Jaffe, Lynne Ellen

READING SKILLS OF SEVERELY LANGUAGE-IMPAIRED CHILDREN

The University of Arizona PH.D. 1986

READING SKILLS OF SEVERELY LANGUAGE-IMPAIRED CHILDREN

by

Lynne Ellen Jaffe

A Dissertation Submitted to the Faculty of the

DEPARTMENT OF SPECIAL EDUCATION

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

1 9 8 6

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Lynne Ellen Jaffe

entitled READING SKILLS OF SEVERELY LANGUAGE-IMPAIRED CHILDREN

and recommend that it be accepted as fulfilling the dissertation requirement for the degree of Doctor of Philosophy.

William A. Dealey	Date 4/14/86
Lionel A. Koch	Date 4/14/86
Linda Lusk	Date 4/14/86
Candace S. Bos	Date 4/14/86
Anthony B. DeRose	Date 4-14-86

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Candace S. Bos Dissertation Director	Date 4/16/86

STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his/her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED: Lynne E. Jaffe

DEDICATION

To my grandfather, Dr. Morris Jaffe,

for his ideals, the values he lived,

and his belief in me

ACKNOWLEDGMENTS

This dissertation, and moreover, the knowledge I've acquired throughout my doctoral program, has been guided and shaped by the members of my doctoral committee. I am most grateful for their scholarship and the effort and interest each devoted to my research project. Dr. Candy Bos, my dissertation director, consistently provided me with valuable advice in the rather difficult area of interdisciplinary study and research. I am also very appreciative of the financial support she made available to me, the much needed time to complete this study, and her friendship. Dr. William Healey was unfailing in his personal and professional support, in his meticulous editing of both the content of this document and my writing style, and in his four year effort to teach me how to write. Through many hours of scholarly discussion and insightful questioning, Dr. Linda Swisher has taught me to see the many possible interpretations of a statement and to say and write only what I can defend. It was she who first suggested this study and her encouragement and belief in its importance has been invaluable. Through his teaching and recommendations of pertinent literature, Dr. Anthony De Feo has directly and indirectly provided me with much of my clinical understanding of school-age children with language disorders and their academic problems. Finally, Dr. Samuel Kirk has been a continual inspiration in considering the interdisciplinary nature of children's abilities and

disabilities and in contributing knowledge in the form of new research to the field of language-learning disabilities. Furthermore, he has consistently forced me to step outside the constraints of conservative ideas.

In addition to my doctoral committee, there are some others who have been vital to the completion of this project. Dr. Joseph Stevens, my patient statistical consultant, taught me a practical understanding of research design, statistical analysis, and interpretation through long hours of answering questions, offering advice, and helping me to resolve the many problems that arose. Dr. Richard Woodcock took a personal interest in this study, and in many instances helped me to resolve problems and consider alternate interpretations for some of my results. Kathy Haagenson and Holly Cluff, my research assistants, were unfailingly careful and accurate in their work, and somehow seemed to possess an inexhaustible supply of tolerance, good humor, and warm friendship. Kathy, especially, provided spur-of-the-moment help through the last draft. I am very grateful to them both.

My doctoral program would have been exceedingly more difficult, and perhaps impossible, without the constant support, help, encouragement, and love of my parents, Bernard and Edith Jaffe. My brother, Art, provided more help than he could know. And finally, I am deeply grateful to Brian Kelly for always, always, always understanding.

TABLE OF CONTENTS

TABLE OF CONTENTS--Continued

TABLE OF CONTENTS--Continued

LIST OF TABLES

ABSTRACT

The research literature has substantiated that many children diagnosed as having oral language impairments demonstrate reading problems at school-age. Few studies, however, have investigated the achievement of language-impaired children on individual reading skills, or the relationship between type of language deficit and type of reading disability. The purpose of this study was to investigate the performance of children with receptive language impairments (Receptives), children with expressive language impairments (Expressives), and children with no identified language or learning problems (Controls) on the reading skills of word attack, word recognition, vocabulary and comprehension.

The subjects, ages 10-0 to 12-11, were 29 children enrolled in self-contained, intermediate level classes for the severely language impaired (SLI), and 37 normal children, selected from 10 elementary schools. The SLI subjects were categorized as Receptives (n = 24) or Expressives (n = 5) based on their performance on the Test of Language Development-Intermediate (TOLD-I). Reading scores were obtained for four subtests of the Woodcock Reading Mastery Tests-Revised (WRMT-R): word attack, word identification, word comprehension, and passage comprehension, and for two subtests of the Iowa Tests of Basic Skills (ITBS): vocabulary and reading.

Results of univariate analyses demonstrated Controls performed significantly ($p < .05$) better on all of the reading subtests than did either of the language-impaired groups. No difference was found between the Receptives and the Expressives on any subtest, although these results may have been due to the small number of Expressive subjects.

Because no differences were found between the two language-impaired groups, they were combined to form a single group. Results of correlational analyses demonstrated correlations above .45 among all reading subtests for the Controls, indicating they measure similar abilities. For the SLI group, the subtests of the WRMT-R were highly correlated with each other ($r > .65$), indicating they also measure similar abilities. The WRMT-R subtests shared correlations of .27 to .49 with the ITBS subtests, indicating the two tests measure abilities that are moderately related. Apparently, for the SLI group, vocabulary and reading measure different abilities, in that they shared a correlation of .24.

The Control group demonstrated reading achievement near to above grade level on all subtests, whereas the SLI group scored at least 2.4 years below the Controls on all subtests. For each group, profiles of subtest performance were flat, indicating that neither group demonstrates particular reading strengths or weaknesses.

CHAPTER 1

INTRODUCTION

Statement of the Problem

Research has demonstrated that many children diagnosed in the preschool years as being language impaired continue to demonstrate language disorders into their school years (Aram, Ekelman, and Nation, 1984; Hall and Tomblin, 1978; Levi et al., 1982; McGrady, 1964; Strominger, 1983). On standardized reading tests, language-impaired children have more difficulty than age-peers in the standardization sample (Aram et al., 1984; Strominger, 1983) or controls (Hall and Tomblin, 1978; Levi et al., 1982; McGrady, 1964). As expected, research also has demonstrated that retention, tutoring, and special education are more common for these children than for non-handicapped children (Aram et al., 1984; McGrady, 1964; Strominger, 1983).

Language deficits may make it difficult for these children to benefit from traditional methods of classroom teaching which rely heavily on verbal explanations from the teacher and on class discussion. A factor that might compound this difficulty is the expectation that once children reach fourth grade, they will acquire a substantial amount of new information by reading the required texts. Reading has been called "secondary language," which relies heavily on oral language knowledge (Mattingly, 1972). Effective readers must be able to

associate the visual symbols in the text with their knowledge of oral language and cognitively construct meaning based on their current knowledge of the world. Thus, research findings that oral language impairments impede the development of efficient reading skills are not surprising. Little is known, however, about the effects of language impairments on particular reading skills or how different patterns of language impairment might affect reading achievement.

Research has supported the common clinical practice of classifying language-impaired children for remediation purposes by modality of language deficit--those having deficits in the reception and expression of language, and those having deficits in expression only (Aram and Nation, 1975; Wolfus, Moscovitch, and Kinsbourne, 1980). Wolfus et al. (1980) pointed out that adequate assessment of the language-impaired child must include assessment of strengths and weaknesses within each language modality to indicate the appropriate focus of treatment. (It is assumed that children with receptive impairments will also have expressive language difficulties. However, for the sake of brevity, the deficit will be termed "receptive"). It seems plausible that deficits in different language modalities would have different effects on children's reading skills. For instance, children with receptive deficits might have more difficulty with vocabulary and comprehension than with word attack or word recognition in silent as well as in oral reading, since the first two skills rely more heavily on language comprehension. Conversely, children with expressive deficits might have difficulty in oral reading only.

More in-depth investigation concerning the reading abilities of language-impaired children is important for several reasons. First, it could further the understanding of how children with specific oral language modality deficits read in comparison to each other and in comparison to children without such handicaps. Second, it could facilitate the planning of reading programs for these children that either emphasize remediation or circumvent those areas of reading difficulty. Third, it could provide support for diagnostically classifying language-impaired children by modality deficit. With the exception of one study (McGrady, 1964), the effects of specific modality deficits on reading have not been addressed.

Statement of Purpose

The purpose of this study was to investigate the influence of specific oral language modality deficits on a variety of reading skills. The study compared the performance among groups of children with receptive language impairments (Receptives), children with expressive language impairments (Expressives), and children with no identified language impairments or other learning handicaps (Controls), on the reading skills of word attack, word recognition, vocabulary, and comprehension, with performance IQ controlled.

Research Questions

The study was designed to answer the following research questions:

1. Does overall reading performance as measured by the Woodcock Reading Mastery Tests-Revised (WRMT-R) (Woodcock, in progress)

and the Iowa Tests of Basic Skills (ITBS) Hieronymus et al., 1983) differ significantly for the three groups (Receptives, Expressives, and Controls) when performance IQ (PIQ) as measured by the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974a) is controlled?

2. Do the three groups differ significantly from each other on the individual reading subtests of Word Attack (WA), Word Comprehension (PC) as measured by the WRMT-R, and on the reading subtests of Vocabulary (VOC) and Reading (RDG) as measured by the ITBS, when PIQ is controlled?
3. What is the relative contribution of each of the reading subtests to the difference among groups?
4. For each group, are there identificable correlational patterns among WA, WI, WC, PC, VOC, and RDG?
5. Comparing groups, are there differences in the correlational patternsof WA, WI, WC, PC, VOC, and RDG?

Significance of the Study

The educational and theoretical implications regarding the relationship between the nature of language deficits and the nature of reading disabilities are manifold. First, the prediction of reading difficulties can serve as a guide for early academic intervention in the developmental learning process. Once a child has been diagnosed

as language impaired, a variety of specialists may share responsibility for planning the educational program. Early warning regarding reading difficulties, and ideally, types of reading difficulties the child might face would then be of particular help to the learning disabilities specialist in designing an individualized reading program to offset these difficulties. Knowledge about which reading skills are particularly related to each language modality could provide direction in the formulation of appropriate remedial techniques.

Second, this information can assist the speech/language pathologist or school psychologist in counseling parents of a language-impaired child. Forewarning that the child may have difficulty in learning to read may help to alleviate the perplexity and frustration most parents feel when their child does not keep pace academically with peers. Additionally, professionals could facilitate a child's reading acquisition by providing parents with information about the particular reading skills that might cause the greatest difficulty and specific suggestions as to prereading activities. In general, knowledge concerning the effects of language impairments on reading abilities should lead to a more accurate prognosis for school achievement, appropriate educational planning, increased parental involvement in the child's academic program, and more informative parental counseling concerning realistic expectations for the child.

Third, information regarding the relationship between language deficits and reading disabilities may highlight the need for interdisciplinary training of specialists and for cooperation among specialists in assessing and providing academic training for language-impaired

children. The speech/language pathologist is well-prepared to assess and train the oral language areas of phonology, morphology, syntax, and semantics. However, many speech/language pathologists have little background in the reading process, the skill hierarchy of which it is comprised, and teaching techniques. Traditionally, this expertise has been the domain of the reading specialist, who may have little background regarding normal and disordered language development. Recently, the learning disability specialist has become the person primarily responsible for choosing or creating techniques for teaching academic skills that circumvent and compensate for deficient learning channels. Confounding these roles for all three disciplines is the increased awareness of metalinguistic skills as a link between oral language knowledge and reading ability (Mattingly, 1972; van Kleeck, 1984). The language-impaired child may need a reading program that will increase awareness of the language-reading connection, provide training in the reading skills that present the most difficulty, and insure consistent emphasis on reading for meaning. Reading training must parallel language strengths, and either circumvent or help to remediate language deficits. Obviously, an integrated reading program of this type requires the cooperative effort of the speech/language pathologist, the reading specialist, the learning disabilities specialist, and unless the child is in a self-contained class, the regular classroom teacher. One practical outcome of more advanced knowledge concerning the relationship between language deficits and reading disabilities could be interdisciplinary training as well as increased cooperation among school professionals.

Fourth, results demonstrating differences between children classified in this study as receptively impaired and children classified as expressively impaired in performance on particular reading skills could support the notion of modality-specific language deficits, as well as the usefulness of ascertaining which modality is deficient for the purpose of more effective academic prognosis and programming.

Assumptions and Limitations of the Study

Assumptions

Subject Selection. The decision to select language-impaired subjects from classes for the Severely Language Impaired (SLI) was an attempt to control for severity of language impairment as a confounding variable in the research design. This decision was based on the following assumptions:

1. Children placed by their respective school districts in SLI classes have a primary language impairment rather than a language impairment that is secondary to some other handicapping condition. Exclusionary criteria were established to reinforce the validity of this assumption.
2. Although these children were assessed and diagnosed by the criteria of different school districts, they were assumed to represent the same population. The children were not reassessed to confirm that they met similar criteria of language impairment. The exclusions governing sample selection

represent an attempt to establish homogeneity of the sample in regard to primary language impairment.

3. It has been established that language impairments have an influence on reading ability. It is assumed that lesser degrees of impairment have a lesser influence. This study investigated only the effects of severe language impairments.

Limitations

Effects of Deficits Other Than Language

Learning disabilities of the language-impaired subjects, other than primary language impairment, that might negatively influence reading ability, were not assessed or controlled in the research design.

Hearing acuity of the subjects was not assessed on the day of testing, allowing for the possibility of a temporary depression in hearing sensitivity. It was expected that individual test administration would reduce this possible interference.

Subject Selection

Language-impaired subjects were not randomly selected from the population defined. In an attempt to obtain groups of adequate size, it was necessary to include in the study every child who fit the criteria and who had parental permission. By the same token, school districts were self-selected in that only those who had intermediate level SLI classes were invited to participate in the study and all of those who accepted were included.

Based on the criteria for assignment to groups, the sample sizes for the Control, Receptive, and Expressive groups were 37, 24,

and 5, respectively. Eight language-impaired children were omitted from the study because they did not meet the criteria for assignment to either group. The small size of the Expressive group may have decreased the power of the statistical tests and resulted in a Type II error (accepting the null hypothesis when it is false).

Subject Assignment to Groups

SLI subjects were assigned to the Receptive or Expressive group based on their performance and that of the Controls on the Test of Language Development-Intermediate (TOLD-I) (Hammill and Newcomer, 1982). This test is one of the few language tests that reports adequate standardization and reliability and that provides for a distinction between language comprehension and expression. However, validation for this purpose has not been reported.

Instrumentation

The WRMT-R was chosen as the best individualized reading test available for the combined qualities of standardization, reliability, and validity (see Chapter 3, Instrumentation and Appendix A). However, each item requires a one-word response from the subject that could have negatively affected the performance of children with severe word retrieval problems.

The Controls were tested on the ITBS in Spring 1985 and the language-impaired subjects in Fall 1985. The amount of time intervening included the last month of school, summer vacation, and the first month of the next school year. Although the language-impaired subjects had the advantage of two extra months of teaching before they

took the ITBS, reading disabled children often lose some measured reading achievement over the summer. It is expected that the possible gain in reading skill from the extra months of school was offset by the possible loss in reading skill over the summer, so that comparability of the scores of the language-impaired subjects and the Controls was not significantly affected.

The Controls were tested on the Performance Scale of the WISC-R (PIQ) by the investigator and research assistants within a six week period during data collection for this study; however, new PIQ test results were not obtained for the language-impaired subjects. Many of these subjects had been tested recently on the WISC-R and a second administration might have resulted in inflated scores due to practice effect (Wechsler, 1974b). Additionally, school districts were reluctant to have these children retested on the WISC-R for research purposes, as this test is part of the special education reevaluation process. Consequently, the PIQ scores for the language-impaired subjects were taken from their files. These tests had been conducted by a variety of school psychologists from two weeks to three years prior to this study.

Consequently, the TOLD-I and WRMT-R were the only tests that were administered to the entire sample within the same time frame, October through mid-December, 1985.

Examiner Bias

The necessity of using identical test administration procedures with all subjects, and the possibility of test effect if a test is given twice, made it impracticable to establish inter-examiner

reliability. Careful training, as well as procedures to insure inter-scorer reliability were established to compensate for this limitation.

To conduct this study with the least amount of disruption to the participating schools, and because of child safety procedures, it was necessary for the examiners to call for each subject at the classroom and walk the subject back after testing. Consequently, the examiners were aware of the subjects' educational placement. The use of standardized test administration should help to compensate for possible examiner bias.

Generalizability of Findings

Findings of this study are generalizable only to children placed in intermediate level classes for the severely language impaired. Appendix B presents the criteria of the seven school districts participating in the study for placement of a child in a class for the severely language impaired.

Definition of Terms

Language impairment: A deficit in the comprehension or expression of one or more aspects of language (i.e., phonology, morphology, syntax, semantics, pragmatics).

Phonology: The sound units of a language and rules for their combination.

Morphology: The smallest units of language that carry meaning and the rules for their usage.

Syntax: Word order and the rules for the ordering of words.

Semantics: The meaning or message that is carried by language (e.g., word meaning, sentence meaning).

Pragmatics: The appropriate use of semantics, syntax, and suprasegmentals according to the speaker's social situation, environmental context, communicative intent, and audience.

Metalinguistics: The ability to recognize language as an object that one can reflect on, discuss, analyze, and manipulate. Metalinguistic skill requires the awareness that language is an arbitrary, convention code, that it is a system of elements and rules for the combination of those elements, and that it is used for communication (van Kleeck, 1984). These awarenesses are necessary, at least on a subconscious level, for one to understand that the visual symbol system that comprises printed text is related to the sound system of our language--that reading is language.

Oral language: Spoken language, as distinguished from written language, and manifested through either modality, comprehension or expression. Also termed "primary language activity" (Mattingly, 1972).

Word attack: The ability to decode unfamiliar printed words based on a knowledge of phonics, structural analysis, and/or syllabication.

Word recognition: The ability to correctly pronounce a printed word, whether familiar or unfamiliar, with little or no hesitation, and with minimal use of phonics, structural analysis, or syllabication skills.

Reading vocabulary: Knowledge of the meaning of a printed word.

Reading comprehension: The ability to obtain meaning from printed discourse.

Severe language impaired (SLI) class: A self-contained class for children whose deficits in the comprehension and/or expression of language is so severe that they cannot adequately benefit from instruction in the regular classroom with only resource help.

Receptives: Children who have deficits in the comprehension of language. For the purposes of this study, Receptives were defined as children placed in an SLI class whose listening quotient on the TOLD-I was below 81, the cut-off point for the lowest 10% of the Control group. It was expected that all children with receptive language deficits also have expressive deficits; however, expressive impairment was not a defining feature of this group.

Expressives: Children who have deficits in the expression of language that are not caused solely by a problem in speech, and whose comprehension of language is within or above the normal range. For the purposes of this study, Expressives were defined as children placed in an SLI class whose listening quotient (LQ) on the TOLD-I was at or above the cut-off used for Receptives, whose speaking quotient (SQ) was below 69 (the cut-off point for the lowest 10% of the Control group), and whose SQ's were at least 21 points below their LQ's. A discrepancy of practical significance was considered to be more meaningful in this context than a discrepancy of statistical significance (which was considerably smaller). Consequently, the discrepancy cut-off was taken from the widest discrepancy (LQ > SQ) demonstrated by less than 10% of the Control group.

CHAPTER 2

REVIEW OF THE LITERATURE

Scholars have theorized about the relationships between oral language and reading skills; however, few empirical studies have investigated the influence of language impairments on reading achievement. Findings of studies addressing this question indicate that language-impaired children demonstrate reading disabilities and, as a consequence, have needs that require specialized educational instruction. The first part of this chapter briefly summarizes three areas of literature with which this study is concerned: (a) theories of oral language and language impairments, (b) theories of reading, and (c) relationships between oral language impairments and reading disabilities. The major part of this chapter reviews the research literature on reading skills and special educational needs of language-impaired children.

For the purposes of this review, the following definition of primary language impairment is used. Children with primary language impairments have deficits in the comprehension and/or expression of one or more components of oral language (i.e., phonology, morphology, syntax, semantics, pragmatics). These deficits are not considered to be primarily due to native language differences, subnormal intelligence, sensory impairments, serious emotional disorders, gross

neurological abnormalities, or other handicapping conditions. This definition conforms to the definition of childhood aphasia stated in the proceedings of the Institute on Childhood Aphasia (1962) and is generally accepted by the school districts that participated in this study (see Appendix B).

Theoretical Background: Language and Reading

Oral Language and Language Impairments

At least one theory characterizes language as "a code whereby ideas about the world are represented through a conventional system of arbitrary signals for communication" (Bloom and Lahey, 1978, p. 4).

Language theorists and researchers generally agree that language may be described in terms of three major components: content, including semantics and lexical relations; form, including phonology, morphology, and syntax; and use, or pragmatics (American Speech and Hearing Association, 1982a, Bloom and Lahey, 1978; Johnston, 1982; Simon, 1985). These components are manifested through the language modalities of comprehension (reception) and expression (production), that "represent mutually dependent but different underlying processes, with a resulting shifting of influence between them in the course of language development" (Bloom and Lahey, 1978, p. 238). Rees (1974, p. 256) has stated that "the language user possesses a well-established set of rules for comprehending and producing language as well as a set of strategies for applying these rules." Generally, young children can comprehend more vocabulary and more complex syntactic forms than

they can produce, but the gap between comprehension and expression varies with the individual child and his/her level of development (Bloom and Lahey, 1978; Swisher, 1985).

Concomitant with the idea that comprehension and expression are interdependent but separate is the view that a language impairment may be manifested in one or both modalities, and more specifically, in one or more of the components of language within a modality (American Speech and Hearing Association, 1982b; Bloom and Lahey, 1978; Johnson and Myklebust, 1967). For example, a child may evidence a deficit in morphology and syntax when speaking, but demonstrate adequate comprehension of the same forms. Research has confirmed that language-impaired children do evidence patterns of language deficits and that these may be manifested as distinctly different performances in tasks of comprehension and/or expression as well as in phonology, syntax, and semantics (Aram and Nation, 1975; Wolfus, Moskovitch, and Kinsbourne, 1980). Wolfus et al. (1980, p. 168) concluded that "the ability to apply appropriate rules for extracting meaning from verbal input does not guarantee the ability to use these rules in production." With few exceptions, however, it is expected that a deficit in comprehension of a language component will also be demonstrated in the expression of that component (Johnson and Myklebust, 1967; Wood, 1982).

