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DEVELOPMENTAL SENTENCE SCORING AS A

MEASURE OF READABILITY FOR

FIRST GRADE READING

TEXTBOOKS

by

Wanda Powers

A Dissertation Submitted to
the Faculty of the Graduate School at
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POWERS, WANDA CHASON. Developmental Sentence Scoring as a
Measure of Readability for First Grade Reading Textbooks.
(1975) Directed by: Dr. Mariana Newton. Pp. 150.

This study was designed to determine whether the
content of selected beginning reading textbooks is compar-
able in syntactic complexity to the oral language of normal
first-grade age children. A second purpose of the study
was to determine whether there was a predictable progression
of syntactic complexity within the textbooks examined. It
was assumed on the basis of previous research that
(a) readability increases proportionately as written
materials reflect the oral repertoire of the intended
readers; (b) readability decreases as syntactic complexity
increases; and, therefore (c) a descriptor of syntactic
complexity in the oral repertoire of normal five- and six-
year-old children would be a valid index of the syntactic
factor in readability for beginning textbooks.

Ten samples were taken from the primary levels of
The Macmillan Reading Series, designed for average readers,
and eight samples from comparable levels of The Open
Highways Series, designed for "slow starters." Each of the
18 samples consisted of 50 consecutive sentences. All
sentences intended to be read by or to the child were
eligible for inclusion in the samples, but identical
repetitions were omitted.

Developmental Sentence Scoring (DSS) was the instrument used to measure the syntactic complexity of the textbook content samples. DSS was designed to provide guidelines for evaluating syntax development in the oral language of children enrolled in speech clinics. It is based on normative data from 200 normal, white, middle-class, monolingual children who spoke Standard English. Subjects in the normative population were evenly distributed in an age range from two years to six years, eleven months. Within eight grammatical categories, DSS procedure assigns a score of 1 to 8 according to sequence of mastery in oral language. The scores are comparable across categories: all level-three items, regardless of category, emerge in speech at about the same time and thus are assumed to be of comparable difficulty.

The textbook samples were scored according to DSS procedure and scoring was verified by a speech and language pathologist. Examination of individual sentence scores and item analysis within categories revealed an irregular and unpredictable progression of difficulty in both series, and some relatively difficult sentences in the materials for slow starters. It was concluded, therefore, that the syntactic programming in the textbooks examined is not consistent with the order of syntax acquisition in the oral language of first grade children, although sample mean scores for both series were comparable to, or lower than, oral language mean scores for six-year-olds in the normative population.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Whatever the organizational pattern, the teaching method, or the level of technological sophistication, learning to read remains the monumental task of first grade. Despite any pedagogical effort to de-emphasize the notion that "six-years-old equals ready-to-read," pressures of tradition, parents, peers, and the expectations of first-graders themselves yield grudgingly, if at all, on this point.

Studies concerned with difficulty in reading comprehension do not involve beginning first-grade children for the obvious reason that most of them cannot read. Yet a suitable match of student and instructional material seems more important in beginning reading than at any other level.

Unless he has a severe mental or physical handicap, a child achieves skill in the use of oral language very early in life. One cannot assume, however, that his skill in oral language will transfer readily to printed language and learning to read. Although a child may be quite competent in the use of oral language, his free speech omits and alters many language features to be found in

printed Standard English--textbook language--and in the
adult speech of his own language community. Deese (1970)
has suggested that children's language is equivalent to
a different dialect.

It is generally accepted that some relationship
exists between oral language, which a child learns first,
and his subsequent overlay of written language compre-
hension. Indeed, one of the earliest sources pertaining
to the remediation of speech handicaps was titled <u>Better</u>
<u>Speech and Better Reading</u> (Schoolfield, 1951).

Only recently have oral language studies made trans-
criptions of children's speech and analyzed them very
specifically in terms of reception, processing (which
includes cognition), and production. Earlier studies
of language development emphasized length of utterance
(Templin, 1957) with little attention to syntactic
complexity beyond labeling a sentence "simple" or "complex."
It was generally accepted that syntax was mastered well
before the age to enter first grade (McCarthy, 1954);
therefore, syntactic complexity was not a relevant factor
in readability[1] research (Singer, 1972).

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[1]As used in this dissertation, <u>readability</u> refers to
ease of comprehension. For instructional purposes the
accepted criterion is 95 percent accuracy in word recog-
nition combined with 75 percent accuracy in comprehension
as measured by the reader's ability to answer questions
about a passage after he has read it.

More recent research shows that syntactic development continues throughout the elementary grades (Menyuk, 1963; C. Chomsky, 1972). Furthermore, according to Piaget's (1964) theory of cognitive development, certain language forms may be incomprehensible to the average first grader, especially when such forms are presented verbally with no concrete phenomena for the child to observe or manipulate.

Readability research through the 1950's concentrated on the development and refinement of readability formulas[1]. Vocabulary and sentence length were emphasized. Strickland (1962) was the first to consider oral language as a correlate of reading comprehension. Building on Strickland's work, Ruddell (1963) and Tatham (1970) found that the language patterns a child uses most frequently in oral language are the easiest for him to comprehend in written language. Even though the relationship between oral language and reading comprehension has been recognized, the procedures of readability studies generally have involved comprehension tests designed for written materials or an

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[1]Readability formulas are methods of measurement, expressed as multiple regression equations, that provide a quantitative estimate of the reading difficulty of printed material. They are indices of difficulty, but do not indicate causes of difficulty (Klare, 1974).

analysis of children's written composition[1] rather than an analysis of reading materials based on a description of children's language.

The purpose of this study was to determine whether certain selected reading materials follow the developmental order of syntactic complexity observed in oral language. Developmental Sentence Scoring (DSS) was used as the tool to ascertain the readability of the primary levels of two basal reading series, based on the following premise: (a) readability increases proportionately as written materials reflect the oral repertoire of the intended readers; (b) readability decreases as syntactic complexity increases; (c) DSS is a descriptor of syntactic complexity in the oral repertoire, therefore: (d) DSS describes both increases and decreases in readability.

It was hoped that the present study would contribute to a better understanding of the internal syntactic difficulty of reading material. In addition, it was hoped that the study would provide a rationale for programming beginning reading textbooks according to the developmental sequence that has been observed in oral language.

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[1]Comprehension tests involve completing blanks or answering questions about the passage, which assumes some reading ability. The very nature of comprehension tests and composition analyses preclude their use with beginning first-grade children.

Finally, it was hoped that this study would draw attention
to the need for curriculum in elementary education to be
influenced by research in other disciplines that are
concerned with children's communication skills.

CHAPTER II
REVIEW OF LITERATURE

Scholars in a wide range of disciplines have contributed relevant research to the area of syntactic complexity in instructional reading materials. Much of the recent work in psycholinguistics, for example, can be applied directly to reading research (E. Brown, 1970).

Teaching a child to read involves considerably more than teaching him to associate sound and symbol. The particular arrangement of symbols (i.e., words) into sentence patterns may be as important to his understanding what he reads as being able to identify the words. The importance of syntactic complexity in reading materials is indicated in this statement by Bormuth (1966):

> It is almost trite to say that further improvement of public and private life depends upon the ability to transmit ever increasing amounts of knowledge to an increasingly large proportion of the population. But, unfortunately, many adults and children fail to understand what they read, not because the concepts are too difficult or because they lack basic reading skills, but simply because of the complexity of the language in which these concepts are presented. (p. 81)

In other words, readability or ease of comprehension is a function of syntactic complexity and may cause a passage to be too difficult for the readers for whom it is intended. Bormuth intimates that this is a problem for the general population. The first grader who is learning

to read faces a double problem: he is just beginning to
associate sound and symbol--to decode a printed message;
if the syntax is beyond his understanding, his decoded
message has little more meaning than a jumble of uniden-
tified symbols.

Vocabulary traditionally has been carefully controlled
for first graders, but syntactic complexity generally has
not been an aspect of research in readability. Instead,
the basic objective has been the development of principles
or formulas (a) that permit one to predict the level or
difficulty of written materials and (b) that serve as
guidelines in the preparation of materials at a given level
of difficulty.

