THE RELATIONSHIP OF LANGUAGE ABILITIES AND

READING PERFORMANCE FOR ADOLESCENT

DISABLED READERS AND ABLE

READERS AT TWO GRADE

LEVELS

By

NANCY MILLER TOOKER

Bachelor of Science
University of California, Davis
Davis, California
1967

Master of Science
Oklahoma State University
Stillwater, Oklahoma
1974

THE RELATIONSHIP OF LANGUAGE ABILITIES AND

READING PERFORMANCE FOR ADOLESCENT

DISABLED READERS AND ABLE

READERS AT TWO GRADE

LEVELS

Thesis Approved:

Darrel D. Ray
Thesis Adviser

Bernard R. Belden

Helen C. Miller

Bill F. Elsom

Norman N. Durham
Dean of the Graduate College

ACKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF TABLES

FIGURE

NOMENCLATURE

4	fourth grade reading group
10A	able tenth grade reading group
10D	disabled tenth grade reading group
CLGTH	clause length (words/clauses)
COMPGM	Gates-McGinitie Reading Comprehension subtest
DCSENT	sentence length from the Dale-Chall Readability Formula
DIQ	deviation intelligence quotient from the nonverbal battery of the Lorge-Thorndike Intelligence Test
MNCLI	main clause coordination index (T-unit/sentence)
PERHDWS	percent of hard words not found on the Dale list of 3,000 familiar words
PPVT	Peabody Picture Vocabulary Test
RS	raw score
SATGM	Gates-McGinitie Speed and Accuracy Attempts subtest
Sc.S.	scaled score
SD	standard deviation
SMSENT	syntactic maturity sentence length (words/sentence)
SNCGM	Gates-McGinitie Speed and Accuracy Number Correct subtest
Std.S.	standard score
SUBCLI	subordinate clause coordination index (clauses/T-units)
TLGTH	T-unit length (words/T-unit)
VOCGM	Gates-McGinitie Vocabulary subtest

WISC-R	<u>Wechsler Intelligence Test for Children-Revised</u>
WCOMP	<u>WISC-R Comprehension</u> subtest
WINFO	<u>WISC-R Information</u> subtest
WSIM	<u>WISC-R Similarities</u> subtest
WVC	Kaufman's <u>Verbal Comprehension</u> score derived from the <u>WISC-R</u>

CHAPTER I

PRESENTATION OF THE PROBLEM

Introduction

For many years, language experience and proficiency have been
recognized as contributing to reading growth and effectiveness.
Influenced by linguistic research, the relationship between language
functioning and reading performance has received increased attention in
current reading theory (Ruddell and Singer, 1976; Smith, Goodman and
Meredith, 1976; Gibson, 1972). Psycholinguists have described reading
as a process relying upon the reader's ability to select graphic cues
to meaning by utilizing his knowledge of the structure and content of
language, previous experiences and future anticipations. Mattingly (1972,
p. 133) suggested that reading is a "deliberately acquired language
based skill, dependent upon the speaker-hearer's awareness of certain
aspects of primary linguistic activity." As such, reading is inter-
dependent with the other communication skills as they are integrated
into the thinking and learning process of the language.

Within the last decade, much research has focused on the complex
processes of language learning and usage. Sophisticated methods of
structural analysis based on a transformational theory of grammar have
increased the awareness of the positive relationship between language
facility and reading ability (Chomsky, 1965). Recent investigations

1

into the magnitude of this relationship for poor as well as good
readers has provided new insights into the etiology of reading dis-
ability (Vogel, 1975; Isakson and Miller, 1976; Newcomer, 1977).

It is also widely accepted that an adequate vocabulary and know-
ledge of word meanings is a necessary condition for language processing
and reading comprehension. Farr (1969) reported that over ninety per-
cent of group survey tests of silent reading ability include a separate
measure of reading vocabulary. During the past decade there has been
very little attention given to studies of the growth and quality of
reading vocabulary in relation to language development, particularly
in older students. The emphasis of such language research has typi-
cally been placed on the reader's ability to understand semantic and
syntactic cues in generating or comprehending language. Ammon (1975,
p. 247) stated that word knowledge is none the less integral to lin-
guistic competence. "The readers cannot be expected to generate
syntactic patterns with any degree of correspondence to the written
message if significant vocabulary is not understood."

Despite the proliferation of reading skills programs in the schools
today, as much as twenty percent of the school population is considered
to have reading problems, performing one to two years below grade
level (U.S.O.H.E.W., 1969). As these problems become compounded and
intensified through several years of schooling, increasing numbers of
students in the middle and upper grades are being identified as dis-
abled readers, often reading four or more years below grade level
(Spache, 1976; Guszak, 1972). It is clear that the need for the
investigation and correction of reading problems is not limited to the
primary grades.

Adolescent disabled readers having average mental ability and no known perceptual deficits are frequently described as having difficulty with processing and using language. Kolson and Kaluger (1969) noted that disabled readers identified by Rabinovitch and Ingram had common language deficiencies described as "indiscriminating language deficits:"

> Usually the conversation of the primary disability reader is considered to be adequate. However, a closer observation of his language pattern reveals certain minor disturbances in his expressive language. The most frequent difficulties are in finding the specific words which he wants to say in imprecise articulation, and in the use of primitive syntax. Frequently, a related but incorrect word will be spoken or a phrase will be used which has the right connotation but which is awkwardly put together (p. 57).

Studies of both the receptive and expressive language abilities of these readers indicate that poor reading performance is correlated with limited vocabulary knowledge and lack of flexibility in language use. In his thirteen-year longitudinal study of the language and communication skills of school children, Loban (1976) found a strong positive correlation between speed, reading, writing and listening. His description of the students who were consistently rated as "low" in language skills resembles the language deficiencies observed by Rabinovich in disabled readers.

The less effective subjects rambled without apparent purpose, seemingly unaware of the needs of the listener. Their vocabulary was meager, and as listeners they did not focus on relationships or note how main ideas control illustrations or subordinate ideas. Their writing was disorganized, and they were painful "decipherers" rather than fluent readers (Loban, 1976, pp. 70-71). Reading growth for these youngsters is often limited to mastery of the basic reading recognition

skills associated with the primary grades. Lorge and Chall (1963)

noted that except in the case of poor readers, an older pupil's reading

recognition vocabulary exceeds his listening vocabulary.

> At what point pronunciation vocabularies 'catch up with'
> and 'overtake' meaning vocabularies will differ from
> individual to individual and depends on the particular
> method used for teaching children to read. Although no
> comparative studies are available, judging from currently
> used reading programs, it is probably at reading grade
> levels four through six that most children can pronounce
> (recognize in print) more words than they understand or
> speak (p. 149).

If there is such a critical period for the growth of reading vocabulary

then there may also be a corresponding change in general language pro-

cessing which includes the proficient use of syntactic forms in reading.

Further language growth for these youngsters may also be limited by a

lack of expansion through wide reading in the middle grades. Smith

(1976) has stated that reading can be learned only through reading.

> It is only through the experience of reading that a child
> can learn to make minimal use of visual information and to
> use redundancy to reduce the load on short- and long-term
> memory. It is only through reading that a child can learn
> to identify new words on the basis of old (p. 186).

Ray (1976) suggested that language deficiencies, particularly the lack

of an extensive language base, may be directly related to the adoles-

cent disabled reader's lack of reading growth beyond elementary grade

performance levels. Studies of linguistic performance involving the

student's ability to comprehend and use increasingly complex language

structures have indicated that there is an apparent sequence of

language competencies, and that the development of syntactical maturity

is not necessarily attained by the middle grades. The reading ability

of a tenth grade disabled reader reading at fourth grade level, may

indeed reflect the limits of his general language competencies. Con-

sequently, his language performance may resemble that of younger
readers.

Purpose of the Study

The purpose of this study was to investigate the relationship
between the reading performance and language abilities of adolescent
disabled readers as compared to average adolescent readers and average
readers in the intermediate grades.

Statement of the Problem

This study was designed to establish the relationship between
reading and selected language skills and more specifically to determine
whether the language abilities of adolescent disabled readers resemble
that of younger readers performing at the same reading level, rather
than that of able adolescent readers. For the purposes of this study,
measures of vocabulary, general verbal comprehension, and syntactic
maturity have been included as components of language ability. Ques-
tions of interest which are related to these abilities follow: 1) Are
there differences in the relationships between receptive vocabulary and
reading and expressive vocabulary knowledge and reading growth beyond
the middle grades? 2) Are there observed differences between the
general verbal comprehension and expression for the three reading
ability groups? 3) Will reading level reflect a similar level of syn-
tactic maturity? The following hypotheses are designed to test for
these relationships.

Hypotheses

This study has been designed to test the following hypotheses which are stated in the null form.

Hypothesis I: There is no relationship between reading performance and language ability for tenth graders as indicated by scores on tests of silent reading comprehension vocabulary, verbal comprehension and syntactic maturity.

Hypothesis II: There is no relationship between the reading performance and language ability of able fourth grade readers as indicated by scores on tests of silent reading comprehension, vocabulary, verbal comprehension and syntactic maturity.

Hypothesis III: There is no relationship between the reading performance and language ability of tenth grade disabled readers as indicated by tests of silent reading comprehension, vocabulary, verbal comprehension and syntactic maturity.

Hypothesis IV: There is no relationship between the reading performance and language ability of able tenth grade readers as indicated by test scores on tests of silent reading comprehension, vocabulary, verbal comprehension and syntactic maturity.

Hypothesis V: There is no relationship between the mean scores on selected measures of language abilities for average fourth grade readers and tenth grade disabled readers

performing in the same range on a test of silent
reading comprehension.

Hypothesis VI: There is no relationship between the mean scores on
selected measures of language ability of tenth grade
disabled readers and able tenth grade readers.

Hypothesis VII: There is no relationship between the mean scores on
selected measures of language ability of able fourth
and tenth grade readers whose silent reading compre-
hension is at or above their appropriate grade level.

Definition of Terms

Disabled reader - For the purpose of this study, a disabled reader
refers to an individual who, according to Bond and Tinker (1973) has
had the opportunity to learn to read but who is not reading as well as
could be expected on the basis of his mental ability and grade level.
For the purpose of the study, a tenth grade reader with average
intelligence, showing a grade score four or more years below grade
level on a test of silent reading comprehension, is considered to be a
disabled reader.

Receptive vocabulary - Refers to those words understood in print
or oral language. It includes recognition vocabulary--words generally
understood as they are used in context, and vocabulary of meaning--
words which evoke precise deeper interpretations in context.

Expressive vocabulary - Refers to those words produced and under-
stood in oral and written language.

Verbal comprehension - Verbal comprehension is the broad ability
to understand and use language. Specifically, in this study, it refers

to selected tasks of verbal comprehension apart from general intelli-
gence, as determined by factorial analysis of the <u>WISC</u> and the <u>WISC-R</u>
subtests (Cohen, 1959; Kaufman, 1975). Subtests of the <u>WISC-R</u> which
represent this general "verbal comprehension factor," include informa-
tion, similarities, vocabulary and comprehension (Kaufman, 1975, p.
138).

<u>Linguistic competence</u> - Refers to a tacit understanding of the
principles of the language that a person must have in order to communi-
cate in the language.

<u>Transformational grammar</u> - Refers to the theory of transformational-
generative grammar developed by Noam Chomsky (1965). According to this
theory, each sentence has an underlying meaning or deep structure which
must be operated upon by a set of transformations which result in the
constituent pattern or surface structure of the sentence.

<u>Syntactic maturity</u> - The syntax of a language refers to the under-
lying rules of the grammar which influence the structure and word
patterns of sentences.

The chronological development of the use of these grammatical
patterns is reflected in measures of syntactic maturity. The ability
to use mature syntactical form is one factor associated with effective
language performance.

Assumptions

For the purpose of this study, it was assumed that: (1) the
measures included in the four categories of silent reading comprehen-
sion, vocabulary, verbal comprehension and syntactic maturity, while
not being all inclusive are representative of reading and language

ability; (2) the instruments used in this study were sufficiently valid and reliable to actually measure the abilities that they were designed to measure, and (3) any chance factors encountered during the testing situation were no greater than those occurring in any test situation.

Limitations

The findings of this study may not be generalized beyond the university community population from which the sample was drawn. The sample size of thirty subjects for each of three reading ability groups was small and the subjects of the study were predominantly Caucasian. Potential limiting factors such as the health and emotional adjustment, home background and previous experiences of the subjects, the time of day for testing, and examiner sex and personality have not been accounted for in this study. The tests chosen to measure reading and language behaviors were only a few from the numerous measures which might have been utilized. Other tests might have yielded different results.

CHAPTER II

REVIEW OF THE LITERATURE

The literature surveyed deals with those areas of language func-
tioning believed to be influencial in the reading performance of upper
elementary and secondary students. The review is organized into two
sections: 1) studies involving the progression of linguistic compe-
tence and language performance, and 2) studies investigating the
relationship of language structure and function to reading comprehen-
sion.

Developmental Studies of Linguistic Competence

and Language Performance

Early studies of language performance involved quantitative
measures of vocabulary knowledge, sentence length and structure in an
attempt to establish norms for the development of language skills
through the elementary school years. Current linguistic knowledge in
the areas of structural and transformational grammar have provided
evidence that simple counts of vocabulary words and sentence length
are inadequate without regard to the semantics involved in complex
sentence structures (Chomsky, 1965; Dale, 1970).

The available literature concerning vocabulary growth is restricted
to old data. In her classic review of language development, McCarthy
(1954) discussed three basic difficulties which have caused much con-

fusion in the study of vocabulary growth: 1) consensus on criteria for knowing a word, 2) failure of studies to distinguish adequately among spoken, written and recognition vocabularies, and 3) sampling and data collection methods of vocabulary studies. There have been surprisingly few new investigations in light of current linguistic findings.

Many investigators have estimated the size of vocabularies and frequency of word usage. In a comprehensive review of this literature, Lorge and Chall (1963, p. 147) found extreme variations in the reported vocabulary knowledge of both children and adults. "Estimates for the same age groups vary considerably: some of the most recent studies report more than ten times the vocabulary size estimated by earlier studies." Vocabulary size studies conducted by M. K. Smith (1941) indicated that the first graders knew 24,000 words, sixth graders knew 49,500 words, and twelfth graders knew 80,000 words. Seashore and Eckerson (1940) have estimated the word knowledge of college students to be as high as 157,000 words. More conservatively, Dale (1965) suggested that children finish the first grade with an average vocabulary of 3,000 words and that they add about 1,000 words a year from then on. The average high school senior would know 15,000 words and the college senior 20,000. In summarizing the finding of studies of writing vocabularies, Dale states that, in general, a small number of words constitutes the common written vocabulary.

> Fifty words and their repetitions constitute about 50
> percent of the words written by children and adults;
> 1000 words make up 90 percent; 2000 words, 95 percent;
> 3000 words, 97 percent; 4000 words, 98 percent; 10,000
> words, 99.4 percent (p. 896).