Reading

Oral language skills have been described as the primary language system, written language skills as the secondary language system (Mattingly, 1972; Wallach and Goldsmith, 1977). Across language

systems, the receptive modality comprises listening and reading, and the expressive modality, speaking and writing (Goodman, 1985; Wallach and Goldsmith, 1977).

Harris and Sipay (1980, p. 9) have defined reading as "the act of responding with appropriate meaning to printed or written verbal symbols." To learn to read, children must develop the skill of word recognition, master complex forms of language, increase their vocabulary and world knowledge, comprehend textual material, and reflect on and evaluate what they have read.

Although theorists in reading, language, and psycholinguistics have developed many models of the reading process, all include primary language knowledge as an integral component, albeit with varying degrees of importance. Many of these models have been classified as bottom-up, top-down, or interactive (Stanovich, 1980), depending on the amount of emphasis placed on perception of textual data, language knowledge, and experience and world knowledge. Gough (1972), in a bottom-up model, has described reading as a set of operations that moves linearly from lower to higher cognitive processes. The reader's sensory and perceptual processes receive and interpret textual data. Through a complex process of phonological abstraction, each word stimulates access, serially, to the reader's internal lexicon. More simply, meaning is "mapped on" to each word. The resulting information is stored in memory, while the processes of abstraction and mapping continue, until the reading task is completed. In this view, accurate perception of letters and words is of primary importance, and it is assumed that the reader has an adequate lexicon available.

Goodman's (1985) transactional-psycholinguistic model of reading can be characterized as top-down. Meaning is not inherent in the text, but is actively constructed by the reader from his/her own experience and world knowledge. Textual data are used only as needed as clues to feed the reader's processes of inference and prediction. "Readers use the least amount of available text information necessary in relation to the reader's existing linguistic and conceptual schemata to get to meaning" (Goodman, 1985, p. 827). In the top-down view of reading, primary language knowledge and world experience are the foundation of the reading process.

In Rumelhart's (1985) interactive model of reading, there is a dynamic balance between reader and textual data. The reader has at his/her disposal a number of "knowledge sources," each one carrying specialized information required in the reading process (e.g., actual input, perceptual features, letters, syntax, and semantics). Each knowledge source continuously scans hypotheses from other knowledge sources about the nature of the incoming information while it simultaneously scans for information corresponding to its own specialty. The sources are "parallel interacting processes" helping to confirm or change hypotheses from other sources until hypotheses on all levels concur. In the interactive model of reading, perception of textual data, language, and world knowledge share changing but equal importance.

Lerner (1972) has developed a global system model for integrating what she has termed the four dimensions of reading, with each dimension subsumed under the next. The first dimension encompasses prerequisites, or readiness factors, which include physical, visual,

auditory, intellectual, social, and emotional factors. Lerner (1972, p. 40) added, "While oral language development is usually mentioned along with other readiness factors, its importance until recently has been largely unrecognized." The second dimension is comprised of specific reading competencies, such as word recognition, phonics, structural analysis, reading comprehension, and a variety of study skills. The internal process a child goes through in learning to read, and the process by which the child is taught, including methods and materials, are the third and fourth dimensions.

From these models, it is apparent that theorists generally agree that primary language knowledge is an integral component of the reading process. However, another aspect of language knowledge must be taken into account. Mattingly (1972) has described two levels of primary language. These are primary linguistic activity and primary linguistic awareness. Primary linguistic activity has also been termed "oral language," the knowledge of the rules of language and the application of these rules in receptive and expressive language behavior. Primary linguistic awareness, more recently termed "metalinguistics" (van Kleeck, 1984; Wren, 1983), is the ability to think about language as if it were an extrinsic process. For example, to learn phonics, a child must be able to consider a word as an object and analyze it as a sequence of sounds. This is a very different skill from the ability to use the same word to communicate an idea, which is normally acquired as part of the maturational process. Thus, Mattingly concluded that reading is not an activity parallel to language, nor is it analogous to listening. It is an activity based in

primary linguistic activity, but requiring the use of linguistic awareness.

Thus, theorists in the areas of reading and language would seem to agree with Harris and Sipay's (1980, p. 10) description of reading as:

> a complex process in which the recognition and comprehension of written symbols are influenced by readers' perceptual skills, decoding skills, experiences, language backgrounds, mind sets, and reasoning abilities as they anticipate meaning on the basis of what has been read. The total process is a Gestalt, or whole; a serious flaw in any major function or part may prevent adequate performance.

Lerner (1972, p. 41) emphasized oral language as a prerequisite for reading in her statement that:

> recent work in linguistics, language pathology, psycholinguistics, and reading underscore the importance of adequate language development as an essential ingredient for successful reading. Concomitantly, there is a growing appreciation of the intimate relationship that exists between deficits in language development and reading disorders.

Oral Language Impairments and Reading Disabilities

Based on models of the reading process and the comments of Harris and Sipay (1980) and Lerner (1972), one would expect that a deficit in oral language would have an adverse effect on reading achievement. Many language theorists and practitioners have delineated specific reading problems that would be expected to occur depending on the particular language modality (and components within that modality) that is deficient. If reading is receptive language, one would expect that only a deficit in comprehension of spoken language would cause a reading disability, whereas an expressive

deficit would have a less serious effect or no effect at all. There does appear to be general agreement that deficits in comprehension of spoken language will be reflected in particular reading skills (Johnson and Myklebust, 1967; Menyuk, 1984; Menyuk and Flood, 1981; Noell, 1983; Wallach, 1982; Wallach and Goldsmith, 1977; Wood, 1982). It has been posited that a child with an unspecified comprehension deficit would have difficulty abstracting meaning from text, but that he/she might be able to develop some proficiency in decoding and word recognition (Johnson and Myklebust, 1967; Noell, 1983; Wallach and Goldsmith, 1977). If the deficit affects phonological comprehension, however, one would expect the child to have difficulty with phoneme-grapheme correspondence, resulting in mispronunciations and word substitutions (Menyuk and Flood, 1981; Noell, 1983). Difficulty with lexical access and retrieval might hamper vocabulary comprehension, and a deficiency in comprehension of the rules of syntax would be expected to cause difficulty in understanding semantic-syntactic relations within sentences and between sentences (Menyuk and Flood, 1981; Snyder, 1980). Difficulty with storing and integrating meaning at the level of discourse would impede comprehension of stories and reading passages (Menyuk, 1984; Menyuk and Flood, 1981; Snyder, 1980). These reading disabilities would be expected to increase as the child gets older and the written material presented becomes more complex, presumably in vocabulary, syntax, and concept load (Menyuk and Flood, 1981).

Less agreement exists concerning the effect of oral expressive deficits on reading ability. Johnson and Myklebust (1967) and Noell

(1983) have stated that difficulty with word retrieval might result in word substitutions or the inability to say the target word in oral reading, although silent reading will be unaffected. They disagree on the effect of syntax and oral formulation deficits. Johnson and Myklebust (1967) stated that these deficits are not likely to affect oral or silent reading due to the visual clues provided by the text. Noell (1983) has posited that syntax deficits will impede fluency in oral and silent reading decoding and/or comprehension because of the difficulty the reader will have in predicting upcoming words. If the underlying problem in oral formulation is difficulty in organizing and integrating ideas, the child might have difficulty in reading comprehension as well as in answering open-ended comprehension questions based on the reading material.

Thus, reading theorists and practitioners have been quite specific in hypothesizing that deficits in oral language skills are highly likely to interfere with a child's ability to develop efficient reading skills. Language theorists and practitioners have generally restricted their concern about the development of reading skills to the area of receptive language disorders, although a few have posited a relationship between expressive language deficits and reading problems. Consequently, it appears that assessment of the modality of language deficit could be an important step in discerning the underlying factors in a child's reading disability. Based on the results of their study on patterns of deficits in language-impaired children, Wolfus et al. (1980, p. 168) concluded

> With respect to assessment, unless both comprehension and production are adequately tested, diagnostic procedures cannot be considered complete. Results . . . would indicate whether treatment should focus on the comprehension or production of language . . . . In future investigations of developmental language impairment, subjects should be documented so as to clarify whether one or both subtypes . . . have been included.

Review of Research: Reading Achievement of Language-Impaired Children

This review concerns the body of research literature which supports the hypothesis that children classified as language impaired demonstrate reading disabilities. Most of the studies have considered language impairments as global, rather than controlling for modality of deficit or deficiencies in specific language components. Also, few studies have used measures of reading achievement that are representative of the integrated and multifaceted nature of the reading process.

For the purpose of this review, studies investigating the effect of language impairment on children's reading achievement have been categorized into two groups, based on the type of sample used. The first group is comprised of controlled studies concerning children whose language impairments correspond to the definition of primary language impairment previously described. The second group is comprised of descriptive studies which include children whose language impairment may be secondary to or associated with some other handicapping condition. The review of controlled studies has been subdivided into: (a) studies that did not differentiate between modality of language impairment and that either did not define the type of reading skill measured, or measured decoding only; (b) a study that

attempted to control for modality of language deficit and that used a composite measure of reading skills; and (c) a study that assessed modality of language deficit as well as a variety of reading skills.

Controlled Studies

Language Impairment and Undifferentiated Reading Ability. The cross-sectional research study reported by Levi et al. (1982) attempted to verify the hypothesis that not only do language impairments correlate with reading disabilities, but that the severity of language disorder affects the severity and type of reading disability. The subjects were 32 children, tested at the end of first grade, with a mean age of 6-11, who had demonstrated language problems between the ages of 3 and 4. They were grouped as having phonological delays only or both phonological and semantic/syntactic delays. The authors considered the difference between phonological and semantic/syntactic delays one of severity.

Academic data came from a "sentence reading/writing test, standardized for detecting reading disabilities at school age" (Levi et al., 1982, p. 1120), that assessed skill levels for letters, syllables, words and sentences. Subjects with only phonological delays were found to perform significantly better than the group with additional semantic/syntactic delays, specifically at the word and sentence levels. When the entire sample was divided into good readers and poor readers, good readers were characterized by an absence of semantic/syntactic problems and poor readers by inclusion of almost all of the subjects with semantic/syntactic problems.

Specific information concerning the reading/writing measure was limited. It was not reported if reading was oral or silent, or if it was measured by word recognition or comprehension. This information would have provided clues regarding the relationship between severity of language impairment and levels of reading skills. Also, the authors did not distinguish between subjects' reading and writing performance. Nevertheless, the information presented supports other research findings (Hall and Tomblin, 1978; McGrady, 1964) that language-impaired children are at higher risk for reading problems than are normal children and suggests that severity of language impairment is reflected in the type and severity of reading disability.

To obtain information regarding the academic abilities, vocational status, and communicative skills of speech- and language-impaired children as adults, Hall and Tomblin (1978) conducted a retrospective follow-up study 13 to 20 years after their subjects were assessed at the University of Iowa Speech and Hearing Clinic. Follow-up data were obtained from a parent questionnaire, the Iowa Tests of Basic Skills (ITBS) (Lindquist and Hieronymus, 1956), and the Iowa Tests of Educational Development (ITED) (Lindquist and Feldt, 1972). Most of the subjects had taken the two tests while they were in school.

Eighteen subjects were included in each of two groups, language impaired (LI) and articulation impaired (AI), based on information taken from clinical records. The investigators surmised that the academic scores of a clinic sample might not reflect those of a more representative, and less advantaged, population of children. Consequently, the AI group, rather than a test norm sample, served as the

control. For purposes of analysis, Hall and Tomblin (1978) computed a composite reading score from two reading subtest scores. Test results, based on data from grades 3 through 8, indicated that although reading and math were found to be the most significant contributors to the academic difference between the LI and the AI groups, reading was consistently the area of greatest deficiency. In reading, the AI group scored from 1/2 to 3/4 of a standard deviation above the norm mean and the LI group scored approximately 1/2 of a standard deviation below. This difference was significant at all levels except grade 3. As the investigators had surmised, the reading performance of both groups was unexpectedly high, although the scores of the LI group were significantly lower than those of the AI group. Hall and Tomblin (1978, p. 238) concluded that "the LI children showed a definite and persistent limitation in achievement in the areas of reading accompanied by equally persistent but less profound restriction in the other academic areas."

Considering that retrospective studies are not designed prior to the initial assessments, this study was carefully controlled for hearing acuity, age, sex, socioeconomic status, and receipt of therapy. If data had been analyzed for the two reading subtests separately, results might have yielded more information as to the correlation between language disorder and specific reading skills. Nevertheless, language-impaired subjects were again shown to have experienced significant difficulties in reading throughout school, except in third grade, when "reading materials are [still] carefully controlled and do not seriously challenge the language knowledge acquired by

children at ages five through seven or eight" (Menyuk, 1984, p. 156).

One of the limitations of retrospective studies is the dependence on early and often inconsistent clinical records for information regarding intelligence and language abilities. Embarking on a longitudinal study, Aram, Ekelman, and Nation (1984) administered a consistent battery of intelligence and language tests to a group of 47 preschool children previously diagnosed as language impaired and who were receiving therapy at the Cleveland Hearing and Speech Center. Ten years later they administered another battery of tests of intelligence, language performance, academics, and social adjustment to 20 of these children in an attempt to determine, among other factors, preschool predictors of performance on these tests.

In the preschool stage of the study, the Leiter International Performance Scale (Leiter) (Arthur, 1952) was used to assess subjects' intelligence. Seven children with scores below 85 were included in the study because data were insufficient to establish the stability of intelligence measures over time, or to establish a dependable correlation between the Leiter and other IQ measures on language-impaired children (Aram et al., 1984). Subsequently, the authors found that using a cut-off of 85 on the Leiter during the preschool assessment would have included one child who later scored below 85 on the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974a) and would have excluded three children who later scored above 85 on at least one scale of the WISC-R. Results were reported both including and excluding children who were classified as mentally retarded. Only

findings excluding the children classified as mentally retarded are summarized here.

Follow-up measures of language were: Test of Adolescent Language (TOAL) (Hammill et al., 1980) as the primary measure; Peabody Picture Vocabulary Test (PPVT) (Dunn, 1965); Goldman-Fristoe-Woodcock Selective Attention Test (GFW) (Goldman, Fristoe, and Woodcock, 1974); and diadochokinetic rates. The Wide Range Achievement Test (WRAT) (Jastak and Jastak, 1978) provided a measure of reading decoding, spelling, and math calculations.

Findings of this study covered subjects' performances on the follow-up measures, and the best preschool predictors of subsequent intellectual performance, language abilities, educational placement, and academic skills. The TOAL yields an overall score, the Adolescent Language Quotient (ALQ), on skills including listening, speaking, reading and writing. On the ALQ, all subjects showed moderate to severe language deficits. Ninety-four percent of the subjects scored at least 2 standard deviations below the mean on receptive syntax and 31% scored at least that low on the speaking and writing subtests. Regarding the TOAL, the authors noted that although many of the subjects had normal intelligence and were functioning adequately in regular class placements, 18 of the 20 performed exceptionally low on overall language skills, indicating that the TOAL may be "an excessively difficult language measure" (Aram et al., 1984, p. 242).

Consistent with findings of previous studies (Hall and Tomblin, 1978; Levi et al., 1982; McGrady, 1964; Strominger, 1983), these language-impaired subjects showed difficulty in reading. On the WRAT,

50% scored at or below the 25%ile. Aram et al. (1984) cautioned, however, that the WRAT measures only reading decoding ability, and not comprehension. "Thus, the measures obtained are restricted to very limited aspects of the achievement areas and provide only superficial measurement of . . . performance" (Aram et al., 1984, p. 242). A stepwise multiple regression analysis, conducted to identify significant preschool correlates of later performance on measures of intelligence (WISC-R), overall language skills (TOAL:ALQ), reading (WRAT), and class placement, showed the Leiter to be the more powerful predictor in all cases; in one case, however, the expressive subtest of the Northwest Syntax Screening Test (Lee, 1969) reached significance. Correlations between measures of the abilities listed above and significant predictors were as follows: (a) intelligence--WISC-R full scale/Leiter, $r = .637$ ($p < .001$); (b) language--TOAL:ALQ/Leiter, $r = .493$ ($p < .001$), TOAL:ALQ/NSST:Expressive, $r = 1.21$ ($p < .05$), (c) reading--WRAT Reading/Leiter, $r = .480$ ($p < .01$); (d) class placement--class placement/Leiter, $r = .656$ ($p < .01$).

Aram et al. (1984) have made an important contribution with their longitudinal study of the effects of language impairments on subsequent academic skills. It is the only study that reported a consistent battery of preschool tests across all subjects. Given the careful design of this study, a standardized reading measure that would have provided scores on a variety of reading skills (e.g., word attack, word identification, word comprehension, and passage comprehension) would have yielded more extensive information about the effect of primary language impairments on secondary language skills.

In the studies reviewed above, although subjects were assessed on a variety of language skills, it was not the intention of the investigators to control for modality of language deficit. Of the studies located, only those by McGrady (1964) and Strominger (1983) attempted to do so.

Studies of Language Impairment by Modality. Strominger (1983) conducted a retrospective study in which she selected subjects who had been seen before age 5 in a hearing and speech clinic in an urban medical center, and who demonstrated expressive delays with evidence of normal base for receptive language, based on scores from the Peabody Picture Vocabulary Test (Dunn, 1965). Subjects' ages at follow-up ranged from 9 through 12, and at that time some children did show receptive, as well as expressive, language deficits.

At follow-up, the children were given thorough psychological and language evaluations and were tested in reading, spelling, and written expression. Follow-up measures included: (a) intelligence--Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974a); (b) language--Peabody Picture Vocabulary Test (PPVT) (Dunn, 1965); Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, McCarthy, and Kirk (1968); Spencer Memory for Sentences (Spencer, 1958); Token Test (Noll, 1970; DeRenzi and Vignolo, 1962); Boston Naming Test (Kaplan, Goodglass, and Weintraub, 1976); Developmental Articulation Test (Hejna, 1955); examinations of oral diadochokinesis and peripheral speech mechanisms; and Mean Oral Language Age (MOLA), "an average of the age equivalent performances on the oral language measures"

(Strominger, 1983, p. 55); (c) reading--Gray Oral Reading Test (Gray, 1967); (d) spelling--spelling subtest of the Wide Range Achievement Test (Jastak and Jastak, 1965); and (e) writing--Myklebust Picture Story Language Test (Myklebust, 1965). Only results of the language and reading measures are discussed here.

Through patterns of performance on the language measures, subjects were classified as belonging to one of five categories of language impairment. The categories included disturbances in comprehension, syntax, naming, repetition, and phonemic memory/sequencing. They were ranked by severity, ranging from a combination of symptoms to disturbances less severe in number and type, such as dysnomia or a repetition disorder only. Strominger's was the only study located that investigated language and reading performance by gender of subjects. Of the 38 subjects (29 boys and 9 girls) 58% were in the most severe language disorder group. This represented 89% of the girls and 48% of the boys. Although the numbers were too small to show statistical significance, a larger percentage of girls than boys had severe language problems. Except on the PPVT, the average scores of the entire sample on all language measures were below age norms. The mean scores on the PPVT, however, for the sample as a whole and for the boys (but not for the girls) were within the age-expected range.

Reading scores were reported for the sample as a whole and compared by gender. Comparison of mean reading age (derived from the test norms) with mean chronological age for the sample resulted in an average reading discrepancy of 23 months--22 months for the boys and 41 months for the girls. Sixteen percent of the sample scored at or

above grade level in reading, 53% were at least one year below, and 29% at least 2 years below. Reading scores for the sample ranged from first to eighth grade levels, but no significant correlation was found between reading level and chronological age.

Correlational analyses were used to ascertain relationships between scores on the Gray Oral Reading Test and performance on both preschool and follow-up language measures. None of the preschool measures was significantly correlated with reading; however, correlations were significant ($p < .05$) between reading and certain follow-up measures: PPVT ($r = .362$); ITPA/Auditory Sequential Memory ($r = .333$); Spencer Memory for Sentences ($r = .387$); and Boston Naming Test ($r = .368$). When scores for boys and girls were separated in the analysis, only the boys demonstrated significant correlations between reading performance and some of the follow-up language measures. Entered into a stepwise multiple regression, for the whole group, only two follow-up language measures served as significant predictors of reading scores--Spencer Memory for Sentences and the Boston Naming Test. Gender was not a significant predictor.

Strominger's (1983) study is distinctive in a number of ways. It is one of only two studies that have attempted to control for modality of language deficit (by exclusion of children with receptive deficits), although at school-age many of the subjects demonstrated deficits in both modalities. Also, it is the only retrospective study to classify children at time of follow-up by type or severity of language impairment, or to analyze results by gender. The differences between males and females in type or severity of language impairment,

as well as in the correlations of follow-up language and reading performance, should stimulate more research on possible underlying gender-related differences in language impairments. The Gray Oral Reading Test yields a grade score for reading decoding combined with rate. A measure distinguishing between the two skills and also providing a standardized indication of comprehension would have contributed valuable information concerning the types of reading skills most affected by language impairments. Since the Gray Oral was normed approximately 15 years prior to follow-up, a comparison of this sample's reading scores with those of a control group would have yielded a clearer understanding of the reading delays that were found.

Language Modality Deficit and Differentiated Reading Skills. The studies cited above are limited in information regarding the reading achievement of their subjects due to the limitations of the reading measures used or because reading subtest scores were combined to give a composite score. Furthermore, they do not yield information concerning the differential effect of modality deficits on reading achievement. McGrady (1964) conducted the only study located that investigated children's performance on reading skills as a function of language modality deficit. Also, his study reported subjects' performance on a variety of reading skills, better representing reading ability as an aggregate of integrated subskills. His purpose was to investigate whether or not "communicative disorders with presumed etiology of central nervous system dysfunction cause more deviations in behavior than communicative disorders in which this presumption is not made" (McGrady, 1964,

p. 261) and to compare the debilitating effect of receptive versus expressive communicative disorders.

His subjects comprised four groups of 15 boys each, between the ages of 7 and 9. The groups represented: (a) articulatory speech defects, (b) expressive aphasics, (c) receptive aphasics, and (d) controls. Group membership in the receptive and expressive aphasic groups was based on preschool clinical records from the Institute for Language Disorders at Northwestern University. The term "aphasic" was used to refer to developmental, not acquired, language disorders (McGrady, personal communication, June 2, 1985).

