetic support.																	
Initial phonemes	F-6	1. Confuses discrimination task (i.e. /th/ - /t/ in rhyming pairs (i.e. thank-tank). 2. Poor vowel discrimination, particularly short a, e, i. 3. Cannot hold word pairs in mind and concentrate on their differences.	1. Give words with /th/ and /t/ which do not rhyme. 2. Omit word beginning with vowels for the present. 3. Simplify procedures so that pupil has less to recall. Give memory cues (i.e. "Does it start with /m/?"). 4. Later make task more complex, closer to original test.	1. Confusion of sounds of /b/ and /d/. 2. Insecure about phoneme placement. (i.e. "Do 'steak', and 'pint' begin with /t/?" Pupil: "Yes." 3. Confusion of letter names g and j. 4. Difficulty in isolating a consonant paired with phoneme r (i.e. /dr/, /gr/).	1. Present each sound in complete isolation. 2. Present word with designate sound in initial position only. 3. Reinforce names and sounds of g and j. 4. Teach words beginning with phoneme r, then r-controlled blends.	1. Confusion of letter names and sounds of c and s. 2. Difficulty in dealing with consonant blends in initial position.	1. Reinforce letter names and sounds of s and c. 2. Omit consonant blends until single consonants are mastered. 3. Increase complexity of task: "What do you hear at the beginning of ___?" Thus prepare pupil for original criteria.	Difficulty in identifying initial sound in a blend. (Unable to separate the phonemes mentally, and/or cannot produce them separately.)	Sound the blend emphasizing each component; request pupil to do the same. Introduce cards with printed graphemes for the blends. Gradually dispense with support as above. Test without auditory and visual reinforcement.	Mastery of consonants. (Vowel sub-test follows)										
	F-6	Confuses short a and short e because of poor discrimination. Imprecise in pronouncing these sounds in words.	Avoid word pairs containing minimal contrasts at first. Articulate stimulus word clearly; instruct pupil to repeat immediately to avoid interference.	Difficulty in isolating an initial vowel followed by a "continuing consonant" in multisyllable words.	Continue procedures avoiding minimal contrasts. Emphasize short vowel sound at beginning of multi-syllable words by repeating first syllable, having subject repeat, and then repeating in unison.	Confuses letter name a with sound of short a.	Teach and reinforce concept of letter names and sounds in general, then of letter a in particular.	Improvement demonstrated in discrimination of short vowels confirming pupil's continuing need for various forms of reinforcement.	Omit request for pupil repetitions of words and phonemes. Gradually decrease unison reciting. Continue modelling by clear enunciation, reducing investigator repetitions. Test without reinforcement.											
	F-7																			
	F-8																			
Final phonemes	G-6																			
	G-7																			
	G-8																			
Medial phonemes	G-9	Difficulty in segmenting a final phoneme and then substituting it.	Provide exercises with 2-syllable words requiring pupil to segment and substitute final syllable.	The task at the phoneme level appears too much to process. (Pupil dealt successfully with syllable tasks as recommended, but this did not transfer to phoneme analysis.)	Divide task into 4 sub-skills: "1. Say 'bate'. 2. What do you hear at the end? 3. Say it without /t/. 4. Now put /s/ at the end."	Success evidenced in 4-step task, but pupil is not yet ready for original test.	Divide task into 3 sub-skills. "1. Say 'bate'. 2. What do you hear at the end? 3. Instead of /t/ say /s/."	Success evidenced in 3-step task, but hesitancy in blending noted (i.e. said "ba (pause) g" rather than "bag").	More practice required. Test according to original criteria.											