Several investigators have studied the qualitative differences in

students' oral responses to vocabulary items to determine the progression of verbal language processing (Feifel and Lorge, 1950; Kruglov, 1953). Their results indicated that younger students (ages 6 to 9) tended to choose more concrete definitions involving description and use while older students (ages 10 to 14) chose more abstract definitions involving synonyms and classifications.

Russell (1954) made a qualitative study of children's meaning vocabularies. A battery of seven experimental vocabulary tests and three measures of mental ability and reading achievement were administered to students in fourth through twelfth grades. The focus of the study was to investigate the breadth of vocabularies across subject areas, the depth of vocabulary understanding, and the progression of vocabulary development in the middle years and early adolescence. The study also investigated the relationship of vocabulary measures to general verbal ability as postulated by Thurstone's (1941) verbal comprehension factor. Russell reported the following important findings concerning the language behavior of children in middle and upper grades:

1. Vocabulary growth was continuous from grade to grade.

2. There was a tendency for the rate of vocabulary growth to be greater in grades four through eight, and to level off in grades thereafter.

3. Vocabulary abilities become increasingly specialized as children mature from fourth through twelfth grades.

4. The vocabulary scores obtained correlated most highly with verbal meaning scores on the SRA Primary Mental Abilities Test. Factor analysis indicated that all of the vocabulary tests were highly saturated with a verbal meaning factor.

5. The correlations between scores obtained on the vocabulary

   tests and reading ability were consistantly high. Although

   the vocabulary test scores were not necessarily indicative of

   school achievement.

Russell concluded that the results present some evidence for rapid

growth in breadth of meaning (especially as measured by several mean-

ings of the same word) in the intermediate grades of the elementary

school.

Bond and Fay (1950) also reported a high correlation between read-

ing ability and vocabulary performance. They compared the performance

of good and poor fourth, fifth and sixth grade readers on the subtests

of the Stanford-Binet Intelligence Tests. They found that children

whose reading ages were less than their mental ages tended to be pena-

lized by those items which were verbal in nature or which depended upon

the ability to understand and read a passage.

Studies involving the factor analysis of vocabulary ability in

relation to general language ability have indicated that vocabulary is

highly correlated with a verbal comprehension factor which is relatively

independent of general mental ability (Thurstone, 1941; Swineford, 1948;

Cohen, 1959; Rugel, 1974; Kaufman, 1975). Language ability may be a

distinguishing factor between poor and average readers. In his review

of sixteen studies that used the WISC to identify and diagnose children

with reading disability, Farr (1969) concluded that despite numerous

inequities in the designs of the research, fairly consistent patterns

of WISC subtest scores for retarded readers were indicated. In

respect to their general performance levels on all subtests of the WISC,

poor readers performed at a lower level on the following subtests:

information, arithmetic, digit span, coding and vocabulary. One prob-
lem in such an analysis is in interpretation. It appears, at least for
one area of reading disability, that poor performance on the verbal
subtests is related to the lack of opportunity to learn, caused by the
inability to read. An underlying question involves whether poor read-
ing skill has prevented the students from developing in certain areas,
or if poor readers are deficient in particular areas of language com-
petency which in turn limits reading development?

Many studies of language performance conducted in the last decade
have emphasized the oral language behavior of children and have utilized
sophisticated grammatical analysis to follow its development. Attempts
have been made to relate the child's progress in language skills to his
learning of syntactic structures and semantic competencies. The appli-
cation of theories of transformational grammar to language studies have
influenced the scope of current linguistic research considerably.
Palermo (1970) provided the following summary of this theory:

> The grammar of a language, according to Chomsky
> (1965), consists of a tripartite system of rules per-
> taining to semantics, syntax and phonology. Chomsky
> argues that the syntactic component relates the deep
> structure of the semantic component to the surface
> structure of the phonological component. Thus, the
> semantic component consists of the rules pertaining to
> the underlying meaning to be expressed, the syntactic
> component consists of the rules for converting the deep
> structure to a surface structure form which can be
> interpreted by the phonological rules (p. 412).

Studies by Slobin (1966) and C. Chomsky (1969) revealed a complex
progression of abilities involved in linguistic competence through the
interaction of the meaning of a sentence with its syntactic form.
Slobin examined the development of comprehension of active, passive,
negative and passive-negative sentences. He presented students in

second, fourth, sixth grade and college with pictures, and measured,
by errors and time of response, how well they judged the truth of
several sentence forms with respect to the pictures shown. Slobin
found that there was an improvement with age on the more complex
sentence forms, but performance on the simpler forms appeared to be
stable by the second grade. If the sentences were true with respect to
the pictures, the reaction times were shortest for the simple active
sentences and increasingly longer for the passive, negative and negative-
passive. All subjects had more difficulty with negative sentences, and
Slobin noted that some of the children would not accept any of the
negative sentences as being true of the pictures. Since the grammati-
cal transformations involved in forming negatives are less than those
for passives it had not been expected that negatives would pose such
problems.

Chomsky (1969) assessed the understanding of selected syntactical
structures and semantic restraints in oral language by elementary grade
pupils. Her study involved forty children ranging in age from five to
ten who were tested on comprehension of the subject and action of the
verb, knowledge of the antecedent, and the semantic differentiation
between verbs. Chomsky found that "considerable variation" existed in
the ages of the children who knew the structures and those who did not.
She noted that while some structures were acquired at an early age, none
the less, some structures were acquired surprisingly late.

> Contrary to the commonly held view that a child has
> mastered the structures of his native language by the
> time he reaches six, we find that active syntactic
> acquisition is taking place up to the age of nine and
> perhaps even beyond (p. 121).

Robertson (1968) studied the ability of fourth, fifth and sixth

graders to comprehend connectives as they are used in sentences. The seventeen connectives were selected from texts for grades four through six, and were presented to the subjects in a sentence completion, multiple-choice format. Her results indicated that the students' understanding varied from 57 percent for fourth graders up to 75 percent for sixth graders. She reported that the students' comprehension increased with grade level. A high percentage of connectives such as "however," "although," "which" and "yet" were not understood by the students. Robertson noted that the variation of the textbook sentences containing the connectives was almost negligible from grade to grade.

An extensive longitudinal study of the language development of school children was made by Loban (1963, 1976). He followed the progression of language production in 211 students from kindergarten through twelfth grade. He elicited samples of the students' oral language by the use of pictures. Loban used the "communication unit" as a measurement technique to assess language maturity. The "communication unit" represented the length of an independent clause with all of its dependent modifiers. This eliminated the problem of run on patterns of coordinate clauses encountered in previous studies. Loban found that as children become more effective in their use of language they use more communication units as they speak. These units tend to get longer and more grammatically complex as language matures. In subsequent reflections on his early study Loban (1970) stated:

> Not communication unit patterns, but what is done to achieve flexibility within the pattern proves to be a measure of effectiveness and control of language. In the moveable elements of the patterns the high language ability group consistantly showed a greater repertoire of clauses and multiples (moveables within moveables). For subject nominals, the low language ability group depends almost exclusively on nouns and pronouns. The high group

can use noun clauses, infinitives and verbals of all kinds.
For nominals used as compliments, both groups use nouns
and pronouns with the same frequency, but the high group
invariably exceeds the low group in the case of infini-
tives and clauses. As they mature, the low group increases
its ability to use dependent clauses, whereas the high
group shifts to that tighter coiling of thought accom-
plished by infinitive clauses, participial, prepositional
and gerund phrases, appositives, nominative absolutes, and
clusters of words in cumulative sentences (p. 625).

Loban found that there was a positive correlation between the com-
pleteness and ease of language expression and high language ability.
Children in the low language group tended to grope for words and use
more partial utterances. He also found a positive correlation between
reading ability and language skills. Oral language ability and vocabu-
lary correlated highly on group IQ tests. Loban (1963, p. 89) de-
scribed a form of language difficulty that school children are likely
to have as "language that is inflexible and that does not serve the ex-
panding needs of the child, particularly in school tasks."

The analysis of oral and written language by transformational
grammar theory has confirmed previous findings on the development of
language patterns (Strickland, 1963; Loban, 1963, 1976) and brings with
it a greater precision in the measurement of syntactic maturity.

Hunt (1965) analyzed the written language of "average" students in
grades four, eight and twelve. Based on the theory of transformational
grammar, he developed the concept of the "minimal terminal unit," for
syntactic analysis. The "T-unit" represents the shortest grammatical
segment that can be terminated (punctuated as a sentence) without
creating any fragments in between. By analyzing selected uncontrolled
samples of students' writing, Hunt found that as children mature, they
tend to produce more words per "T-unit." Older students wrote both

more words per clause and also wrote more subordinate clauses per main clause.

O'Donnell, Griffin and Norris (1967) used a similar system of transformational analysis to investigate the speech of children in kindergarten and grades one, two, three, five and seven along with the writing of the same children in grades three, five and seven. Language was elicited from the students by asking them to make comments after viewing short movies without sound. Findings confirmed the earlier Hunt study. O'Donnell et al., found the "T-unit" length increased in children's writing from grade three to five, and was greatest at grade seven. Results also showed that the "T-unit" length increased in the children's speech for each successive grade level.

In an effort to validate an instrument to more efficiently measure syntactic maturity, Hunt (1968) repeated his earlier study on a larger group of students varying in age and mental ability within grades four, six, eight, ten and twelve. In this later study, Hunt devised an instrument to control for the content variance in the free writing samples previously analyzed. A simple passage containing 32 short sentences was presented to all students with the directions to "rewrite the passage in a better way." The findings of the controlled content study support and clarify the results of Hunt's earlier research. The following characteristics of syntactic maturity were observed by Hunt:

1. The more mature students tended to reduce many main clauses to words or phrases and include them in the remaining main clauses. Therefore, their average number of words per clause increased.

2. There was a positive correlation between scores of syntactic

maturity and general academic ability within the same
chronological age group.

3. The number of main clauses reduced to subordinate clauses
increased sharply from grades four to six and from grades six
to eight. This number appeared to level off and remain the
same for grades eight. This number appeared to level off and
remain the same for grades eight through twelve. Hunt com-
mented that this leveling off had not been observed in
analysis of free writing samples and may be due to the
instrument.

4. The coordination of main clauses decreased with both chrono-
logical and mental maturity.

5. As a result of these tendencies, the more mature students
produced longer "T-units" and students in grades ten and
twelve wrote longer sentences than those in the younger
grades.

In reference to this study, Smith, Goodman and Meredith (1976)
commented upon the value of the knowledge of transformational progres-
sion on the development of effective language.

> The ability to 'generate' these more complex and compact
> language units not only may reflect the increased control
> of the youngsters over the transformational rules involved
> but also may be an indication of the ability of children
> to relate the complex ideas involved rather than to handle
> them one at a time. 'In any case this well-defined pro-
> gression of transformations suggests an area in which
> school can contribute to development and generation of
> effective language (p. 28).'

Studies of the Relationship of Language

Structure and Function to

Reading Performance

The ability to utilize implicit knowledge of syntax while reading has emerged as a consistant characteristic of effective readers. This strong link between language patterns and readability has been confirmed by numerous studies, which indicate that the syntactic patterns which appear frequently in student's oral and written language are also comprehended more easily in reading than are less frequent patterns (Loban, 1976; Strickland, 1963; Ruddell, 1963; Tatham, 1970; Wisher, 1976).

In her study to determine the relationship between the language of children and syntactic patterns used in reading texts, Strickland (1963) analyzed the oral language patterns of 575 elementary grade pupils ranging in age from six years to fourteen years eleven months. A language analysis system based on theories of structural linguistics, was devised to describe the structural units of the language patterns. These units or "slots" represented the fixed structural components of a sentence such as subject, verb, object, etc. Those units of the sentence pattern which usually do not have fixed positions were called "moveables." These units included adverbials of place and time, and conjunctions. The words and phrases that filled these "slots" were called "slot fillers." The primary emphasis of analysis of linguistic patterns involved the positions of these "slots" rather than the types of "slot fillers." The sequence of syntactic structure within twenty-five sentences of uninterrupted speech was analyzed for each child, as well as texts for grades one through six.

Strickland found a significant correlation between pupils' oral language and performance on silent and oral reading tests. She noted that the more skilled a child is in manipulating sentence elements, the higher he will score on reading performance tests. Expanded nominalizations and a flexibility in the use of adverbials and coordinated conjunctions were reported to indicate increasing language skills. It was also noted that the simple measure of sentence length could not be considered a reliable measure of language maturity. This measure presents a problem when there are run-on sentences joined by "and," resulting in long sentences that are not necessarily representative of language maturity. Analysis of the reading texts did not indicate a controlled progression of sentence structures. In fact, Strickland concluded that there is no progression in the reading texts to organize the presentation of syntactic patterns as there is to control vocabulary. Strickland suggested that the language patterns used most frequently in children's language would be easily comprehended in written form.

Following Strickland's study, Ruddell (1963), studied the effects of high and low frequency sentence patterns on reading comprehension. Reading passages, which were controlled for reading grade level but which varied in the structural organization of the sentences, were presented in a close test format to fourth grade readers. Ruddell's findings supported the previous implications of Strickland's (1972) research. He found that the sentence patterns designated as high frequency in the children's oral language were indeed read with higher comprehension than those sentences representative of low frequency oral language patterns.

Tatham (1970) extended further the investigation of this relation-
ship between reading comprehension and material written with selected
oral language patterns. She measured the reading comprehension of
second and fourth graders on a series of unrelated sentences containing
different types of "slot fillers." The degree and type of embeddedness
in each sentence was varied to reflect the frequency of these structures
in oral language development. Tatham's results supported Ruddell's
findings (1963), that material written with frequent oral language
patterns are comprehended better than material written with infrequent
oral language patterns.

Wisher (1976) found that prior knowledge of the syntactic structure
of a sentence allows it to be read faster. When college students were
aware of the syntactic structure of material to be read, the reading
time necessary to process the material was shortened. Wisher suggested
that precise syntactic expectations reduce linguistic computation and
its related memory requirements associated with the reading act. There-
fore, for the reader to be most efficient, he must utilize all cues the
language offers.

The ability to predict reading level from student writing samples
was investigated by Lazdowski (1976). Writing samples were collected
from 338 students in grades seven through fourteen whose reading levels
ranged from below third-grade level to above fourteenth-grade level.
The investigator constructed a formula to predict reading level from
these writing samples. Each writing sample was scored for readability
according to: 1) standard formulas and 2) for selected measures of
vocabulary load, sentence structure, density of ideas, and syntactic
complexity. Lazdowski reported that by using the second set of measures,

it was possible to predict reading ability within one grade level,
with a reliability of .88.