McGrady used 52 measures from various tests to assess 23 cognitive and motor functions, which he grouped into five areas of behavior. The functions were categorized as: (a) intelligence--reading and non-reading; (b) verbal functions--receptive language, reading, expressive language, writing, and verbal memory; (c) other symbolic functions--numerical ability, verbal meaning, reasoning, coding, and blending; (d) non-verbal functions--visual, auditory, and tactual perception and memory; and visual-motor abilities; and (e) other functions--motor abilities, left-right orientation, and articulation.

Given the scope of McGrady's study, the report of his findings was massive. His results are summarized here in terms of between-group comparisons and within-group intercorrelations of the following functions: reading, receptive language, receptive language and reading, expressive language, and expressive language and reading.

Reading--Five measures of reading were employed: Oral Reading from the Gates Reading Diagnostic Tests (Gates, 1953), Word Recognition and Paragraph Meaning from the Gates Reading Tests (Gates, 1958a, 1958b) and reading vocabulary (synonyms) and categorization of printed words from the Primary Mental Abilities Test (PMAT) (Thurstone and Thurstone, 1954).

Comparison of reading scores to chronological age showed the controls at or above age level on all subtests, the expressive aphasics "at levels ranging from slightly above the average to about one-half year below" (McGrady, 1964, p. 79), the speech defects group ranging from slightly below to almost one year below the expressive aphasics, and the receptive aphasics significantly below all the other groups.

Within the control and speech groups, all reading measures were significantly intercorrelated (ranging from $r = .71$ to $r = .93$, $p < .01$). Within the expressive and receptive aphasic groups, all reading measures except vocabulary were intercorrelated (ranging from $r = .69$ to $r = .92$, $p < .01$). McGrady (1964, pp. 158, 160) concluded, "Any one type of reading measure does not appear to be any more useful than any other in terms of differentiating the reading ability of subjects within these groups."

Receptive language--The receptive language measures used were the picture vocabulary subtest of the PMAT, representing single-word comprehension, and the oral directions subtest of the Detroit Tests of Learning Aptitude (Baker and Leland, 1959), representing the ability to comprehend complex instructions.

Between-group comparisons showed the control, speech, and expressive aphasics groups to be within the normal range in receptive language, although the expressive aphasics were the lowest of the three groups. The receptive aphasics scored significantly lower than the other groups on both measures of receptive language, and scored significantly lower on understanding complex instructions than in receptive vocabulary.

Within all of the groups, the intercorrelation between receptive vocabulary and ability to comprehend complex instructions was nonsignificant. McGrady noted that since the two measures appeared to be independent of each other, assessment of receptive language should not rely solely on a measure of receptive vocabulary.

Receptive language and reading--Regarding the relationship between receptive language and reading, the control group demonstrated a number of significant ($p < .01$) correlations between receptive vocabulary and the reading measures. Specifically, receptive vocabulary was significantly correlated with word recognition ($r = .78$), reading vocabulary ($r = .82$), and paragraph meaning ($r = .72$), but not with oral reading or word grouping. For this group, understanding complex instructions was not significantly correlated with any reading measure. The speech and expressive aphasic groups demonstrated no significant correlations between any of the measures of receptive language and reading. In contrast to the control group, the receptive aphasics showed no significant correlations between receptive vocabulary and any of the reading measures, but performance on understanding of complex instructions was significantly correlated with paragraph meaning

($r = .73$). McGrady noted that understanding complex instructions had high, but nonsignificant, correlations with all other reading measures.

Expressive language--Expressive language was evaluated by a test of spontaneous story-telling with scoring adapted from the Picture Story Language Test (Myklebust, 1960). Eight scores were derived from this test and divided into three types of language functions: (a) productivity (total output), (b) mean length of response, and (c) oral effectiveness (correctness of language usage).

For the control group, all measures within each type of language function were highly correlated ($p < .01$), but were not significantly correlated with measures representing other language functions. McGrady considered these results to support the existence and independence of the three types of functions within expressive language. Findings were similar for the speech and expressive aphasic groups. For the receptive aphasics, independence of these functions was not supported. Concerning productivity, the receptive aphasics did not score significantly lower than the other groups except on the measure of effective (grammatically correct) words. Each measure of mean length of response showed the receptive aphasics scoring lower than at least one of the other groups. Oral effectiveness also showed this group at a significant disadvantage. Concerning the receptive aphasics, McGrady (1964, p. 166) concluded, "most [functions] were highly related . . . indicating that their low level of performance was generalized to all subfunctions of oral language."

Expressive language and reading--Expressive language measures were not significantly correlated with any of the reading measures for

the control and expressive aphasic groups. The speech group showed significant ($p < .01$) correlations between oral effectiveness and two measures of reading--oral reading ($r = .68$) and paragraph comprehension ($r = .73$). The receptive aphasics demonstrated correlations between reading vocabulary and two measures of productivity--total words ($r = .70$) and effective words ($r = .73$).

Conclusions--The expressive aphasics did not differ significantly from the controls on reading ability, receptive language, expressive language, or correlations between any of these functions. The receptive aphasics, however, performed significantly lower than the controls in all of these areas with the exception of the expressive language function of productivity. Compared to the expressive aphasics, the receptive aphasics proved significantly disadvantaged in reading and receptive language. Regarding expressive language, the receptive aphasics scored significantly lower than the expressives only on the measures that required grammatically correct words. McGrady (1964, p. 139) noted, "It would appear that adequacy of 'meaning' is the major differentiation between the aphasic groups when verbal and symbolic behavior is considered." The receptive aphasics also demonstrated different patterns of correlations between these functions than did any of the other groups.

Analyzing which of the 23 cognitive and motor functions were highly correlated with reading within each group, McGrady found that each group demonstrated a dissimilar pattern. However, for the receptive aphasics, the number of significant correlations among verbal functions (including reading) was 8 to 12 times higher than for any

other group. McGrady (1964, p. 257) concluded that "it appears that receptive language deficiency results in a generalized language deficit.

One of the difficulties in generalizing the results of McGrady's study to reading skills of other children with specific language modality deficits is that his subjects were not reclassified expressive or receptive at follow-up. Some researchers have found that certain patterns of language deficit did not remain stable from preschool to follow-up assessment (Strominger, 1983) or were correlated with age (Aram and Nation, 1975). Consequently, it is possible that a more recent evaluation of language deficits may not have conformed to the findings of the initial assessment. Nevertheless, based on McGrady's findings, there are strong indications that a receptive language deficit "represents a significantly debilitating condition which cuts across the lines of verbal and nonverbal behavior" (McGrady, 1964, p. 136), whereas the disabilities associated with an expressive language deficit are not nearly so severe. The finding that receptive aphasics read at significantly lower levels than the expressive aphasics, who functioned within the normal range, exemplifies this conclusion. This finding also suggests that a significant reading disability may be associated with receptive language impairments rather than with language impairments in general.

Descriptive Studies

The next seven studies reviewed are descriptive. Since it was outside the purpose of these studies to restrict their samples, few or

no exclusionary criteria were used, or exclusions were not reported. Consequently, in many cases, children were included whose language impairments could have been associated with or secondary to some other handicapping condition. These studies are frequently cited and corroborate the findings of the more controlled research that children with language impairments develop reading disabilities at school-age. They are summarized briefly here by date of publication.

The summaries include the following information, if included in the original article: (a) description of the sample (e.g., age range, gender, intelligence, emotional disability, sensory impairments, sample size and method of selection), (b) comparison or control group, (c) types of measures used (e.g., language, reading), and (d) type and severity of language and reading disabilities. For the sake of brevity and because no conclusions about the population of language-impaired children were drawn from these reports for the current study, this review does not include specific information concerning: (a) titles of measures used, (b) criteria for placement in language-impairment subgroups, and (c) educational placement of the subjects.

Griffiths (1969) conducted a follow-up study of 49 speech- and language-impaired children who had received intensive therapy and academic training at the John Horniman School in England, and who had subsequently transferred to other schools. The children ranged in age from 5-1 to 8-0 upon admission to the John Horniman School, and at follow-up, from 7-5 to 16-8.

Results of the initial assessment were used as the basis for classifying the children into six speech/language impairment groups.

Based on Griffiths' report, it was possible to identify a group of 11 subjects classified as having "delayed or abnormal language development and defective articulation" and a group of 8 subjects classified as having "severely defective articulation with normal or near normal language development." Both groups had intelligence scores within the normal range and no hearing impairment.

Reading ability was measured by standardized reading vocabulary and silent reading tests. When the language-delayed group left the John Horniman School their mean reading delay compared to age-peers was 16 months; at follow-up, the delay had increased to 26 months. In contrast, the articulation-impaired group had reading delays of 4 months and 14 months, respectively.

A follow-up study on 58 children and young adults, originally seen for a presenting problem of delayed speech, was reported by Garvey and Gordon (1973). At follow-up, the children ranged in age from 4-11 to 18-6, and in intelligence from trainable mentally retarded to above average.

This sample was grouped by educational placement, rather than by handicapping condition. Reading problems were reported by the home school. The present discussion excludes children placed in institutions for the hearing impaired and mentally retarded. Of the 25 children who were enrolled in regular public schools, 2 were listed as deaf. Of 12 who had been assessed as having normal language skills, 6 (50%) had pre-reading or reading problems. Of 11 children with below normal language performance, 9 (82%) had pre-reading or reading problems.

A study conducted by the National Children's Bureau in England provided information on 15,490 children, making possible further investigation of 198 11-year-olds who had had unintelligible speech but normal hearing at age 7. Sheridan and Peckham (1975) reported results of a follow-up study on those children that were attending regular public schools (65%) rather than special schools for handicapped children (35%). This study has been included in this review because the speech problems that were specified (dyslalia, mixed word order, and cluttered speech) might also be classified as expressive language impairments. The subjects, categorized as those having residual speech problems at age 11 and those having developed satisfactory speech, were compared to a control group. Both speech groups included children with some degree of hearing loss, as well as physical and neurological problems. In addition, the group with residual speech problems included children with defective vision and behavioral problems.

Reading achievement was reported by the children's teachers. Nonstatistical comparisons indicated that the group with residual speech problems had a larger percentage of below average readers, very poor readers, and nonreaders than the group with satisfactory speech, and both of these groups were reported to be poorer readers than the controls.

De Ajuriaguerra and his colleagues (1976) studied 40 dysphasic children, ages 4-3 to 10-10, with intelligence levels ranging from superior to very deficient and emotional stability ranging from normal to psychotic. All subjects had normal hearing, physically normal articulation systems, and most were judged to be in the operational

stage of development as defined by Piaget. No children had dysarthria, anarthria or acquired aphasia.

Two years later, de Ajuriaguerra and the other members of his research group began a follow-up study of 17 subjects, ranging in age from 7-2 to 12-9. Subjects' reading skills were discussed only as one aspect of the effect of therapy on a number of linguistic, cognitive, and academic areas measured. Results indicated that therapy did not have a significant effect on reading "unless the treatment had been particularly intensive" (de Ajuriaguerra et al., 1976, p. 354). Academic difficulty appeared to result from the interaction of intelligence level, emotional health, and severity of language deficit rather than from any single factor.

Kolvin, Fundudis, and Scanlon (1979) reported on the initial phase of a longitudinal study of 102 children living in Newcastle Upon Tyne, England, who, at the age of three years, failed to use "three or more words strung together to make some sort of sense" (Kolvin et al., 1979, p. 51). The entire group was matched with controls and then subdivided into a pathological deviant group (n = 18), which included children with an IQ of 65 or below, and a residual speech retarded group (n = 84). The latter group was described as including children with adverse home environments and hearing impairments, although the percentage of hearing-impaired children in the residual speech retarded group was not significantly different from that of the control group.

In the results of a follow-up study, the educational development of the residual speech retarded group at age 7 was reported by Fundudis et al. (1979). The children were classified as specific

speech delay, intermediate, or general delay, depending on the age at which they walked unsupported. Reading achievement was assessed by teacher judgment and a standardized reading test. Comparisons among the three groups showed the specific speech delay group to be better readers than the intermediate group, which was, in turn, better than the general delay group. All of the speech retarded groups performed significantly below the control group.

In 1980, Aram and Nation published the results of a follow-up study on 63 children diagnosed 4 to 5 years earlier as speech and language impaired at the Cleveland Hearing and Speech Center. Age range of subjects at initial assessment was 0-8 to 5-0 and at follow-up, 4-7 to 10-4. Intelligence levels were not reported, but the sample included subjects who were later placed in classes for the mentally retarded, multiply handicapped, or hearing impaired. Academic data, obtained from parents, teachers, and recent test results (based on different standardized measures) were made comparable by rating systems. Unlike the other studies reviewed, results showed that 55.6% of the subjects were at or above grade level in reading skills and 39.6% were below grade level. No information was reported on the mean reading scores of other children in the subjects' home schools for comparison.

King, Jones, and Lasky (1982) conducted a follow-up study 15 years after children were assessed at the Kent State University Speech and Hearing Clinic. At least two hearing-impaired children were included in the sample of 50; intelligence levels were not reported. Age range at initial assessment was 3-0 to 5-11, and at follow-up, 13-10

to 20-5. . Information was provided by the subjects' mothers through a telephone questionnaire.

At follow-up, based on early clinical records, subjects were classified by handicap into five groups. Academic problems were reported by communication disorder group and subject area: reading, math, English, and two or more areas. Problems specifically in reading were reported as follows: (a) no speech--2 of 5 subjects (40%), (b) language disorder/delayed speech--3 of 18 subjects (17%), (c) articulation problems--3 of 18 subjects (17%), (d) language and articulation problems--2 of 7 subjects (29%), and (e) articulation and fluency--1 of 2 subjects (50%). Subjects who had difficulty in two or more academic areas were reported under that classification and therefore are not included in the figures above. Consequently, it is possible that more subjects had reading difficulties than are reported here. Whereas the sample as a whole had grades reported as B/C or better, the language disorder group received grades of C or below.

With the exception of the subjects in Aram and Nation's (1980) study, it can be seen that children classified as having language impairments in the studies reviewed above also had difficulties in reading. However, since these children cannot necessarily be classified as having primary language impairments, it is difficult to discern whether or not other handicapping conditions were the major contributing factors to their reading disabilities.

Educational Placement of Language-Impaired Children

In general, reported educational placement of the subjects followed in the controlled studies showed that special provisions have had to be made for the needs of language-impaired children. Of Strominger's (1983) 38 subjects, only 2 had received no special help or therapy. Aram and her colleagues (1984) reported that 12 of their 20 subjects were enrolled in regular public school, although 7 received tutoring or had been retained; 4 subjects were in self-contained classes for the learning disabled, and 4 were placed in classes for the educable mentally retarded. McGrady (1964) reported that children with receptive language impairments were found to be in ungraded classes in greater proportions than children with expressive impairments, although both groups had received more specialized tutoring than controls.

Summary and Discussion

It is difficult to draw conclusions about the academic effects of primary language impairments from studies which include children whose language impairments may be secondary to some other handicapping condition. Therefore, this section will summarize the findings of the controlled studies only, and will conclude with a discussion of some implications for the current study that were drawn from these reports.

Summary. Although limited in number, all of the studies reviewed found that language-impaired children, when considered as a group, demonstrated significant reading delays (Aram et al., 1984; Hall and Tomblin, 1978; Levi et al., 1982; McGrady, 1964; Strominger,

1983). Moreover, some research results indicated that different types of language impairments may be associated with type and severity of reading delay. Receptive language deficits may contribute to a generalized reading disability, whereas expressive deficits have a much less serious effect (McGrady, 1964). Semantic/syntactic language delays may prove more deleterious than phonological delays in reading words and sentences, but not in reading letters and syllables (Levi et al., 1982). Not surprisingly, language-impaired children have been shown to require tutoring, retention, and special education more frequently than their nonhandicapped peers (Aram et al., 1984; McGrady, 1964; Strominger, 1983).

Implications for the Present Study. There are numerous difficulties inherent in investigating the reading achievement of children with primary language impairments. Many of these, such as the low prevalence of these children and lack of adequate language measures, are beyond the control of the researchers. The following shortcomings of the research reports reviewed here were considered in planning the research design of the current investigation.

Many researchers did not report explicit criteria for inclusion of children in the language-impaired samples, so that results could be compared from studies with like samples. Furthermore, some studies did not exclude or did not report exclusions of conditions that may be primary contributing factors to the language impairment or the reading disability. With confounding factors controlled, research could present more reliable information than is currently available concerning

the effects of a primary language impairment on reading achievement.

Language-impaired children do not form a homogeneous group (Stark and Tallal, 1981), yet most investigators have not formed subsamples on the basis of particular language deficits. Subgrouping subjects according to patterns of impairment would allow a more precise interpretation of research results concerning their development, academic or otherwise. One example is McGrady's (1964) findings concerning the debilitating nature of receptive as opposed to expressive language impairments.

Since most of the studies reviewed were exploring a variety of factors concomitant to language impairments, reading achievement was not the main focus. Perhaps it was for this reason that many of the studies represented reading achievement as decoding or a composite of skills. Using a test which represents the diversity of skills comprising the reading process (e.g., word attack, word recognition, vocabulary, comprehension), as well as subgrouping a language-impaired sample, would have allowed investigators to deduce more precise connections between specific language skills and particular reading skills.

All of the studies reviewed here drew their samples from clinic populations, which are not necessarily representative of the general population of language-impaired children. Concerning this problem, Weiner (1985, p. 88) warned that "biases of one sort or another are probably inevitable and will depend largely on the population that is served by the particular facility." One way to avoid clinical bias

might be to randomly select subjects from the caseloads of public school speech/language pathologists or, to control for severity of impairment, one could study an entire population of language-impaired children from the public schools at a single severity level.

To consider subjects as comprising a homogeneous group for investigative purposes, they must all be classified on the basis of consistent assessment measures and procedures. Retrospective studies have a particular difficulty in this regard. Since the requirements of long-term follow-up were not necessarily a consideration at the time of the initial evaluation, each child was assessed on whatever measures were current and were deemed necessary, varying from case to case. Consequently, differences and similarities between subjects might be artifacts of the measures used rather than due to underlying skills and abilities. Planned longitudinal studies such as that conducted by Aram et al. (1984), and cross-sectional studies such as that conducted by Levi et al. (1982) avoided this problem by using a predetermined battery of tests for all children.

Strominger (1983) found that children originally diagnosed as expressively impaired demonstrated receptive problems at follow-up. Although this change may have been due to differences in measurement instruments, one implication of these findings is that individual patterns of language impairment may change over time (American Speech and Hearing Association, 1982b; Bashir et al., 1983). Consequently, it would seem good research practice to assess language abilities concurrently with reading achievement, as well as at initial evaluation in longitudinal and retrospective studies.

In most of the studies reviewed here, language abilities were assessed using subtests from a variety of measures (Aram et al., 1984; Hall and Tomblin, 1978; McGrady, 1964; Strominger, 1983). Without use of a control group, comparisons of results based on more than one test and thus more than one norming sample may lead to invalid conclusions as to the nature of the language impairment; one cannot know if the patterns of abilities found represent underlying behaviors or differences in the various norming samples (McCauley and Swisher, 1984a). In addition, many language tests currently in use have been criticized as not meeting minimal psychometric standards (McCauley and Swisher, 1984b). The most accurate way to ascertain patterns of abilities within an area such as language or reading would be to use a test standardized on one norming sample that meets the psychometric guidelines of the American Psychological Association (1974) and that provides in-depth measurement of a variety of skills. In the field of language, development of tests such as these is still a critical need. In the area of reading, tests that meet these criteria, such as the Woodcock Reading Mastery Tests (Woodcock, 1973) are available.

From the existing research it is apparent that language-impaired children develop reading disabilities when they reach school-age. However, in the existing research, results are sometimes difficult to interpret due to insufficiently stringent exclusionary factors and criteria for subject inclusion, treatment of language-impaired subjects as a homogeneous group, inadequate reading measures, and use of clinical samples. Additional difficulties arise from use of inconsistent assessment measures, comparison of results from a

variety of measures normed on different samples, and, when subjects were classified into subgroups of language impairment, classification not concurrent with reading assessment. Before definitive relationships can be drawn between patterns of language abilities and particular reading skills, these issues must be addressed. The research design of the present study addressed some of these issues. Procedures for doing so are described in Chapter 3: Methodology.

CHAPTER 3

METHODOLOGY

Overview

The principal concerns of the present study were to delineate differences in reading skills among three groups of children: (a) language impaired children who have receptive deficits, (b) language-impaired children who have expressive deficits, and (c) children who have no identified language impairments or other learning handicaps. Two standardized tests, the Woodcock Reading Mastery Tests-Revised (WRMT-R) (Woodcock, in progress) and the Iowa Tests of Basic Skills (ITBS) (Hieronymus et al., 1983) provided independent information concerning children's performance on four categories of reading skills: (a) word attack, (b) word recognition, (c) vocabulary, and (d) comprehension. The Performance scale (PIQ) of the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974a) had been intended to provide a means to adjust for the difference in intelligence levels among subjects, but was excluded later, when the data were analyzed.

The research sample consisted of children, ages 10 to 12, from selected public schools in Tucson and Phoenix. The language-impaired children were chosen from self-contained classes for the severely language impaired and assigned to the Receptive group or to the Expressive group based on their performance on the Test of Language

Development-Intermediate (TOLD-I) (Hammill and Newcomer, 1982). Controls were randomly selected from each school to equal the number of language-impaired subjects from the same school.

Procedures for collecting data included the training of examiners on standard administration and scoring of the TOLD-I, the WRMT-R, the ITBS, and the PIQ. In the first testing session, the TOLD-I was administered to the language-impaired subjects, and the TOLD-I and the PIQ were administered to the Controls. The WRMT-R was administered to all of the subjects in the second session. The ITBS was administered to the language-impaired subjects by class groups, as standardized.

The TOLD-I, the WRMT-R, the WISC-R, and the ITBS are well-standardized measures with clear directions for administration and scoring. The first three tests are all individually administered. The TOLD-I yields separate scores for receptive and expressive language competency. The WRMT-R measures a variety of reading skills and is a revision, as yet unpublished, of the Woodcock Reading Mastery Tests (Woodcock, 1973). The WISC-R is comprised of a Verbal scale and a Performance scale and is commonly used as an indication of verbal and nonverbal intelligence. The ITBS is a group-administered measure of many areas of school achievement, from which two reading subtests were selected.