	H-6																			
	H-7	Difficulty in identifying individual phonemes in a consonant blend.	1. Present a card with several graphemes. State a word pair. Ask pupil to indicate the phoneme omitted in one of the words. 2. Present alphabet cards. Have pupil construct words, i.e. "stab", then "tab". Ask pupil what was omitted.	Spelling is very poor; pupil evidences insecurity in using graphemes.	Continue with alphabet cards Sound the word slowly; help pupil to construct word by supplying required letter cards.	Perception of consonant blends is weak. Demonstrated need for auditory support or multi-sensory reinforcement.	Eliminate letter cards. Provide auditory support by introducing word pairs and analyzing each sound. Sound out corresponding phonemes so pupil can compare and detect difference.	Only auditory support is insufficient. Demands of the task are too great for pupil's auditory abilities as evidenced in frustration.	Reintroduce alphabet cards. Avoid testing until clear indication of confidence is evident. (Meanwhile consideration is to be given to trying H-8 because some progress has been noted.)											
	H-8	As in H-7, difficulty in omitting one consonant in a blend without multi-sensory reinforcement.	Use alphabet cards as in H-7, in reverse procedure, in accordance with task requirements.	1. Success is evident when multi-sensory approach is used. 2. Evidence of continued need for auditory reinforcement.	1. Discontinue cards 2. Give full support and cues as in H-7 by contrasting word pairs sound by sound.	The auditory modality is insufficient, for even with auditory cues and reinforcement the task frustrated the pupil.	Avoid testing until greater improvement noted without alphabet cards. Re-introduce cards if progress is limited. (Because some improvement has been noted, consideration is to be given to trying H-9.)													
Final Position Phonemes as sub-components in consonant blends	H-9	Demonstrated ability to substitute one vowel or consonant sound for another. Difficulty persists in substituting one phoneme of a consonant blend. (See H-7 and H-8 for difficulty in omitting one consonant of a blend without multi-sensory reinforcement.)	Use alphabet cards as in H-7 and H-8, to see if pupil can substitute phoneme as required.	Evidenced inability to demonstrate perception of "separateness" of phonemes in a consonant blend.	Resume H-7 and H-8 with more deliberate steps, with multi-sensory reinforcement. Apply test criteria to conditions including multi-sensory support (alphabet cards).															

APPENDIX D

Diagrammatic Chart of

Case Study II - Anna

	UNIT	MASTERY	DIAGNOSIS	PROCEDURES	MASTERY	RE-DIAGNOSIS	PROCEDURES	MASTERY	RE-DIAGNOSIS	PROCEDURES	MASTERY	RE-DIAGNOSIS	PROCEDURES	MASTERY
Syllables as sub-components of words	E-5	1	1. Pupil cannot hold word in mind long enough to complete task. 2. Cannot coordinate writing and saying at the same time.	Pupil requires motor activity. Demonstrate a) clapping in rhythm to syllable pronunciation and request pupil to clap; b) saying and writing. Start with one then two-syllable words.		Identifies a word as the smallest verbal unit; has difficulty in reading back a syllable.	Apply unit task to 2-syllable words, emphasizing syllable break to facilitate awareness of auditory parts within words.		Mastered 2-syllable tasks, but still some difficulty in 3-syllable words.	Continue previous procedures with 3-syllable words emphasizing syllable divisions. Test.				
	E-6		1. Insecure in knowledge of syllable boundaries in "heard" words. 2. Divides words imprecisely in her own speech.	Pronounce words for pupil with definite breaks or pauses between syllables. Enunciate clearly. Test.										
	E-7		Uncertain of meaning of "left out" in reference to omitting word segments.	Test and teach concept: "What did we leave out?" Start with groups of objects, printed symbols, then spoken words.		Demonstrates a tendency to forget order of 3-syllable words.	Practice with 2-syllable words. Return to 3-syllable groupings, requiring pupil to clap as she pronounces. Test without clapping.							
	E-8		Pupil seems to "forget" whole word -- poor auditory sequential memory or poor receptive and expressive language.	Practice with 2-syllable words. Request pupil to listen closely, then repeat word immediately if it has been mispronounced. Test.										