Language development research shows that a child
grows in his ability to use more complex syntactic
structures as he matures (C. Chomsky, 1969), which in turn,
influences his ability to comprehend written materials
(Loban, 1963; Hunt, 1965; Stoodt, 1972). Moreover,
research in cognitive development indicates that the first
grade child may find certain structures incomprehensible
because his logical reasoning capability has not developed
to the point that he can understand the relationship
signaled by certain structures (Piaget, 1964; Karl, 1971).

This review of literature will be divided into three sections. The first part will deal with readability studies, first with the historical development of readability formulas through the 1950's, then with the language analysis studies based on structural grammar and on the transformational-generative theory of grammar. The second part will focus on studies of oral language development and performance, describing what seems to be a typical order of syntax development and specifying particular structures that are difficult for young children. The last part will review briefly Jean Piaget's cognitive development theory related to language in an effort to explain some of the reasons why certain syntactic structures are difficult for the first-grade age child.

Readability Studies

Historically, readability studies can be divided into two general periods. While no precise division can be determined, there is some agreement (Chall, 1958; Klare, 1963) that the later 1950's and early 1960's saw a change in focus for readability research. The earlier period was characterized by concentration on development of formulas. Later studies were similar to each other in approach, but the underlying theory separates research since the early sixties into that based on structural grammar and that based on transformational grammar. It is important that

these be considered separately because what appears to be
conflicting results may not be when one realizes the
difference in the premise from which each is developed.

Development of Readability Formulas

Readability refers to how easy a passage is for a
given population to read and understand; readability
formula refers to an equation into which one puts certain
data about the passage and arrives at a "reading level"
or level of difficulty. To say that a passage is "third
grade reading level" would mean that average third graders--
or people reading at the level of average third graders--
could be expected to read the passage and recognize at
least 95 percent of the words and answer correctly at
least 75 percent of the questions asked about the passage.
To find the reading level of a book according to the
Washburne-Morphett readability formula, for instance, one
would follow these directions:

> Systematically select a sample of 1,000 words;
> Count the number of different words (X_2);
> Count the number of different uncommon words
> (not in Thorndike's first 1,500) (X_3);
> Count the number of simple sentences in 75 sample
> sentences (X_4);
> Apply in the formula:
> X_1 (grade placement) = .00255X_2 + .0458X_3
> - .0307X_4 + 1.294.(Klare, 1963, p. 52)

The constant added or subtracted at the end of a
formula brings the final solution to a number that

corresponds to a grade level and, therefore, makes a conversion table unnecessary. A solution of 1.9 would represent first grade, ninth month reading level or grade placement, although grade placement is not used that precisely; 1.9 would be interpreted simply as late first grade.

Much of the research, at least until the 1960's, dealt with the development of these readability formulas, attempting both to improve the reliability of their prediction and to make them quicker and easier to use without significantly sacrificing accuracy for efficiency. Klare (1963, pp. 75-80) listed 31 formulas and 10 variations that were published between 1923 and 1959. Of these, only nine included first grade in the range of difficulty (see Table 1); two of the nine were only slight variations of another formula. All of the formulas emphasized vocabulary and sentence length.

The earliest efforts to determine reading difficulty centered around vocabulary, with Thorndike's (1921) list of familiar words apparently the most influential word list. Sentence length and number of syllables were also factors in the initial attempts to develop formulas that could estimate the difficulty of written materials.

The early formulas of 1921-1934 included such factors as number of different words in a sample and number of

Table 1

Nine Readability Formulas for Primary Materials

Title	Range	Indices
Johnson (1930)	primer-grade 8	percentage of poly-syllables
Washburne and Morphett (1938)	grades 1-9	number of different words; number of un-common words (not in Thorndike's first 1,500); number of simple sentences in a 75 sentence sample
Bergman (1936)	presumably grades 1-9	an early version of the Washburne-Morphett, identical except for final constant
Dolch (1948)	grades 1-6	factors used indepen-dently: "average sen-tence" length; "long sentence" length; percentage of words not on Dolch list; number of polysyllabic words
Spache (1953)	grades 1-3	average sentence length; number of words out-side the Dale list of 769 words
Stone (1957)	presumably grades 1-3	a revision of Spache formula using a different word list
Wheeler-Smith (1954)	primer-grade 4	sentence length; percentage of polysyllables
Bloomer (1959)	primer- grade 6	number of words per modifier; sound com-plexity of modifiers

"hard" words--i.e., polysyllabic words or words not on some list of easy or familiar words. Some formulas took account of the number of prepositions and the number of complex versus simple sentences.

W. A. McCall and Lelah Crabbs' Standard Test Lessons in Reading (1925) were published in this early period. The "lessons" consisted of short, graded selections followed by multiple-choice questions, with a scale to determine reading level for each score. Although not used in early research, the McCall-Crabbs Lessons "later became the most used and most adequate of available criteria for the construction of readability formulas" (Klare, 1963, p. 32). The lessons have been revised twice (1950, 1961) and still are used widely. However, Bormuth (1969, 1970) criticized the validity of such multiple-choice measures on the basis that test items can so easily be written to be easy or difficult that they are more a test of the test item than of the passage. MacGinitie (1971) also reported evidence that the McCall-Crabbs Lessons are no longer suitable criteria for readability studies.

In an effort to achieve greater accuracy, detailed formulas (1934-1938) took account of technical words, clauses, phrases, personal pronouns, concrete versus abstract words, etc. The reaction to such cumbersome detailing could be expected. Emphasis on efficiency and

simplicity of use characterized the readability formulas into the 1950's. The revisions in favor of simplicity did not materially affect accuracy. For example, the 1928 version of the Washburne-Morphett Formula (The Vogel and Washburne) had included a count of prepositional phrases and had used Thorndike's list of 10,000 familiar words instead of the first 1,500. The multiple correlation of the 1928 formula was .845, of the revised version, .86 (Klare, 1963, p. 52). Klare (1963) cited the Forbes formula for determining the readability of standardized tests and the Wheeler-Smith and Spache formulas for primary-grade reading materials as examples of the "new trend to specialization" in the later 1950's.

In addition to the superficiality apparent in the counting of elements approach, there are other inadequacies that need to be pointed out as a caveat for using readability formulas as more than general indicators of reading difficulty.

1. Formulas will tend to overestimate the readability of such writers as James Joyce and Gertrude Stein. These writers use familiar words and short sentences, but the redundancy factor in their writing is low so that the reader cannot compensate for not understanding one sentence by getting the meaning from another part of the passage (Klare, 1963, p. 173).

2. In order to satisfy the equation in various reading formulas there is no consistency in level of performance. For example, in the Lorge (1939) formula, grade placement equals the ability required to correctly answer one-half of the test questions on the passage. To get the reading grade required to answer 75 percent, one must add an additional 1.866 to the score. Klare (1963) suggested:

> Some agreement should be reached on the most appropriate criterion for grade levels, that of 50% correct (C_{50}) or that of 75% correct (C_{75}). Or. . . formulas should be presented for both criteria so that the user may choose the one he wishes. (p. 120)

3. At least three of the formulas used with primary materials use publisher's grade-level designation as a criterion. They arrive at an average of the major publishers' grade-level designations. In the Bloomer formula, 23 commercial readers were used as criteria; formula authors "assumed" a progression of difficulty (Klare, 1963, p. 73). The high correlation between grade-level designations by textbook publishers and reading level as measured by readability formulas is not surprising, given this criterion.

4. Easy-to-use formulas are inadequate to account for the linguistic variables that have been identified in transformational grammar analyses.

5. Bormuth (1967) questioned the assumption of linear correlation and the process of averaging values across an entire passage.

Recently some attention has been given to refining and developing more powerful formulas, especially with computer technology being able to manipulate more data quickly and efficiently. However, the influence of linguistics and language performance studies has focused more attention on studying what factors determine readability than on counting surface elements.

Since the mid-1960's, researchers have been concerned with the relationship between oral language performance and reading comprehension. Strickland (1962) initiated the new approach to readability research. She studied the complexity of language structure in terms of similarity between oral and written language.