The primary statistical tests of the data were intended to be multivariate analyses of covariance (Tabachnick and Fidell, 1983). However, due to the failure of the data to meet the required statistical assumptions, PIQ could not serve as a covariate. Additionally, it

was not possible to conduct the multivariate tests necessary to answer the questions concerning differences among the three groups in overall reading achievement and the relative contribution of each reading subtest in discriminating among the groups. The Welch and Brown-Forsythe procedures (Tomarkin and Serlin, 1986) were used to assess the significance of the difference in performance among the three groups on each reading subtest. Pearson Product-Moment correlational analyses were conducted to assess the interrelationships among the subtests.

Sample

Description of Subjects

Forty-six school districts in the Tucson and Phoenix areas were contacted to determine which had intermediate level self-contained classes for severely language-impaired children. Thirteen elementary schools in eight districts had such classes and 10 elementary schools from seven districts agreed to participate in the study. Control and SLI subjects were selected from five schools in Tucson and five in Phoenix. The total sample initially consisted of 74 subjects but subsequently was reduced to 66 when the SLI subjects were subgrouped as Receptive or Expressive (see Language-Impaired Groups).

Subjects were between the ages of 10-0 and 12-11 on the day testing started. The lower age limit was selected in an attempt to insure that all children would have reached the Piagetian stage of concrete operations (normally thought of as between 5 and 7 years), even if delayed. The upper age limit was chosen to maintain approximately comparable age-expected language levels, insure placement in

the same type of school (intermediate level of elementary school), and reduce age as a confounding variable.

The following were the exclusionary criteria used in subject selection:

1. Children were excluded whose primary home language was other than English, according to the children's current school file or if a child volunteered the information that a language other than English was predominant in the home.
2. Children were excluded who did not have a Performance scale score of at least 85 on a WISC-R administered within three years, according to the child's current school file or a WISC-R administered by the investigator or one of the examiners.
3. Children were excluded who had signs of sensory impairment, judged according to school hearing and vision screenings administered within the previous year. The vision screening must have been passed, with or without glasses. Minimum acuity for passing the vision screening in any participating school was better than 20/40 in each eye. Maximum levels for passing the hearing screening were 25 decibels at frequencies of 500 to 4000 (see Appendix B for vision and hearing screening criteria for each school district). Any child with a history of sensory-neural hearing loss was omitted.
4. Children were excluded who had previously been placed in a program for treatment of severe emotional problems or whose current teacher judged their language deficits to be secondary to a severe emotional disturbance.

5. Children were excluded who had gross neurological abnormalities (e.g., severe cerebral palsy or other handicapping conditions), according to their current school files.
6. Children were excluded who had articulation problems judged by the teacher or examiner as severe enough to interfere with standardized scoring of the language test and the oral portions of the reading tests.

Selection and Assignment to Groups

Control Group. The Control group selection procedure was designed so that the number of Controls would equal the number of SLI subjects in each school. In this way, the entire Control group and SLI group would represent the same school populations in equal proportions. Potential control subjects were selected from a randomized list (by use of a random number table) of all children within the chosen age range. The first 30 students on the list were given parent permission forms. Those students who returned the forms and who had no record of deficits that would qualify them or that had previously qualified them for a special education program were retained on the Control selection list. In each school, the Controls were tested after the SLI children so that the number of SLI subjects included in the study had been established. When data collection was completed, 37 children had been assigned to the Control group.

Language-Impaired Groups. The investigator obtained permission to test 73 of the 81 children enrolled in the SLI classes. Thirty-six

(49.3%) of the 73 children for whom permission was obtained did not meet the criteria for inclusion in the present study. Among the 36 who were excluded, 18 (24.7%) children lived in homes in which English was not the predominant language spoken. Seventeen of these came from Spanish-speaking homes and one from a home in which sign was the predominant language. Eleven (15.1%) children had a history of severe emotional disturbance. This information was reported in the files of 7 of the children. The SLI teachers of the 4 other children were of the opinion that the children's language impairments were secondary to severe emotional problems. Ten (13.7%) children scored below 85 on PIQ, and 5 (6.8%) children failed their hearing screenings or had a history of sensory-neural hearing loss. None of the children failed the vision screening. Three (4.1%) children had histories of gross neurological problems. Of these, one had had a shunt placed in his brain as a result of severe child abuse. Two had seizure disorders, one with evidence of left hemisphere damage. Table 1 presents the number and percentage of children in the SLI classes who were excluded from the study by reason for exclusion. The figures represent a combination of characteristics in some children.

All children in the SLI groups (Receptive and Expressive) had been classified by the standards of their school districts as having language impairments severe enough to qualify them for placement in a self-contained SLI class. It was hoped that by including only children already placed in SLI classes, the confounding variable of severity would be controlled to some extent.

Table 1. General characteristics of children enrolled in classes for the severely language impaired

Characteristic	Number of Children	Percentage of Total
Total enrolled	81	
Refused permission	8	
Potential subjects	73	100.0
Subjects included	37	50.7
Subjects excluded	36	49.3
Subjects excluded		
Not predominantly English speaking	18	24.7
Spanish	17	23.3
Sign	1	1.4
Severe emotional disturbance	11	15.1[a]
School file	7	9.6
Teacher report	4	5.4
PIQ below 85	10	13.7
Failed hearing/sensory-neural loss	5	6.8
Failed vision	0	-
Gross neurological problems	3	4.1

[a]Due to rounding, subordinate numbers do not match the figure.

Note: Figures represent a combination of characteristics in some children.

In each school, the names of all children in the intermediate SLI class who fit the subject selection criteria and who had obtained written parental permission were placed in random order using a random number table. Subjects were tested consecutively from this list. When a child was absent, his/her name headed the list for the next testing session. All potential subjects were tested on the TOLD-I, the WRMT-R, and the ITBS (see Test Procedures).

After all of the test data for the study were collected, the SLI subjects were assigned to groups. Because the means and standard deviations of the Control group were lower than those of the norm sample (M = 100, SD = 15) on both the listening quotient (LQ) (M = 94.6, SD = 10.4) and the speaking quotient (SQ) (M = 88.7, SD = 11.3) of the TOLD-I, SLI subjects were assigned to either the Receptive group or the Expressive group based on the performance of the lowest 10% of the Controls on these measures.

Receptive group--Language-impaired children whose LQ on the TOLD-I was below 81 were assigned to the Receptive group. This cut-off point was chosen because it represented the upper limit of the lower 10% of children in the Control group. (The upper limit of the lower 10% of the norm sample was 82.) Based on this criterion, 24 children were assigned to the Receptive group.

Table 2 summarizes subjects' performance on the listening and speaking quotients of the TOLD-I by group. On the LQ, the Receptive group obtained a mean of 67.8, with scores ranging from 46 to 79. On the SQ, the mean was 56.0, with scores ranging from 47 to 79.

Table 2. TOLD-I listening quotient and speaking quotient mean scores, standard deviations, and range of scores by group

	Receptive (n = 24)	Expressive (n = 5)	Group SLI (n = 29)	Controls (n = 37)	Excluded SLI (n = 8)
LQ					
M	67.8	85.6	70.8	94.6	86.5
SD	10.1	3.9	11.5	10.4	5.3
Range	46-79	82-91	46-91	76-118	82-97
SQ					
M	56.0	56.4	56.1	88.7	72.5
SD	6.9	5.7	6.6	11.3	4.6
Range	47-79	49-59	47-79	66-115	68-79

Expressive group--Language-impaired children whose LQ on the TOLD-I was at or above 81, whose SQ was 68 or below (the upper limit of the lower 10% of Controls) and whose SQ was at least 21 points below their LQ were assigned to the Expressive group. A discrepancy of practical significance was considered to be more meaningful in this context than a discrepancy of statistical significance (which varied by age from 5.3 points to 8.8 points at $p < .05$). Consequently, the cut-off was determined by the widest discrepancy (LQ above SQ) demonstrated by less than 10% of the Control group. Based on these criteria, 5 children were assigned to the Expressive group.

For the Expressive group, the mean LQ score was 85.6, with scores ranging from 82 to 91, and the mean SQ was 56.4, with scores ranging from 49 to 59 (see Table 2).

Excluded subjects--Eight language-impaired subjects did not fit the criteria for the Receptive group or the Expressive group. They obtained a mean LQ score of 86.5, with scores ranging from 82 to 97, and a mean SQ score of 72.5, with scores ranging from 68 to 79. These subjects were omitted from the study.

Validation procedure for assignment of children to language-impaired groups--Because the TOLD-I has not been validated for the purpose of differentiating between children with receptive impairments and children with expressive impairments, a validation procedure based on teacher judgment was established. (See Appendix C.) After data collection was completed, each participating SLI teacher was asked to categorize each subject's language deficit using the following definitions:

1. Comprehension/expression deficit--student seems to lack understanding or often misses the point in conversations, discussions and teachers' verbal explanations.
2. Expressive deficit only--student seems to understand conversations, discussions, and teachers' verbal explanations, but has major difficulty expressing ideas clearly.

The teachers checked either Comprehension/Expression Deficit or Expressive Deficit Only after each child's name, added comments as desired, and returned the form to the investigator. Because there was

no appropriate group in which to place the 8 subjects who were omitted on the basis of the TOLD-I criteria, these subjects were classified by the teachers but excluded from the calculation of test/teacher agreement. Agreement between the TOLD-I criteria and teacher classification of children to SLI groups was 89.7%, indicating a high level of agreement. However, when agreement on classification of Expressives was calculated independently, test/teacher agreement was only 50%, compared to 88.5% agreement on the Receptives. It is interesting to note that based on teacher judgment, 4 of the 8 excluded subjects would have been placed in the Expressive group.

Instrumentation

The instruments used in this study were the Test of Language Development-Intermediate (TOLD-I) (Hammill and Newcomer, 1982), the Woodcock Reading Mastery Tests-Revised (WRMT-R) (Woodcock, in progress), the Iowa Tests of Basic Skills (ITBS) (Hieronymus et al., 1983), and the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974a). All are standardized, normed measures. Technical information concerning these measures is summarized here. More complete technical information is presented in Appendix A.

Test of Language Development-Intermediate

The purpose of the TOLD-I in this study was to provide criteria by which the language-impaired children could be assigned to modality deficit groups. It and the Clinical Evaluation of Language Functions are the tests in wide use that provide separate

scores for receptive and expressive language competence. The TOLD-I was chosen for the quality of its standardization.

The TOLD-I is comprised of five subtests: (a) sentence combining, (b) characteristics, (c) word ordering, (d) generals, and (e) grammatic comprehension. These subtests are rated on two dimensions: linguistic systems, which includes receptive skills and expressive skills, and linguistic features, which includes semantics and syntax. The receptive skills composite is represented by the subtests of characteristics and grammatic comprehension, and the expressive skills composite is represented by the subtests of generals, sentence combining, and word ordering. The semantic composite is represented by characteristics and generals, and the syntax composite is represented by sentence combining, word ordering, and grammatic comprehension.

Scores. The TOLD-I yields raw scores, percentiles, and standard scores for the five subtests ($M = 10$, $SD = 3$), and quotients for the composites ($M = 100$, $SD = 15$). The five composites are: (a) listening, (b) speaking, (c) semantics, (d) syntax, and (e) spoken language (total score). For the purposes of this study, only the scores given by the listening and speaking quotients were used.

Standardization. The TOLD-I was standardized on over 800 subjects, ages 8-6 to 12-11, representing 1980 census characteristics. Reliability of the composites are above .90, the level recommended by Salvia and Ysseldyke (1985) for individualized assessment.

Woodcock Reading Mastery Tests-Revised

The WRMT-R is an individually administered test of reading readiness skills and reading skills that includes six subtests: (a) visual-auditory learning, (b) letter identification, (c) word identification, (d) word attack, (e) word comprehension, and (f) passage comprehension. A total reading score may also be derived.

The four measures used in this study were word attack, word identification, word comprehension, and passage comprehension. Word attack requires the subject to decode a nonsense word and respond orally within a reasonable time limit. Word identification requires the subject to read real words orally within a reasonable time limit. Word comprehension is comprised of three subtests: antonyms and synonyms require the subject to respond orally to a request for antonyms or synonyms for words she/he reads from a word list. Analogies requires the subject to silently read a partial verbal analogy and respond orally with the word that completes the analogy. Passage comprehension requires the subject to silently read a short passage of one or two sentences from which a word is missing and orally provide an acceptable word.

Scores. The WRMT-R provides a variety of scores for each reading skill and for overall reading achievement. These scores include raw scores, grade equivalents, percentiles, standard scores, and relative performance indexes. Individual subtests are also grouped as clusters: (a) readiness--visual-auditory learning and letter identification; (b) basic skills--word attack and word identification; (c)

comprehension--word comprehension and passage comprehension; and (d) total reading--word attack, word identification, word comprehension, and passage comprehension. All derived scores are available for each subtest as well as for each cluster. The percentile rank profile shows one confidence band for percentile rank scores in each area; the instructional implications profile shows easy, instructional, and frustration level reading scores on a grade scale.

Standardization. The WRMT-R will not be published until spring or summer of 1986; however, the test has been standardized on over 6,000 subjects, ages 5 to above 70, with reliability coefficients above .90 (Woodcock, personal communication, August 17, 1985).

The 1973 version of the Woodcock Reading Mastery Tests (Woodcock) was considered by the investigator to be the best standardized, individually-administered reading test available. However, the revised edition is expected to be an improvement in regard to standardization, flexibility of assessment, variety of scores, reliability of individual subtests, use of clusters, and statistical equation with other diagnostic measures. Dr. Woodcock made the revised edition available to this investigator for use in data collection and analysis.

Iowa Tests of Basic Skills

The ITBS is the group achievement test adopted for state-wide testing by school districts in the State of Arizona. Three batteries are available: early primary, primary, and multilevel. The multilevel battery is appropriate for children ages 9 through 14 and provides for comprehensive assessment in the areas of vocabulary, reading, language,

mathematics, and work-study. Vocabulary and reading were the subtests used for this study. The vocabulary subtest requires the subject to read a target word in a phrase and select a synonymous phrase from four printed choices. The reading subtest requires a subject to read passages varying in length from a few sentences to a full page and answer questions in a multiple-choice format. The passages cover a variety of school-related content. The questions assess a reader's ability to comprehend the material, grasp the significance of the ideas presented, evaluate, and draw conclusions.

The ITBS was chosen because it functions as a complement to the WRMT-R. It provides a measure of reading vocabulary and comprehension without the need for an oral response, and the reading passages are long enough to provide a stable measure of comprehension on passages exceeding one paragraph. In addition, success in answering the questions requires reading for meaning. The ITBS was considered by the investigator to have good construct and content validity for school-required reading.

Scores. The ITBS scoring tables provide grade equivalents, percentile ranks, stanines, normal curve equivalents, and developmental standard scores. The developmental standard scores provide different means and standard deviations for each test level, but for the purposes of this study, subjects' raw scores were transformed into standard scores with a mean of 100 and a standard deviation of 15.

Standardization. The battery was standardized in 1977 on a stratified norming sample of over 100,000 children, approximately evenly distributed throughout the grades. District enrollment, geographic region, and socioeconomic status of the sample were representative of U.S. population as described in the 1970 census. An equating study conducted in 1982 provided updated norms. Correlation coefficients for internal consistency were above .90, and for stability, ranged from .75 to .84. Validity data showed moderate correlations with later school performance. Although the children in this study ranged in age from 10 to 12 years, Level 9 of the battery, appropriate for age 9, was administered to the language-impaired subjects. Guidelines given in the Manual for School Administrators (Hieronymus, Lindquist, and Hoover, 1982, p. 11) suggest that when out-of-level testing is to be conducted, "a level should be selected which conforms most closely to the general developmental level of the pupils." The investigator decided to use the lowest level available within the battery that had been administered to the Controls and that provided reading subtests comparable to those of the WRMT-R. Although Level 9 proved very difficult for most of the language-impaired children tested, norms for this level provide derived scores from grades K through 8.

Wechsler Intelligence Scale for Children-Revised

The WISC-R is an individually administered test that is widely used to indicate children's intelligence levels. Each of the 12 subtests are considered to emphasize various types of ability or knowledge. The two scales provided indicate verbal versus nonverbal abilities and

consist of five mandatory and one optional subtest each. The verbal scale includes the subtests of information, similarities, arithmetic, vocabulary, comprehension, and digit span; the performance scale includes picture completion, picture arrangement, block design, object assembly, coding and mazes. An overall intelligence quotient (full scale IQ) may be derived from the 10 mandatory subtest scores. A summary of the specific cognitive abilities and knowledge required for competence in each of the subtests may be found in A Guide to 65 Tests for Special Education (Compton, 1980).

Reading achievement has been found to share a high correlation with verbal intelligence (Woodcock, 1975). To avoid confounding the findings of this study relative to reading achievement, the research design required a measure of intelligence that was relatively uncontaminated by the language-impaired subjects' verbal disabilities. The performance scale of the WISC-R was chosen because it is well-standardized and was considered to be the most widely used and accepted nonverbal intelligence test available.

Scores. Scaled scores (M = 10, SD = 3) are derived for the subtests and the intelligence quotients (M = 100, SD = 15) are derived for the verbal, performance, and full scales.

Standardization. The WISC-R was standardized on a sample of 2,200 children, ages 6-0 through 16-11, distributed evenly throughout 11 age groups. The sample excluded severely emotionally disturbed and institutionalized mentally retarded children. Based on the 1970 census, the sample was stratified on the variables of age, sex, race (white and

nonwhite), geographic region (northeast, north central, south, and west), to proportionally represent the U.S. population.

Reliability data are provided for internal consistency and stability for each subtest and scale. Internal consistency coefficients and stability coefficients for the scales and subtests were provided for each age group and averaged across age groups. Coefficients for the scales were above .89; the subtest coefficients ranged from .70 to .86.

Procedures

This section describes the examiners, testing procedures, and provisions for reliability of data collection.

Examiners

Administration of the TOLD-I, the WRMT-R, the ITBS, and the PIQ was conducted by the investigator and two research assistants. Each research assistant was a credentialed learning disabilities specialist, had five years teaching experience, and was a graduate student in special education. The research assistants were specifically trained by the investigator on the TOLD-I, the WRMT-R, and the ITBS. They then administered the TOLD-I and the WRMT-R to two children, learning disabled and nonhandicapped, who were not included in the sample. Testing of the first child was videotaped by the investigator. The videotapes were used in a follow-up training session to correct any violations of standard test procedures. Examiners were observed during testing of the second child and were rated by the investigator according to a check-out procedure (see Appendix D) to

ensure that administration proceeded in a standard manner and that adequate rapport was established with the subject before testing commenced.

The investigator and both research assistants were experienced in administration of the ITBS. Before data collection began, the manual was studied and discussed to ensure that each examiner used the standard administration procedures.

The investigator and research assistants were trained on the PIQ by a University of Arizona instructor in the Department of Special Education who had successfully completed a university course in administration of the WISC-R and who had administered the test to over 100 elementary school students. The investigator and research assistants practiced administering the PIQ to four elementary school students who were not included in the sample and were checked out on administration procedures by a certified school psychologist.

Test Procedures. Testing followed the standard procedures delineated in the test manuals.

One well-lighted, private room in each school was secured for testing purposes. Subjects were tested individually on the TOLD-I, the WRMT-R, and the PIQ. Each examiner was responsible for testing all of the subjects within each school to which she was assigned, and each examiner tested approximately the same number of subjects.

Individual testing took two sessions. For the language-impaired subjects, the TOLD-I was administered in the first session. For the Controls, the TOLD-I and the PIQ were administered in the

first session. TOLD-I administration always preceded administration of the PIQ. For all subjects, the four subtests from the WRMT-R were administered in the second session. The language-impaired subjects were tested on the ITBS by class groups in a third session. Testing of each subject was completed within a three week period and testing of all subjects was completed within three months.

Since the ITBS is the achievement test adopted by the State of Arizona for administration to all public students, all Controls had these test scores in their files from April of 1985. It is the choice of the school district as to whether language-impaired children will take the ITBS or be excused. None of the language-impaired children participating in this study had taken the ITBS.

Reliability of Data Collection

Each examiner was responsible for tabulating raw scores and derived scores for each test she administered. Those protocols were then given to another examiner and rescored. Each examiner rescored approximately the same number of protocols. Approximately 30% of the protocols were scored a third time by the investigator to ensure accuracy.

Two types of reliability figures were obtained. The first represented the total number of scores that were accurately calculated by the initial scorer divided by the total number of scores calculated for all subjects on a particular test. For example, each TOLD-I protocol requires calculation of 19 scores. If an examiner made a calculation error on 2 scores, the agreement figure for that protocol

would be 17/19. Agreement on calculation of scores for the four tests were: (a) WRMT-R--94.9%, (b) TOLD-I--99.0%, (c) ITBS--98.7%, and (d) WISC-R/PIQ--98.9%.

Occasionally, questions arose concerning how to score a response on particular items of the WRMT-R and the TOLD-I. Problems of this type that could not be resolved by using information in the test manuals were resolved by the investigator in conjunction with the test authors. Consequently, there was no disagreement on the scoring of these items. A figure was calculated, however, representing the number of items on which questions arose divided by the total number of items in a test. No questions arose concerning the ITBS and the WISC-R/PIQ. Reliability figures for the WRMT-R and TOLD-I were 98.1% and 94.8%, respectively.

Data Analysis

Tests of Differences among Groups in Overall Reading Performance and Tests of the Statistical Assumptions

The initial plan for the analysis of the data called for two multivariate analyses of covariance (MANCOVA) (Tabachnick and Fidell, 1983) to test the hypothesis of no difference among the three groups in overall reading performance. In the first MANCOVA, WRMT-R subtest scores were to serve as the dependent measures and in the second MANCOVA, ITBS subtest scores were to serve as the dependent measures. For both analyses, PIQ would be used as the covariate.

Tests of the Assumptions. For each MANCOVA, tests of statistical assumptions were conducted. Box's M test (Tabachnick and Fidell, 1983) was used to test the assumption of homogeneity of multivariate variance-covariance for the matrix comprised of the WRMT-R subtests and PIQ and for the matrix comprised of the ITBS subtests and PIQ. Results of both tests rejected the assumption of homogeneity of multivariate variance-covariance ($p < .001$). Investigation of the univariate tests, using the Bartlett-Box procedure (Tabachnick and Fidell, 1983) demonstrated homogeneity of variance ($p < .01$) for some, but not all, of the dependent variables. The following variables were accepted as having homogeneous variances: (a) word attack [$F(2, 1544) = 4.38$], (b) word comprehension [$F(2, 1544) - 3.65$], (c) passage comprehension [$F(2, 1544) - 4.02$], and (e) reading [$F(2, 1544) = 1.51$]. Word identification and PIQ both failed the univariate assumption of homogeneity of variance. As a result of the rejection of this assumption in both multivariate and univariate tests, it was decided that use of MANCOVA was statistically inappropriate.