Kuntz (1975) assessed the relationship of reading achievement to
syntactic attainment for 96 seventh-grade students. Significant cor-
relations of .68 and .80, between reading variables from the Gates-
McGinitie Reading Test, Survey E and subtests of the Sentence Construc-
tion Test were obtained from two school samples. The syntactic attain-
ment battery included the following subtests: completeness, involving
recognition of sentence elements; pattern transformation, which tests
the ability to produce basic sentences and simple transformations; and
precision transformations, which samples more complex sentence-combining
transformations. The subtest which correlated most closely with the
reading variables was precision transformation, with significant cor-
relations ranging from .24 to .64. This subtest resembled Hunt's
(1969) since the tasks involved required combining two or more sentences
into more mature syntactic constructions. Kuntz concluded that her
results were supportive of the view that there is a close and reliable
relationship between reading achievement and syntactic attainment. She
recommended that the function of syntax in reading be given more con-
sideration.

The interrelationship between reading and writing skills has
gained increasing interest in recent research. In summarizing a
national study of high school English programs, Applebee (1977)
reported that when teachers indicated that the composition program
rather than the literature program was primarily responsible for
student success, there was also a reported increase in the amount of
time students spent reading. He also describes a limited experimental

study by Hughes (1975) in which practice in transformational sentence combining aided seventh grade students' reading comprehension.

The application of transformational-generative grammar theory to the investigation of reading disabilities has produced several studies comparing the performance of good and poor readers on tasks related to language facility and syntactic knowledge. Evans (1973) tested the comprehension of 24 high shcool seniors whose reading scores ranged between seventh and ninth-grade level. Half of his subjects were presented with five simplified "de-transformed" passages in which nominalizations, relative clauses, passive voice verbs and grammatical deletions were rewritten into simple kernel sentences. The remaining subjects read an unsimplified version of the same material. A T-unit analysis following Hunt's (1969) procedures, indicated that the detransformation process reduced the passages, to a sentence length and word order which reflected the performance of an eighth-grade writer who as shown by Hunt's data is just beginning to write sub-ordinate clauses, verbal noun constructions and adjective phrases in place of the conjunction "and". Evans presented both subject groups with multiple choice and close tests to assess comprehension of the passages. He found significant results favoring the increased reading comprehension of the detransformed structures. He concluded that the transformations investigated tend to complicate the reading process for poor readers, because they encode information in sentence structures that are unused by many problem readers. Isakson and Miller (1976) investigated the sensitivity of good and poor readers to language constraints in sentences. Forty-eight fourth grade subjects who differed on comprehension ability but not word identification skills

were presented with a series of sentences containing syntactic and
semantic manipulations between the main verb and other key parts of
the sentence. The sentence triads presented included a meaningful
sentence and a semantically anomolous sentence which did not violate
syntactic constraints. The investigators found that readers who were
sensitive to the semantic and syntactic constraints in the sample
sentences showed increasing amounts of disruption across sentence
types as they were read orally. Conversely, the poor comprehenders
displayed no such increasing number of errors across sentence types.
The authors concluded that this apparent failure on the part of poor
comprehenders to utilize language structure could account, in part,
for the difficulty they face in deriving sentence meaning. Poor
readers seemed to ignore semantic and syntactic cues to meaning and
simply focus on words as individual entities.

Recent studies comparing the developmental trends in the proces-
sing of syntactic relationships in good and poor readers have been
conducted by Vogel (1975), Newcomer and Magee (1977) and Takahashi
(1975).

Vogel (1975) studied syntactic abilities in the auditory language
of dyslexic and normal children. Twenty dyslexic and twenty normal
second grade boys were tested to determine the relationship between
syntactic ability and reading comprehension. The test battery included
four categories of functioning: syntactic ability, receptive vocabulary,
auditory memory, and reading. Vogel found that dyslexic children were
significantly poorer in syntactic ability than good readers for three
of the five aspects of syntax studied. Significant differences were
found between the groups in the areas of recognition of melody pattern,

sentence repetition and syntax, and morphology in expressive language.

Vogel (1975) also reported a high correspondence between reading compre-

hension and syntactic ability for both groups. Although a discrepancy

was noted in the overall predictability between the sample groups,

Vogel concluded the following:

> The three predictors, syntax, semantics, and decoding
> accounted for approximately three-fourths and two-thirds
> of the variability in reading comprehension in the normal
> and dyslexic groups respectively. It was suggested that
> this discrepancy in overall predictability between the
> sample groups may in part be a result of the inability of
> the dyslexic child to use efficiently the semantic infor-
> mation he possesses because of his syntactic deficiencies
> (p. 81).

She suggested that the evidence of the three high predictors of

reading comprehension confirms the psycholinguistic theory of reading

and the importance of syntactic information in reading comprehension.

A similar study of the oral-language skills of disabled first and

second grade readers was conducted by Newcomer and Magee (1977). The

language performance of 38 disabled readers with average or better

intelligence was compared to a matched group of able readers. Seven

semi-independent aspects of oral language were measured by the Test of

Language Development (TOLD), which included expressive and receptive

measures: word articulation, word discrimination and semantics; oral

vocabulary, picture vocabulary and syntax; sentence initiation and

grammatic understanding, as well as the combined expressive-receptive

syntactic task of grammatic completion. Children who were disabled

readers scored consistantly below the able readers. This difference

was significant at the .05 level for all subtests except receptive

picture vocabulary. The investigators reported that although the read-

ing disabled children performed less well, their group mean scores did

not fall below the lower limit of normalcy and therefore they were not
as a group "linguistically handicapped." However, there was con-
siderable disparity in the intrasubtest performances of the reading
disabled group, while the able readers showed little intrasubtest
variance. The investigators concluded that mean group scores masked or
leveled the divergence present in the performance of the disabled group.

Examining the frequency with which individual group members scored
below the normal range on at least one TOLD subtest, indicated that
significant differences existed between the two reading ability groups.
A disproportionate number of disabled readers had specific language
problems which were masked by group analysis. The authors suggested
that possibly the fact that poor readers must work harder simply to
understand and use the language restricts their progress in reading.

The reading comprehension and written syntactic structures by good
and poor readers at two grade levels was investigated in a study by
Takahashi (1975) using the Nelson Reading Test and a Test of Sentence
Meaning (ATSM); she compared the relationship of reading to syntactic
comprehension for ninth grade poor readers and sixth grade readers per-
forming at the same reading level and ninth grade good readers.
Takahashi found that significant differences existed between the per-
formance of good and poor ninth grade readers for comprehension of
syntactic structures. Low correlations were reported for the relation-
ship between total reading scores and syntactic comprehension of the
ninth grade groups whereas the sixth grade reading performance cor-
related .70 with syntactic comprehension. The investigator suggested
that while comprehension of syntactic structures is surely an element
in total reading comprehension, it may be a more important reading

factor at the sixth grade level.

Summary

A survey of the literature has revealed numerous studies of language performance which have indicated the direction of a child's growth toward language maturity, and have provided the basis for comparisons in language functioning. The interdependent development of increasing knowledge of word meaning, structural awareness and transformational generativity has been described. It has been noted that some older children do not utilize these mature forms of language processing in their expressive language and may not comprehend them. Reading comprehension tends to be highly correlated with these language abilities. Studies of the differences in language performance of good and poor readers appears to indicate support for the hypothesis that reading disability is related to deficiencies in language competency.

Studies investigating a wide range of vocabulary and verbal comprehension skills have consistantly indicated a strong degree of correspondence between vocabulary use and reading success. However, much of the available literature concerning vocabulary growth has been restricted to old data (McCarthy, 1954; Russell, 1954; Bond and Fay, 1950; Dale 1965). Performance of poor readers on the WISC subtests of Information and Vocabulary were reported as consistantly low (Farr, 1969). The question of whether poor reading skills have prevented students from developing language competencies or if poor readers are deficient in particular areas of verbal comprehension and performance which in turn limits reading development is a subject of increasing conjecture, and an area in need of further study.

Several investigations have utilized sophisticated grammatical analysis based in transformational theory to relate language development to the learning of syntactic structures and semantic competencies. This progression of abilities related to linguistic competence involves the complex interaction of the meaning of a sentence with the syntactic form. Acquisition and mastery of such competencies, while developmental in nature, have been shown to be quite variable for some children and adults (Seobin, 1966; Chomsky, 1969; Robertson, 1968; Loban, 1963, 1976). In his extensive study of the language development of school children, Loban found that there was a positive correlation between reading ability and language skills including oral language expression and vocabulary.

The analysis of developmental patterns of the oral and written language of school children and adults has provided a knowledge of the language behavior of average learners (Loban, 1963; Strickland, 1963; Hunt, 1965, 1969; O'Donnell, Griffin, and Norris, 1967). These studies and others have confirmed that there is a significant relationship between a student's oral and written language and reading performance.

Several studies have supported the findings that prior knowledge of syntactic structure allows for more efficient and effective reading of material. Readability of student's written material has been directly correlated with their reading performance by Lazdowski (1976). Numerous studies have supported close and reliable relationships between reading achievement and syntactic maturity.

Studies comparing the performance of poor readers on tests of linguistic competence suggest that these readers seem to ignore semantic and syntactic cues to meaning (Evans, 1973; Miller and Isakson, 1976).

The syntactic and oral language skills of disabled readers studied by Vogel (1975) and Newcomer and Magee (1977) were consistantly lower than normal readers; this was particularly true for measures of expressive language abilities. Newcomer and Magee reported that a disproportionate number of disabled readers had specific language problems which were masked by group analysis.

A comparison of the performance of good and poor readers on a test of comprehension of syntactic structure conducted by Takahashi (1975) revealed that the relationships between reading and syntax were greater at sixth than at ninth grade.

Evidence of a strong relationship between reading and language skills is apparent from a review of the literature. The extent of this relationship at various ages and levels of reading or implicit linguistic ability are not clearly understood. In view of the disparity between the general language skills of good and poor readers and the paucity of information on the specific language skills of secondary disabled readers, there appears to be a need to further investigate the relationship of language skills and reading performance for adolescent disabled readers.

CHAPTER III

METHODS AND PROCEDURES

Sample and Population

The primary purpose of this study was to examine the selected
language abilities of disabled tenth grade readers whose reading per-
formance is four to six years below grade placement in comparison with
able fourth grade readers with similar reading performance, and able
tenth grade peers.

The subjects for this study were drawn from tenth grade pupils in
the high school and all of the fourth graders in one of four elementary
schools in Stillwater, Oklahoma. This is a mid-sized university com-
munity with a population of approximately 39,300 people, located in
north central Oklahoma. The sample was selected because of its con-
venience and the willingness of the public school administration to
permit this study. It was felt that a cross-section of socioeconomic
levels was represented. Demographic records indicate that 93% of the
school population is Caucasion, 5% Black, and 2% of American Indian or
other extraction.

The sample consisted of three groups of 30 pupils each: a group
of tenth grade disabled readers, a group of average fourth grade
readers whose performance on a test of silent reading comprehension
was similar to the reading grade level of the disabled group, and able

31

tenth grade readers whose silent reading comprehension was at or above grade level. All tenth grade readers identified as disabled readers and who conformed to the criteria outlined below were included in the study. The able readers who met the criteria were randomly selected for the sample by grade levels.

The following criteria were met by all students included as subjects for the sample population of this study:

1. All students fell within the average age for grade placement at mid-year. All tenth graders were between 14.5 and 16.9 years old. The mean age for both tenth grade sample groups was 16.0 years. Fourth graders ranged in age from 9.5 to 10.6 years, with an average age of nine years nine months.

2. All students were functioning within the range of average intelligence on a standardized test of nonverbal intelligence. Only those students with DIQ scores between 84 and 116 on the nonverbal form of the Lorge-Thorndike Intelligence Tests were included in the sample. The mean nonverbal DIQ for fourth graders, disabled tenth grade readers and able tenth grade readers were 107, 101, and 107, respectively.

3. All students were informally observed as being free of gross mental, physical or emotional handicaps which might interfere with the learning processes.

4. All students were from a monolingual language background. Only those students whose primary home language was English were included in the study.

5. Reading ability of all students was assessed by a standardized test of silent reading ability to be within the following defined ranges for group inclusion: fourth graders performing ½ to +1 SD from

the mean (approximately between 4.0 and 6.0 grade level) on the Gates-McGinitie Reading Test Comprehension Form D-2. Tenth graders falling 1 SD or more below the mean (below 6.5 grade level) on the Gates-McGinitie Reading Test Comprehension Form E3M and those scoring within 1 SD above the mean (10.1 + grade level) were included in the sample groups. In addition, classroom teachers corroborated this assessment of reading ability.

    6. Permission was obtained for the testing.

    7. All students completed all tests included in the battery. Special testing sessions were arranged for the five tenth graders and three fourth graders who were absent during the scheduled group testing. Although the sex of the subjects was not a factor considered for group membership, the proportion of males to females was similar for the three groups. The fourth grade and disabled groups each consisted of 20 males and 10 females while the able tenth grade group had 17 males and 13 females.

    Table I presents the selection data for the sample groups.

<div align="center">Testing Procedures</div>

    The following tests were administered in this sequence, by qualified examiners, to the sample population between the dates of February 23, 1977 and March 11, 1977:

    1. Gates-McGinitie Reading Test, survey E3M and D-2, Arthur I. Gates and Walter H. McGinitie, 1972 (1965).

    2. Lorge-Thorndike Intelligence Tests, nonverbal battery, levels 3 and 5, Irving Lorge and Robert L. Thorndike, 1957.

    3. Peabody Picture Vocabulary Test, Form B, Lloyd M. Dunn. 1965.

TABLE I

SAMPLE GROUP DESCRIPTION

Measure*	Group	Mean RS	Mean SS	SD(RS)	Grade Score	Age Score
Age	4	117.1000		3.9340		(9-9)
	10D	192.1667		5.5470		(16-0)
	10A	191.7000		5.7548		(16-0)
DIQ	4	106.9000		7.2560		
	10D	101.0333		7.7662		
	10A	107.2333		8.3159		
COMPGM	4	33.3333	51.9667	4.3497	4.8	
	10D	21.3333	35.9667	4.7441	5.1	
	10A	45.0000	55.1667	2.5189	12.1	

4. <u>Wechsler</u> <u>Intelligence</u> <u>Scale</u> <u>for</u> <u>Children</u>--Revised, verbal scale, David Wechsler, 1974.

5. <u>Instrument</u> <u>to</u> <u>Measure</u> <u>Syntactic</u> <u>Maturity</u>, Kellogg Hunt, 1969.

6. A free-writing passage was also elicited from the students by their classroom teachers. <u>The</u> <u>Formula</u> <u>for</u> <u>Predicting</u> <u>Readability</u> (Edgar Dale and Jeanne Chall, 1948) was then applied to each passage.