The readability studies dealing with oral language performance and reading comprehension essentially are asking questions about the compatibility of written textbook language and the spontaneous oral language of the children who are expected to read the textbooks: whether the language the child uses is similar in construction to that of his textbooks and whether the similarity (or lack of it) makes a difference in his ability to understand the textbook language. These studies will be grouped according to grammatical theory.

Studies Based on Structural Grammar

According to the theory of structural grammar, word order in sentences is an important feature of language. Each of the ordered units in a construction is a position that can be filled by certain forms. A given form will occur only in certain positions. Much attention is given to parts of speech, classes, and word patterns in structural grammar (Francis, 1958).

Strickland (1962). Strickland compared the syntactic structure of children's oral language in grades one through six with the structure of language in reading textbooks for the same levels. A language analysis system, based on structural grammar, was developed by a group of linguists specifically for Strickland's research.

The study involved 575 children selected by random sampling from the 3,801 children enrolled in the Metropolitan School District of Bloomington, Indiana. One hundred subjects were selected from each of grades one, two, three, five and six; 75 from grade four. There were 296 boys and 279 girls, ranging in chronological age from six years to fourteen years, eleven months.

Strickland's procedure involved tape recording spontaneous spoken language in "free interaction with children and adults" (p. 6). The spoken language was analyzed for:

1. Syntactic structure of sentences
2. Frequency of occurrence of certain patterns
   of syntax
3. Amount and kinds of subordination
4. Length of sentences
5. Flow of language

The speech samples were divided into phonological units
--a unit of speech ending with a distinct falling intonation
which signals a terminal point. In Strickland's study,
sentence means a phonological unit. Twenty-five con-
secutive sentences of each child's conversation were
analyzed for slots or stationary elements (verbs, subjects,
objects, predicate nominatives); for moveables which could
occur in different locations (adverbials of place, time,
and manner; coordinate conjunctions such as and, but); for
fillers, which are single words, phrases, or clauses that
fill a slot; and for language patterns--a sequence of slots
and moveables such as the noun-verb-object pattern (e.g.,
He hit the ball).

After the speech samples had been analyzed and the
constructions that occurred most frequently in the subjects'
oral language had been identified, selected samples from
reading texts at each grade level--one through six--were
then analyzed in the same manner as the oral language samples.
The purpose was to determine the frequency of occurrence
in the texts of patterns commonly used by the children in
oral language.

Strickland found that (a) relatively few sentence patterns (e.g., subject-verb-object, subject-verb-adverb, and subject-verb-complement) appear with high frequency in the language of children; (b) flexibility in the use of moveables and expanded use of nominalization indicated increased language maturity; (c) there is a statistically significant correlation between oral language performance and performance on silent and oral reading tests; and (d) the texts analyzed showed no organized progression or control of syntactic patterns.

Thus, the pupil who is more skillful in manipulating sentence elements within a few sentence patterns can be expected to score higher on reading performance tests than a pupil who shows less flexibility. Moreover, sentence patterns which appeared most frequently in the oral language samples did not appear most frequently in the texts. Sentence length and vocabulary appeared to be the only factors that were systematically controlled. Strickland suggested that more readable materials could be developed if the language patterns used most frequently in children's oral language were used in the writing of reading textbooks.

Loban's (1963) research supported Strickland's finding that flexibility in the use of language is an indicator of maturity. Ruddell (1963) and Tatham (1970) used

Strickland's "high frequency" patterns as criteria for determining difficulty of reading materials in experiments designed to test the validity of Strickland's suggestion for developing more readable materials.

Ruddell (1963). Ruddell reported that fourth graders more easily comprehend material written with the patterns that occur most frequently in their speech. He developed six reading passages with Strickland's high frequency patterns. Sentence length and vocabulary were controlled by using the Dale-Chall Readability formula to equate those two variables in the six passages. Also, each passage contained exactly 254 words to establish an identical situation for use of the cloze procedure.[1] Cloze comprehension tests were constructed for each passage in the Ruddell study and were administered to 140 fourth graders. Ruddell reported significantly higher scores for the passages written with high frequency patterns than for passages written with low frequency patterns.

Tatham (1970). Tatham studied second and fourth graders to determine whether children at each grade level comprehend

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[1]Cloze procedure was described by Taylor (1953) as a "psychological tool for measuring the effectiveness of communication" (p.415). The procedure involves systematically deleting words in a passage (e.g., every fifth word) and replacing the word with a blank of standardized length. Subjects respond by giving orally or in writing the word they think belongs in the blank. Acceptable responses may be the exact word deleted or a grammatically correct synonym.

material written with frequent oral language patterns better than material written with infrequent oral language patterns. Like Ruddell, Tatham's "high frequency" patterns were those identified by Strickland as occurring most often in children's speech. Two reading comprehension tests were devised and given to 163 second graders and 137 fourth graders. Test A used patterns that appear frequently in the oral language of second and fourth graders; Test B included infrequently used patterns.

Reading comprehension was measured by having students read a sentence and select one of three similar pictures that best represented the sentence content. "Vocabulary, content, and grammatical complexity were carefully controlled across tests"(Tatham, 1970, p. 402).

Tatham reported that significantly more second and fourth graders scored higher on Test A, written with frequently used patterns than on Test B. Also, fourth graders scored higher than second graders on both tests. Tatham's study confirmed Ruddell's major finding that children more easily comprehend written materials that reflect their speech patterns. It also extended the applicability of the findings to primary children and to children from another section of the country. Both the Strickland and Ruddell studies involved upper elementary grade students in the Bloomington, Indiana, area.

In discussing implications of the study, Tatham suggested that beginning readers would benefit from control over sentence patterns and that "establishing a hierarchy of difficulty could be helpful in the area of readability as well as in the area of developmental reading instruction" (p. 425).

The Strickland, Ruddell, and Tatham studies were significant in establishing oral language performance as a correlate of reading comprehension. However, because of the limitations of structural grammar analysis on which the investigations were based, they were unable to adequately account for the differences in difficulty which they found.

Studies Based on Transformational Grammar

Noam Chomsky is the "father" of transformational-generative grammar. All other works on transformational grammar are based on his theory. Chomsky first presented the theory in Syntactic Structures (1957) which, though obsolete at some points, remains the basic work in transformational-generative grammar. Chomsky's Aspects of the Theory of Syntax, published in 1965, is a more comprehensive treatment of transformational grammar, with some revisions of the earlier theory.

According to Chomsky, a grammar is a set of rules that will generate sentences--all the grammatical sentences, and only the grammatical sentences, of a given language. The set of rules, called phrase-structure rules, generate the components of the sentence, or the kernel sentence. A common designation for this approach is "generative grammar." The phrase-structure rules account for only the basic or kernel sentences of a language. To produce more complicated and structurally different sentences from the kernel sentences, Chomsky proposed a set of transformational rules. Transformational rules are applied to a kernel sentence or several kernel sentences in the underlying, or deep structure, of a sentence to produce a related but structurally different sentence. This part of Chomsky's theory is "transformational grammar." The best term for the grammar proposed by Chomsky is "transformational-generative grammar," but it is more commonly designated simply "transformational grammar."

All sentences have both a surface structure and a deep structure. According to Jacobs and Rosenbaum (1968), "the meaning of a sentence is conveyed by its deep structure; the form of the sentence is given by its surface structure" (p. 18). Structural analysis is concerned with the surface level--the form one reads or speaks--and the arrangement and order of words. This emphasis was evident
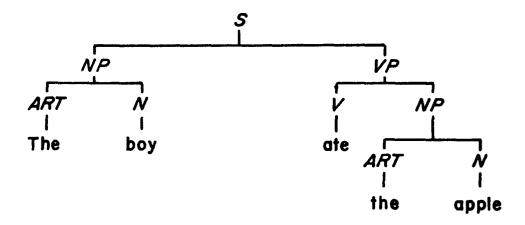
in Strickland's (1962) study. Transformational analysis,
on the other hand, uses phrase-structure rules as a base
but goes on to analyze the deep structure, or meaning level,
of the sentence.

Menyuk (1969) observed that most first graders have
mastered the phrase-structure level of grammar; it is the
transformations and embedded sentences, mastered later,
that are directly related to difficulty in comprehending
oral and written language and that are not described at
the phrase-structure level. By following the sequence
of transformations, one may reveal the deep structure of
the sentence and, in turn, some of the implicit relation-
ships that are not obvious at the surface level but that
contribute to the difficulty of the sentence.