One-way analyses of variance (ANOVA) (Tabachnick and Fidell, 1983) were conducted to test the assumption of homogeneity of regression slopes ($p < .05$) of PIQ on each of the dependent variables. The assumption of homogeneity was accepted for all of the variables except word identification. Large differences, however, were found among the coefficients of the slope for each variable by group. It is quite likely that the statistical finding of homogeneity of regression slopes was due to insufficient power of the test. In addition, scatterplots of the residuals showed failure of the assumptions of homogeneity of

variance for all subtests and failure of the assumption of linearity for word identification, word comprehension, and passage comprehension. Therefore, due to the inability of the covariate to meet the assumptions of homogeneity of variance, homogeneity of regression, and linearity, use of PIQ as a covariate was eliminated. Correlational analyses were conducted to investigate the relationship of PIQ and the reading subtest scores for the purpose of determining if its elimination might introduce the confounding variable of differences in nonverbal intelligence among groups. Results of these analyses are discussed in Chapter 4, Results.

To ascertain whether or not it would be appropriate to use multivariate analysis of variance (MANOVA) (Tabachnick and Fidell, 1983) to answer the question of differences in overall reading performance among groups, multivariate tests for homogeneity of variance-covariance were again conducted, this time excluding PIQ. Again results of the Box's M test rejected the ITBS ($p < .001$), but this time, the WRMT-R subtests were accepted as displaying multivariate homogeneity of variance [$F (20, 444) = 1.49$, $p < .001$]. Results of the univariate tests on the WRMT-R subtests showed homogeneous variances among groups for word attack [$F (2, 1544) = 4.38$, $p < .01$], word comprehension [$F (2, 1544) = 3.65$, $p < .01$], and passage comprehension [$F (2, 1544) = 2.91$, $p < .01$], but not for word identification. Because only three of the six reading subtests met the assumption of homogeneity of variance required by multivariate statistical analyses, further multivariate tests were not conducted. Consequently, it was impossible to answer questions #1 and #3.

Differences in Reading Subtest Performance by Groups

To answer the question concerning differences among groups in performance on the individual reading subtests, it was necessary to select a statistical analysis that did not require homogeneity of variance. Univariate analyses were conducted using both the Welch and Brown-Forsythe procedures. These procedures are parametric alternatives to ANOVA that have been shown to have acceptable Type I error rates and adequate power when sample sizes and variances are unequal (Tomarkin and Serlin, 1986). The Scheffé procedure (Tabachnick and Fidell, 1983) was used for the post hoc comparison of subtest means among groups.

Interrelationships among the Dependent Variables

A discriminant function analysis had been planned to determine the relative contribution of each dependent variable in separating the groups (Bray and Maxwell, 1982). However, because discriminant function analysis is a multivariate test and multivariate assumptions were not met, the analysis was not conducted.

Pearson product-moment correlations (Minium, 1978) were obtained for each pair of dependent variables by group to ascertain if identifiable patterns of interrelationships could be found and if patterns would differ by group.

CHAPTER 4

RESULTS

This chapter describes the results of the investigation of differences in reading subskills between children classified as having receptive oral language impairments, children classified as having expressive oral language impairments, and children with no identified language impairment or other learning handicaps. The findings are presented according to the research questions posited.

Major Findings

Question #1

Does overall reading performance as measured by the Woodcock Reading Mastery Tests-Revised (WRMT-R) and the Iowa Tests of Basic Skills (ITBS) differ significantly for the three groups (Receptives, Expressives, and Controls) when Performance IQ (PIQ) as measured by the Wechsler Intelligence Scale for Children-Revised (WISC-R) is controlled?

Failure to meet the requisite statistical assumptions of multivariate analyses made it impossible to conduct the tests necessary to answer this question.

Due to the inability of PIQ to meet the assumptions of homogeneity of variance and homogeneity of regression, its use as a covariate was eliminated.

As an indication of the effect on reading scores, uncontaminated by heterogeneity of variance and regression, Pearson product-moment correlations (Minium, 1978) were obtained between PIQ and each reading subtest by group. For the Controls (n = 37), correlations ranged in magnitude from .34 to .52, and were significant at the .05 level. For the SLI group (n = 29), correlations ranged in magnitude from -.002 to -.19 and were nonsignificant. Consequently, omission of PIQ as a covariate did not appear to introduce difference in nonverbal intelligence as a confounding factor.

Question #2

Do the three groups differ significantly from each other on the individual reading subtests of word attack (WA), word identification (WI), word comprehension (WC), and passage comprehension (PC) as measured by the WRMT-R, and on the reading subtests of vocabulary (VOC) and reading (RDG) as measured by the ITBS?

Univariate analyses using the Welch (W) and Brown-Forsythe (BF) procedures (Tomarkin and Serlin, 1986) resulted in significant differences among the three groups on all of the reading subtests. Alpha was set at a reduced level ($p < .008$) to correct for performing multiple analyses on interrelated variables. Only the Welch statistic is reported in the following results. Significant differences were found among the groups for word attack [$F(2, 10) = 37.96$], word identification [$F(2, 10) = 65.86$], word comprehension [$F(2, 10) = 72.50$], passage comprehension [$F(2, 11) = 77.97$], vocabulary [$F(2, 15) = 88.54$], and reading [$F(2, 10) = 23.53$]. Table 3 presents summary statistics from these analyses for each of the reading subtests.

Table 3. Summary of univariate analyses of variance for each reading subtest

Subtest	Test Statistic	df	$^{a}MS_{e}$	F
WA	W	2, 10	194.85	37.96*
	B-F	2, 11		31.42*
WI	W	2,10	143.52	65.86*
	B-F	2,18		64.19*
WC	W	2, 10	165.44	72.50*
	B-F	2, 17		74.18*
PC	W	2, 11	157.33	77.97*
	B-F	2, 27		88.60*
VOC	W	2, 15	82.09	88.54*
	B-F	2, 40		67.86*
RDG	W	2, 10	140.74	23.53*
	B-F	2, 8		13.40*

[a]Mean square error terms were obtained from ANOVA's.

*p <.008

Note: WA = word attack; WI = word identification; WC = word comprehension; PC = passage comprehension; VOC = vocabulary; RDG = reading comprehension; W = Welch statistic; B-F = Brown-Forsythe statistic.

The Scheffé procedure was used for comparison of subtest means among groups. Results showed that the Controls performed significantly ($p < .05$) higher than both the Receptives and the Expressives on all of the reading subtests. Differences in means between the Controls and the Receptives ranged from 20.22 standard score points in RDG to 42.34 in WC. Differences between the Controls and Expressives ranged from 16.26 in RDG to 41.58 in WI. No significant differences were found between the Receptives and the Expressives on any of the reading measures. Differences between the means for all measures were less than 7.4 points, with no clear pattern of either language-impaired group scoring higher than the other. Table 4 displays the obtained means and standard deviations for each reading subtest by group.

Because no differences were found between the performance of the Receptives and the Expressives on any of the reading measures, and because there was some question as to whether the Expressive group's sample size ($n = 5$) could be considered a stable representation of children with expressive language impairments, these two groups were combined to form a single Severe Language Impaired (SLI) group ($n = 29$). Therefore, the analyses concerning correlational patterns were conducted using two groups (Control and SLI) rather than three groups (Control, Receptive, Expressive).

Table 4. Obtained cell means and standard deviation by group for reading subtests and performance IQ

Subtest	M/SD	Group Control (n = 37)	SLI (n = 29)	Receptive (n = 24)	Expressive (n = 5)
WA	M	99.76	66.45	66.83	64.60
	SD	10.29	17.41	17.47	19.01
WI	M	101.38	64.72	65.75	59.80
	SD	7.85	15.78	16.42	12.48
WC	M	108.97	67.21	66.63	70.00
	SD	9.84	15.79	16.43	13.51
PC	M	100.03	59.72	59.38	61.40
	SD	10.17	14.89	15.86	10.01
VOC	M	108.59	85.87	87.15	79.71
	SD	7.49	10.99	11.57	4.31
RDG	M	107.63	88.09	87.41	91.37
	SD	11.59	12.10	10.57	19.12
PIQ	M	107.08	95.31	94.54	99.00
	SD	13.34	7.30	7.24	7.18

Note: M = 100, SD = 15

Question #3

What is the relative contribution of each of the reading subtests to the difference among groups?

Due to the failure of the dependent variables to meet the requisite statistical assumptions for multivariate analyses, this question could not be investigated.

Question #4

For each group, are there identifiable correlational patterns among WA, WI, WC, PC, VOC, and RDG?

To ascertain whether or not identifiable correlational patterns could be found among reading subtests for each group (Control and SLI), Pearson product-moment correlation coefficients were obtained for each pair of subtests. Table 5 displays the correlations among subtests by group.

Correlation coefficients of .10, .30, and .50 have been considered to represent low, moderate, and high degrees of relationship, respectively (Cohen, 1969). For the Controls, the correlations of all except one of the subtest pairs appear to be high, ranging in magnitude from .52 to .78. WA and PC are moderately correlated at a magnitude of .46. The magnitudes of all correlations are significant at the .05 level. Thus, for the Controls, it appears that regardless of the test one uses (WRMT-R or ITBS), all subtests measure similar abilities.

For the SLI group, all of the subtest pairs of the WRMT-R were highly correlated, ranging in magnitude from .66 to .91. The relationships of these magnitudes were significant at the .05 level. Conversely, the two subtests of the ITBS shared a low and nonsignificant

Table 5. Pearson product-moment correlations among reading subtests by group

	Subtests					
	WRMT-R				ITBS	
Subtest	WA	WI	WC	PC	VOC	RDG
Controls (n = 37)						
WA	1.00	.74*	.56*	.46*	.73*	.52*
WI		1.00	.78*	.64*	.77*	.60*
WC			1.00	.75*	.78*	.75*
PC				1.00	.64*	.71*
VOC					1.00	.78*
RDG						1.00
SLI (n = 29)						
WA	1.00	.77*	.66*	.67*	.37*	.27
WI		1.00	.88*	.91*	.45*	.36
WC			1.00	.90*	.41*	.49*
PC				1.00	.35	.37*
VOC					1.00	.24
RDG						1.00

*p <.05

relationship (r = .24). Examining the correlations between the four WRMT-R subtests and the two subtests of the ITBS (VOC and RDG), seven of eight subtest pairs were only moderately correlated, showing magnitudes ranging from .35 to .49. Five of these reached significance. The eighth subtest pair, WA and RDG, shared a low and nonsignificant degree of correlation (r = .27). These relationships indicate that while all of the WRMT-R subtests appear to measure the same ability or similar abilities, they are not measuring the same ability as either of the ITBS subtests. In addition, the two ITBS subtests appear to be measuring different abilities.

Question #5

Comparing groups, are there differences in the correlational patterns of WA, WI, WC, PC, VOC, and RDG?

Differences were apparent between the Control group and the SLI group in the correlational patterns of the reading subtests (see Table 5). For the Control group, all but one subtest shared a high degree of relationship. For the SLI group, the WRMT-R subtests were highly intercorrelated, but were only moderately correlated with the ITBS subtests. Also, this group demonstrated a low correlation between the two ITBS subtests. Consequently, it appears that all reading subtests measure the same ability or similar abilities in the Controls, but for the SLI group, the WRMT-R subtests as a set, VOC and RDG, measure somewhat different abilities.

Incidental Findings: Grade Equivalents

Some incidental findings emerged from this study. It was possible to obtain grade equivalents for the Control and the SLI groups and the data are summarized in Table 6.

Table 6. Obtained means and standard deviation ranges by group for reading subtest grade equivalents

Subtest	M/SD	Controls Grade 5 (n = 22)	Controls Grade 6 (n = 15)	Controls Combined (n = 37)	SLI Ungraded (n = 29)
WA	M	4.6	6.4	5.1	1.6
	±1 SD	2.5-9.9	3.0-16.9	2.7-16.9	1.2-2.2
WI	M	5.0	6.0	5.4	2.3
	±1 SD	4.1-6.8	4.5-8.3	4.2-7.4	1.8-3.1
WC	M	7.7	12.9	9.3	1.4
	±1 SD	4.5-13.0	7.1-16.9+	5.2-15.1	[a]BN-2.2
PC	M	5.1	6.2	5.5	2.1
	±1 SD	3.6-7.7	4.5-9.4	4.0-8.2	1.4-2.8
VOC	M	5.0	6.3	-	2.1
	±1 SD	4.5-6.1	5.6-7.4	-	1.0-2.9
RDG	M	5.2	6.5	-	2.8
	±1 SD	4.2-6.5	5.4-8.0	-	1.3-3.2

[a]Below norms

Because the fifth and sixth grade subjects were given different levels of tests within the ITBS battery, it was not possible to obtain combined group scores for them on the ITBS. Combined scores were obtained for them on the WRMT-R. When considering the mean grade scores obtained by the Controls, it is important to note that the fifth and sixth grade subjects were in the fourth and fifth grades, respectively, when they took the ITBS in the spring of 1985.

The Controls scored near grade level to above grade level on all of the reading subtests. On the WRMT-R, the grade equivalents of the SLI subjects ranged from 1.6 on word attack to 2.3 on word identification, which represents a reading delay from 3.1 years (WI) to 3.5 years (WA) in comparison to their age peers. Word comprehension scores were not included in calculating grade score differences between the groups, because of possible spurious inflation of these scores for the Controls. See Chapter 5, Subtest Profiles for Each Language Group, for a discussion of this problem. On the ITBS, the Control group scored at or above grade level, which represents grade score differences from 2.4 to 4.2 years above the SLI group.

Summary of Results

In summary, because the test data failed to meet the requisite statistical assumptions for multivariate analyses, Questions #1 and #3 could not be answered.

Results of the univariate tests of the difference in reading performance among groups showed significant differences on all reading measures. Post hoc analyses demonstrated that the Controls performed

better than either of the language-impaired groups on all reading measures and that the Receptives and the Expressives did not perform significantly different from each other on any reading measure. Since no differences were found between the language-impaired groups, they were combined into a single SLI group for the correlational analyses.

Results of the correlational analyses for the Controls demonstrated a high degree of relationship for almost all of the reading subtest pairs. The SLI group demonstrated high correlations among all of the WRMT-R subtests, but a low correlation between the ITBS subtests. Correlations between the WRMT-R subtests and the ITBS subtests were moderate for almost all of the subtest pairs.

Concerning grade equivalent scores, the Control group demonstrated reading achievement near to above grade level, whereas the SLI group performed from 2.4 to 4.2 years below the Controls.

CHAPTER 5

SUMMARY AND DISCUSSION

This chapter presents an overview of the purpose of the study, the procedures, and the results. It includes a discussion of the major findings, as well as some incidental observations concerning the sample and the entire group of children enrolled in the SLI classes from which the sample was selected. Based on the findings of this study, implications for education are presented and recommendations for future research are suggested.

Summary

Review of Literature

The research literature has substantiated that many children diagnosed as having oral language impairments demonstrate reading problems at school-age (Aram et al., 1984; Hall and Tomblin, 1978; Levi et al., 1982). Also, these children require tutoring, retention, and special educational programs in greater proportion than their non-handicapped peers (Aram et al., 1984; McGrady, 1964; Strominger, 1983). However, few studies have investigated the achievement of language-impaired children on individual reading skills, or the relationship between type and severity of language deficit and type and severity of reading disability. The purpose of this study was to investigate the

performance of children with receptive/expressive language impairments (Receptives), children with expressive language impairments only (Expressives), and children with no identified language or learning problems (Controls) on the reading skills of word attack, word recognition, vocabulary, and comprehension.

Procedures

Twenty-nine children enrolled in self-contained, intermediate level classes for the severely language impaired (SLI), and 37 normal children, ages 10-0 to 12-11 years, were chosen from 10 elementary schools as meeting the subject selection criteria. Subsequently, the SLI subjects were categorized as Receptives (n = 24) or Expressives (n = 5) based on their performance on the Test of Language Development-Intermediate (TOLD-I) (Hammill and Newcomer, 1982). All subjects were tested on the Woodcock Reading Mastery Tests-Revised (WRMT-R) (Woodcock, in progress). Only the SLI subjects were given the two reading subtests from the Iowa Tests of Basic Skills (ITBS) (Hieronymus et al., 1983) as these test scores were already available for the Controls.

Statistical analyses were selected to investigate five research questions. However, due to the failure of the data to meet the requisite statistical assumptions, Performance IQ (PIQ) of the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler, 1974a) could not serve as a covariate. Additionally, it was not possible to conduct the multivariate tests necessary to answer the questions concerning differences among the three groups in overall reading achievement

(Question #1) and the relative contribution of each reading subtest in discriminating among the groups (Question #3). Univariate analyses (Welch and Brown-Forsythe) that did not require homogeneity of variance were conducted to answer the question concerning differences among the three groups on the reading subtests of word attack, word identification, word comprehension, and passage comprehension from the WRMT-R, and vocabulary and reading from the ITBS. Because no differences were found between the Receptives and the Expressives, they were combined to form a single SLI group. Correlational analyses (Pearson product-moment) were conducted to ascertain correlational patterns among the subtests for the Controls and the SLI group. Grade equivalents obtained for each group allowed for observations regarding relative strengths or weaknesses on the reading subtests by group.

Results

Results of the univariate tests demonstrated that the Controls performed significantly better on all of the reading subtests than did either of the language-impaired groups. No difference was found between the Receptives and the Expressives on any subtest.

Results of the correlational analyses found high correlations among all reading subtests for the Controls, regardless of test. For the SLI group, the subtests of the WRMT-R were highly correlated with each other, but only moderately correlated with the subtests of the ITBS (VOC and RDG). Also, for the SLI group, VOC and RDG shared a low correlation.

The Control group demonstrated reading achievement at near to above grade level on all subtests, whereas the SLI group scored from 2.4-4.2 years below the Controls on all subtests (excluding word comprehension).

Discussion of Major Findings

The major findings are discussed in regard to differences in reading performance between the Control group and the SLI group, an absence of differences between Receptives and Expressives, and hypotheses for the correlational patterns found for each group.

Differences among Groups on Reading Subtests

The findings of the present study were that childrn without identified handicaps were superior to SLI children on the individual reading skills of word attack, word recognition, vocabulary, and comprehension, regardless of test. On all subtests of the WRMT-R, the SLI children scored more than 2 standard deviations below the Controls, and on the subtests of the ITBS, they scored more than one standard deviation below the Controls. From the results of research reviewed previously, this finding was predictable, particularly because the children in this study were chosen for the severity of their language impairments. A finding that was unexpected, however, was that no differences were found between SLI children classified as Receptive and those classified as Expressive on any of the reading skills.

Because the major focus of the present investigation was the differential effects of specific modality deficits on individual

reading skills, possible explanations for the absence of differences between the two language-impaired groups are discussed below.

Absence of Differences between Receptives and Expressives. The lack of differentiation between the two SLI groups on reading achievement may have a number of possible explanations. Two of the more probable are (a) that receptive versus expressive language deficits do not have differential effects on children's reading skills and (b) that with a sample size of 5, either the statistical test was not sufficiently powerful to find differences where they existed, or the subjects comprising the sample were not an adequate representation of the population.

The first explanation is contrary to McGrady's (1964) findings that Expressives obtained reading scores within the normal range. However, McGrady had classified his subjects as Receptive or Expressive based on preschool clinical records and assessed their reading achievement a number of years later. The hypothesis of no difference is also in disagreement with Johnson and Myklebust (1967), who have stated that an expressive language impairment should not necessarily interfere with silent reading comprehension. However, it has been pointed out that deficits in expressive syntax (Noell, 1983) or difficulty in organizing and integrating ideas (Feagans, 1983; Noell, 1983) may adversely affect reading comprehension.

The second explanation, that a sample size of 5 is likely to result in a Type II error, is also a possibility. Five subjects cannot be considered an adequate representation of a population, no matter how

rare the prevalence of children in this population. By chance, the Expressives in this sample might be considerably poorer readers than most of their expressively-impaired peers. The other explanation, that these children did score better than the Receptives, but that the statistical test was not sufficiently powerful to find the difference, is unlikely. Visual inspection of their scores found that 4 subjects had very poor performance on all reading subtests with one outlier having moderately low scores.

Consequently, a major problem in this study appears to be the inadequate size of the Expressive group. Four explanations are posited to answer the question of why this group was so much smaller than the Receptive group. These explanations concern (a) the prevalence of severely expressively-impaired children in the population of language-impaired children, (b) the criteria used to group the SLI subjects, (c) the obscuring of obvious modality deficits by age 10, and (d) the placement of Expressives in classes other than SLI.

Based on the findings of this study, one possible explanation for the small Expressive group is that children with severe expressive language impairments may represent a smaller population than those with severe receptive impairments. No prevalence data were found to support or refute this possibility.

The second explanation concerns the adequacy of the Test of Language Development-Intermediate (TOLD-I) (Hammill and Newcomer, 1982) in assigning subjects to language groups, based on the criteria established by this investigator. To answer this question, a validation procedure was established that compared teachers' classification of

SLI subjects to that of the TOLD-I. This procedures was described in Chapter 3, Methodology, Selection and Assignment to Groups. Agreement between the teacher and test classifications was 89.7%, indicating that generally, the TOLD-I assigned subjects to the same groups as did the teachers. When assignment to the Expressive group was considered separately, however, agreement between the TOLD-I and teachers was 50%, compared with 88.5% for the Receptives. Consequently, compared to teacher judgment, the criteria established for the TOLD-I was effective in classifying the Receptives but was considerably less so in classifying the Expressives. According to the teachers' classifications, only 4 of the 29 subjects would have been placed in the Expressive group. (It was interesting to note, however, that of the 8 excluded subjects, 4 were identified by the teachers as Expressives. Even if these subjects were included, the Expressive group would still be small.) Therefore, the adequacy or inadequacy of the TOLD-I in identifying Expressives did not appear to be the reason for their small number.