All group tests were administered to the students in their English or reading classes. For the individually administered tests; <u>Peabody</u> <u>Picture</u> <u>Vocabulary</u> <u>Test</u> and <u>Wechsler</u> <u>Intelligence</u> <u>Scale</u> <u>for</u> <u>Children</u>-- <u>Revised</u>, the subjects were removed from the classroom. These tests were administered in rooms relatively free from distraction by qualified examiners. The students were informed of the nature and purpose of the testing in advance and assured of the confidentiality of their scores.

Standardized directions for the administration and scoring of the tests were followed for all tests except the following:

1. Survey E of the <u>Gates-McGinitie</u> <u>Reading</u> <u>Test</u> was administered to the tenth graders, although survey F was designed to be used with grades 10, 11 and 12. According to the manual:

> Scores that are near the lowest or highest low scores obtainable with a test are less reliable than those between the extremes. Students getting only a few right answers may not have understood what they were to do. They should be retested with an easier test. Students getting near the highest possible scores might get still higher scores on a more advanced test (Gates, 1965, p. 7).

Since we were especially concerned with obtaining a reliable assessment of reading performance for the disabled reading group, survey E, for grades 7, 8 and 9 was administered to the tenth graders. It is acknowledged that reading scores for the able tenth grade readers might have been higher if they had taken survey F. By having both groups of

tenth graders take the survey E it was felt that a better estimate of performance could be obtained for the disabled group and raw scores for both groups could be directly compared.

2. The instructions for the Test of Syntactic Maturity were amended to include having the examiner read the passage aloud to the group immediately after presenting the general test instructions. This was done to insure that readability of the passage would not interfere with the task at hand. Although Hunt's procedures for scoring the tests were followed, the passages were first typed and randomly numbered for identification purposes. Then three judges independently scored each test to assure objectivity.

3. Application of the rules for the Dale Chall Readability Formula were relaxed to discount the word "advice" as a hard word since it was provided by the examiner. A repeated hard word was only counted twice in the count of hard words or in the calculation of the Dale score.

Test Instruments

Gates-McGinitie Reading Tests
Survey D and E

This is a standardized group test which measures three aspects of silent reading ability; comprehension, speed and accuracy, and vocabulary. The comprehension test (COMPGM) was selected as a criterion measure of the student's ability to read and understand complete prose passages. It was used to identify the reading level of the students for grouping purposes. The test contains 21 passages of increasing

difficulty in which a total of 52 blank spaces have been introduced. For each blank the student must choose one of five answers provided to best complete the meaning of the whole passage.

The speed and accuracy test measures how rapidly the student can read and understand sentences. This test consists of 36 short paragraphs of relatively equal length and difficulty. Each paragraph is followed by four words from which the reader must choose one, to best answer the question or complete the statement. The time limit is such that few students can complete all paragraphs. Two scores are reported for speed and accuracy, number attempted (SATGM) and number correct (SNCGM).

The vocabulary (VOCGM) section samples the student's reading vocabulary; his ability to recognize or analyze isolated words in print. The test consists of 50 items, each followed by five other words. The student's task is to choose the word that means nearly the same as the test word. The items gradually become less common and increase in difficulty.

The validity of this test is based on the content of the typical school curriculum. The authors cite a study by Davis (1968) which reports concurrent validity coefficients for the correlation of survey D with four other standardized reading tests. The median coefficients were .78 for vocabulary and .80 for comprehension. The following average alternate form reliabilities were reported for levels D and E, respectively: .86 and .80 for the vocabulary test; .86 and .81 for the comprehension test; .71 and .69 for speed and accuracy number attempted; and .78 and .74 for speed and accuracy number correct.

The Gates-McGinitie Reading Tests were standardized on a nation-

wide sample of approximately 40,000 students. Each student who parti-

cipated in the standardization first took one form of the reading test

designed for his own grade and then either another form of the same

test or one form of the test designed for the grade above or below his

own. In this way an extensive grade norm subsample of two-thirds of

the standardization sample was established.

Lorge-Thorndike Intelligence Tests

Nonverbal Battery, Levels 3 and 5 (DIQ)

This test was used as both a screening instrument for the sample

selection and as a source for mental age scores. The nonverbal battery

yields an estimate of scholastic aptitude independent of the ability

to read. The test provides pictorial and numerical items in three

subtests: pictorial classification, pictorial analogy, and numerical

relationships.

It was normed on over 136,000 children drawn from a stratified

sample of communities throughout the nation. The Lorge-Thorndike Tests

were designed to measure reasoning ability and therefore content

validity is difficult to evaluate. Correlates for the concurrent

validity of the nonverbal battery with other group intelligence tests

are reported as high as .84. Alternate-forms reliability for the non-

verbal battery, levels 3 and 5 are reported in the manual to be .81 and

.85.

Peabody Picture Vocabulary Test,

Form B (PPVT)

This test was administered to assess the receptive or listening

vocabulary of the sample subjects. The PPVT was designed to provide

an estimate of intellectual ability. It is an individually adminis-

tered test which consists of a series of stimulus words presented

orally to the subject one at a time. For each word the subject is

instructed to choose one picture out of four that best describes the

word presented. Both the stimulus words and picture plates gradually

increase in difficulty. Norms are provided for ages ranging from two

years to eighteen years. A student completes only that portion of the

test which is within his own ability range.

The standardization group included 4,000 white children and youth

residing in and around Nashville, Tennessee. The test manual provides

summaries of previous congruent validity studies. Correlations with

the 1960 Stanford Binet are reported as .83. Alternate form reliability

coefficients of correlation are reported for raw scores ranging from a

low of .67 at the six year level to a high of .84 at the seventeen and

eighteen year levels with a median of .77. Dale (1970) concluded

that:

> As a vocabulary test, the PPVT is carefully designed and
> well standardized... However, it is widely used as a general
> language assessment tool. The implicit assumption in this
> use is that vocabulary growth alone reflects language
> development...there is little supporting evidence for
> such an assumption (p. 268).

In the present investigation the raw PPVT scores were used as compara-

tive measures of receptive word knowledge between reading ability groups.

Wechsler Intelligence Scale for Children--

Revised (WISC-R)

The WISC-R is a much respected individual intelligence test

designed for ages 6-0 to 16-11 years. It consists of twelve subtests

which are combined into two subscales to yield three measures of
intelligence: verbal, performance, and full-scale.

A factor analysis of the structure of the Wechsler Intelligence
Scale for Children (WISC) was conducted by Cohen (1959) and more
recently the revised edition of that test, WISC-R, was analyzed by
Kaufman (1975). They found that three factors emerged as being inde-
pendent components of a "g" factor or general intelligence. The three
major factor structures analyzed were verbal comprehension, perceptual
organization and freedom from distractability. The verbal comprehension
factor emerged as the best measure of general intelligence, although it
clearly represented verbal language skills. The four subtests included
in this catagory were information, similarities, vocabulary and com-
prehension. Kaufman suggested that by computing the average scaled
score on tests associated with each factor, clinicians may better
observe the component abilities of general intelligence for a given
individual. Consequently, the language components of general intel-
ligence may be observed apart from other aspects of intelligence by
computing the verbal comprehension score from the four WISC-R subtests
identified by Cohen. The factor score for verbal comprehension is
found by averaging the scaled scores for the above four subtests. When
compared to the population mean of 10 for WISC-R scaled scores, a
factor score differing by three points is considered to be significant.
Based upon the analyses conducted by Cohen (1959) and Kaufman (1975) the
following four subtests of the verbal scale of the WISC-R which factor
strongly as measures of verbal comprehension apart from general
intelligence were included in the present study: information, simi-
larities, vocabulary and comprehension. The WISC-R is a revision and

complete restandardization of the 1949 WISC. The standardization

sample based on the 1970 census, included a stratified sample of over

2,200 cases throughout the nation. Wechsler (1974) reports the follow-

ing split half reliabilities for the subtests administered for age group

9½ years and 15½ years, respectively: information, .81 and .90, simi-

larities .79 and .74; vocabulary .86 and .90, and comprehension .78

and .72. A correlation of .96 is reported between the verbal scale of

the WISC-R and Wechsler Adult Intelligence Scale.

Intercorrelations of the four verbal scale subtests administered

are relatively consistant for both the 9½ year and 15½ year age groups.

Intercorrelations corrected for contamination range from .52 to .74

while appearing to correlate most highly with the other three verbal

subtests.

The following selected subtests of the WISC-R were administered

individually to all sample individuals in the order presented by the

manual of instructions. All subtests required the subjects to respond

orally to questions presented by the examiner.

Information: This subtest consists of 30 factual questions in
ascending order of difficulty. These are basic
facts assumed to be generally available to child-
ren. The information subtest measures memory of
general information gained through experience and
education.

Similarities: This subtest is composed of 17 pairs of words
which require the identification of likenesses
between objects, substances, facts or ideas. The
subtest measures remote memory, concept formation

and the ability to see associational relation-

ships. It also assesses logical and abstract

thinking and the individual's ability to verba-

lize generalizations.

Vocabulary: The vocabulary subtest of the WISC-R consists of

32 words, to be defined, arranged by order of

increasing difficulty. It measures the individ-

ual's oral language vocabulary and word knowledge

acquired from experience and education. It also

reflects his ability to understand and use the

language.

Comprehension: This subtest presents 17 questions which involve

common sense, reasoning and moral judgment. It

measures the individual's ability to utilize

practical knowledge and judgment in social situa-

tions and reflects his knowledge of conventional

standards of behavior.

Instrument for the Measurement of

Syntactic Maturity

This test was developed by Kellogg Hunt and others (1968) to study

the differences in the syntactic structure of sentences written by

individuals at various stages of chronological maturity (for grades 4,

6, 8, 10, 12 and skilled adult) and at three levels of mental ability

within each grade. The test was normed on approximately 250 school

children in the Tallahassee, Florida public schools, chosen to represent

a normal distribution of academic ability.

Hunt (1968) based his analysis of syntactic structures on the con-
cept of a "T-unit" or "minimal terminal unit" as the shortest gram-
matical segment that can be punctuated as a sentence without forming
any fragments in between. Studies by Hunt (1965, 1969) and O'Donnell
(1967) which are described in the review of the literature confirm that
the length and number of T-units in a student's language is directly
related to syntactic maturity.

The instrument consists of 32 sentences of connected discourse on
an expository subject. The sentences are each single clauses with an
average of four and one-third words. Extremely short sentences were
deliberately chosen to provide ample opportunities for the students to
use many of the sentence combining transformations produced with
increasing frequency by older students.

Upon receiving a copy of the written passage, the students were
directed to rewrite it "in a better way" while maintaining the essential
meaning of the passage. Hunt's test and his instructions for adminis-
tration and scoring are provided in Appendix A. Along with qualitatively
describing the types of sentence transformations occurring at various
stages of maturity, Hunt made a quantitative analysis of the number of
words, clauses, T-units and sentences counted for each piece of writing.
The present investigation utilized only the quantitative analysis of
sentence structure as a measure of syntactic maturity. The following
five ratios (called synopsis scores by Hunt) involving the relationship
of clause to sentence factors were figured for each passage. (Hunt's
data may be found in Appendix B.)

1. Sentence length (SMSENT). The mean words per sentence have

long been utilized as a measure of language maturity, and

although sentence length is still considered to be one of the
simplest indexes of readability, numerous research studies
(Strickland, 1963; Loban, 1965; Hunt, 1965) have pointed out
the fact that sentence length is confounded by excessive
coordination and run-on sentences in the language of younger
students. In general, Hunt found a rough correspondence be-
tween sentence length and maturity.

2. Main clause coordination index (MNCLI). The average number of
main clauses per sentence serves as an indication of the ex-
tent to which the writer has used "and" to coordinate main
clauses or has simply strung main clauses together. Hunt
found that at every level of maturity there was a decrease in
the numerical value of this index.

3. T-Unit length (TLGTH). Hunt (1970, p. 4) defines T-unit as
"one main clause plus any subordinate clause or nonclausal
structure that is attached or embedded in it." Studies of
syntactic maturity (Hunt, 1965, 1968) have shown unmistakably
that the mean number of words per T-unit decreases at every
grade interval: Hunt (1970) concludes in his study that

> The fact that T-unit length goes steadily up while
> T-units per sentence go down explains why sentence
> length varies irregularly...T-unit length is clearly
> a better index of syntactic maturity than sentence
> length (p. 17).

4. Subordinate clause index (SUBCLI). This index represents the
ratio of all clauses, subordinate and main, per main clause.
Hunt's studies indicate that this index increased rapidly for
grades 4 to 8 and tended to level off from grades 8 through 12.

5. Clause length (CLGTH). The mean words per clause was found to

increase at every grade interval in Hunt's studies. It was hypothesized that since measurable growth in clause length is a slow process in the early grades, only sensitive instruments and closely controlled studies can be expected to detect it (Hunt, 1970, p. 18).

Free Writing Samples

To provide an index or estimate of maturity in vocabulary usage, the Dale-Chall Readability Formula (1948) was applied to the students' free writing. With the cooperation of English and classroom teachers essays of approximately 100 words were elicited from the students. The topics "On Saturday I Like To..." and "My Advice to the President" were suggested to the classes. Students were told that they did not need to worry about spelling errors, and they were given as much as a class hour to complete the assignment.

The Dale-Chall Readability Formula (1948) was designed to predict readability of materials above 4.0 grade level. It is based on the assumption that two efficient indicators of the reading difficulty of printed matter are mean sentence length and the familiarity and redundancy of the vocabulary contained in the test. Klare (1975) suggested that it has been the singularly most popular and widely used readability formula to date. Briefly, using the formula involves calculating the sentence length (DCSENT) and percentage of hard words (PERHDWS) or "Dale-Score," which is derived from the number of words not found on the Dale list of 3,000 familiar words, and converting them to raw scores or corrected grade level scores. In the present study the Dale-Score was used as a comparative numerical index of the maturity of vocabulary usage for each reading group.

Statistical Analysis

Statistical analysis was conducted at the Oklahoma State University Computer Center, using an IBM System 370/158 computer.

Procedures for Scoring the Syntactic

Maturity Tests

To assure the objectivity and reliability of scoring Hunt's Instrument for Syntactic Maturity, three trained independent judges scored each passage according to Hunt's procedures. A one-way analysis of variance was calculated by hand for judges by subject groups for each of the five synopsis scores of clause-sentence relationships on the syntactic maturity test. Upon establishing no significant differences between judges for each measure across the three subject groups, the mean score of the three judges for each individual passage was recorded as the individual subject's score.

Relationship of Language Abilities

Within Reading Groups

To test the first four hypotheses and investigate whether a significant relationship exists between language ability and reading performance scores at each level, Pearson product-moment correlations were computed between reading comprehension scores and all other variables within each subject group. The Pearson correlation coefficient r is used to measure the strength of relationship. The strength of the relationship indicates both the goodness of fit of a linear regression line to the data, and when r is squared, the proportion of variance in one variable explained by the other.