It may be instructive at this point to show how one
sentence can be embedded within another by means of trans-
formations. The "tree diagrams" shown in Figure 1
illustrate a relative clause transformation, re-positioning,
and deletion.

The first example shows the grammatical steps involved
in generating a kernel sentence from its constituent noun
phrase (NP) and verb phrase (VP) that exist in the deep
structure. The second example, The hungry boy ate the
apple, is the result of a sentence-combining transformation.
In addition to the kernel sentence in example one, there

I. The boy ate the apple.

2. The hungry boy ate the apple.
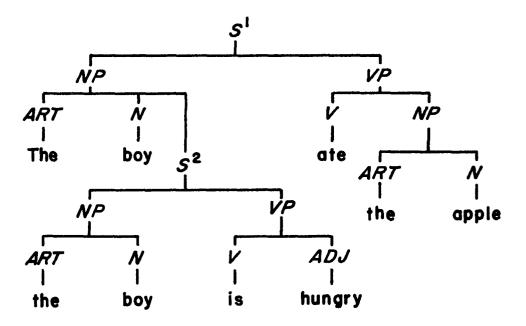
Figure I. "Tree Diagrams" of two sentences illustrating relative clause transformation, re-positioning, and deletion.

is the additional kernel, <u>The boy is hungry</u>. They are
combined by applying a series of transformational rules.
First, by a relative clause transformation, the sentences
become <u>The boy who is hungry ate the apple</u>. A deletion
transformation yields <u>The boy hungry ate the apple</u>.
Finally, the adjective transformation (re-positioning)
produces <u>The hungry boy ate the apple</u>.[1]

Transformational grammar theory has been a major
influence on the research in readability and language
performance since the mid-sixties. The following studies
are based on the transformational-generative theory of
grammar.

<u>Hunt (1965)</u>. Although not strictly a readability
study, Hunt's analysis of students' written language and
his concept of "T-unit" is reviewed at this point because
several readability studies have used his method of
segmentation. Hunt studied clause length and frequency of
subordinate clause as indices of maturity in the writing
of 54 students--18 each from grades four, eight, and twelve.
Recognizing the problem of defining a sentence, Hunt
devised a "minimal terminal unit" (T-unit) for segmenting
language. The T-unit is "exactly one main clause plus
whatever subordinate clauses are attached to that main

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[1]For a more detailed explanation of these rules,
see Jacobs and Rosenbaum (1968, pp. 109-213).

clause" (Hunt, 1966, p. 737). The T-unit, then, is
essentially the same unit that Loban (1963) called a
"communication unit."

Hunt divided his entire corpus of writing into
T-units--1,000 words from each of the 54 subjects. He
then analyzed the units to see whether students at higher
grade levels condense and consolidate more kernel sentences
through sentence-combining transformations which result
in the production of longer T-units than do students at
lower grade levels. Hunt reported findings that indicate
that T-unit length is a valid index of maturity in writing.
Older students produced fewer short and single-clause
T-units; older students included more subordinate clauses
and non-clauses to produce longer T-units. In addition,
progressively older students used increasingly more
transformations that converted sentences into subordinate
clauses and into non-clauses. Studies by Griffin (1966),
by O'Donnell, Griffin, and Norris (1967), and a later
study by Hunt (1970) supported the conclusion that the
T-unit is a valid index of maturity in written language.

Griffin (1966). One hundred eighty children from
grades three, five, and seven were shown two eight-minute
animated cartoons with the sound turned off. They were
asked to write a composition about the films after they
had discussed the stories orally. Griffin used Hunt's (1965)

T-unit segmentation to analyze the compositions. He found that both total length and use of transformations which produce nominal, adverbial, and coordinate constructions increased with higher grade levels.

O'Donnell, Griffin, Norris (1967). O'Donnell, et. al. followed essentially the same procedure used in Griffin's (1966) earlier study, but this time they analyzed the oral and written language of 180 students randomly selected from kindergarten through grade five, and grade seven. The language analysis, based on transformational grammar, followed in part Hunt's (1965) technique. The findings showed a strong correlation between age and T-unit length, confirming Hunt's (1965) hypothesis that increased sentence length due to embedded forms, rather than sentence length per se is indicative of increasing maturity in language production.

Coleman (1968). Coleman summarized a "sample of experiments that study grammatical relations" including Gough's (1965) finding that the active form of the verb is more readable than the passive and Martin's (1966) finding that sentences of low depth (fewer transformations) were easier to read than sentences of greater depth. Coleman also reported his own earlier findings that the active verb is more readable than the passive (1966) or than a nominalized form of the verb (1963, 1964)

and that readability increases as embeddedness decreases.

Coleman concluded:

> Most of the time when a writer applies rules for
> improving readability, he is actually choosing
> one grammatical transformation above another. Thus,
> the rules for writing readable material could be
> stated more precisely in terms of grammatical
> transformations. . . .The prescriptions for readable
> writing. . . prefer grammatical transformations
> that give short clauses and use active verbs; prefer
> grammatical transformations that do not use abstract
> nouns nominalized from verbs. (p. 175)

<u>Bormuth (1969)</u>. Bormuth tested the reading compre-
hension of 60 fourth graders on 25 syntactic structures
that he judged to represent the most difficult patterns in
a total list of 52. To measure comprehension, sentences
were presented to the students as follows:

Original sentence:	The boy rode the steed.
Rote:	Who rode the steed?
Transform:	By whom was the steed ridden?
Semantic substitute:	Who rode the horse?
Compound (both semantic and syntactic transform):	By whom was the horse ridden? (Bormuth, 1969, p. 5)

Students responded by answering the questions. Acceptable
responses were the exact subject that had been replaced by
<u>who</u> or <u>whom</u> or a semantically correct substitute.

Bormuth found a "startlingly" high rate of failure to
to comprehend the structures he tested. He suggested,
therefore, that some easier structures which had previously
been presumed understood should be retested. He also

established a ranking of the syntactic structures according
to the difficulty for the students in his study.   In
reviewing Bormuth's study, Glazer (1973) concluded:

> Because a child acquires the ability to use a
> syntactic structure does not mean, however, that
> be is able to comprehend all the information it
> contains.   An implication from this research is
> that testing children for comprehension of syntactic
> structures and measuring these structures in their
> reading material may be a valid tool for appropriate
> matching. (p. 55)

Hunt (1970).   Hunt's study altered slightly from his
1965 study the source of material to be analyzed and ex-
panded the subject population to include grades six and
ten and a skilled adult level.   A passage was presented
in the form of kernel sentences and subjects were asked
to rewrite the passage.   Hunt reported that both clause
length and T-unit length increased significantly as a
function of maturity.

Smith (1970).   Smith developed readability tests
based on a transformational analysis of the data from
Hunt's (1970) study.   Passages were written for grades
four, eight, twelve, and skilled adult levels.   Each
test passage was administered to all of the 120 subjects
randomly selected from grades four through twelve in a
Florida school system.   A cloze technique was used to
test reading comprehension for each passage.

Smith reported that the fourth grade students read material written by fourth graders best, but eleventh graders read the writing of fourth graders least easily. Habit may account for the incorrect responses by older students. Smith commented that "the redundancy level the reader is accustomed to in both reading and writing may affect, possibly determine, the predictions he would make on a cloze test" (p. 8).

Students in grades ten through twelve consistently read all levels of writing better than did students in grades four through six. Smith tentatively concluded that "as a student matures he comprehends best the material which is written near his own productive syntactic level, providing the vocabulary and content are not foreign to him" (p. 8).

Denner (1970). Denner's study was designed to "evaluate the theoretical notion that representational and synthetic competence are essential to learning how to read" (p. 881). He compared first grade "problem readers," first grade "normal" readers, third to fifth grade problem readers, and headstart preschoolers.

Using Farnhow-Diggory's (1967) four tasks (enactive, pictograph, logograph, and synthesis), Denner found that problem readers did about as well as normal readers on all except synthesis. Headstart preschoolers and older

problem readers, even as late as fifth grade, approached the synthesis task in the same way. "Both acted as if the sentence meaning were a product of individual word meanings, while the average readers seemed to appreciate that words derive their meaning from the sentence context" (p.886).