It is also possible that the most obvious signs of expressive modality deficit wash out by age 10, except in children with the most severe expressive deficits. No studies were located that studied receptive/expressive patterns of impairment in children above the age of 7.

A fourth reason for the scarcity of subjects classified as Expressive may be that children who have good language comprehension skills may be placed in less restrictive educational environments than the self-contained SLI class. For example, Expressives may be placed

in the self-contained learning disabilities classroom, often considered the next step up from the SLI class in the service delivery continuum, or mainstreamed for most classes and receiving only resource help. Conversely, children with receptive deficits may be judged as having a more severe impairment and needing the more intensive treatment that is available in the SLI class. Consequently, the number of children in SLI classes may not be representative of Expressives in the language-impaired population.

The answer to the question concerning the disproportionate number of Expressives and Receptives is beyond the scope of this study. Nevertheless, results of the present study based on the TOLD-I support existence of the oral language modality deficits. Results based on the WRMT-R and the ITBS do not support the notion that each pattern of impairment has a differential effect on reading achievement; however, this may have been due to insufficient sample size.

Correlational Patterns among Subjects

For the Controls, all except one of the reading subtest pairs were highly correlated ($r < .49$) with each other, and the remaining pair approached that level ($r = .46$). This indicated that all of the subtests tend to measure aspects of the same ability or similar abilities.

The SLI group, however, evidenced a different pattern of subtest correlations. Whereas the WRMT-R subtest pairs were all highly correlated with each other, they shared only a moderate degree of relationship with the ITBS subtests ($r = .30$ to $.49$). In addition, VOC and RDG (ITBS) shared a low intercorrelation ($r < .30$). Given these

results, several interpretations are tenable and pertain to (a) the uniformly high correlations among all of the subtests for the Controls, (b) the high correlations among the WRMT-R subtests for the SLI group and the low correlation between the two subtests of the ITBS, and (c) the moderate correlations between the WRMT-R and the ITBS.

The most immediate interpretation of these results would be that within the Control group, the underlying dimension being measured is a generalized reading ability. PIQ, however, also shares a moderate to high degree of relationship ($r = .34$ to $.52$) with each of the reading subtests, although it presents very different types of tasks than do the reading subtests. Consequently, it appears that an aspect of general performance, such as test-taking ability, may be one important ability being measured by the WRMT-R and the ITBS.

Four explanations can be postulated for the pattern within the SLI group of high correlations among the WRMT-R subtests and low correlations between the two ITBS subtests. The first follows the assumption that, similar to the Controls, the underlying ability measured by the WRMT-R was general performance, whereas the ITBS subtests measured some other, more specific, abilities. This explanation appears to be inadequate because the correlations between PIQ and each of the WRMT-R subtests were low to negligible ($r = -.11$ to $-.002$).

The second hypothesis considers the reading-language connection. Descriptions of this connection by such language theorists and researchers as Blachman (1984), Menyuk and Flood (1981), Snyder (1980), and van Kleeck (1984) might be summarized as follows. Word attack requires phonological, morphological, and metalinguistic abilities.

Word recognition may require all of these skills plus the ability to access one's internal lexicon. Vocabulary requires at least the latter ability, plus the ability to access one's store of world knowledge for comprehension, refinement, and clarification of meanings. Comprehension of text could require all of the aforementioned language abilities, competence in semantic/syntactic relations in units of language longer than a phrase, and the ability to organize and store familiar and unfamiliar ideas. Success across reading skills requires cumulative language competence as well as the application of these skills to the reading task. Thus, for the purposes of this discussion, it does not seem feasible to consider general oral language competence and general reading competence as distinct abilities.

The hypothesis concerning the relationship between language and reading was that the WRMT-R measures a generalized reading/language ability, whereas the VOC and RDG subtests of the ITBS measure more specific reading/language skills. If this were true, one would expect to find that whether individual SLI subjects scored similarly or differently on VOC and RDG, their WRMT-R subtest scores would be similar to each other. Visual inspection of the data did not bear out this hypothesis.

The third explanation for high correlations between the WRMT-R subtest pairs and low correlations between the ITBS subtests was that the major ability measured by the WRMT-R is the ability (or inability) to execute the cognitive/linguistic processes involved in the type of response required. Throughout all of the subtests except word attack, after the printed word(s) are identified, a successful response

requires accessing one's world knowledge for comprehension. For the WRMT-R subtests, formulation and execution of a response require accessing of one's internal lexicon, choice of an appropriate word, and expression of that word. Difficulty with the complexity of the response requirement would interfere with a subject's performance on all of the WRMT-R subtests except, perhaps, word attack. However, since the formulation and expression steps of the response requirement are obviated by the multiple-choice format of the ITBS, these scores would be less influenced by response requirements than WRMT-R scores.

A variety of oral language deficits might interfere with response on the WRMT-R, but not on the ITBS. For instance, a word retrieval problem, one of the most obvious deficits, would be expected to impede accessing of one's internal lexicon for the purpose of choosing an appropriate response, whereas on the ITBS one has only to recognize the correct answer. None of the subjects presented obvious manifestations of the behaviors indicative of a deficit in word retrieval, but this hypothesis remains tenable.

If the WRMT-R response requirement were not a hindrance, then the WRMT-R and the ITBS should measure similar abilities. If the response requirement did interfere with the performance of the SLI subjects on the WRMT-R, one would expect to see a lesser difference between the scores of the Control group and the SLI group on the ITBS than on the WRMT-R. In fact, this pattern was evident in the data. Whereas the difference scores (Control>SLI) for the ITBS subtest means were 19.5 and 22.7, the difference scores for the WRMT-R means ranged from 33.3 to 41.8. However, another viable explanation for this

pattern, based on test design, is presented later in this chapter (see Incidental Observations from the Study, Test Characteristics of the Sample).

Lastly, it is possible that the WRMT-R measures some general ability that shares a moderate degree of relationship to the ability assessed by the ITBS. Given the low correlation between VOC and RDG, one would expect that each measures quite a different aspect of the ability underlying the ITBS.

Three explanations are posited for the moderate correlation between the WRMT-R and the ITBS, two of which focus on a possible interaction between the ability being assessed, such as reading, and the response requirement. As described above, the comprehension processes involved in responding to items in both tests are similar, but the processes necessary for formulation and expression of a response are different. It is possible that both tests measure very similar abilities, but that the difference in the response requirements, interacting with the degree of difficulty each child has with the requirement, reduces the relationship between them. Conversely, the abilities assessed by each test may be quite different, but similarities in the response requirements increase the degree of relationship among the scoring patterns. The third explanation, noted above, is that the tests measure two different abilities that are moderately related to each other.

Incidental Observations from the Study

In addition to answering the research questions which were the focus of this study, the data yielded some interesting information concerning test characteristics of the sample and general characteristics of children enrolled in the SLI classes from which the sample was drawn.

Test Characteristics of the Sample

Results from the test score characteristics of the sample permitted the investigator to establish profiles of standard score subtest means for each group on the WRMT-R and the ITBS respectively, comparisons of WRMT-R and ITBS standard score subtest means by group, and grade equivalents.

Subtest Profiles for Each Language Group. The subtest means for each group on the WRMT-R depict a rather flat profile for the Control, Receptive, Expressive, and the combined SLI groups, indicating that by group, the subjects did not tend to do better or worse on any particular reading skills (see Chapter 4, Results, Table 2).

The only break in this pattern occurred when the Controls scored 7.6 points higher on word comprehension than on any other WRMT-R subtest. This appears to be an artifact of the test rather than a true indication of increased vocabulary ability. The pattern of inflated word comprehension scores was found in the protocols of almost all of the Control subjects in the study. Twenty-four of the 37 Controls scored higher on word comprehension than on any other WRMT-R subtest, and in four other cases, word comprehension was tied with another

subtest for the highest score. In addition, the higher a subject's scores on the other subtests, the more inflated word comprehension was in relation to them. Consequently, the pattern was quite pronounced for almost all of the Controls (more so for the particularly good readers) and not nearly so noticeable for the SLI subjects. Before the data for the present study were analyzed, Dr. Woodcock and his staff had spent two months tackling this problem. Although they made a number of changes in the scoring tables which resulted in lower scores, the spurious inflation was not completely eliminated. Because the differences among groups were the focus of this study and the inflation seemed to affect all groups, albeit not equally, the decision was made to proceed with analysis of the data based on the revised tables. The comparison of word comprehension scores by group mirror the results on the other WRMT-R subtests. Consequently, the findings relative to the differences among groups on word comprehension are probably valid, whereas the finding that the Controls tend to score higher on word comprehension than on the other subtests appears to be spurious.

This inflation is also evident in the grade equivalents for the Controls. Consequently, word comprehension was not included in the calculation of grade score differences between the Control and SLI groups.

Results on the subtests of the ITBS were similar to those on the WRMT-R. Each group scored approximately the same on vocabulary as it did on reading. Although the Expressives appeared to have a much

higher score on reading (91.37) than on vocabulary (79.71), the difference was not significant ($p > .05$).

Comparison of WRMT-R and ITBS Scores for Each Group. It is tempting to compare the performance of each group on the WRMT-R subtests to its performance on the ITBS, specifically regarding the subtests thought to measure analogous skills. These were WC and VOC, and PC and RDG. The obvious problem that arises, however, is that any apparently meaningful findings might have been due to the difference in norming samples rather than the underlying abilities of the groups. Taking this caution into consideration, some extreme differences should be noted. Due to the spurious inflation of word comprehension, it is impossible to discern whether or not a discrepancy exists between vocabulary and word comprehension for the Controls. The SLI group, however, scored 18.66 points higher on vocabulary than on word comprehension. Whereas the Controls scored 7.6 points higher on reading than on passage comprehension, the difference in the same direction for the SLI group was 28.4 points. Not only did the SLI subjects score substantially higher on the ITBS subtests than on the WRMT-R, even relative to the Controls, but their ITBS scores were within one standard deviation below the mean, placing them within the normal range.

The question arises as to why the SLI subjects appear to perform so much better on the ITBS than on the WRMT-R. The first, and perhaps the most probable explanation, is that the difference is due to discrepancies between the two norming samples or between test development procedures. However, this explanation does not account

for the extreme difference between ITBS and WRMT-R scores found in the SLI group but not in the Controls.

An explanation that would account for this difference concerns the level of the ITBS battery administered to the SLI group. The Level 9 test, which is normally administered to third graders, was the test judged to be most appropriate to the reading and language levels of the SLI subjects. After administration of the test, scores obtained for the entire sample on the ITBS developmental standard score scale were transformed to a scale comparable to the WRMT-R standard score scale (M = 100, SD = 15). However, the raw score mean for Level 9 (M = 16.0) used in the formula for the transformation was considerably lower than the raw score means for Level 10 (M = 23.6) and Level 11 (M = 24.4) which were the levels administered to the Controls. It is possible that the transformation of the SLI group's scores based on the lower mean score resulted in inflated scores when compared to the transformed scores of the Controls. In other words, the SLI group was compared only to the third graders in the norm sample rather than to their age or grade peers. This inflation would not occur in the SLI scores of the WRMT-R because this test is not separated by grade levels, and children may be compared by age or grade level to the entire norm sample. On the WRMT-R, both the Control group and the SLI group were compared to their age peers. This explanation would account for the greater difference on the WRMT-R than on the ITBS in subtest means between Control and SLI subjects, but not for the uniformly higher performance of both groups on the ITBS.

One reason for higher ITBS scores than WRMT-R scores focuses on the task requirements and was presented previously (see Discussions of Major Findings, Correlational Patterns among Subtests). The response requirement in the WRMT-R, generally a retrieval task, may be more difficult for language-impaired children to perform than the recognition task required by the ITBS.

Other tentative explanations involve possible differences between group versus individual testing (although one would expect the advantage to lie with the WRMT-R) and the possibility that the ITBS Level 9, taken by all of the SLI subjects, had an inappropriately high basal, making the test unreliable at the lower end. One further possible difficulty with the reliability of the Level 9 test is that scores lower than those obtained for the third graders in the norm sample were extrapolated, since the Level 9 norm sample did not contain younger children.

Investigation of grade equivalent scores for both the Control and the SLI groups yielded disconcerting results. Excluding word comprehension, the Control group's grade scores ranged from 5.1 to 5.5 on the WRMT-R (grades 5 and 6 combined) and from 5.0 to 6.5 on the ITBS (grades 5 and 6 separate), whereas the SLI group's scores ranged from 1.6 to 2.3 and 2.1 to 2.8, respectively. Since most of the SLI subjects had been in special education classes since kindergarten or first grade, a variety of questions arise concerning current practices in the teaching of reading in SLI classes and SLI students' rate of progress. Although standard score differences were found between the ITBS and the WRMT-R for both groups, no appreciable differences

between the ITBS and the WRMT-R in grade equivalent scores were demonstrated for either group.

General Characteristics of Children in the SLI Classes Participating in the Study

An interesting sidelight of this study was the opportunity to investigate the general characteristics of children served in the SLI classes from which this sample was drawn (see Chapter 3, Methodology, Selection and Assignment to Groups and Table 1). These classes are designated for children whose primary learning disorder has been judged to be in the area of oral language (see Appendix B). Children who have learning problems judged to be primarily due to English as a second language, emotional disturbance, subnormal intelligence, or sensory deficits are generally excluded from SLI programs. Consequently, it was interesting to note that almost half (49.3%) of the children classified as SLI did have one or more characteristics with which a language impairment is normally associated, although in most cases these would not have been considered to be the primary impairment. (These children, however, were excluded from the present study.) Four of the ten SLI teachers judged one child in each of their classes as having language problems secondary to a severe emotional disturbance. When the study was completed, an additional child, one of the eight subjects excluded due to the TOLD-I grouping criteria, was reported as being primarily severely emotionally disturbed. (This child is not reflected in the figures presented in Table 1.) The composition of these classes emphasizes the importance of clearly defined samples in studies including language-impaired children.

Implications for Education

It appears indisputable, from the findings of the present study and those of previous studies, that children with language impairments are poor readers. The consequences of combined reading and language impairments are more far-reaching than one might assume at first, for a language impairment may enter a child into a debilitating cycle of generalized impairment. A major way of acquiring world knowledge, aside from direct experience, is in listening to others recount their own experiences or describe knowledge they have acquired by other means. Language-impaired children are less likely than most children to understand and integrate what they are hearing. Consequently, they bring less world knowledge to the task of reading, making it more difficult for them than for others to comprehend the message conveyed in the text. Thus, the new information language-impaired children glean from the text is limited, or perhaps misinterpreted, further limiting the resources they have at their disposal for interaction with other people and with reading materials. This inability to use language to aid in information gathering and comprehension of text is obviously a serious impediment to all academic success. The findings of this study carry some implications for the education of language-impaired children.

Teaching Methods

As a group, the SLI subjects were functioning similarly to first and second grade children, 2.4 to 4.2 years below their age-peers. Given this profound reading disability, and considering that

most of these children had been in special classes since they started school, immediate concerns regarding their education focus on their rate of progress in learning to read and the methods of teaching reading currently implemented in their classrooms. There appears to be a need to find or develop more effective teaching methods than those currently in use, assuming that the children have the ability to overcome or compensate for their disability.

Individualized Needs of Language-Impaired Children

Reading. Although, as a group, no profiles of reading strengths were evident, visual inspection of the data found relative strengths and weaknesses for individual children. Consequently, it appears that all areas of reading are areas of need for language-impaired children as a group, but for individuals, reading training may focus on particular skills and deficits that require attention.

Learning Behavior. The exclusion of approximately 50% of the children in the SLI classes due to bilingualism, emotional problems, PIQ scores below 85, hearing deficits, and neurological abnormalities indicates many cognitive and behavioral differences among the children. Although data were not collected on the prevalence of other learning disabilities such as visual perception and visual-motor problems, these were stated in the diagnostic reports of some of the SLI children. Apparently, one cannot assume that because children are classified as having a language impairment, they are alike in their learning behavior. As with other learning disabled children, their learning

strengths and weaknesses need to be assessed so that a technique for teaching reading may be tailored to the particular needs of each child.

Reading for Meaning

With any child, it is good practice not to teach just basic reading skills, but to consistently teach reading for meaning. Seven of the 29 SLI subjects had their lowest WRMT-R and ITBS scores on both passage comprehension and reading, respectively. Low comprehension scores may indicate that at least some language-impaired children may be unable to generalize from their ability in the lower level reading skills to comprehension of text.

Metalinguistic Knowledge

Language-impaired children may not infer that the purpose of reading is to obtain information about the world, and thus may see the reading task as just another rote exercise required of them at school. The connection between reading and language, as well as their joint communicative purpose, may need to be taught explicitly. For example, the class might discuss what to feed a pet turtle that has recently been acquired for the classroom. After a brainstorming session in which everyone participates verbally, the teacher may direct the class to a specific page in their book, with the direction, "Read to find out what turtles like to eat." After completing the assignment, the class can resume its discussion with the newly acquired information. Once the issue of the turtle's diet has been dealt with, the teacher can lead a discussion about why people might read, making explicit that reading is one way people find information they need to know. The

literature on reading is replete with techniques for teaching reading comprehension that could be adapted to the special needs of the language-impaired child. Explicit teaching of the purposes for reading and the connection between reading and language may help to break the cycle of limited world knowledge and low reading comprehension.

Vocational Education

The language-impaired children in this study demonstrated acute reading impoverishment, even after several years of specialized educational help. Until more effective methods for teaching reading or achieving compensations are devised, educators must give special consideration to the future educational and vocational needs of language-impaired children. As adults, they are unlikely to be successful in a traditional college program or in careers that require good verbal and/or reading skills. In the intermediate grades, children can be taught vocational survival skills, such as time management, monitoring one's own work, asking for feedback, and accepting criticism. Career exploration can begin in junior high, and vocational training can be initiated early in high school. If the future vocational needs of language-impaired children are provided for early, perhaps dead-end jobs can be avoided or at least be one of several options.

Usefulness of the TOLD-I

Results of the present investigation demonstrated that, based on the criteria established by this investigator, agreement of the TOLD-I with teacher judgment regarding subjects classified as expressively impaired was only 50%. Since the TOLD-I is frequently

used in the assessment of language-impaired children, clinicians might find it beneficial to know what criteria on the TOLD-I would better approximate teacher judgment in the classification of Receptives and Expressives, and if this can be done without first obtaining local norms.

Furthermore, the Controls in this study obtained mean listening quotient and speaking quotient scores that were 5.4 and 11.3 standard score points below those of the TOLD-I norm sample. These findings may be an indication that, at least with regard to the speaking quotient, the TOLD-I might be an excessively difficult measure. Consequently, it may be more valid to use local norms to establish criteria for normal or deficient language skills on the TOLD-I composites than to use criteria based on performance of the TOLD-I norm sample.

The mean speaking quotient of 88.7 for the Controls in the present study, compared with a mean of 100 for the norm sample, could also indicate that performance on the speaking quotient might depend more on children's metalinguistic skill than on oral language ability in a meaningful context. Informal comparison of results of spontaneous language samples with speaking quotient scores for both normal and language-impaired children may help to verify or refute this possibility.

Interdisciplinary Training of Professionals

Increased attention to interdisciplinary training, as well as cooperation, of professionals working with these children might well be one of the more effective ways of developing the reading skills of

language-impaired children. Specifically, it would seem beneficial for the professionals who teach reading to language-impaired children to have strong training in normal development of both reading and language skills, in specialized reading techniques, and in understanding language disorders and other types of learning disabilities. The speech-language pathologist, whether in the role of classroom teacher or resource person, also should have training in the development of reading skills so that these may be incorporated, where appropriate, in language remediation.

Recommendations for Future Research

Many difficulties are inherent in studying the development and needs of children with primary language impairments. Based on the present investigation, several research issues are apparent and are discussed below.

Recommendations for Improving Similar Investigations

Comparison of Language and Reading Levels. The present investigation was not designed to compare developmental oral language levels and reading levels. This information, however, might help to explain the relationship between the oral language and reading levels of SLI subjects. Reading levels significantly below oral language levels might indicate a need to emphasize reading skills, although without reducing oral language training. If oral language development and reading appear to be on par with each other, oral language skills might need to be increased before one can expect an increase in reading achievement.

A common complaint heard by this investigator from SLI teachers was the lack of time for oral language instruction because of pressure to teach academics. It is conceivable that research into the relationship of reading and language levels would demonstrate that reading achievement is dependent, at least in part, on continuous development of oral language skills.

Sample Size. Although this study did demonstrate that it is possible to subclassify intermediate grade level children as receptively impaired and expressively impaired, it did not demonstrate that these deficits have differential effects on reading achievement. This last finding is in disagreement with the findings of McGrady (1964) and with statements of language theorists and practitioners such as Johnson and Myklebust (1967). One of the major hypotheses offered for absence of reading differences between the Receptives and the Expressives was the small size of the Expressive group. To the end that Expressives will be better represented in future research, two suggestions are offered.

It was posited that children with only expressive impairments may be in educational placements other than the SLI class, such as the self-contained learning disabilities class, or in less restrictive placements, such as the regular classroom with resource help. Consequently, a larger proportion of Expressives might be found in a sample whose oral language impairments are less severe than those of the present sample.

The investigator screened 46 school districts to eventually find the 29 SLI children who fit the subject selection criteria.

Consequently, it appears that researchers who want to subtype their samples as well as control for severity of language impairment will need large populations from which to select subjects. Weiner (1985, p. 89) has suggested "collaboration of a number of facilities that serve language disordered children" to obtain samples with a variety of backgrounds and types of language impairments. Although Weiner was suggesting cooperation among clinics, public schools could also cooperate in pursuing research on a large scale.

The Usefulness of PIQ as a Covariate. This investigator attempted to use PIQ scores to adjust for differences in intelligence among subjects. However, the covariate did not meet the necessary assumptions and was eliminated. A flaw in the present design was the attempt to control for differences in intelligence twice, once in excluding children with low PIQ scores and again in attempting to use PIQ as a covariate.

Correlational analyses showed PIQ to share negligible relationships with SLI reading scores, and moderate, significant relationships with the Control group's reading scores. Two explanations were posited to account for this discrepancy. The first was that the low correlations for the SLI group may have been due to the exclusion from the sample of all children who scored below 85 on PIQ. This exclusion did not affect the Controls, since no subject in this group obtained a PIQ score that was below the cut-off point. However, since 10 (13.7%) of the possible SLI subjects were eliminated due to low PIQ scores, this exclusion did restrict the range of PIQ scores in the SLI group.