The following formula for computing Person correlation coeffi-
cients was applied to the data according to the computer program
statistical package for the social sciences (SPSS), Nie et al. (1975).

$$r = \frac{\sum_{i=1}^{N} X_i Y_1 = (\sum_{i=1}^{N} X_i)(\sum_{i=1}^{N} Y_i)/N}{[\sum_{i=1}^{N} X_1^2 - (\sum_{i=1}^{N} X_i)^2/N][\sum_{i=1}^{N} Y_i - (\sum_{i=1}^{N} Y_1)^2/N]^{\frac{1}{2}}}$$

Tests of significance derived from Students t with N-2 degrees of free-
dom were computed for each coefficient to test the hypothesis of zero
correlation:

$$t = r \frac{N-2}{1-r^2}$$

To determine possible differences in the degree of relationship of
language ability to reading performance for each subject group, a test
for significant differences between correlations was computed. The
procedure for Fisher's Z-Transformation function for Pearson's r corre-
lation coefficient was followed, using the following formula from
Bruning and Kintz (1968, p. 191).

$$Z = \frac{1}{2} [\log_e (1+r) - \log_e (1-r)]$$

Relationship of Language Abilities

Between Reading Groups

To test hypotheses four through six, which investigate whether there are significant relationships between the mean scores of language abilities across the three sample groups, point-biserial correlation coefficients were calculated. The point biserial r is especially designed for the situation in which one of the continuously measured variables being correlated is naturally dichotomized. Guilford (1973) reported that it is particularly useful when dealing with a truncated distribution. Such is the case with the reading ability groups of the present study. The point-biserial coefficient is a product-moment r and is designed to be a good, yet conservative, estimate of the Pearson r. Utilizing subroutine Point from the IBM scientific subroutine package point-biserial correlations were calculated for each variable between groups by reading ability. The formula for computing the point biserial correlation $r_p b$ follows:

$$r_p b = \frac{(M_p - M_t)}{r_t} \quad \frac{N_p}{N_q}$$

To test whether the correlation is significantly different from zero, a t-test with N-2 degrees of freedom was computed for each coefficient.

$$t = r_p b \quad \frac{N-2}{1-r^2_p b}$$

CHAPTER IV

ANALYSIS OF THE DATA

Introduction

The study was concerned with the relationship between language

functioning and reading performance for three reading ability groups;

fourth grade able readers, tenth grade disabled readers and tenth grade

able readers. The fourth graders and disabled readers shared a similar

level of reading performance, while age and grade level were the same

for both of the tenth grade sample groups. The data collected included

an assessment of silent reading comprehension and selected measures

representing various aspects of language ability including receptive

and expressive vocabulary, verbal comprehension and syntactic ability.

These variables were then correlated with reading performance and

analyzed for relationships within and between groups.

Results Related to the Hypotheses for

Relationships Within Groups

Hypothesis I. There is no statistically significant relation-

ship between reading performance and language

ability for tenth graders, as indicated by mean

scores on tests of silent reading comprehension,

vocabulary, verbal comprehension and syntactic

maturity for able and disabled readers.

To determine the degree of relationship between reading and language skills across all tenth graders sampled, correlations were derived between silent reading performance and each language variable. The results, presented in Table II indicate that all of the language variables, except the number of clauses per T-unit and sentence length, were significantly related to reading performance at the .001 level of confidence. The number of clauses per T-unit (SUBCLI) was significant at the .01 level of confidence, while both measures of sentence length (SMSENT and DCSENT) showed no significant relationship to level of reading performance. Thus, the null hypothesis of no signicant relationship between language and reading scores for tenth graders can be rejected.

To test Hypotheses, II, III and IV and to examine possible differences within the restricted samples which were selected by silent reading performance, correlations were computed, by group, for each language variable on reading performance. Results of these correlations are presented in Table III.

Hypothesis II: There is no statistically significant relationship between the reading performance and language ability of able fourth grade readers as indicated by mean scores on tests of silent reading comprehension and syntactic maturity.

With one exception, the correlations of language variables on reading for fourth grade readers indicate no significant relationship exists within the group for language ability, and reading performance.

TABLE II

RESULTS OF THE PEARSON CORRELATION OF SILENT READING
PERFORMANCE WITH LANGUAGE VARIABLES FOR
TENTH GRADE STUDENTS (ABLE AND
DISABLED READERS)

Variables	R	R^2
SATGM	.4102**	.1683
SNCGM	.6231**	.3883
VOCGM	.7157**	.5122
PPVT	.5791**	.3354
WINFO	.6395**	.4090
WSIM	.5764**	.3322
WVOC	.7196**	.5179
WCOMP	.5270**	.2777
WVC	.6914**	.4780
SMSENT	.1341	.0180
MNCLI	-.4813**	.2316
SUBCLI	.3227*	.1041
TLGTH	.4815**	.2319
CLGTH	.4696**	.2205
DCSENT	-.1614	.0260
PERHDWS	.4378**	.1917

*p beyond the .01 level of significance
**p beyond the .001 level of significance

TABLE III

RESULTS OF THE PEARSON CORRELATIONS OF SILENT READING
PERFORMANCE WITH LANGUAGE VARIABLES
WITHIN GROUPS

Variable	Group		
	4	10D	10A
AGE	.2310	-.3555	-.0825
DIQ	.0718	-.1539	.2930
SATGM	.0571	.0744	.1998
SNCGM	.1931	.2642	.3049
VOCGM	.3418	.3303	.5593***
PPVT	.2978	-.0070	.2607
WINFO	.2347	-.0729	.4174*
WSIM	.2797	.0279	.4020*
WVOC	.4483**	-.0137	.2702
WCOMP	.2810	-.0356	.0274
WVC	.3010	-.0199	.3856*
SMSENT	.3395	-.0602	.1423
MNCLI	.2058	-.0883	-.1258
SUBCLI	.3243	.1658	-.2208
TLGTH	.2885	.0516	.2190
CLGTH	.1965	-.0918	.5479**
DCSCENT	-.1586	-.1652	-.1171
PERHDWS	.0804	-.0878	-.1933

2-tail t-test
*p beyond the .05 level of significance
**p beyond the .01 level of significance
***p beyond the .001 level of significance

Expressive vocabulary, derived from the WISC-R Vocabulary subtest

correlated at the .01 level of significance with reading scores within

the fourth grade reading group. Age and non-verbal IQ also show no

significant relationship in this group. This is evidence that there

is little significant variation within this sample group. Therefore,

the null-hypothesis of no significant relationship can not be rejected

for any variables except WISC-R Vocabulary (WVOC).

> Hypothesis III: There is no significant relationship between the
> reading performance and language ability of dis-
> abled tenth grade readers as indicated by mean
> test scores on tests of silent reading comprehen-
> sion, vocabulary, verbal comprehension and
> syntactic maturity.

Table III reports the correlations performed to test this hypo-

thesis. No significant correlations are reported for the disabled

group, indicating that the measured performance of the group is con-

sistant. Although none of the within group variables related signifi-

cantly with reading performance, two-thirds of the recorded correlations

were negative, displaying a slight inverse trend between reading perfor-

mance and language abilities for this group. The null-hypothesis of no

significant relationship can not be rejected for any of the language

variables.

> Hypothesis IV: There is no significant relationship between the
> reading performance and language ability of able
> tenth grade readers, as indicated by mean test
> scores on tests of silent reading comprehension,
> vocabulary, verbal comprehension and syntactic
> maturity.

The correlations of language abilities with reading performance for able tenth grade readers are also reported in Table III. Five significant relationships were indicated within this group: reading vocabulary, measured by the Gates-McGinitie Vocabulary subtest was significantly related to reading performance at the .001 level of confidence; clause length (Hunt's Test of Syntactic Maturity) was significantly related at the .01 level; and the WISC-R subtests of Information and Similarities, and Kaufman's grouping of WISC-R scaled scores for verbal comprehension were significantly related to reading performance at the .05 level of significance. Although the five variables which are significantly related to reading within this group should aid in the interpretation of between-group differences, the majority of variables tested indicated no significant relationship to reading performance; therefore the group of able tenth grade readers is considered to be homogeneous. The null-hypothesis of no significant relationship cannot be rejected for any language variables except the following: WVOC, WINFO, WSIM, WVC, and CLGTH.

Variation in the Patterns of Correlations

As a further examination of possible patterns or degrees of relationships specific to one sample group, Fisher's transformation to Z was calculated between groups to test for significant differences between the Pearson correlations. Results of this test are reported in Table IV.

For the comparison of correlations between fourth grade and and disabled readers, although not considered significant in this study, the correlation between WISC-R Vocabulary and reading

TABLE IV

RESULTS OF THE TEST FOR SIGNIFICANT DIFFERENCE BETWEEN
THE PEARSON CORRELATIONS (FISHER'S
TRANSFORMATION TO Z)

Variable	Group Z Scores		
	4-10D	10D-10A	4-10A
AGE	.5147	1.062	.5476
DIQ	.3124	.5329	.8453
SATGM	.0625	.4704	.5256
SNCGM	.2683	.1580	.4263
VOCGM	.0404	1.062	1.021
PPVT	1.0915	.9813	.1103
WINFO	.6137	1.374	.7607
WSM	.9371	1.466	.6542
WVOC	1.7126*	.9666	.7460
WCOMP	.9298	.0294	.9592
WVC (SS)	.7901	.7938	.6321
SMSENT	1.066	.3050	.7607
MNCLI	.4410	.1397	.3014
SUBCLI	.5211	.2095	.4116
TLGTH	.9004	.5843	.3161
CLGTH	.3969	1.922*	1.525
DCSENT	.0294	.1801	.1507
PERHDWS	.0257	.4006	.4263

*Z scores are significant at .10 level with values greater than 1.64.

performance was significantly different at the .10 level for these
two groups. A correlation of .4483 was reported for the fourth grade
group while the tenth grade disabled readers had a correlation of -.0137
on this variable (Table III). All other comparisons of correlations
for these two groups showed no significant differences. Comparisons of
the correlations for the disabled and able tenth grade readers indicate
that only the correlations between clause length and reading performance
are significantly different at the .10 level of significance for the
two tenth grade groups. All comparisons between the correlations for
the fourth and tenth grade able readers showed no statistically signi-
ficant differences in relationships at the .05 level. The results of
these tests may have been influenced by the relatively small sample
size.

<div align="center">Results Related to the Hypotheses for

Relationships Between Groups</div>

Table V presents a comparison of the means, standard deviations,
grade and age scores for the three reading groups according to measures
of language ability. To test Hypotheses V, VI, and VII, and determine
relationships of language abilities to reading performance between
reading groups, point biserial correlations were calculated on each
language variable for the following dichotomized reading group pairs:
4-10D; 10D-10A; and 4-10A. Results of these correlations and t-tests
to determine relationships significantly different from zero are
reported in Table VI by each group pair.

Hypothesis V: There is no significant relationship between the
mean scores on selected measures of language

TABLE V

MEANS, STANDARD DEVIATIONS, GRADE AND AGE SCORES
FOR GROUPS BY MEASUREMENT CATEGORIES

	Measure	Group	Mean RS	Mean Std.S.	Mean Sc.S.	SD(RS)	Grade Score	Age Score
Reading Comprehension	COMPGM	4	33.33	51.97		4.35	4.8	
		10D	21.33	35.97		4.74	5.1	
		10A	45.00	55.17		2.52	12.1	
	SATGM	4	18.70	54.20		8.38	5.8	
		10D	13.70	43.80		5.90	8.4	
		10A	17.80	52.07		4.86	11.6	
	SNCGM	4	17.80	55.13		6.53	5.9	
		10D	11.23	43.00		3.95	7.3	
		10A	17.13	54.33		4.72	11.2	
Vocabulary	VOCGM	4	27.17	52.63		5.14	4.8	
		10D	20.23	41.93		6.77	7.3	
		10A	30.23	52.67		5.48	11.0	
	PPVT	4	84.03			8.36		11-3
		10D	94.6			12.27		13-11
		10A	110.13			10.17		17-10
	PERHDWS	4	2.99			2.22		
		10D	2.70			1.44		
		10A	5.28			2.74		
Verbal Comprehension	WVOC	4	27.93		10.70	4.49		9-10
		10D	35.53		7.03	6.35		12-2
		10A	47.53		10.57	4.99		16-6
	WINFO	4	14.43		11.43	2.58		10-6
		10D	16.80		7.37	2.99		12-2
		10A	22.03		10.63	3.94		16-6
	WSIM	4	12.60		10.53	3.14		10-2
		10D	16.83		7.80	3.77		13-2
		10A	21.07		10.67	2.69		16-10

TABLE V (Continued)

	Measure	Group	Mean RS	Mean Std.S.	Mean Sc.S.	SD(RS)	Grade Score	Age Score
Verbal Comprehension	WCOMP	4	16.03		10.10	4.57		9-10
		10D	24.33		8.57	2.89		14-2
		10A	28.33		11.97	3.17		16-10
	WVC	4			10.61	1.92(SS)		10-1
		10D			7.77	1.84(SS)		12-10
		10A			10.96	1.66(SS)		16-8
Syntactic Maturity	DCSENT (wd/sent)	4	14.15			4.99		
		10D	19.95			10.74		
		10A	17.84			4.41		
	SMSENT (wd/sent)	4	6.36			2.39	4.0**	
		10D	10.17			2.99	8.0**	
		10A	10.81			1.86	8.0**	
	MNCLI (T-unit/sent)	4	1.26			0.35	8.0**	
		10D	1.50			0.44	6.0**	
		10A	1.13			0.16	10.0**	
	SUBCLI (Clause/ T-unit)	4	1.03			0.08	4.0**	
		10D	1.18			0.28	6.0**	
		10A	1.38			0.22	10.0**	
	TLGTH (T-unit/sent)	4	5.00			0.99	4.0**	
		10D	7.20			2.75	6.0**	
		10A	9.63			1.75	8.0**	
	CLGTH (Clause/sent)	4	4.85			0.64	4.0**	
		10D	5.99			1.27	6.0**	
		10A	7.05			1.14	10.0**	

**Approximated grade scores derived from Hunt's (1969) data norms.
  Appendix B)

TABLE VI

RESULTS OF THE POINT-BISERIAL CORRELATION OF LANGUAGE
VARIABLES BETWEEN READING GROUPS

Variable	Groups		
	4-10D	10D-10A	4-10A
SATGM[a]	-.4607***	.3904**	-.1322
SNGGM[a]	-.5801***	.5744**	-.0462
VOCGM[a]	-.6272***	.6345***	.0027
PPVT	.4518***	.5692***	.8119***
WINFO	.3925***	.6004***	.7510***
WSIM	.5230***	.5447***	.8206***
WVOC	.5711***	.7239***	.8960***
WCOMP	.7346***	.5524***	.8394***
WVC[a]	-.6031***	.6726***	.0979
SMSENT	.5770***	.1283	.7200***
MNCLI	.2904*	-.4813***	-.2205
SUBCLI	.3542**	.3540**	.7215***
TLGTH	.4710***	.4695***	.8485***
CLGTH	.4928***	.4068**	.7652***
DCSENT	.3268**	-.1287	.3671**
PERHDWS	-.0790	.5097***	.4188***

*p beyond the .05 level of significance
**p beyond the .01 level of significance
***p beyond the .001 level of significance

[a]Computed using standard scores

ability for average fourth grade readers and
tenth grade disabled readers performing in the
same range on a test of silent reading compre-
hension.