In the synthesis task, the logographs are placed on a line in the same way that words are arranged to form a sentence. The child is asked to "read" the sentence and then do what the sentence commands. The meaning of the symbols (logographs) is taught in advance. The words do not appear on the cards. For example, the following logographs were placed in front of the children in Denner's study: //(walk)   ♡(around)   ☺(teacher). Some children read the sentence and walked around the teacher. Others first walked, then went up to the teacher and asked, "How do you do around?" "Although they read the sentence as if it were a higher order unit," concluded Denner, "it was apparent from their behavior that the sentence did not function for them as a unit" (p.882).

Sauer (1970). Sauer used a method called "boinguage" to test 153 fourth grade children on their knowledge of language structure. The test procedure, similar to a cloze procedure, deleted all lexical words and replaced them with "boing." For example, The boy and the dog chased the ball would be rewritten The boing and the

boing boinged the boing. Students were expected to replace
each boing with an appropriate word for that position in
the sentence. Acceptable responses were grammatically
logical and represented the appropriate number of words.

Sauer reported that longer syntactic units were more
difficult than shorter ones for the students to complete
correctly. Single word modifiers caused the least difficulty;
the phrase was easier to understand than the dependent clause
but more difficult than the single word modifier.

Sauer's findings and Bormuth's (1969) concerning one-
word modifiers are counter to transformational analysis.
According to transformational theory, as more transform-
ations are required to go from deep structure to surface
structure, a sentence would become increasingly difficult.
Sauer (1970) and Bormuth (1969) found that the one-word
modifier (e.g., the hungry boy) was easier for children
than the embedded dependent clause (e.g., the boy who is
hungry), even though the one-word modifier represents more
transformations and deletions. The difference in difficulty
may be a function of the relative clause, a particularly
difficult structure for children (Brown, 1971), or it may
be related to one's ability to hold several elements in
mind at once, a function of cognitive development (Piaget,
1964).

Generally research has confirmed the validity of
transformational grammar analysis in explaining differences

in the difficulty of underlying syntactic forms. The
counter finding by Sauer and Bormuth emphasizes the need
for including oral language studies in readability research.

Fagan (1971). Fagan examined selected passages from
three fourth-grade basal readers. His purpose was to
determine (a) which transformations were used to derive
the sentences in the passages he selected and (b) the degree
to which the type and number of transformations affect
comprehension of pupils in grades four, five, and six.

Fagan identified 43 transformations which he grouped
into four major categories, with a fifth added to account
for re-ordering of elements within the surface structures,
such as an introductory adverbial phrase. "Sentences in
which it was not possible to measure the difficulty of
transformations independently were termed multi-transform-
ation units" (p. 8). Glazer (1973) summarized the five
categories Fagan used:

1. Embedding. A sentence enclosed within a sentence.
   For example, the appositive in "Bob Jones, a
   sailor, is home on leave."

2. Conjoining. The union of two sentences by a
   conjunction. For example, "The room seemed lonely
   and the room seemed damp."

3. Deletion. Words that would ordinarily appear in
   the surface structure are eliminated. For example,
   "Common elements deletion" in "The room seemed
   lonely and damp."

4. <u>Simple</u>. Transformations which act on a single existing sentence. For example, the negative in "He did not see the mirage on the desert."

5. <u>Position shift</u>. In which either the sequential pattern of subject-predicate is inverted or various grammatical units are placed before the subject. For example, "Adverbial position shift" in "After a crash they always make pilots fly again." (p. 30)

Fagan tested for both sentence difficulty and passage difficulty. Variables of students' grade, sex, mental ability, and reading achievement were considered. Two sets of stories were constructed, with vocabulary difficulty as well as number and type of transformations controlled. Four hundred forty students were randomly selected from regular classes in grades four, five, and six of an eastern Canadian city. The subjects included 220 boys and 220 girls between the ages of nine and twelve.

To test reading comprehension, Fagan used a cloze test with five forms so that eventually every word had been deleted once (e.g., form one had words 1, 6, 11, etc. deleted; form two had words 2, 7, 12, etc. deleted). The findings of this study indicated that deletions and embedding transformations tend to make sentences and passages more difficult for children to read. Fagan reported that appositives, the -ing nominalization, the genitive pronoun, common elements deletion, and negative structures are most difficult.

Granowsky (1971). Granowsky developed a readability
measure based on transformational grammar which isolates
and "weights" syntactic structures according to frequency of
use and difficulty. Granowsky also included a lexical
count in his considerations "to compensate for transform-
ational grammar theory's deficiency in accounting for the
complexity of single-word embeddings in comparison to the
embedded phrase or clause" (p. 41). This added measure
was based on findings that single-word modifiers, even
when they represent more transformations, are easier to
understand than phrases, which are easier than clauses.

To validate his formula, Granowsky conducted an ex-
periment with 180 students in a Willow Grove, Pennsylvania,
school. Subjects were selected from grades two, three, and
four. Two 100-word passages were analyzed with four read-
ability formulas, all of which showed the passages to be at
second grade level, despite obvious differences in syntactic
complexity. A cloze comprehension test on each passage
was administered to all the students. In addition to
filling in the blanks with appropriate words, each student
was asked to rate the passages on a five-point scale from
"very easy" to "very hard."

In all cases the students had more difficulty with
passage two, which included what Granowsky had identified
as "later appearing structures," than with passage one,

which did not include the later appearing structures. Fourth grade students had less difficulty with the second passage than did second and third graders. Students at all levels judged passage one to be easier to read than passage two.

Granowsky conclued that "syntax is an important factor in the development of primary reading materials that has not been adequately considered" (p. 116). In addition, he suggested further research on oral language processing and the use of his formula in conjunction with a vocabulary measure.

Glazer (1973). Glazer used Strickland's (1962) analysis, based on structural grammar theory, and the Botel-Dawkins-Granowsky (BDG) Syntactic Complexity Formula,[1] based on transformational grammar analysis, in a comparative analysis of four reading textbook series. The materials "were selected because they each approach reading instruction in different ways" (p. 59). Samples were systematically selected for analysis from a total of 40 textbooks and 33 workbooks.

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[1]This formula is a further revision of the Granowsky (1971) formula, which, in turn, was developed from Botel's (1969) syntactic schedule.

Findings were different for the two instruments. Using Strickland's analysis suggested there was no syntactic programming in any of the texts. When compared to research findings on syntactic development in children's language, the Strickland analysis indicated a mismatch along with an inconsistent system of presentation of syntactic structures in the materials examined. Results of the analysis with the BDG formula suggested an opposite conclusion: there appeared to be considerable programming of syntax in the instructional reading materials Glazer examined; the programming was found to be generally consistent with research findings on syntactic development. Glazer reported that the workbooks designed to accompany children's texts were generally higher in complexity values than their corresponding texts.

Glazer attributed the differences in findings for the two analyses to the premise upon which each instrument is based (i.e., structural vs. transformational grammar). The BDG Syntactic Complexity Formula was judged to be the more powerful for measuring syntax. Glazer did specify some "imperfections" in the BDG instrument, due to inadequate research in the area of children's syntactic development. The authors of the formula suggested that "two cautions need to be noted in using the syntactic complexity formula: 1) it should be used in conjunction with a measure of

vocabulary; and 2) the value of the instrument lies not in giving precise measurement but in ranking syntactic structures" (MacGinitie, 1973, p. 78).

A number of studies have been designed to test the difficulty of specific syntactic structures. They are summarized below.

Robertson (1968). Robertson investigated children's understanding of connectives (conjunctions). She analyzed the content of three basal reader series for grades four, five, and six to identify the connectives used and the type of sentence structures in which they were found. More than one-third of the sentences in the sample contained connectives. Of these, three-fourths of the sentences had one connective; the remaining one-fourth had at least two. The variation from grade to grade was "almost negligible."

From the 42 connectives identified, 17 were selected for further study on the basis of "frequency of occurrence in the basal reader sentence analysis, the multiplicity of meanings the connectives had, the homographs of the connective, the findings of previously published research, and the classes to which the connectives belonged" (p. 398).