The second hypothesis was that lower correlations between PIQ and academic measures are the norm in a group of SLI children, due to the usual selection criteria. Students are often placed in SLI classes based on indications of normal nonverbal ability (often PIQ scores) and low verbal ability and academic scores. Thus, within the SLI population, neither nonverbal scores nor academic scores are completely free to vary, resulting in lower correlations. This is not true of the population of normal (unselected) children, in which all scores are free to vary.

In future research, PIQ should be considered as a covariate, rather than as the basis for excluding potential subjects. Thus, another researcher might be able to determine if differences in nonverbal intelligence might confound comparison between language-impaired and nonhandicapped children on the variable of major interest.

Recommendations Based on the Results of the Present Investigation

The reading achievement of the SLI subjects was surprisingly inferior to that of the Controls, despite the years many of these children had been enrolled in special classes. This disconcerting finding suggests the need for research in several areas pertaining to the education of language-impaired children.

Reading Progress. Information is needed on the effectiveness of methods currently employed in the teaching of reading to language-impaired children. Longitudinal studies could provide such information by monitoring the reading progress of these children for a designated

period, starting from the initiation of special educational services.

Current Practices. Research is needed to ascertain what methods are currently used in teaching reading to SLI children, as well as to less severely impaired children, and how these methods are adapted to the particular needs of the students. This information could be used as a foundation for developing more effective teaching techniques.

Effective Teaching Methods. Investigations into development of more effective teaching techniques in teaching reading to language-impaired children would be a significant contribution to the field of special education. Researchers might explore the efficacy of using already established techniques, such as Fernald or language experience, ways to adapt current techniques to the individual needs of language-impaired children, or the development of new techniques. It is hoped that new instructional techniques would integrate reading and oral language development.

Professional Training. One cannot assume that the professionals responsible for the teaching of reading to language-impaired children have strong training in the cognitive and linguistic processes involved in individual reading skills, specialized instructional techniques, and ways to adapt those techniques to the needs of language-impaired children. Before one can strongly recommend training in these areas, researchers should ascertain the level of reading training these

professionals have received and their competence in using specialized reading methods.

To ascertain the importance of teacher training on the academic progress of SLI students, a longitudinal study might be initiated that provides for intensive training for SLI teachers in specialized reading techniques. The reading progress of the students in these classes could then be monitored and compared with a control group whose teachers were not provided such training.

APPENDIX A

SUPPLEMENTARY TECHNICAL DATA

Test of Language Development-Intermediate (Hammill and Newcomer, 1982)

Standardization

The Test of Language Development-Intermediate (TOLD-I) was standardized on 871 subjects from 13 states, ages 8-6 to 12-11, who spoke "typical" English, and whose sex, place of residence, race, geographical distribution and parental occupation were comparable to that of the population of the United States as reported in the 1980 census.

Reliability

Analysis of internal consistency of items, drawn from subtest scores of 200 subjects at four age levels, yielded reliability coefficients ranging from .70 to .98. However, only one coefficient, at each of two age levels, fell below .80. Coefficients for internal consistency of composites ranged from .91 to .98.

Stability (test-retest) was tested on 30 normal fifth and sixth grade children from two elementary schools in Austin, Texas at one week intervals. Coefficients on subtest raw scores ranged from .85 to .96, and on composite quotients, from .94 to .96.

The standard errors of measurement, a measure of deviation due to error for each obtained score, ranged from 1.0 to 2.1 raw score points on the subtests, and from 2.1 to 4.5 on the composite quotients.

Validity

Content validity was rated by 50 people involved in language theory or clinical practice as to placement of the subtests on the dimensions of linguistic systems and linguistic features. The model presented by the authors was considered to be supported.

Criterion validity was tested against the Test of Adolescent Language (TOAL) (Hammill et al., 1980). The median coefficient between the subtests of the TOLD-I and the subtests of the TOAL was .56; the coefficient of the two spoken language quotients was .86.

Construct validity was tested by five criteria: (a) age differentiation, (b) subtest interrelationships, (c) relationship to school achievement, (d) group differentiation, and (e) item validity. Analysis of raw score means and standard deviations found that children perform better on all subtests except word ordering as they get older. The correlation between chronological age and raw score for each subtest was significant (p .001). Subtest interrelationships were also significant (p .001), indicating that the subtest measured related traits. Relationship to school achievement was tested against the written language tests on the TOAL. Half the correlation coefficients were above .35. Results of assessment of 9 learning-disabled subjects and 13 normal subjects was considered to confirm that the TOLD-I differentiated between groups. T-tests were significant at the p .05 level. The relationship of each item raw score to overall raw score demonstrated strong discriminating power, including item validity.

Woodcock Reading Mastery Tests-Revised
(Woodcock, in progress)

The Woodcock Reading Mastery Tests-Revised (WRMT-R) has been standardized on over 6,000 subjects, ages 5 to above 70, representing nine geographical divisions of the United States, and encompassing over 40 communities. The standardization sample is representative of the U.S. population as reported by the 1980 census in regard to geographical location, size of community, sex, race, hispanic origin, and socioeconomic status.

All technical data have not yet been compiled, but Dr. Woodcock (personal communication, March 11, 1985) has stated that the WRMT-R has been designed so the stability and internal consistency coefficients for each subtest and each cluster will be above .90. A stability study is being conducted on 70 subjects at each of three educational levels: grades 3, 8, and college. Internal consistency tests, based on the norm sample, are being conducted for grades 1, 3, 5, 8, college, and adult up to age 70. The technical manual will contain discussions of content validity and construct validity. Concurrent validity will be established in relation to the Woodcock-Johnson Psycho-Educational Test Battery (Woodcock and Johnson, 1977).

Iowa Tests of Basic Skills (Hieronymus et al., 1983)

Scores

The ITBS scoring tables provide grade equivalents, percentile ranks, stanines, normal curve equivalents, and developmental standard scores. The developmental standard scores provide different means and standard deviations for each test level, reflecting "increasing variability in achievement as pupils progress through the grades" (Hieronymus et al., 1982).

Standardization

The 1977 norms for the multilevel battery were developed on a sample of 103,105 children evenly distributed throughout grades 3 to 8. Based on the 1970 census, the sample was stratified on the variables of district enrollment, geographic region (southeast, southwest, north central, northeast, and far west), and socioeconomic status of the community. Within each geographic region, three school districts were selected at random. Within each school district, school buildings were selected at random to represent public and private school proportionally. Racial and ethnic representation in the sample closely approximated that of the public school population and included Native American, Asian American, Hispanic American, Black, and White children.

The 1982 norms were developed from an equating study on 23,015 children approximately evenly distributed throughout grades K-8. Although geographic representation was not as representative of the U.S. population as that of the 1977 norms, racial-ethnic composition

and socioeconomic levels were roughly equivalent to the 1977 norm sample.

Reliability

Reliability studies investigated internal consistency (split-half) and stability (test-retest) of the subtests. Reliability coefficients for internal consistency of vocabulary and reading for Levels 9-12 were above .90. A variety of studies on stability of test scores, cited by the authors of the manual and covering time periods from one to four years, found reliability coefficients ranging from .75 to .84.

Validity

Predictive validity studies on samples of elementary school children, cited in the Manual for School Administrators (Hieronymus et al., 1982), demonstrated that ITBS scores were moderately correlated with high school and first year college grade point averages.

Wechsler Intelligence Scale for Children-Revised (Wechsler, 1974a)

Scores

Scaled scores (M = 10, SD = 3) may be derived for the subtests and intelligence quotients (M = 100, SD = 15) for the verbal, performance and full scales.

Standardization

The Wechsler Intelligence Scale for Children-Revised (WISC-R) was standardized on a sample of 2,200 children, ages 6-0 through 12-11, excluding severely emotionally disturbed and institutionalized mentally retarded children. Two hundred children were included in each of 11 age groups. Based on the 1970 census, the sample was stratified on the variables of age, sex, race (white and nonwhite), geographic region (northeast, north central, south, and west) to proportionally represent the U.S. population.

Reliability

Reliability data were provided for internal consistency and stability of each subtest and scale. Averaged across the age groups, the internal consistency coefficient for each scale was above .90. Reliability coefficients for the subtests in the verbal scale ranged from .77 to .86 and for the subtests in the performance scale, from .70 to .85. Of 12 subtests at each of 11 age groups, only 6 reliability coefficients fell below .65. Reliability coefficients for the age groups used in the present study approximated those reported for the entire sample.

Reliability coefficients representing the stability of the three scales for the age range included in this study were above .89. Coefficients for the verbal subtests ranged from .73 to .86 and for the performance subtests, from .70 to .85.

The standard errors of measurement for the three scales (M = 100, SD = 15) and the 12 subtests (M = 10, SD = 3) reported for age groups 10-6 and 11-6 were: (a) verbal scale--3.34 and 3.65, (b) performance scale--4.39 and 4.65, (c) full scale--2.98 and 3.21, (d) verbal subtests (averaged)--1.00 and 1.63, and (e) performance subtests (averaged)--1.08 and 1.81.

APPENDIX B

DISTRICT CRITERIA FOR PLACEMENT OF CHILDREN IN SLI CLASSES AND MINIMUM STANDARDS FOR PASSING HEARING AND VISION SCREENINGS

Information concerning placement criteria are directly quoted from printed district guidelines. Placement criteria for the Isaac school district (which does not have printed guidelines) and all hearing and vision standards were obtained in telephone interviews with the special services departments of each school district.

Amphitheater Unified School District, No. 10
Wetmore Center
701 W. Wetmore
Tucson, AZ 85705

Placement Criteria

I. Definition

A language delayed student is one who may have problems forming verbal abstractions and performing the logical operations required to interpret the complex relationships expressed in language. Their oral language may lead to deficits in perceiving and interpreting as well as in formulating and producing spoken language. The difficulties may also be reflected in academic retardation in subject areas such as reading, spelling, writing, mathematics and other academic areas requiring adequate language skills.

This language delay may not be due to mental retardation, emotional handicap, physical handicap, sensory impairment of vision or hearing, bilingualism, or educational deprivation as the primary handicapping condition.

II. Assessment Procedures

A. Grades K-3

1. Speech and Language

a. Peabody Picture Vocabulary Test

b. Test of Auditory Comprehension of Language

c. Carrow Elicited Language Inventory

d. Spontaneous Language Sample

e. Illinois Test of Psycholinguistic Abilities: Verbal Expression

f. Test of Language Development

g. Boehm Test of Basic Concepts

Scores two standard deviations or more below the mean for each instrument are considered significant. A minimum of one receptive and one expressive measure must be used. A spontaneous language sample must be obtained.

2. Academic (any one of the following instruments may be used)

a. CUES (preprimer level and first grade)

b. Brigance (Early Childhood-General Knowledge)

c. Woodcock Reading Mastery Tests

d. Key Math Diagnostic Arithmetic Test

e. Teacher Report of Classroom Performance

f. Pupil Rating Educational Behavior

Some of these instruments may not be appropriate for students below third grade. Grade level scores placing the student 50% below his current grade placement are considered significant.

3. Psychological

    a. Intellectual potential

    b. Classroom observation

    c. Adaptive behavior

    d. Developmental history

Some of the instruments which may be used to assess intellectual potential are as follows:

    a. Wechsler Pre-school and Primary Scale of Intelligence

    b. Wechsler Intelligence Scale for Children-Revised

    c. Stanford-Binet (Form LM)

    d. Leiter International Performance Scale

    e. Hiskey Nebraska

    f. California Test of Mental Maturity

    g. French Pictorial Test of Intelligence

Students with severe language delay often obtain low scores on verbal intelligence measures. It is suggested that a nonverbal measure be given along with a verbal measure when language impairment is suspected. Since delayed language severely depresses scores on intelligence masures, the measured IQ score should not be used as the sole basis for making a placement decision. The student must project average potential as certified by the school psychologist.

4. Audiological

    a. Acuity testing as needed

    b. Monitoring middle ear problems

    c. Central auditory skills assessment (if needed)

B. Grades 4-6 (a minimum of one receptive and one expressive measure must be used. The measure may be written or oral).

1. Speech and Language
   a. Test of Written Language
   b. Test of Syntactic Abilities
   c. Test of Verbal Opposites (MA is 1.5 years below CA)
   d. Token Test
   e. Spontaneous Oral Language Sample
2. Academic (any one of the following measures may be used)
   a. Woodcock Reading Mastery Tests
   b. Key Math Diagnostic Arithmetic Test
   c. Wide Range Achievement Test
   d. Peabody Individual Achievement Test
   e. CUES
   f. Teacher report of classroom performance
3. Psychological
   See Grades K-3
4. Audiological
   See Grades K-3

These are the basic components required for an evaluation of a candidate for placement in the language impaired program. Individual school teams may use additional assessment procedures depending upon the needs of the student. All assessment will be done in the students'

primary language in accordance with the guidelines established by PL 94-142.

III. Requirements for Placement

The student must demonstrate a significant delay in receptive and/or expressive language as well as a significant academic delay. Students considered for placement must demonstrate that hearing is not the primary handicapping condition. This will be certified by the audiologist. Students considered for placement must project average intelligence as certified by the school psychologist.

Prior to placement a student must have had at least 20 sessions of speech and language therapy. The student must also have been served for a minimum of one semester in the learning disabilities resource program.

Hearing: Maximum Levels

dB:	20	20	25	Impedance:	-190
Hz:	1000	2000	4000		

Vision: Minimum Levels

20/40 in each eye

Chandler Unified School District, No. 80
500 W. Galveston
Chandler, AZ 85224

Placement Criteria

I. Definition

The language disordered child is defined as follows: Those students who demonstrate severe difficulty in understanding or in using spoken language. The difficulty may manifest itself in impaired ability to listen or speak with meaning to include inappropriate or inadequate articulation, vocabulary, sequencing, sentence structure, and language content (phonology, morphology, grammar and semantics). These language difficulties must exist in the child's native or primary language.

The language disorders definition does not include bilingual children who are having difficulty with English, but who are proficient in their primary language. It does not include children whose communicative problems can be effectively treated in the resource speech and language handicapped program. In addition, the language disorder must not be primarily the result of a visual, hearing, or motor handicap; mental retardation; emotional disturbance; environmental, cultural or economic disadvantage attributable to community and/or family norms, physical/emotional abuse and neglect; or educational disadvantage such as attendance at a nonaccredited school or family transience.

II. Prerequisites for Placement Consideration

It is the responsibility of the school psychologist and speech and language specialists to determine the eligibility of students to be placed in the language disordered program.

A. Prior to scheduling a multidisciplinary conference, the school counselor will ensure that the following have been obtained: all necessary referral forms, a social and developmental history, current vision and hearing screenings, determination of primary language of home and child.

B. The student must receive the services of a speech and language specialist prior to consideration for placement in the language disorders program.

C. A language assessment must be accomplished which includes, but is not limited to, the following instruments:

1. Carrow Elicited Language Inventory
2. Test of Auditory Comprehension of Language
3. Illinois Test of Psycholinguistic Abilities
4. Standardized articulation measure, e.g., Goldman-Fristoe-Woodcock or Photo Articulation Test
5. Utah Test of Language Development or similar receptive/expressive language test

D. The language disorders teacher will be contacted to observe the child, review evaluation results, and/or attend any preliminary conferences prior to consideration for placement in the language disorders classroom. If the child is eligible

for placement consideration, the language disorders teacher who would receive the child will attend the multidisciplinary conference.

E. Criteria for Placement--The team must determine that the child has a severe discrepancy between language skills and intellectual ability assessed through appropriate formal and/or informal inventories as follows:

1. Student exhibits receptive and/or expressive oral language age which is two or more years behind his/her mental age.

2a. Student's score on either the WISC-R (PIQ or FS) or Stanford-Binet will be at or above the 16%ile.

b. In some instances the student with a score above the 5%ile will be considered eligible for placement in the language disorders program. In such cases the professional judgment concerning the student's potential for higher intellectual functioning must be supported by additional data. Evidence of normal perceptual-motor ability, performance within the normal range on nonverbal intellectual assessment, or another standardized measure will be considered appropriate justification for placement. Such justification will be presented in the multidisciplinary conference and written in the psychological report. The student whose highest IQ score is at the 5%ile

or below is not eligible for placement in the language disorders program.

3. The findings of standardized achievement tests, appropriate informal inventories, and classroom data indicate the student is performing below expected learning levels in one or more of the following academic areas:

    Reading recognition

    Reading comprehension

    Mathematical calculations

    Mathematical reasoning

    Written expression (to include spelling)

Hearing: Maximum Levels

dB:	25	20	20	25
Hz:	500	1000	2000	4000

Vision: Minimum Levels

20/40 in each eye

Deer Valley Unified School District, No. 97
20402 N. 15th Avenue
Phoenix, AZ 85027

Placement Criteria

I. Definition

PL 94-142 defines a speech impairment as a communication disorder, such as stuttering, impaired articulation, a language

impairment (severe disorders of syntax, semantics or vocabulary), or a voice impairment, which adversely affects a child's educational performance. Deer Valley's SLI program is designed for students (grades K-6) whose handicap is a language disorder of such severity that it cannot be serviced adequately on a speech resource basis. Concomitant handicapping conditions must be considered in relation to the language disorder. Although a student may demonstrate several handicapping conditions (i.e., EMH, EH, LD), along with a severe language impairment, it must be the consensus of the multidisciplinary team that an SLI setting provides the most appropriate services in the least restrictive environment.

II. Specific Guidelines for Placement of a Student in the SLI Program

Program eligibility is determined by an assessment team consisting primarily of the sending school's psychologist and speech therapist. The assessment team reviews information including norm referenced and criterion referenced testing, classroom observations, and social and emotional development in a pre-conference with [the administrator]. Typically, a significant discrepancy occurs between verbal and nonverbal intellectual functioning (PIQ>VIQ) and delays have occurred in the child's language development.

Hearing: Maximum Levels

dB:	25	20	20	25
Hz:	500	1000	2000	4000

Vision: Minimum Levels

20/40 in each eye

Isaac Elementary School District, No. 5
1701 N. 35th Avenue
Phoenix, AZ 85009

Isaac Elementary School District does not have written criteria for placement in the SLI program. The following information was provided verbally by the district's Department of Special Services.

Placement Criteria

I. Definition:

The child has a learning disability with emphasis in the language area.

II. Assessment

A. The psychologist will assess the child on measurement devices such as the Wechsler Intelligence Scale for Children-Revised, the Kaufmann Assessment Battery for Children, and the Bender Visual Motor Gestalt Test.

B. The social worker will assess adaptive behavior.

C. The speech/language pathologist will assess the child on tests such as the Expressive One Word Picture Vocabulary Test, the Receptive One Word Picture Vocabulary Test or the Peabody Picture Vocabulary Test, the Northwestern Syntax Screening Test, the Illinois Test of Psycholinguistic Abilities, and a a language sample.

A multidisciplinary team makes the final decision as to whether or not the child qualifies for the SLI program.

Hearing: Maximum Levels

dB:	25	20	20	25
Hz:	500	1000	2000	4000

Vision: Minimum Levels

20/40 in each eye

Mesa Unified School District, No. 4
549 N. Stapley Drive
Mesa, AZ 85203

Criteria for Placement

The team must determine that a student has a severe discrepancy between language skills and intellectual ability assessed through appropriate formal and/or informal inventories as follows:

I. The student's SPH severity rating in the language area must be in the Severe Disorder (4) category, which is generally comparable to a delay or two or more years below his/her mental age. The SPH severity rating should be calculated according to district guidelines.

II.

A. The student's score on either the Wechsler scales (to include WISC-R or the WPPSI) or the Kaufmann Assessment Battery for Children (KABC) will be at or above an IQ score of 85 (+SEM), Performance/Simultaneous or Full Scale/Mental Processing Component. The nonverbal scores on the KABC should also be reviewed for additional information.

1. If test results are of questionable validity, as in the case of younger children, additional evaluation measures will be given for justification purposes. These may include adaptive measures, criterion referenced tests, and observation of learning styles and rate.
2. For children referred from a language based preschool program, justification may be made if significant difficulties remain in language and communication skills though results of psychoeducational testing may not reflect the expected discrepancy. In such cases, past progress in language development and prognosis for continued progress in a school setting will be considered.

B. In some instances, the student with an IQ score below 85 may be considered eligible for placement in the language disorders program. In such cases, the professional judgment concerning the student's potential for higher intellectual functioning must be supported by additional data. Evidence of normal perceptual-motor ability or performance indicating average abilities on another standardized measure may be considered possible justification for placement. Such justification will be presented at the preliminary conference and written in the psychological report and the I.E.P.

C. If there is a possibility that the language of the home or student is other than English, it should be considered that a student coming from such an environment may likely exhibit a discrepancy between verbal and performance scores on

standardized measures. Caution should be taken when reviewing such testing information. In all cases of bilingualism, an ESL (English as a Second Language) representative must be contacted to assist in the evaluation of language skills and participate in the multidisciplinary team process. In some instances, it is recommended that a bilingual speech and language specialist provide additional evaluation data as to general language competence.

D. The findings of standardized achievement tests, appropriate informal inventories, and classroom data indicate the student is performing significantly below expected learning levels in one or more of the following academic areas:

1. Basic reading skill
2. Reading comprehension
3. Mathematical calculations
4. Mathematical reasoning
5. Written communication (to include spelling)

Hearing: Maximum Levels

dB:	25	25	Impedance: -200 or +100
Hz:	1000	4000	

Vision: Minimum Levels

20/40 in each eye

Tempe Elementary School District, No. 3
PO Box 27708
Tempe, AZ 85282

Placement Criteria

I. Definition

The child exhibits a significant discrepancy between ability and achievement and displays a severe communication disorder such as impaired articulation, severe disorders of phonology, morphology, syntax, pragmatics, semantics or vocabulary. The definition does not include:

A. Mental handicap (mental retardation)

B. Severe emotional handicap

C. Bilingual--a child having difficulty with English, but who is proficient in his/her home language

D. Visual handicap

E. Hearing handicap

F. Regular classroom child, who can be effectively serviced by resource/speech and language services

G. Physical handicap

The language handicap impedes educational progress to the degree that the student is not able to benefit from the regular classroom instruction.

II. Criteria for Placement

Placement in the program will occur when the child study team has determined the eligibility of the student to be placed in the program. The child must:

A. Display a severe communication disorder which is the primary handicap

B. Exhibit a significant discrepancy between normal ability and achievement of approximately two years or more delay in receptive and/or expressive language skills.