Results of the point biserial correlation between the 4-10D group
pair indicate that the mean percent hard words score is the only language
variable which does not display a significant relationship of at least
.05 significance with reading performance across these groups. Nega-
tive correlations are reported for each of the Gates-McGinitie Test
variables and the WISC-R verbal comprehension score. This is due pri-
marily to the nature of the calculation of the point biserial corre-
lation and the fact that these are standard scores which result in
higher values for the fourth grade group. As displayed in Table VI,
the positive correlations which range from .2904 to .7346 indicate
that performance on these variables is higher for the tenth grade
disabled readers. The null-hypothesis of no significant relationships
may be rejected for all variables except PERHDWS.

Hypothesis VI: There is no significant relationship between the
mean score on selected measures of language
ability of tenth grade disabled readers and able
tenth grade readers.

Positive correlations with at least .01 level of significance are
reported for the 10D-10A group pair for all of the variables with the
exception of the two measures of sentence length, SMSENT and DCSENT, and
main clause coordination index (MNCLI). No significant relationships
are reported for the measures of sentence length and a negative correla-
tion of −.4813 at the .001 level of significance is reported for the

MNCLI. As the results in Table VI indicate, the positive correlations which range from .3540 to .7239 represent significantly higher language performance by the able tenth grade readers. The null-hypothesis of no significant relationship may be rejected for all variables except SMSENT and DCSENT.

> Hypothesis VII: There is no statistically significant relationship between the mean scores on selected measures of language ability of able fourth and tenth grade readers whose silent reading comprehension is at or above appropriate grade level.

Positive correlations are reported for most of the language variables for the 4-10A group pair. Correlations ranging from .3671 to .8960, most of which are significant beyond the .001 level of confidence, indicate that performance of the tenth grade group is significantly higher than the fourth grade group. The Gates-McGinitie Test variables and verbal comprehension, which were reported as standard scores, showed no significant relationship between the 4-10A group pair. This indicates similar performance rank in relation to their age groups. A non-significant correlation of -.2205 was also reported for MNCLI. The null-hypothesis of no significant relationship may be rejected for all variables except the Gates-McGinitie subjects of Speed and Accuracy Attempts, Number Correct and Vocabulary; WISC-R Verbal Comprehension and MNCLI.

By summarizing the data according to the language ability category measured, observable comparisons can be made between reading groups. Table V presents mean scores for each group summarized over the follow-

ing categories: silent reading comprehension, vocabulary, verbal com-
prehension, and syntactic maturity.

A direct comparison of raw scores is not possible between the
fourth grade group and the others due to the difference in test forms
of the Gates-McGinitie Test. The mean raw scores of 21.33 and 45.0 for
the tenth grade disabled readers and able readers respectively indi-
cate a broad gap between the reading performance of these two groups.
A grade span from 5.1 to 12.1 underscores this difference. Also, for
the reading comprehension test the grade score of the disabled group,
5.1, approximates the 4.8 grade score of the fourth grade group.
Whereas the grade score performance for both groups of able readers
remained fairly consistent for all measures of silent reading compre-
hension and speed and accuracy, the performance of the disabled readers
improved to grade levels of 8.4 and 7.3 on speed and accuracy attempts
and number correct. The data summarized in Table V indicates that the
average performance on vocabulary which includes the measures of read-
ing, receptive and expressive vocabulary reflects an ascending pattern
of grade and age score levels with the disabled tenth grade readers
falling midway between the fourth and able tenth grade readers. Age
and grade scores for both groups of able readers fall within one year
of their average age and grade, with the exception of PPVT which is in-
flated by two years. The mean grade and age scores for the disabled
readers reflect a grade level of 7.3 and mental age between 12 and 13
years, except for the average PPVT mental age which is 13-11 years.
The average percentage of hard words from the Dale list indicates simi-
lar values of 2.99% and 2.70% for the fourth and disabled groups
respectively while the percentage reported for the able tenth grade

readers, 5.28%, is nearly twice that of the disabled readers.

Abilities of verbal comprehension as measured by Kaufman's (1975) grouping of four subtests of the WISC-R follow a similar ascending pattern of test-age equivalency with the disabled readers falling mid-way between the expected age-grade scores for the fourth and able tenth grade readers. Consistent test-age scores are reported for the able tenth grade readers with a total verbal comprehension age score of 16-8 years. Similar age-grade scores were also reported for the fourth grade readers for all subtests with a verbal comprehension age grade score of 10-1 years. In contrast, the disabled readers ex-hibited variations in test-age scores for the subtests ranging from 12-2 years on vocabulary and information to 13-2 years on similarities and 14-2 years on comprehension. The total verbal comprehension are scores of 12-10 years does not reflect this variability.

Mean words per sentence (DCSENT) from the free writing samples reported for the three groups are 14.15, 19.95 and 17.85 words, re-spectively. Although the longest average sentence length is reported for the disabled group, it also has a large standard deviation of 10.74, twice that for either of the other groups. The measure of sentence length (SMSENT) from controlled writing samples is somewhat lower for all groups with 6.36, 10.17 and 10.18, respectively for fourth through able tenth grade readers. Grade scores approximated from Hunt's data (Appendix B) indicate that the fourth grade readers placed close to 4.0 grade level while the sentence length for dis-abled and able tenth grade readers falls at the 8.0 level. Disabled readers had the greatest mean number of coordinated sentences similar to a grade of 6.0 while fourth graders and able tenth grade readers

fall close to 8.0 and 10.0. The measures of sentence embeddedness; clauses per T-unit, T-unit length and clause length all follow an ascending order for the level of maturity; 4.0 for fourth graders; 6.0 for disabled tenth grade readers; 8.0 on T-unit length, and 10.0 on clauses per T-unit and clause length for able tenth grade readers.

Summary

This chapter has presented the statistical results from the treatment of the data. Pearson product-moment correlations were used to determine the relationship of 16 selected language variables to the reading performance of average and disabled tenth grade readers. Significant correlations were found for all language variables on reading except for sentence length. A summary of these relationships is found in Table II.

Pearson product-moment correlations were also used to examine the consistency of the relationships of language abilities to reading performance for the subjects within the three reading groups. With the exception of expressive vocabulary, no significant relations were found within the fourth grade group. No significant relationships were reported for the tenth grade disabled readers. The five variables of reading vocabulary, information, similarities, verbal comprehension and clause length were significantly related to reading performance within the able tenth grade reading group. For all other language variables no significant relationships were reported. A summary of correlations within groups is found in Table III. Fisher's transformation to Z was utilized to compare patterns of these correlations across the groups.

Ten significant differences were found in the pattern of these
correlations between groups. Results of these tests are presented
in Table IV.

Point biserial correlations were used to identify the relation-
ship of selected language abilities to reading performance between
group pairs. T-tests were computed to determine the significance of
these relationships. Results for the 4-10 D group pair indicated that
the mean percent hard words score was the only language variable which
did not display a significant relationship of at least .05 with reading
performance. Significant relationships were also established for the
10 D-10 A pair for all variables except the two measures of sentence
length. Strong relationships were reported for the 4-10 A group pair
for all variables. Results of the point biserial correlations are
presented in Table VI.

CHAPTER V

SUMMARY AND CONCLUSIONS

General Summary of the Investigation

This study was concerned with the relationship of selected language abilities to the reading behavior of tenth grade disabled readers, as compared to fourth graders reading at the same grade level, and able tenth grade readers reading at or above grade level. Four categories of reading and language skills were selected for investigation; these included silent reading comprehension, vocabulary, verbal comprehension and syntactic maturity. A total of 16 variables were chosen to measure these abilities.

The sample consisted of 90 fourth and tenth grade students from the public school population of a mid-sized university community in North Central Oklahoma. Three reading ability groups of 30 students each--fourth grade readers, disabled tenth grade readers, and able tenth grade readers--were randomly selected from all students screened who met the following criteria set for the study: a non-verbal IQ within one standard deviation from the test mean; a reading level between 4.0 and 6.0 for the fourth graders and disabled tenth grade readers, and a reading level of 10.0 or above for the able tenth grade readers; a monolingual language background; and no discernible physical or emotional handicaps which would interfere with reading or language behavior.

Testing of the study sample was completed during February and March of 1977. Group tests administered included the Lorge-Thorndike Intelligence Test-Non-Verbal Battery Forms 3 or 5; the Gates-McGinitie Reading Tests Survey D or E; and an Instrument for Syntactic Maturity. All students were individually administered the Peabody Picture Vocabulary Test and four subtests of the verbal scale of the Wechsler Intelligence Test for Children-Revised. A free writing sample was also elicited from each subject.

Pearson product-moment correlations were used to determine the relationships of the language variables measured to reading performance both for all tenth grade readers, and within each reading group. Correlations were tested for significance by the students t-test, and Fisher's transformation to Z was utilized to determine significant differences between correlations across the groups. Point biserial correlations were used to identify the relationship of language abilities and reading performance between groups and t-tests were utilized to establish the degree of significance of the relationships.

As an aid to the sample group description, the means, standard deviations, grade score equivalents, and estimated mental or test age scores were included for each group in Tables XI, XII and XIII in Appendix C.

The fourth grade group had an average age of nine years, nine months and a mean non-verbal IQ of 107. Raw scores on the Gates-McGinitie Reading Tests approximated the standardization data for the fifth grade group raw score means (Gates and McGinitie, 1972). Grade score equivalencies fell within a developmental range with reported mean grade level performances of 4.8 for comprehension, 5.8 and 5.9 for

speed and accuracy attempts and number correct, and 4.8 for vocabulary. The fourth grade sample mean of 84.03 on the PPVT was nearly one standard deviation above the standardization sample mean of 76.11 for the ages 9-6 to 10-5 years (Dunn, 1965). The mean total verbal comprehension score of 10.60, derived from the scaled score of the WISC-R subtests, reflects average performance (Wechsler, 1976). Compared with the grade score norms from Hunt's data (1969), the mean syntactic maturity scores of the fourth grade readers placed their performance at a fourth grade level, with the exception of an accellerated grade score of 8.0 for main clause coordination index. Considerable variation was found in the free writing samples of the fourth grade readers; the mean Dale-Chall sentence length was quite high at 14.15. Frequent coordination with "and", and "run-on" sentences were observed in the writting samples. The percent of hard words found in the samples was 2.99%. There was substantial variation since the standard deviation was nearly as large as the mean at 2.22%.

The disabled tenth grade readers averaged 16.0 years old and had a mean non-verbal IQ of 101. There was a considerable discrepancy between their performance on the sample tests and their actual grade placement. Raw scores on the Gates-McGinitie Tests approximated sixth and seventh grade raw score means (Gates and McGinitie, 1972). These test scores varied from an average grade score of 5.1 on the extended passages of the comprehension subtest to 8.4 and 7.3 on the shorter passages in speed and accuracy attempts and number correct. Similar levels of performance were also indicated for the vocabulary subtest and the WISC-R Vocabulary subtest, with a mean grade score of 7.3 and an average test age score of 12-2 years. Group performance on the

PPVT indicated a somewhat higher average mental age of 13-11 for this test of receptive vocabulary although the mean group raw score of 94.6 was considerably below the standardization raw score mean of 102.7 for the age group 15-6 to 16-5 (Dunn, 1965). A bimodal distribution of PPVT was observed for this group with one-third of the scores clustering between the raw scores of 79 and 82 and nearly all of the rest falling between 95 and 105. According to the WISC-R manual, the average scaled scores of the disabled readers fell one standard deviation below the mean on the information and similarities subtests. The mean total verbal comprehension score of 7.77 fell approximately three-quarters of a standard deviation below the standardization mean which estimated a test age of 12-10 years. Grade score approximations for the indexes on the Syntactic Maturity Test varied from 8.0 for sentence length, 6.0 for main clause coordination; and 4.0 for subordinate clause index, T-unit length and clause length. In general, the tests of syntactic maturity reflected a level similar to that of the silent reading comprehension score. Excessive "run-on" sentences and coordination with "and" were observed in the free writing samples of this group. The mean Dale-Chall sentence length was 19.95 words with a standard deviation of 10.74. The average percent hard words was fairly stable at 2.70%.

An average age of 16.0 years was also calculated for the able tenth grade readers, along with a mean non-verbal IQ of 107. All grade score equivalencies from the Gates-McGinitie Tests fell within a developmental range from 12.1 on comprehension, 11.6 and 11.2 on speed and accuracy attempts and number correct, to 11.0 for vocabulary. The

mean raw score on the PPVT of 110.13 was considerably higher than the standardization sample raw score of 102.7 for the age group 15-6 to 16-5 years. The reported mean mental age on the PPVT was 17-10 years. Mean scaled scores on the WISC-R subtests fell within one standard deviation above the mean with comprehension somewhat higher than the other subtests. The mean total verbal comprehension score of 10.96 is close to two-thirds the standard deviation above the mean of 10.0 for the scaled scores of the WISC-R subtests. Mean age score reported for these subtests ranged from 16-6 years for information, 16-10 years for similarities, 16-6 years for vocabulary and 16-10 years for comprehension. The cumulative average verbal comprehension age score was 16-8 years. Mean grade scores reported for the indexes on the test of syntactic maturity place this group at a level of 8.0 on sentence length and T-unit length and at 10.0 for main clause coordination, subordinate clause index and clause length. The average Dale-Chall sentence length for the free writing samples from able tenth grade readers was 17.84 words. A fairly sophisticated use of embedded structures and adverbial clauses was observed in the writing of this group. The percent hard words reported was 5.28%, subordinate clause index, and clause length.

A graph which summarizes the reading group of performance patterns by age and grade-age scores for language measures is presented in Figure 1. Grade-age is a way of representing the approximate mental age of a student on the basis of his grade level equivalency score. The computational method is to add five years to the student's attained grade level score.