The 17 connectives Robertson included in the study can be grouped into five categories:

1. Coordinating conjunctions: <u>and</u>, <u>but</u>, <u>for</u>, <u>yet</u>

2. Subordinate conjunctions: <u>although</u>, <u>because</u>, <u>if</u>, <u>so</u>, <u>that</u>, <u>when</u>, <u>where</u>

3. Relative pronouns: <u>that</u>, <u>which</u>, <u>who</u>

4. "Sentence linkers":   <u>however</u>, <u>thus</u>

5. "Omitted connectives": <u>that</u> (whether expressed or omitted in the noun clause)

Sentences containing the 17 selected connectives were analyzed and the data used to construct a multiple choice Connectives Reading Test. In each test item, the first part of the sentence, including the connective, was written; the rest of the clause was written below the sentence as one of the alternative answers. The second alternative used the connective correctly, but incorporated some other type of grammatical error. The third alternative used the connective correctly but did not "make sense." The fourth alternative was based on the use of an entirely different connective.

The 150-item test included 85 single-connective items and 65 multi-connective items. It was administered, untimed, to 402 students in grades four through six. An additional 49 items had been used in a pilot study. From these 49, twenty items were selected for a Written Connectives Test. The written test consisted of the entire sentence with the connective deleted. Subjects were to fill in the blank with one word they thought belonged there. Fourteen items had one space each where connectives had been deleted; five items had two spaces each; one item had three spaces.

In summarizing the results of the study, Robertson reported that:

> The total student group in grades four to six understood 67 per cent of the sentences having connectives. The understanding level rose from 57 per cent in grade four to 66 per cent in grade five to 75 per cent in grade six. (p. 405)

In other words, according to the Robertson study, only students above fifth grade have acquired for these connectives the comprehension level that is commonly set as a criterion for the instructional level of reading materials (75%).

For six of the 17 connectives (however, thus, although, which, and, yet) Robertson reported comprehension scores below 66 percent. The "sentence linkers" (however, thus) received the lowest number of correct responses. The most frequent type of error in the Connectives Reading Test was "grammatical," the second alternative, with wrong connective next, and the fewest errors in the situational (did not "make sense") category. The same order was observed at each grade level. Robertson speculated that "situations involving concession are hard for students to understand" (p.406). She further suggested that the difficulty she observed with and could be attributed to its variety of meanings. Which and thus were linked to more formal language structures than students typically use, and according to Robertson, "difficulty with yet indicated that the children cannot hold information in reading well while

they consider other information given to them" (p. 409).
According to Piaget's theory of cognitive development this
is typical of the age group tested. Also, from a cognitive
development point of view, Robertson's findings for and
could be interpreted as relating to the child's use of
because when and is more appropriate, a tendency which
Piaget also observed.

Robertson reported that on the Written Connectives Test,
"test blanks which could have been filled acceptably with
although, and, and yet proved to be as hard for the students
as they were on the Connectives Reading Test." Robertson
concluded that:

> This study showed that although children acquire
> language structures using connectives early in life,
> they gain mature understanding of them gradually
> throughout their school years. Children use clauses
> in speech before they go to school but they do not
> develop a sufficient understanding of the meaning
> of connectives in print for a number of years after
> that. (p. 416)

Granowsky (1971) suggested that Robertson's findings
should be qualified on the basis of her test question
design. He questioned the significance of the type of
error represented by the second alternative "as a measure
of the student's comprehension of the structure being
tested" (p. 21). The second alternative was the one with
the correct connective, but some other grammatical error,
and the greatest percentage of errors occurred on this item.

Robertson's results as a whole, however, are consistent with other researchers' findings that many connectives are difficult for children to process (Menyuk, 1963; Piaget, 1964; Hunt, 1965; Stoodt, 1972; Karl, 1972; Rystrom, 1972). Nevertheless, the coordinating conjunction and, which Robertson included among the six more difficult connectives, usually has been found to be one of the easiest connectives and one that is acquired early in the language development sequence (Piaget, 1964; Hunt, 1965; Stoodt, 1972). Furthermore, one might wonder what influence vocabulary had on the younger subjects in the study. Vocabulary was controlled at mid-fifth grade level, although subjects ranged from fourth grade to sixth grade.

Brown (1971). H. Douglas Brown's study of the difficulty of restrictive relative clauses is significant for readability research in that he applies his findings directly to primary grade reading materials. Brown examined three factors in the syntactic structure of restrictive relative clauses:

1. Embeddedness position of the clause,

2. Focus of the relative pronoun (subject or object focus),

3. The relative pronoun itself.

These three factors were incorporated into a picture-cue comprehension test which was administered to three groups of children: three-, four-, and five-year-olds. Analysis of

variance showed three-year-olds scored significantly lower in over-all performance. Brown reported that embeddedness was "nonsignificant" except in case of an added structural ambiguity. Subject focus was significantly easier to comprehend than object focus. Brown concluded that many structures were not adequately understood even by five-year-olds because their scores were barely within the range of chance. Noting that the five-year-olds are at the age just prior to entering first grade, Brown stated explicitly the relevance of his findings for reading instruction:

> Perhaps the most crucial implication of this study relates to reading programs in early childhood education. An examination of a preprimer recommended by the state of California (Russell, 1957) /Ginn Basic Readers/ revealed the following questions placed in quotation marks in the teacher's manual, indicating that the teacher is to ask them verbatim:
>> Do you know what the lady is called who works in the library?
>> Why do you suppose Tom chose the books he did?
>> Where will you look to find out the number of the page on which the new story begins?
>> What is the color of the book we are reading now?
>> Who can name the toys Tom wants his sister to bring?
>> Can you make your voice sound the way you think Susan sounded?
>
> Judging from a comparison of these relativized sentences with those of the study here, one could assume that they might be very difficult, if not incomprehensible for a five-year-old child. The corresponding primer used the following sentences in the text of the child's first reader:
>> It is something I made at home.
>> Come and see the ones I painted.
>> Run and get all the eggs that you can find.
>> Then Mary's mother came out with something they all liked.
>
> These sentences, while considerably less complex, may still present problems to a five-year-old since pronoun

deletion and object focus are used, both of which were shown to be potentially difficult structures. (p. 1934)

Albanese (1972). This study examined the influence of adverbs and adjective phrases and clauses on reading comprehension for fifth grade pupils reading below grade level, fifth grade pupils reading on grade level, and third grade pupils reading on grade level. Findings indicated that the fifth grade pupils reading below level performed like the on-level third graders on all syntactic features except simple sentences. Denner (1970) also found that "problem readers" tend to perform like "normal" readers of a younger age on certain tasks.

Stoodt (1972). Stoodt's study revealed a significant relationship between reading comprehension and comprehension of conjunctions. She tested 95 fourth grade students, representing three socio-economic levels in the Munsfield, Ohio, public schools, using multiple choice and cloze test procedures. With the exception of the coordinating conjunction and, Stoodt's work confirmed Robertson's (1968) findings that connectives influence readability. Stoodt's conclusion, listing and among the easiest conjunctions, is consistent with other research (Hunt, 1965; Menyuk, 1963; Rystrom, 1972).

Foust (1973). Using a design similar to Stoodt's, Foust studied the relationship between understanding prepositions and reading comprehension. His subjects were

127 fourth graders, representing three socioeconomic levels in the Columbus, Ohio, public schools. Foust found a significant correlation between a subject's ability to correctly identify the relationship that prepositions signal and his reading comprehension. A significant difference in the difficulty of various prepositions was reported also.

Summary of Readability Studies

The following conclusions were drawn from the foregoing review of research in readability:

1. Readability studies to the mid-1960's were concerned mainly with development and refinement of readability formulas to estimate grade level of materials.

2. Readability formulas emphasize a counting of elements; they usually are based on vocabulary and sentence length.

3. Developments in linguistic theory and the availability of technology for more sophisticated analysis changed the focus of readability studies. Different factors came to be recognized as significant; these factors could be measured and analyzed more accurately and efficiently.