III. Assessment

A. Psychological Assessment

A comprehensive psychological evaluation, following the guidelines for diagnosis of learning disability, is required for consideration of placement in the Communication Disorders program. Qualification must include diagnosis of learning disability in the area of either oral expression or listening comprehension as the primary disability. In addition, learning disability may also be evidenced in one or more of the following areas:

1. Written expression
2. Basic reading
3. Basic comprehension
4. Math calculation
5. Math reasoning

Psychological assessment must include, but must not be limited to a standardized individual intelligence measure appropriate to the child. The student's intellectual ability must fall at or above the 16th percentile on the intelligence measure. The

professional judgment concerning the student's potential for higher intellectual functioning must be supported by additional data.

B. Speech and Language Evaluation

The child will be considered for placement in the language handicapped program when the following current assessments have been completed by the certified speech and language pathologist at the student's home school.

1. Audiometric screening results
2. One or more standardized tests of articulation, such as:

   Goldman-Fristoe-Woodcock Test of Articulation

   Photo Articulation Test

   McDonald Deep Test
3. One or more standardized tests of receptive language and vocabulary, such as:

   Test of Language Development

   Peabody Picture Vocabulary Test

   Boehm Test of Basic Concepts

   Test of Auditory Comprehension of Language

   Sequenced Inventory of Communicative Development
4. One or more standardized tests of expressive language development and vocabulary, such as:

   Test of Language Development

   Carrow Elicited Language Inventory

   Sequenced Inventory of Communicative Development

5. An analysis of a spontaneous language sample.
6. A statement of functional communication skills, such as primary mode of communication (expressive-receptive) in academic, social, and home environments.

Hearing: Maximum Levels

dB:	25	30	Impedance: -150
Hz:	1000	4000	

Vision: Minimum Levels

20/30 in each eye

Tucson Unified School District, No. 1
PO Box 40400
Tucson, AZ 85717

Placement Criteria

I. Placement

A child can be considered for placement in the SLI Program when the following statements apply:

A. The child shows normal intellectual potential as measured by instruments that do not require only oral directions or oral expression.

B. The child's hearing is within normal limits or if a loss exists, it is not educationally significant.

C. The child's score on a standardized measure of language functioning falls at least two standard deviations below

the mean in several areas may be considered for oral language placement.

D. The child is nonverbal or when a spontaneous language sample of at least 50 utterances can be obtained, the sample shows development judged clearly inadequate for the child's age in at least two of the following areas of language development--syntax, semantics, morphology, phonology.

E. A child's language disorder is assessed to be so severe that speech and language remediation (if available) requires two or more hours of help daily (not applied to severe language impaired kindergarten).

F. If the child's primary problem is articulation, she/he is not a candidate for SLI Program.

II. Assessment

A. Students are referred to:

1. the audiologist for a hearing evaluation
2. the speech and language pathologist
3. the social worker for a developmental history
4. the adaptive education resource teacher for educational and/or process testing

B. The speech and language pathologists will administer the language diagnostic battery. The diagnostic battery will cover the following language areas (suggested tests are listed under each area):

1. Language and process tests
    a. Carror Test of Auditory Comprehension of Language
    b. Carrow Elicited Language Inventory
    c. Developmental Sentence Scoring
    d. Assessment of Children's Language Comprehension
    e. Peabody Picture Vocabulary Test
    f. Boehm Test of Basic Concepts
    g. Token Test for Children
    h. Utah Test for Language
    i. Clinical Evaluation of Language Function
    j. Test of Language Development
    k. Detroit Tests of Learning Abilities
    l. Illinois Test of Psycholinguistic Abilities
    m. Goldman-Fristoe-Woodcock Auditory Battery
    n. other appropriate tests of language competency
2. Phonology
    a. Fisher-Logemann Test of Articulation
    b. Templin Darley Test of Articulation Competence
    c. McDonald Deep Test
    d. other appropriate tests of articulatory competency

Hearing: Maximum Levels

dB:	25	20	20	25	Impedance: -150
HZ	500	1000	2000	4000	

Vision: Minimum Levels

20/40 in each eye

APPENDIX C

TEACHER QUESTIONNAIRE OF TOLD-I/

TEACHER JUDGMENT AGREEMENT

Classification of Language-Impaired Children by Type of Deficit

Comprehension/Expression Deficit:

Student seems to lack understanding or often misses the point in conversations, discussions, and teachers' verbal explanations.

Expressive Deficit only:

Student seems to understand conversations, discussions, and teachers' verbal explanations, but has major difficulty expressing ideas clearly.

Please check the appropriate box for each student and, if you wish, add comments.

Name	Comprehension/ Expression Deficit	Expressive Deficit Only	Comments

APPENDIX D

STANDARDIZED TEST ADMINISTRATION

CHECK-OUT FORMS

Name:_____

Sessions:_____

Date:_____

Woodcock Reading Mastery Tests-Revised: Check-Out

Yes	No	General Procedures
		1. Fills in background data
		2a. Establishes rapport
		b. Maintains rapport
		3a. Uses Starting Point Table (not Word Attack)
		b. Uses expected reading levels
		4. Gives instructions verbatim
		5a. Establishes basal
		b. Tests backwards as necessary
		6. Establishes ceiling
		7a. Records using I/O
		b. Records error responses verbatim
		8. Allows for speech defect, dialect
		9. Allows no more than 15 seconds per item unless child actively attempting
		10. Shows familiarity with pronunciation of items
		11a. Calculates raw scores accurately
		b. Converts raw scores into interpreted scores

Name:_____

Sessions:_____

Date:_____

WRMT-R Check-Out, Continued

Yes	No	General Procedures
		Word Attack
		1. Starts with item #1
		2. Reminds S that words are not real words
		3. Requires S to read whole row if item repetition is necessary
		Word Comprehension
		Analogies
		1. Sample items
		a. Points to words while reading them
		b. Provides supplemental help when needed
		2. Responds appropriately to S' request for help
		3. Questionable responses
		a. Records verbatim
		b. Makes appropriate decisions
		Antonyms
		1. Administers sample items
		2. Responds appropriately when S offers 2-word answer or uses un-/non-
		3. Queries appropriately

Name: _____

Sessions: _____

Date: _____

WRMT-R Check-Out, Continued

Yes	No	General Procedures
		Synonyms
		1. Administers sample items
		2. Queries appropriately
		Passage Comprehension
		1. Responds appropriately to S' request for help

Name:_____

Sessions:_____

Date:_____

Test of Language Development-Intermediate: Check-Out

Yes	No	General Procedures
		1. Fills in background data
		2a. Establishes rapport
		b. Maintains rapport
		3a. Gives instructions verbatim
		b. Speech is clear
		4. Uses appropriate starting point
		5. Establishes basal correctly
		6. Establishes ceiling correctly
		7. Follows correct procedure in response to S' request for repetition
		8. Uses recommended recording code (1 or 0)
		9. Scoring
		a. Calculates raw scores accurately
		b. Calculates composite quotients accurately
		c. Completes profile accurately

Name:_____

Sessions:_____

Date:_____

Check-Out on TOLD-I, Continued

Yes	No	General Procedures
		Sentence Combining
		1. Models task, if needed
		2. Gives credit for change in order of words/phrases
		Word Ordering
		1. Models task, if needed
		2. Does not credit omission of grammar marker/word change
		Generals
		1. Queries appropriately
		2. Gives credit for responses approximating listed responses
		Grammatical Comprehension
		1. Discontinues testing if S misses more than 1 foil

REFERENCES

American Psychological Association. (1974) Standards for Educational and Psychological Tests. Washington, D.C.: APA.

Aram, D. M., Ekelman, B. L., and Nation, J. E. (1984) Preschoolers with language disorders: 10 years later. Journal of Speech and Hearing Research, 27, 232-244.

Aram, D. M. and Nation, J. E. (1975) Patterns of language behavior in children with developmental language disorders. Journal of Speech and Hearing Research, 18, 229-241.

Aram, D. M. and Nation, J. E. (1980) Preschool language disorders and subsequent language and academic difficulties. Journal of Communication Disorders, 13, 2, 159-170.

Arthur, G. (1952) The Arthur adaptation of the Leiter international performance scale. Washington, D.C.: Psychological Service Center Press.

American Speech and Hearing Association. (1982a) Definitions: Communicative disorders and variations. Asha, 24, 11, 949-950.

American Speech and Hearing Association. (1982b) Position statement on language learning disorders. Asha, 24, 11, 937-944.

Baker, H. J. and Leland, B. (1959) Detroit Tests of Learning Aptitude. Indianapolis: Bobbs-Merrill.

Bashir, A., Kuban, K., Kleinman, S., and Scavuzzo, A. (1983) Issues in language disorders: Considerations of cause, maintenance, and change. In J. Miller, D. E. Yoder, and R. Schieflebush (Eds.), Contemporary Issues in Language Intervention, ASHA Reports 12 (pp. 92-106). Rockville, MD: The American Speech-Language Hearing Association.

Blachman, B. A. (1984) Language analysis skills and early reading. In G. P. Wallach and K. G. Butler (Eds.), Language Learning Disabilities in School-Age Children (pp. 271-287). Baltimore: Williams and Wilkins.

Bloom, L. and Lahey, M. (1978) Language Development and Language Disorders. New York: John Wiley and Sons.

Bray, J. H. and Maxwell, S. E. (1982) Analyzing and interpreting significant MANOVAs. Review of Educational Research, 52, 3, 340-367.

Cohen, J. (1969) Statistical Power for the Behavioral Sciences. New York: Academic Press.

Compton, C. (1980) A Guide to 65 Tests for Special Education. Belmont, CA: Fearon Education, Pittman Learning.

de Ajuriaguerra, J., Guignard, F., Jaeggi, A., Kocher, F., Maquard, M., Paunier, A., Quinodoz, D., and Siotis, E. (1976) The development and prognosis of dysphasia in children. In D. Morehead and A. Morehead (Eds.), Normal and Deficient Child Language (pp. 345-385). Baltimore: University Park Press.

DeRenzi, E. and Vignolo, L. (1962) The token test, A sensitive test to detect receptive disturbances in aphasics. Brain, 85, 665-678.

Dunn, L. M. (1965) Peabody Picture Vocabulary Test: Manual. Circle Pines, MN: American Guidance Service.

Feagans, L. (1983) Discourse processes in learning disabled children. In J. D. McKinney and L. Feagans (Eds.), Current Topics in Learning Disabilities (pp. 87-118). Norwood, NJ: Ablex.

Fundudis, T., Garside, R. F., van der Spuy, H. I. J., Nolan, J. S. H., and Kolvin, I. (1979) A follow-up study: Predictive importance-cognitive, language and educational development. In T. Fundudis, I. Kolvin, and R. Garside (Eds.), Speech Retarded and Deaf Children: Their Psychological Development (pp. 51-66). London: Academic Press.

Gates, A. I. (1953) Gates Reading Diagnostic Tests. New York: Bureau of Publications, Teachers College, Columbia University.

Gates, A. I. (1958a) Manual for the Gates Primary Reading Tests. New York: Bureau of Publications, Teachers College, Columbia University.

Gates, A. I. (1958b) Manual for the Gates Advanced Primary Reading Tests. New York: Bureau of Publications, Teachers College, Columbia University.

Goldman, R., Fristoe, M., and Woodcock, R. W. (1974) Goldman-Fristoe-Woodcock Auditory Selective Attention Test. Circle Pines, MN: American Guidance Service.

Goodman, K. S. (1985) Unity in reading. In H. Singer and R. B. Ruddell (Eds.), Theoretical Models and Processes of Reading (3rd ed.) (pp. 813-840). Newark, DE: International Reading Association.

Gough, P. B. (1972) One second of reading. In J. F. Kavanagh and I. G. Mattingly (Eds.), Language By Eye and by Ear: The Relationships between Speech and Reading (pp. 331-358). Cambridge, MA: MIT Press.

Gray, W. (1967) Gray Oral Reading Test. Indianapolis: Bobbs-Merrill.

Griffiths, C. P. S. (1969) A follow-up study of children with disorders of speech. British Journal of Disorders of Communication, 4, 46-56.

Hall, P. and Tomblin, J. B. (1978) A follow-up study of children with articulation and language disorders. Journal of Speech and Hearing Disorders, 43, 227-241.

Hammill, D. D., Brown, V. L., Larsen, S. C., and Wiederholt, J. L. (1980) Test of Adolescent Language. Austin: Pro-Ed.

Hammill, D. D. and Newcomer, P. L. (1982) Test of Language Development-Intermediate. Austin: Pro-Ed.

Harris, A. J. and Sipay, E. R. (1980) How to Increase Reading Ability: A Guide to Developmental and Remedial Methods (7th ed.). New York: Longman.

Hejna, R. (1955) Developmental Articulation Test. Storrs, CN: Author.

Hieronymus, A. N., Lindquist, E. F., and Hoover, H. D. (1982) Manual for School Administrators: Iowa Tests of Basic Skills for Form 7, Levels 5-8 and Forms 7/8, Levels 9-14. Chicago: Riverside Publishing.

Hieronymus, A. N., Lindquist, E. F., Hoover, H. D., Oberley, K. R., Lewis, T. B., Neckere, E. D., Santos, B. N., Peterson, J. J., Whitney, M. A., Renk, R. A., Strayer, F. H., and Plake, B. S. (1983) Iowa Tests of Basic Skills, Form 7. Chicago: Riverside Publishing.

Institute on Childhood Aphasia. (1962) Childhood Aphasia: Proceedings. San Francisco: California Society for Crippled Children and Adults.

Jastak, J. F. and Jastak, S. R. (1965) Wide Range Achievement Test (rev. ed.). Wilmington: Guidance Associates.

Jastak, J. F. and Jastak, S. R. (1978) Wide Range Achievement Test (rev. ed.). Los Angeles: Western Psychological Services.

Johnson, D. and Myklebust, H. (1967) Learning Disabilities: Educational Principles and Practices. New York: Grune & Stratton.

Johnston, J. R. (1982) The language disordered child. In N. J. Lass, L. V. McReynolds, J. L. Northern, and D. E. Yoder (Eds.), Speech, Language, and Hearing: Vol. II. Pathologies of Speech and Language (pp. 780-801). Philadelphia: W. B. Saunders.

Kaplan, E., Goodglass, H., and Weintraub, S. (1976) Boston Naming Test (experimental edition). Unpublished.

King, R. R., Jones, C., and Lasky, E. (1982) In retrospect a 15 year follow-up of speech-language disordered children. Language, Speech, and Hearing Services in Schools, 13, 24-32.

Kirk, S. A., McCarthy, J. D., and Kirk, W. D. (1968) Illinois Test of Psycholinguistic Abilities. Urbana, IL: University of Illinois Press.

Kolvin, I., Fundudis, T., and Scanlon, E. (1979) Early development, types and prevalence. In T. Fundudis, I. Kolvin, and R. Garside (Eds.), Speech Retarded and Deaf Children: Their Psychological Development (pp. 3-22). London: Academic Press.

Lee, L. L. (1969) Northwestern Syntax Screening Test. Evanston, IL: Northwestern University Press.

Lerner, J. W. (1972) Reading disability as a language disorder. Acta Symbolica, 3, 1, 39-45.

Levi, G., Capozzi, F., Fabrizi, A., and Sechi, E. (1982) Language disorders and prognosis for reading disabilities in developmental age. Perceptual and Motor Skills, 54, 3, Pt. 2, 1119-1122.

Lindquist, E. F. and Feldt, L. S. (Eds.) (1972) Iowa Tests of Educational Development. Iowa City: Iowa Testing Program.

Lindquist, E. F. and Hieronymus, A. N. (1956) Iowa Tests of Basic Skills: Manual for Administrators, Supervisors, and Counselors. Boston: Houghton-Mifflin.

Mattingly, I. G. (1972) Reading, the linguistic process, and linguistic awareness. In J. F. Kavanagh and I. G. Mattingly (Eds.), Language by Ear and by Eye: The Relationship between Speech and Reading (pp. 133-148). Cambridge, MA: MIT Press.

McCauley, R. J. and Swisher, L. (1984a) Use and misuses of norm-referenced tests in clinical assessment: A hypothetical case. Journal of Speech and Hearing Disorders, 49, 338-348.

McCauley, R. J. and Swisher, L. (1984b) Psychometric review of language and articulation tests for preschool children. Journal of Speech and Hearing Disorders, 43, 34-42.

McGrady, H. J. (1964) Verbal and non-verbal functions in school children with speech and language disorders. Unpublished doctoral dissertation, Northwestern University, Evanston, IL.

McGrady, H. J. (1985) Personal communication. Director of Special Education, Mesa Public Schools, Mesa, AZ 85203.

Menyuk, P. (1984) Language development and reading. In J. Flood (Ed.), Understanding Reading Comprehension (pp. 101-121). Newark, DE: International Reading Association.

Menyuk, P. and Flood, J. (1981) Linguistic competence, reading writing problems and remediation. Bulletin of the Orton Society, 31, 13-28.

Minium, E. W. (1978) Statistical Reasoning in Psychology and Education. New York: John Wiley and Sons.

Myklebust, H. R. (1960) Psychology of Deafness. New York: Grune and Stratton.

Myklebust, H. R. (1965) Myklebust Picture Story Language Test. New York: Grune and Stratton.

Noell, E. A. (1983) Reading. In C. Wren (Ed.), Language Learning Disabilities: Diagnosis and Remediation (pp. 243-296). Rockville, MD: Aspen.

Noll, D. (1970) The Use of the Token Test with Children. Paper presented at the 46th Annual American Speech and Hearing Convention, New York.

Rees, N. S. (1974) The speech pathologist and the reading process. Asha, 16, 55, 255-258.

Rumelhart, D. E. (1985) Toward an interactive model of reading. In H. Singer and R. B. Ruddell (Eds.), Theoretical Models and Processes of Reading (3rd ed.) (pp. 722-750). Newark, DE: International Reading Association.

Salvia, J. and Ysseldyke, J. E. (1985) Assessment in Special Education and Remediation (3rd ed.). Boston: Houghton-Mifflin.

Semel, E. and Wiig, E. (1980) Clinical Evaluation of Language Function. Columbus, OH: Charles E. Merrill.

Sheridan, M. and Peckham, C. (1975) Follow-up at 11 years of children who had marked speech defects at 7 years. Child: Care, Health and Development, 1, 157-166.

Simon, C. S. (1985) The language-learning disabled student: Description and assessment implications. In C. S. Simon (Ed.), Communication Skills and Classroom Success: Assessment of Language Learning Disabled Students (pp. 1-42). San Diego: College-Hill Press.

Snyder, L. S. (1980) Have we prepared the language disordered child for school? In K. Butler and G. Wallach (Eds.), Topics in Language Disorders, 1, 1, 29-46.

Spencer, E. (1958) An investigation of the maturation of various factors of auditory perception in pre-school children. Unpublished doctoral dissertation, Northwestern University, Evanston, IL.

Stanovich, K. E. (1980) Toward an interactive-compensatory model of individual differences in the development of reading fluency. Reading Research Quarterly, 16, 32-71.

Stark, R. E. and Tallal, P. (1981) Selection of children with specific language deficits. Journal of Speech and Hearing Disorders, 46, 2, 114-122.

Strominger, A. Z. (1983) A follow-up study of reading and linguistic abilities in language-delayed children. Unpublished doctoral dissertation, Boston University, Boston, MA.

Swisher, L. (1985) Language acquisition. In P. H. Skinner and R. L. Shelton (Eds.), Speech, Language, and Hearing: Normal Processes and Disorders (2nd ed.) (pp. 57-81). New York: John Wiley and Sons.

Tabachnick, B. G. and Fidell, L. S. (1983) Using Multivariate Statistics. New York: Harper & Row.

Thurstone, L. L. and Thurstone, T. G. (1954) SRA Primary Mental Abilities Test: Examiner Manual (Elementary) (2nd ed.). Chicago: Science Research Associates.

Tomarkin, A. J. and Serlin, R. C. (1986) Comparison of ANOVA alternatives under variance heterogeneity and specific noncentrality structures. Psychological Bulletin, 99, 1, 90-99.

van Kleeck, A. (1984) Metalinguistic skills: Cutting across spoken and written language and problem-solving abilities. In G. Wallach and K. Butler (Eds.), Language Learning Disabilities in School-age Children (pp. 128-153). Baltimore: Williams and Wilkins.

Wallach, G. P. (1982) Language processing and reading deficiencies: Assessment and remediation of children with special learning problems. In N. J. Lass, L. V. McReynolds, J. L. Northern, and D. E. Yoder (Eds.), Speech, Language, and Hearing: Vol. II. Pathologies of Speech and Language (pp. 819-838). Philadelphia: W. B. Saunders.

Wallach, G. P. and Goldsmith, S. C. (1977) Language-based learning disabilities: Reading is language too! Journal of Learning Disabilities, 10, 3, 178-183.

Wechsler, D. (1974a) Wechsler Intelligence Scale for Children-Revised. New York: The Psychological Corporation.

Wechsler, D. (1974b) Manual: Wechsler Intelligence Scale for Children-Revised. New York: The Psychological Corporation.

Weiner, P. S. (1985) The value of follow-up studies. In K. Butler and M. I. Stephens (Eds.), Topics in Language Disorders, 5, 3, 78-92.

Wolfus, B., Moskovitch, M. and Kinsbourne, M. (1980) Subgroups of developmental language impairment. Brain and Language, 10, 152-171.

Wood, M. L. (1982) Language Disorders in School-age Children. Englewood Cliffs, NJ: Prentice Hall.

Woodcock, R. W. (1973) Woodcock Reading Mastery Tests. Circle Pines, MN: American Guidance Service.

Woodcock, R. W. (1975) Development and Standardization of the Woodcock-Johnson Psychoeducational Battery. Hingham, MA: Teaching Resources.

Woodcock, R. W. (1985) Personal communication. Director, Measurement/Learning Consultants, Tolovana Park, Oregon 97145.

Woodcock, R. W. (in progress) Woodcock Reading Mastery Tests-Revised. Circle Pines, MN: American Guidance Service.

Woodcock, R. W. and Johnson, M. B. (1977) Woodcock-Johnson Psychoeducational Battery. Hingham, MA: Teaching Resources.

Wren, C. (1983) Language and language disabilities. In C. Wren (Ed.), Language Learning Disabilities (pp. 1-38). Rockville, MD: Aspen.