Initial phonemes	F-6													
	F-7		Insecure in letter sound knowledge or overall concept of "sounds".	Explain about "sounds" made by whistling, tapping, etc. Demonstrate, request pupil to demonstrate. Relate this to concept that letters "make sounds". Illustrate.		Pupil demonstrates knowledge of letter sounds, however is reluctant or insecure in using such phonemes.	Remind pupil to "give the sound" whenever response is given in the form of letter name. Test.							
	F-8													
Final phonemes	G-6													
	G-7													
	G-8		Identifies a word as the smallest unit; becomes confused when required to state a word part. (i.e. say "rope" without /p/.)	Divide task into 5 sub-skills: 1. Which one ends with /p/, "rope" or "rode"? 2. What is the end sound in "rope"? 2. Say "row". What sound is missing? 5. Say rope without /p/.		Pupil dealt successfully with sub-divisions. (May be ready for combination of sub-skills.)	Continue with sub-skill approach but use larger divisions. Omit first 2 steps of previous procedures. (Start at sub-skill 3.) Test skill as a whole.							
	G-9		Difficulty in substituting and blending a final phoneme, although understanding of phoneme segmentation demonstrated.	Apply task requirements to syllables: pupil must substitute and blend one syllable in a multi-syllable word.		Difficulty in blending the syllable, and in ascertaining where to blend. (i.e. "Say book/mark. Change /mark/ to /case/." Pupil: "case/mark".	1. Clap hands to the syllables. 2. Recite words in unison (with syllable distinctness). 3. Remind the pupil to "think if we are changing the beginning or the end". Test without reinforcement.	Mastery at syllable level						
Re-test	G-9		Marked improvement, although still some difficulty in fusing final phoneme to word part.	Do not introduce final phoneme substitution until mastery of initial phonemes is demonstrated. Provide "advance" cue: "Think if we are changing the beginning or the end."		Confuses final phoneme substitution with initial phoneme substitution.	Simplify task by presenting word families: (i.e. "Say /rat/ Change /t/ to /g/. Now change /g/ to /m/, etc.) Test.							
Medial phonemes	H-6													
Phonemes as sub-components in consonant blends	H-7		Unfamiliar with specific blends (i.e. /st/), difficulty in determining which phoneme, /s/ or /t/ has been omitted.	Test with a variety of consonant blends to determine if problem is general or specific to certain consonant blends.		Difficulty in segmenting phonemes in any two-consonant blend.	Help pupil analyze each sound by comparing it with corresponding sound in word pairs so pupil can "hear" the difference.		The auditory modality is inadequate for this task, for even with auditory cues (analysis as in previous procedures) frustration is evident.	Request pupil to construct word with alphabet cards, then remove appropriate card after new word has been pronounced.		Pupil handled multi-sensory approach with ease. Auditory approach continues to be frustrating.	Re-introduce alphabet cards. Avoid testing until clear indication of confidence is evident. (Meanwhile some consideration is to be given in trying H-8 because some progress has been noted.	
	H-8		Demonstrated grasp that a consonant blend contains two components; however, as in H-7, difficulty in separating the components without multi-sensory reinforcement.	Help pupil to compare word pairs through sound-by-sound analysis, as in H-7.		Demonstrates inadequate auditory perception of consonant blends. (Sound-by-sound analysis proved helpful, but frustrating.)	Avoid testing until more improvement, less frustration noted. Reintroduce alphabet cards. (Because some progress has been noted, consideration is to be given to trying H-9.)							
	H-9		Demonstrated ability to substitute consonant sound in any position, but some difficulty with vowel substitution.	Problem exists because of blending difficulty. Demonstrate blending with consonant-vowel-consonant words. Provide ample practice.		Vowel substitution has been mastered. Difficulty persists in substituting one phoneme of a consonant blend. (See H-7, H-8 for difficulty in identifying one consonant of a blend without multi-sensory support.	Resume H-7 and H-8 with more deliberate steps with multi-sensory reinforcement. Apply test criteria to conditions including multi-sensory support of alphabet cards.							