4. Readability studies since the mid-1960's have shown: (a) sentence length is not an adequate measure of syntactic difficulty in reading materials; (b) transformational-generative grammar affords a more powerful analysis of syntactic complexity than other theories; (c) syntactic structure does significantly influence ease of comprehension

of written language; (d) patterns children use more
frequently in speech are easier for them to comprehend--
that is, more readable; (e) certain specific patterns are
more difficult than others; and (f) "problem readers"
tend to approach problems of language structure like
"average readers" of a younger age.

Oral Language Studies

Having determined that written materials are easier
for children to understand--i. e., more readable--when
they are written with the structures that appear most
frequently in children's oral language, the obvious next
question, "Which structures appear most frequently and in
what sequence?" leads to a consideration of the research
in oral language development.

Most researchers begin their study of syntax in
language development when the child strings together two
recognizable phonemes. Detailed reviews of the language
acquisition studies on young children have been compiled
by Berko and Brown (1960), McNeill (1966), Diebold (1965),
Ervin and Miller (1963), Brown (1966), Ervin-Tripp (1964),
and Ervin-Tripp and Slobin (1966). Although these studies
of younger children can offer pertinent background, this
review is concerned specifically with five- to seven-year-
old or first-grade age children.

Studies before the 1960's assumed that children had
for the most part mastered the grammar of their native

language before they were of the age to enter first grade (Templin, 1957). More recent studies show that age eight, about second or third grade, is a more accurate estimate and that some development continues throughout the elementary grades, with certain syntactic patterns posing particular difficulty (Strickland, 1971; C. Chomsky, 1969, 1971, 1972; Hopper, 1973).

A typical sequence of development has been established that, like other developmental sequences, appears to be generally invariant in order but with much individual difference in rate. All children progress through generally the same sequence of language development but individuals vary greatly in terms of how fast they go through the sequence or how long they stay at a particular stage (Menyuk, 1972). Therefore, there is considerable variation in language competence among first graders. The language-delayed apparently go through the same sequence as normal children do, but more slowly. Variables of socio-economic status, intelligence, experience, and to some extent sex, influence rate of development, although some recent research reports the influence of these factors to be lessening. These variables seem to influence speech development more than language competence (DeVito, 1970).

The first part of this chapter reviewed changes in approach to readability research in the late 1960's. A

similar change in language development research followed the
publication of Chomsky's (1957, 1965) theories of trans-
formational-generative grammar. Essentially the same
emphases are evident as in readability research: the concept
of surface structure and deep structure and the means to
study more and different factors.

Sequence of Syntax Development

Structural and traditional grammar analysis was
inadequate to account for differences in syntactic complexity
except at the surface level. Labeling utterances as simple,
compound, or complex sentences did little to explain the
actual differences in particular structures. Chomsky's
(1957, 1965) transformational grammar provided an analytic
tool for judging progression in children's language.

Menyuk (1963, 1969, 1972) concluded that Chomsky's
theory could serve as a framework for describing syntax
development. Lee (1971, 1974) used transformational grammar
as a basis for developing a scale of syntax acquisition
showing the general order in which normal children acquire
certain syntactic structures.

Menyuk (1963). Menyuk used Noam Chomsky's technique
with transformational grammar for describing the development
of syntax and found that at age five only the phrase-
structure level, if that, could be said to be complete. Even
with Menyuk's atypical population she found that syntax

mastery was not complete at the transformational level by age five. In the group Menyuk studied, she reported a mean IQ of 130.3 for nursery school children and 132.0 for first grade. Parental occupation for all children fell within the upper 24 percent of a middle-class population, with a majority in professional, semiprofessional, or managerial categories.

Menyuk tested 48 nursery school children (24 girls, 24 boys) and 48 first grade children (25 boys, 23 girls), representing an age range from three years, one month to four years, four months for nursery school and five years, eleven months to seven years, one month for first grade.

Spontaneous speech was recorded in three situations: (a) response to the Blacky Pictures (Blum, 1950); (b) conversations with an adult in which each child was asked the same questions; and (c) conversation with peers generated by role playing. For cross-validation purposes, the children were observed in the classrooms and language samples were recorded there also.

The individual and classroom language samples were analyzed according to transformational grammar theory. Menyuk found that "at the phrase structure level (rules for simple-active-declarative sentences) and the morphology level (inflectional rules) of grammar, all children used all the structures in a grammatically acceptable form" (p. 410).

However, differences were evident in the usage of transformational rules. Menyuk reported evidence of sequential maturation in grammatical development. She observed that "some transformations were used by significantly more of the first grade children than by the nursery children, whereas the inverse was never true" (p. 412).

The passive transformation, auxiliary verb have; conjunctions with if and so, and the nominalizational transformations were used by significantly more children in the first grade population than in the nursery school population. Many of the transformations that showed maturation from nursery school to first grade still had not been mastered by the first grade children: pronominalization, participle complement, "iteration" transformation. "With those structures which show significant maturational changes in a comparison of nursery school and first grade children," stated Menyuk, "there are indications that further significant changes occur beyond the seven-year level" (p. 419).

Olds (1968). The Olds study reported evidence that certain specific syntactic patterns are not mastered until the upper elementary grades. The study included 20 boys of average intelligence, ages seven, nine, and eleven. Oral comprehension of nine types of utterances was tested in a game which involved following directions. Olds categorized

the results according to degree of comprehension:

1. Those interpreted correctly by all subjects, indicating total mastery. This category included simple statements, affirmation condition with _if_, and sentences with one embedding.

2. "Difficult enough to cause the children to make some mistakes but the children performed well enough to show a well-developed capacity for interpreting all types in the group" (p. 108). This category included limiting contingencies with _although_ and _but_, temporal contingencies, and negative conditionals with _if_ + _not_.

3. Those that caused so much difficulty, especially for seven to nine year old children, that Olds suggested that "many children have not developed an ability to interpret these forms until about age eleven and even then some have difficulty" (p. 108). These most difficult types included negative conditionals with _unless_ and _ask/tell_ combinations.

Olds speculated that learning of the more difficult patterns "may well be enhanced by appropriate forms of instruction" (p. 108). Tatham (1970) also suggested direct teaching of the more difficult constructions.

C. Chomsky (1969). Carol Chomsky's research supported the findings of the Olds (1968) study that elementary children have not mastered some features of their language.

Chomsky studied the oral comprehension of 40 children between ages five and ten. She was interested in the children's acquisition of four syntactic structures:

Structure	Difficulty
1. John is easy to see.	1. subject of sentence subject of see
2. John promised Bill to go.	2. subject of go
3. John asked Bill what to do.	3. subject of do
4. He knew that John was going to win the race.	4. reference of he

In discussing the results of the study, Chomsky commented on the surprisingly late acquisition of these patterns and some specific features of acquisition.

1. Promise and easy to see: mixed period from age 5.6 to 9.0; success from age 9 on.

2. Ask: mixed at all ages.

3. Pronominalization: failure before age 5.6; success from 5.6 on. (p. 116)

In the "mixed period" a child may or may not comprehend the construction, depending on variations in his own development.

Chomsky speculated that "the basic principles of language (such as pronominalization) may be acquired more uniformly across the population of children, perhaps at a certain level of maturation, whereas the more specialized constructions vary more with the individual" (p. 116). Certainly language development and cognitive development research indicates that generalizations are learned first, then the exceptions to the generalizations.