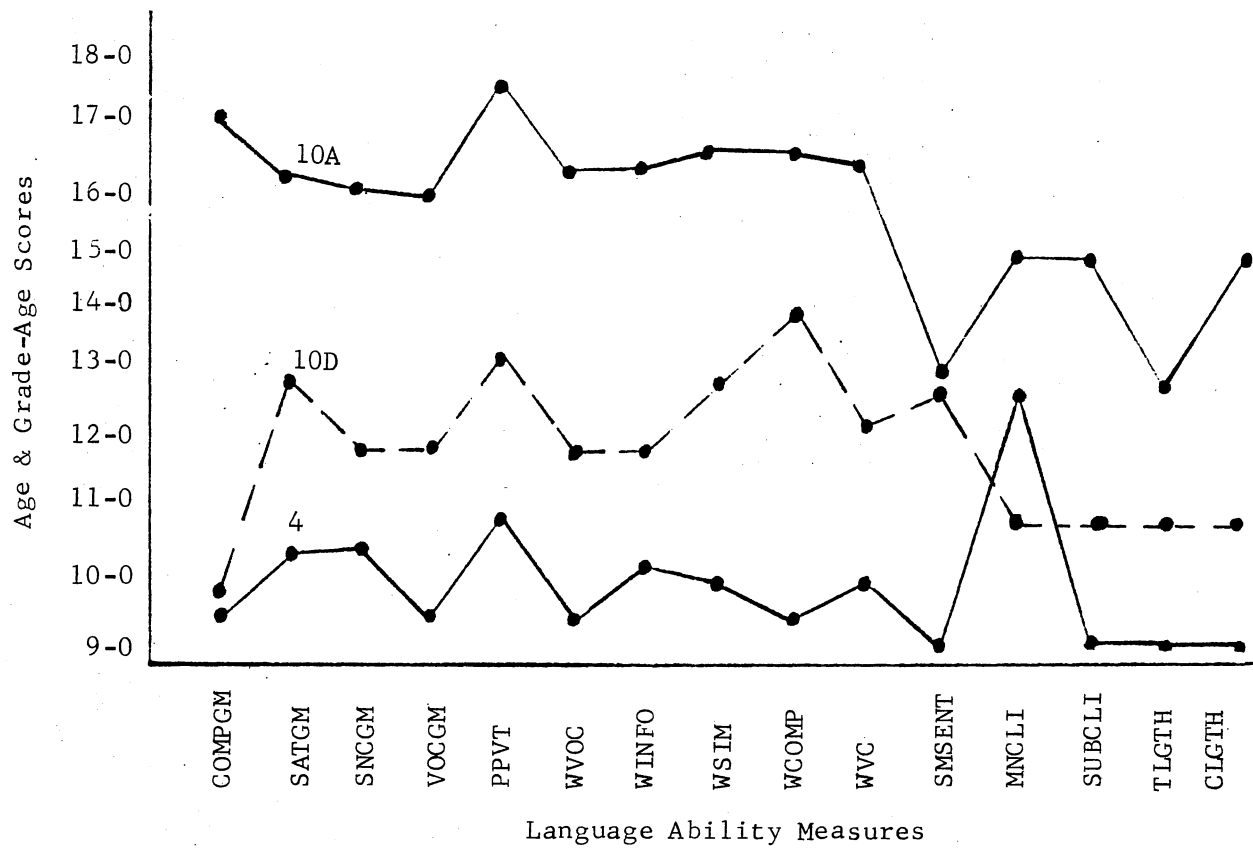As indicated in Figure 1, the disabled readers maintained a

Figure 1. Reading Group Patterns for Age and Grade-Age by Language Measures

consistent performance profile, falling between the fourth and tenth

grade able readers on measures of speed and accuracy, vocabulary and

verbal comprehension. The recorded drop in age equivalency of the

disabled readers for all measures of syntactic maturity approximates

their level of silent reading performance and that of the fourth grade

readers. In fact, the fourth graders were observed to show a higher

level of maturity for the average number of main clauses per sen-

tence, indicating that the writing samples from the disabled readers

contained the greatest number of immature sentence forms such as "run-

on" sentences and excessive coordination with "and". These results

indicate that the synopsis of clause to sentence length factors meas-

ured by Hunt's Instrument for Syntactic Maturity may provide a reliable

estimation of silent reading performance. The disabled readers ap-

parent lack of competence in dealing with the expressive syntax of the

language may be a factor directly related to their poor reading status.

Whether increased exposure to a variety of written forms through read-

ing or directed sentences combining instruction would improve their

reading and writing skills remains a question for further study.

Conclusions

The following conclusions may be drawn from the results of the

statistical treatment of the data:

1. A strong relationship between reading performance and the se-

lected variables of language ability was established for the tenth

grade students sampled. Significant correlations were derived between

silent reading comprehension and fourteen of the sixteen language

variables. No significant relationships were indicated for the two

measures of sentence length. The apparent lack of relationship between reading and sentence length may in fact be due to differences in sentence construction not observable by word counts alone. Although an analysis of the transformational forms of sentence coordination was not tabulated in this study, it was noted that the quality of writing elicited from the tenth grade able readers was noticeably more sophisticated than that of the disabled readers. The writing of the disabled group was characterized by numerous "run-on" sentences and excessive coordination with "and". However, the sentences written by the able readers included varied and flexible combining forms and embedded clausal constructions. These observations are in agreement with earlier studies which indicated that sentence length alone is a poor measure of syntactic maturity (Strickland, 1963; Hunt, 1951, 1969; O'Donnell, Griffin and Norris, 1967; and Loban, 1976).

Two variables of vocabulary--reading vocabulary and oral expressive vocabulary--correlated most highly with reading performance, each individually accounting for over half of the correlated variance in the reading performance assessed. Thus, the importance of both reading vocabulary and oral expressive vocabulary to reading is clearly evident.

2. Few significant relationships were found between reading performance and the selected language variables within each reading ability group. Three hypotheses explored these relationships. Where no significant relationships were found, it was assumed that a lack of subject variation within the group assured sample group conformity.

The relationships reported for the fourth grade readers were all not significant with the exception of WVOC, a measure of oral

expressive vocabulary. This may indicate a dependence upon oral language as an antecedent of reading growth still present at this level.

No significant relationships were reported for the disabled readers. As a group, reading and language behavior appeared to be consistent. Surprisingly, two-thirds of the recorded correlations within this group were negligible. This may be the result of a wide spread of language scores indicative of individual variation, similar to the profile of disabled readers reported by Newcomer and Magee (1977).

A greater number of significant relationships between language variables and reading performance were reported for the able tenth grade readers. The five measures of reading vocabulary, clause length, information, similarities and total verbal comprehension were significantly related to reading performance for this group. This might imply that for older students, these measures of language abilities, particularly reading vocabulary and clause length, are increasingly sensitive and important to reading success.

3. No statistically significant differences were found between the correlations of reading and language abilities for the three reading groups. The lack of significant patterns may be due in part to the small sample size. Visible differences between correlations were noted for reading vocabulary, receptive vocabulary, information, similarities, oral expressive vocabulary, comprehension, total verbal comprehension and clause length. The language-reading correlations for the disabled group were consistently lower than those for the able readers. The correlations between reading and PPVT and WVC were noticeably higher for both groups of able readers. The tenth grade able readers attained correlations greater than the fourth and

disabled groups on the following measures: Reading Vocabulary, Information, Similarities and Clause Length.

4. Grade score and test age equivalents for the reading and language performance of the three groups indicated that both groups of able readers were placed at or above expected levels, whereas the disabled reading group placed at levels consistently below grade expectancy. Grade equivalents for the poor tenth grade readers ranged from an average of 6.0 on tests of syntactic maturity to 7.3 for reading vocabulary and correct speed and accuracy. Comparable age scores ranged from 12-2 years on oral expressive vocabulary and information, and 13-11 years on receptive vocabulary to 14-2 years on comprehension. For these problem readers all language scores are depressed in relation to their grade placement and it appears that while their mean reading comprehension is at a 5.0 grade level, their combined language skills are approximately between 6.0 and 8.0 grade levels. While this shows a wide discrepancy between grade placement and language performance, the fact that skills involving reading vocabulary and written expression fall markedly below most oral language skills may indicate that for these students, vocabulary growth and syntactic maturity is limited by a lack of expansion of reading skills through wide and varied reading experiences. Chall (1963) suggested that somewhere between the grades of 4.0 to 6.0 the development of vocabulary skills depends more heavily upon wide reading. If this is true of language skills in general, especially reading vocabulary and written expression will mature in relation to the reading ability of the students. The critical period for this expansion of reading-language skills may in fact be

closer to the 7.0 grade level, as suggested by the performance of this sample of disabled readers.

5. Significant relationships were found between the mean language variable scores for average fourth grade readers and disabled tenth grade readers performing in the same range of reading ability. The disabled readers scored consistently higher on all variables except the percent hard words in written passages and the total verbal comprehension, which is a scaled score. The assumption that the language performance of disabled readers would reflect their level of reading has not been supported. Instead, it appears that either language ability precedes reading ability by one to two years, and that possibly writing skills plateau at approximately 7.0 grade level for disabled adolescent readers.

6. The performance of the disabled tenth grade group was consistent for each of the three categories of language abilities. In relation to the other groups, the average performance of the disabled readers on measures of vocabulary, verbal comprehension and syntactic maturity, fell midway between the performance of the able fourth and tenth grade readers.

Four major points may be drawn from this study. First, there is a strong link between reading and language skills beyond the elementary grades. Second, adolescent disabled readers are not as proficient in the language skills assessed as able readers at the same grade level. Third, developmental variations may exist for the magnitude and importance of the relationship between reading performance and specific language abilities at different stages of maturation and reading levels. Fourth, while the language ability of disabled tenth grade readers is

not limited to the same level as their reading performance, vocabulary and writing skills tend to level off at a grade level close to 7.0.

Recommendations

1. The findings of this study are tied to the instruments utilized in assessing reading comprehension and the selected language skills. A change in any of these may produce different results. It is suggested that another reading test, such as a miscue analysis, informal reading inventory or diagnostic reading test be utilized in future studies to better describe reading behavior in relation to language skills.

2. It is recommended that the relationship of language abilities and reading performance be investigated for average sixth, seventh and eighth grade readers. Possibly stronger similarities might be found in the language skills between these grade levels and the disabled tenth grade readers studied in the present investigation.

3. It is suggested that the written language of disabled readers be further analyzed for patterns in syntactic and semantic style. Tabulation of the specific transformations and sentence combining forms used by poor readers should be compared to those utilized by able readers.

4. Further investigation should be made into potential pattern variations of the correlations between reading and language skills of able and disabled readers.

5. The relationship of vocabulary development and reading performance, particularly at the secondary level, needs to be investigated further for disabled readers.

6. It is suggested that future research investigating the inter-relationship of language and reading skills include controlled studies on the effects of expressive language training and writing instruction on the reading performance of disabled readers at several grade levels.

7. It is suggested that directed wide-reading and structured encounters with varied and less frequent sentence structures be integrated into the reading-language curriculum, especially at the middle grades and above.

BIBLIOGRAPHY

Ammon, R. "Generating Expectancies to Enhance Comprehension." Reading Teacher, 29 (December, 1975), 245-249.

Applebee, A. N. "Writing and Reading." Journal of Reading, 20 (March, 1977), 534-537.

Bond, G. L. and L. Fay. "A Comparison of the Performance of Good and Poor Readers on the Individual Items of the Stanford-Binet Scales." Journal of Educational Research, 43 (1950), 475-479.

Bond, G. L. and M. A. Tinker. Reading Difficulties: Their Diagnosis and Correction. New York: Appleton-Century Crofts, 1967.

Bruning, J. and B. L. Kintz. Computational Handbook of Statistics. Glenview, Illinois: Scott, Foresman and Co., 1968.

Carroll, J. B. "Development of Native Language Skills Beyond the Early Years." In C. Reed (Ed.). The Learning of Language. New York: Appleton-Century Crofts, 1971, 97-156.

Chomsky, C. "After Decoding: What?" Language Arts, 53 (March, 1976), 288-296.

Chomsky, C. The Acquisition of Syntax in Children from 5 to 10. Cambridge: MIT Press, 1969.

Chomsky, N. Aspects of the Theory of Syntax. Cambridge, Massachusetts: MIT Press, 1965.

Cohen, H. "The Factorial Structure of the WISC at ages 7-6, 10-6, and 13-6." Journal of Consulting Psychology, 23 (1959), 285-299.

Cramer, W. and M. Wiener. "Ideosyncratic Response Patterns Among Good and Poor Readers." Journal of Consulting Psychology, 30 (1966), 1-10.

Dale, E. "Vocabulary Measurement: Techniques and Major Findings." Elementary English, 42 (1965), 895-901; 948.

Dale, E. and J. Chall. "A Formula for Predicting Readability." Educational Research Bulletin, 23 (1948), 11-20; 37-54.

Dale, P. S. Language Development Structure and Function. Hinsdale, Ill.: The Dryden Press, Inc., 1972.

Dunn, L. M. Peabody Picture Vocabulary Test. Twin Pines, Minn.: American Guidance Service, 1965.

Evans, R. V. "The Effect of Transformational Simplification on the Reading Comprehension of Selected High School Students." Journal of Reading Behavior, 5 (1973), 273-281.

Farr, R. Reading: What Can Be Measures? Newark, Delaware: IRA, 1969.

Feifel, H. and I. Lorge. "Qualitative Differences in the Vocabulary Responses of Children." Journal of Educational Psychology, 41 (1950), 1-8.

Gates, A. I. and W. H. McGinite. Gates-McGinite Reading Tests. New York: Teachers College Press, Columbia University, 1972.

Gibson, E. "Reading for Some Purpose." In J. F. Kavanagh and I. G. Mattingly (Eds.). Language by Ear and by Eye: The Relationships Between Speech and Reading. Cambridge, Mass.: MIT Press, 1972, 3-20.

Goodman, K. "Reading: A Psycholinguistic Guessing Game." In R. Buddell and H. Singer (Eds.). Theoretical Models and Processes of Reading. Newark, Delaware: IRA, 1976, 497-508.

Guilford, J. P. Fundamental Statistics in Psychology and Education. New York: McGraw-Hill Book Co., Inc., 1973.

Guszak, F. J. Diagnostic Reading Instruction in the Elementary School. New York: Harper & Row, 1972.

Hughes, T. O. "Sentence-Combining: A Means of Increasing Reading Comprehension." Education Resources (1975).

Hunt, K. W. An Instrument to Measure Syntactic Maturity, Preliminary Version. U.S. Department of Health, Education and Welfare Report No. Br-6-2253, Tallahasse, Florida: Florida State University, 1968.

Hunt, K. W. "Another Probe into Syntactic Maturity." Louisiana English Journal, 9 (1969), 5-15.

Hunt, K. W. Grammatical Structures Written at Three Grade Levels. Champaign, Ill.: NCTE, 1965.

Hunt, K. W. "Syntactic Maturity in School Children and Adults." Monographs of the Society for Research in Child Development, 134 (1970), 1-67.

Isakson, R. L. and J. W. Miller. "Sensitivity to Syntactic and Semantic Cues in Good and Poor Comprehenders." Journal of Educational Psychology, 68 (December, 1976), 787-792.

Kaufman, A. S. "Factor Analysis of the WISC-R at 11 Age Levels Between 6½ and 16½ Years." Journal of Consulting and Clinical Psychology, 43 (1975), 135-147.

Klare, G. "Assessing Readability." Reading Research Quarterly, 10 (1974-1975), 62-102.

Kolson, C. J. and G. Kaluger. Reading and Learning Disabilities. Columbus, Ohio: Charles Merrill, 1969.

Kruglov, L. "Qualitative Differences in the Vocabulary Choices of Children as Revealed in a Multiple Choice Test." Journal of Educational Psychology, 44 (1953), 229-243.

Kuntz, M. H. "The Relationship Between Written Syntactic Attainment and Reading Ability in Seventh Grade." (Unpub. Ph.D. Dissertation, University of Pittsburgh, 1975).

Lazdowski, W. P. "Determining Reading Grade Levels from Analysis of Written Compositions." (Unpub. Ph.D. Dissertation, New Mexico State University, 1976).

Loban, W. D. Language Development: Kindergarten Through Grade Twelve. Research Report No. 18, Urbana, Ill.: NCTE, 1976.

Loban, W. D. "The Limitless Possibilities for Increasing Knowledge About Language." Elementary English, (May, 1970), 624-630.

Lorge, I. and J. Chall. "Estimating the Size of Vocabularies of Children and Adults: An Analysis of Methodological Issues." The Journal of Experimental Education, 32 (Winter, 1963), 147-157.

Lorge, I. and R. Thorndike. The Lorge-Thorndike Intelligence Tests. Boston: Houghton Mifflin Co., 1957.

Mattingly, I. G. "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. Cambridge, Mass.: MIT Press, 1972, 133-149.

McCarthy, D. "Language Development in Children." In L. Carmichael (Ed.), Manual of Child Psychology. New York: Wiley, 1954, 452-630.

Newcomer, P. L. and P. Magee. "The Performance of Learning (Reading) Disabled Children on a Test of Spoken Language." Reading Teacher, 30 (May, 1977), 896-900.

Nie, N. H. et al. Statistical Package for the Social Sciences. New York: McGraw Book Co., Inc., 1975.

O'Donnell, R. C., W. J. Griffin and R. C. Norris. Syntax of Kindergarten and Elementary School Children: A Transformational Analysis.

Champaign, Ill.: NCTE, 1967.

O'Hara, F. Sentence Combining: Improving Student Writing Without
    Formal Grammar Instruction. Urbana, Ill.: NCTE, 1973.

Palermo, D. "Research on Language Acquisition." In L. R. Goulet and
    P. B. Baltes (Eds.). Life-Span Developmental Psychology. New
    York: Academic Press, (1970), 358-400.

Ray, D. "Language Acquisition and Reading Performance." Unpublished
    manuscript, Oklahoma State University, 1976.

Redden, E. "Syntactical Structure and Reading Comprehension." Reading
    Teacher, 23 (1970), 467-469.

Richek, M. A. "Effect of Sentence Complexity on the Reading Comprehen-
    sion of Syntactic Structures." Journal of Educational Psychology,
    68 (1976), 800-806.

Robertson, J. "Pupil Understanding of Connectives in Reading." Read-
    ing Research Quarterly, 3 (Spring, 1968), 387-417.

Ruddell, R. B. "An Investigation of the Effects of the Similarity of
    Oral and Written Patterns of Language Structure on Reading Com-
    prehension." (Unpub. Ph.D. Dissertation, Indiana University,
    1963.)

Ruddell, R. B. "Language Acquisition and the Reading Process." In
    R. B. Ruddell and H. Singer (Eds.), Theoretical Models and
    Processes of Reading. Newark, Delaware: IRA, 1976, 22-38.

Rugel, R. "The Factor Structure of the WISC in Two Populations of
    Disabled Readers." Journal of Learning Disabilities, 7 (November,
    1974), 47-61.

Russell, D. H. "The Dimensions of Children's Meaning Vocabulary in
    Grades Four Through Twelve." University of California Publica-
    tions in Education, 11 (1954), 315-414.

Russell, D. H. and F. Saadeh. "Qualitative Levels in Children's
    Vocabularies." Journal of Educational Psychology, 53 (1962),
    170-174.

Seashore, R. H. and L. D. Eckerson. "The Measurement of Individual
    Differences in General English Vocabularies." Journal of
    Educational Psychology, 31 (1940), 14-38.

Semel, E. M. and E. H. Wiig. "Comprehension of Syntactic Structures
    and Critical Verbal Elements by Children with Learning Disabilit-
    ies." Journal of Learning Disabilities, 8 (1975), 53-58.

Slobin, D. I. "Grammatical Transformations and Sentence Comprehension
    in Childhood and Adulthood." Journal of Verbal Learning and

Verbal Behavior, 5 (1966), 219-277.

Smith, E. B., K. Goodman and R. Meredith. *Language and Thinking in School*. New York: Holt, Rinehart and Wilson, 1976.

Smith, F. *Comprehension and Learning*. New York: Holt, Rinehart and Winston, 1975.

Smith, M. K. "Measurement of the Size of General English Vocabulary Through Elementary Grades and High School." *Genetic Psychology Monographs*, 24 (1941), 311-345.

Spache, G. *Diagnosing and Correcting Reading Disabilities*. Boston: Allyn and Bacon, 1976.

Stark, J. "Reading Failure: A Language-Based Problem." *Journal of the American Speech and Hearing Association*, 17 (December, 1975), 832-834.

Stotsky, S. L. "Sentence Combining as a Curricular Activity: Its Effect on Written Language Development and Reading Comprehension." *Research in the Teaching of English*, 9 (Spring, 1975), 30-71.

Strickland, R. G. "The Language of Elementary School Children." *Bulletin of the School of Education*, 38, Bloomington, Indiana: Indiana University, 1962, 1-131.

Swineford, F. *A Study in Factor Analysis: The Nature of General Verbal and Spatial Bi-factors*. Chicago: Univ. of Chicago Press, 1948.

Takahashi, B. L. "Comprehension of Written Syntactic Structures by Good Readers and Slow Readers." (Unpub. M.S. Thesis, Rutgers University, 1975.)

Tatham, S. M. "Reading Comprehension of Materials Written with Select Oral Language Patterns: A Study at Grades Two and Four." *Reading Research Quarterly*, 5 (Spring, 1970), 402-426.

Thurstone, L. "Factorial Studies of Intelligence." *Psychometrical Monographs*, 2, Chicago: Univ. of Chicago Press, 1941.

U.S. Office of Health, Education and Welfare. "Reading Disorders in the U.S.," *Report of the Secretary's National Advisory Committee on Dyslexia and Related Reading Disorders*. Washington, D. C.: U.S. Government Printing Office, 1969.

Vogel, S. A. *Syntactic Abilities in Normal and Dyslexic Children*. Baltimore: University Park Press, 1975.

Wechsler, D. *Wechsler Intelligence Test for Children-Revised*. New York: Psychological Corp., 1974.

Wesman, A. G. and H. Seashore. "Frequency Vs. Complexity of Words in Verbal Measurement." Journal of Educational Psychology, 40 (1949), 395-404.

Wisher, R. A. "The Effects of Syntactic Expectations During Reading." Journal of Educational Psychology, 68 (1976), 603-612.

APPENDICES

APPENDIX A

AN INSTRUMENT FOR SYNTACTIC MATURITY

BY KELLOGG HUNT

ALUMINUM*

<u>Directions</u>: Read the passage all the way through. You will notice
that the sentences are short and choppy. Study the passage, and then
re-write it in a better way. You may combine sentences, change the
order of words, and omit words that are repeated too many times. But
try not to leave out any of the information.

Aluminum is a metal. It is abundant. It has many uses. It comes from

bauxite. Bauxite is an ore. Bauxite looks like clay. Bauxite contains

aluminum. It contains several other substances. Workmen extract these

other substances from the bauxite. They grind the bauxite. They put

it in tanks. Pressure is in the tanks. The other substances form a

mass. They remove the mass. They use filters. A liquid remains. They

put it through several other processes. It finally yields a chemical.

The chemical is powdery. It is white. The chemical is alumina. It is

a mixture. It contains aluminum. It contains oxygen. Workmen separ-

ate the aluminum from the oxygen. They use electricity. They finally

produce a metal. The metal is light. It has a luster. The luster is

bright. The luster is silvery. This metal comes in many forms.

APPENDIX B

COMPARISONS BY GRADE LEVEL OF THE READING

GROUPS' SCORES ON THE FIVE SYNOPSIS

OF CLAUSE TO SENTENCE LENGTH

FACTORS AND HUNT'S

NORMATIVE DATA

TABLE VII

COMPARISON BY GRADE LEVEL OF THE READING GROUPS' SCORES ON THE FIVE SYNOPSIS
OF CLAUSE TO SENTENCE LENGTH FACTORS AND HUNT'S NORMATIVE DATA

Factors	Hunt's Normative Data					Reading Groups			Grade Level		
	G4	G6	G8	G10	G12	4	10D	10A	4	10D	10A
Sentence Length	9.21	8.78	11.73	11.68	12.17	6.36	10.17	10.81	4.0	8.0	8.0
Main Clause Coordination Index	1.74	1.34	1.25	1.13	1.08	1.26	1.50	1.13	8.0	6.0	10.0
T-Unit Length	5.42	6.84	9.84	10.44	11.30	5.00	7.20	9.63	4.0	6.0	8.0
Subordinate Clause Index	1.04	1.18	1.43	1.42	1.44	1.03	1.18	1.38	4.0	6.0	10.0
Clause Length	5.19	5.76	6.79	7.35	7.85	4.85	5.99	7.05	4.0	6.0	10.0

APPENDIX C

SUMMARIZED DATA FOR EACH READING GROUP

TABLE VIII

SUMMARIZED DATA FOR FOURTH GRADE READERS

Variable	Mean RS	Mean Std.S.	Sc.S.	SD.(RS)	Grade Score	Age Score
SATCM	18.7000	54.2000		8.3847	5.8	
SNCCM	17.8000	55.1333		6.5359	5.9	
VOCGM	27.1667	52.6333		5.1401	4.8	
PPVT	84.0333			8.3606		11-3
WINFO	14.4333		11.4333	2.5822		10-6
WSIM	12.6000		10.5333	3.1360		10-2
WVOC	27.9333		10.7000	4.4485		9-10
WCOMP	16.0333		10.1000	4.5750		9-10
WVC(total)			10.6083	1.9183(SS)		10-1
SMSENT	6.3630			2.3863	4.0*	
MNCLI	1.2560			0.3499	8.0*	
SUBCLI	1.0273			0.0806	4.0*	
TIGTH	.5.0013			0.9950	4.0*	
CLGTH	4.8530			0.6389	4.0*	
DCSENT	14.1500			4.9885		
PERHDWS	2.9903			2.2214		

*Approximated grade scores derived from Hunt's (1969) data norms.
 Appendix C.

TABLE IX

SUMMARIZED DATA FOR DISABLED TENTH GRADE READERS

Variable	Mean RS	Mean Std.S.	Sc.S.	SD.(RS)	Grade Score	Age Score
SATGM	13.7000	43.8000		5.8965	8.4	
SNCGM	11.2333	43.0000		3.9539	7.3	
VOCGM	20.2333	41.9333		6.7757	7.3	
PPVT	94.6000			12.2718		13-11
WINFO	16.8000		7.366	2.9874		12-2
WSIR	16.8333		7.800	3.770		13-2
WVOC	35.5333		7.0333	6.3558		12-2
WCOMP	24.3333		8.5666	2.8928		14-2
WVC(total)			7.7750	1.8422(SS)		12-10
SMSENT	10.1680			2.9889	8.0*	
MNCLI	1.4957			0.4406	6.0*	
SUBCLI	1.1843			0.2841	6.0*	
TLGTH	7.1973			2.7516	6.0*	
CIGTH	5.9863			1.2719	6.0*	
DCSENT	19.9527			10.7407		
PERHDWS	2.6963			1.4397		

*Approximated grade scores derived from Hunt's (1969) data norms.
 Appendix C.

TABLE X

SUMMARIZED DATA FOR ABLE TENTH GRADE READERS

Variable	Mean RS	Mean Std.S.	Sc.S.	SD.(RS)	Grade Score	Age Score
SATGM	17.8000	52.0667		4.8595	11.6	
SNCGM	17.1333	54.3333		4.7251	11.2	
VOCGM	20.2333	52.6667		5.4816	11.0	
PPVT	110.1333			10.1668		17-10
WINFO	22.0333		10.6333	3.9435		16-6
WSIM	21.0667		10.6666	2.6902		16-10
WVOC	47.5333		10.5666	4.9879		16-6
WCOMP	28.3333		11.9666	3.1660		16-10
WVC(total)			10.9583	1.6610(SS)		16-8
SMSENT	10.8067			1.8608	8.0*	
MNCLI	1.1340			0.1596	10.0*	
SUBCLI	1.3760			0.2222	10.0	
TLGTH	9.6357			1.7525	8.0	
CILGTH	7.0538			1.1868	10.0*	
DCSENT	17.8380			4.4077		
PERHDWS	5.2767			2.7415		

*Approximated grade scores derived from Hunt's (1969) data norms. Appendix C.

VITA

Nancy Miller Tooker

Candidate for the Degree of

Doctor of Education

Thesis: THE RELATIONSHIP OF LANGUAGE ABILITIES AND READING
PERFORMANCE FOR ADOLESCENT DISABLED READERS AND ABLE
READERS AT TWO GRADE LEVELS

Major Field: Curriculum and Instruction

Biographical:

Personal Data: Born in San Francisco, California, May 5, 1947,
the daughter of Mr. and Mrs. Harrison M. Miller.

Education: Attended public schools in Richmond, California;
graduated from Harry Ells High School in 1964. Received the
Bachelor of Science degree from the University of California
at Davis, with a major in Child Development in December,
1967. Attended the University of California at Los Angeles,
1968-1969; received the California State Elementary Teaching
Credential, June, 1969; received the Master of Science de-
gree from Oklahoma State University, with a major in Ele-
mentary Education, in December, 1974; completed requirements
for the Doctor of Education degree in December, 1977.

Professional Experience: Second grade teacher in Oakland, Cali-
fornia, 1969-1970; Substitute teacher, El Paso Public Schools,
El Paso, Texas, 1970; Instructor of G.E.D. math and reading,
Army Education Center, Buedingen, Germany, 1971-1972; Graduate
Assistant in the Reading Center, Oklahoma State University,
serving as Supervisor, Community-Based Right to Read Project,
1973-1975; Project Director, Right to Read Adult Program,
Summer, 1975; Supervisor of O.S.U. Reading Clinic, 1975-1976;
Research Associate, O.S.U. Reading Clinic Research Foundation,
Summer, 1976; Graduate Assistant, teaching College Reading
Improvement, 1976-1977; Instructor, O.S.U. Reading Center,
teaching a Workshop in Teaching College Reading Improvement,
Summer, 1977.