"*Promise* and *ask* require the same linguistic process for complement subject assignment, namely that the subject from the main clause rather than the object be selected as the subject of the complement verb" (p. 117), explained Chomsky. She identified the *ask/tell* construction as the most difficult, at least the most inconsistent, and subdivided the *ask/tell* construction into five stages according to increasing complexity and age of mastery. The *ask/tell* construction is still "imperfectly learned" by some children at age ten. Chomsky concluded:

> Contrary to the commonly held view that a child has mastered the structures of his native language by the time he reaches the age of 6, we find that active syntactic acquisition is taking place up to the age of 9 and perhaps even beyond. Second, our observations regarding order and rate of acquisitions for related structures in different children are in agreement with findings of investigators who have worked with younger children. . . . Quite simply, although we cannot say just when a child will acquire the structures in question, we can offer a reliable judgment about the relative order in which he will acquire them. (p. 121)

A third conclusion from Chomsky's summary has broad implications for linguistic research:

> We find several distinct patterns of acquisition in our study, each characteristic of one or more of the test constructions. These observed differences in the way the structures are acquired point up interesting distinctions in the nature of the constructions themselves. . . . Our understanding of linguistic complexity in general can be enhanced by inquiring into the children's underlying competence and studying these differences. (p. 121)

Kessel (1970) carried out a related experiment with ask and did not find the distinct stages which Chomsky identified. Kessel also reported an earlier age for what Chomsky called stage A4 in the acquisition of ask, a stage which requires a more difficult task of subject assignment in addition to the basic ask/tell distinction. Chomsky (1971) explained that Kessel's experiment, which involved picture identification did not distinguish the more difficult stage, A4. Once the child has chosen a picture on the basis of asking or telling, the subject is obvious: the picture shows who is doing the reading, sharpening, or whatever. Chomsky stated that Kessel's results actually are in agreement with her findings.

Gaer (1969). Gaer studied the ability of children ages three to six and of adults to understand and produce sentences which vary in complexity and type of transformation. She investigated whether mastery occurs in the same sequence for production and comprehension of specific constructions.

One hundred twenty subjects—24 each at ages three, four, five, six, and adult—participated in the study. Adult performance was used to define the upper limits of each task. Subjects at each age level were randomly divided into four groups.

To test comprehension (receptive language), each child was shown pictures that illustrated an action and

its negative for each of the four transformations. When
the picture was shown and the sentence spoken, the child
responded "yes" if he heard what the picture showed; "no"
if he did not. Adults responded similarly. To test
production (expressive language), each subject was asked
to recall the sentence he had heard about each picture
as it was shown again or to tell what the picture showed
if he could not recall the sentence he had heard earlier.

Four types of transformations were examined: active,
negative, passive, and question. The "levels of complexity"
included (a) a sentence with no embedded sentence, (b) a
sentence with one embedded sentence at the end, (c) a
sentence with one center embedding, and (d) a sentence with
two embedded sentences. From easiest to most difficult,
the order reported was:

Comprehension (reception)   Production (expression)

    1. active   1. active

    2. question   2. negative

    3. passive   3. question

    4. negative   4. passive

Older subjects were able to produce and understand
all of the sentence types more easily than younger subjects.
Simple sentences were understood better than those with
center embedding or multiple embedding. Single-embedded
sentences were understood as well as simple sentences but

were not produced as well as simple sentences at all age
levels. Center and double embeddings were produced
infrequently by all ages. Gaer's results support Smith's
(1970) conclusion that the productive level may indicate
the best receptive level. Glazer (1973) concluded from
the Gaer study:

> If the child is able to produce a sentence type
> at a particular level of complexity, one may
> safely make the judgment that he should be able
> to receive it in spoken or written form. (p. 50)

Hatch (1969). Hatch investigated the developmental
changes in the use of certain syntactic structures by
white, monolingual, middle-class five- and seven-year-
old children. The study involved four separately designed
experiments that were concerned with (a) mass and count
noun responses of young children, (b) pronoun case prefer-
ence of young children, (c) comprehension of time connec-
tives, and (d) comprehension of conditional structures.

Both comprehension and production were tested in the
time connectives and condition (if. . .then) experiments.
For the time clause experiment, Hatch constructed a
variation of Olds' (1968) procedure: a simplified game in
which the subjects moved markers to indicate their compre-
hension of the stimulus sentence. Examples of the time
clause stimulus sentences suggest that conjunctions,
temporal order, and position of the clause in the sentence
all may have contributed to comprehension difficulty.

Sentence Type	Example
1.	Move a red one and then a yellow one.
2.	Move a yellow one before you move a green one.
3.	After you move a black one, move a red one.
4.	Move a green one but first move a red one.
5.	Move a yellow one after you move a green one.
6.	Before you move a black one, move a yellow one. (Hatch, 1969, p. 46)

Hatch reported that the subjects gave more correct responses when the order of mention was the same as the order of action and that both the kindergarten and second grade children gave more correct responses when the time clause was at the end of the sentence. Similar findings have been reported by Rystrom (1972).

A picture-identification task was used for the comprehension part of the conditional structures experiment. The subject heard the stimulus sentence (e.g., If it's red, raise your hand) through earphones and pushed a lever to indicate which of the two pictures projected on a screen in front of him correctly reflected the stimulus sentence. According to Hatch, the analysis of test results showed that kindergarten children apparently have great difficulty both in comprehension and repetition of sentences which use the

conditional form. Second grade students appeared to have mastered "if. . . then" but they were less successful with "if. . . not. . .then" and "unless. . . then. . . not." Conditional forms may, therefore, present problems for the child just beginning to read and second graders would find some conditional forms difficult.

An imitation task was included in both the time clause and the conditional structures experiment. The imitation required subjects to repeat the stimulus sentence. The conclusions Hatch reported for these two experiments confirmed the findings of Olds (1968), C. Chomsky (1969), and Gaer (1969). However, the procedures involved in the experiments raise some questions. Although the use of earphones can be justified to screen out distracting noises and encourage concentration, the response procedure for the conditional structures experiment seems unreasonably complicated for five-year-olds.

A second purpose of Hatch's study was to determine differences between the syntax of young children's oral language and that used in beginning reading textbooks. Cursory examination of preprimers and primers revealed that the language used included more complex patterns than the oral language of first and second grade children, e.g., so clauses, unless clauses, nominalizations. She reported that the books she examined followed neither a pedagogically

determined sequence nor one which paralleled children's language development. Hatch recommended that new structures be systematically introduced orally, but not included in the reading texts until the child can understand them.

> Each experiment elicited either non-verbal comprehension responses to the structures, imitation of the structure, or production of the structure by the subject. The form of the task is particularly important if research is to be related to the reading program since a child may understand a structure long before he is able to use it. If the child neither produces nor comprehends a structure, there can be little justification for including it in a beginning reading book where emphasis must be on teaching word attack skills. However, if the child seldom produces a structure or produces his own alternate of the structure, there is some justification for including the adult form in the reading materials and arranging for oral practice of the structure in an adjunct program. (p. 4)

Scholes (1969). Scholes studied the ability of adults and children (ages three years through five years, ten months) to differentiate between grammatical and ungrammatical sentences on the basis of intonational patterns in the tester's voice. Adults made no errors and apparently can interpret grammatical patterns without the support of intonation. Three-year-olds could not differentiate accurately between the grammatical and the ungrammatical without the support of intonational cues. The older children were much more successful than the younger ones; however, they too made errors, indicating the continued need for some support from intonation in the speaker's voice.

Granowsky (1971), on the basis of the Scholes study, suggested that reading is more difficult for children because of the absence of intonational cues. Granowsky wrote:

> Intuitively, it would seem safe to infer that confusion created by syntactic complexities on the oral level would be of a lesser extent than on the printed level. The printed mode of communication is less familiar, the need to attend less pressing typically, and oral and kinesic cues which apparently facilitate syntactic comprehension are largely absent. The punctuation marks of printed materials are certainly a weak substitute for oral intonation, and an illustration can hardly be equated with the expression on the speaker's face, his many gestures as he speaks, and the concrete setting in which communication occurs. (p. 18)

Lee and Canter (1971). Lee and Canter developed a procedure for estimating children's language performance based on a developmental scale of syntax acquisition. The theoretical basis of the scale is Chomsky's theory of transformational grammar. The procedure, Developmental Sentence Scoring (DSS), assigns weighted scores to specific structures according to developmental sequence. In addition, a "sentence point" is added or not to show whether the sentence is in all ways correct according to adult standard dialect. Lee and Canter acknowledged that for practical purposes some syntactic structures were not included in the DSS; the sentence point is intended to compensate for not scoring certain features.

Developmental Sentence Scoring analysis uses fifty consecutive sentences (at least a noun and a verb in subject and predicate relationship) from a tape recording of the child's conversation with an adult. Identical sentences, unintelligible sentences, and identical repetitions of the experimenter's speech are omitted.

Lee and Canter tested the DSS procedure on 160 children, 80 boys and 80 girls, ranging in age from three years to six years, eleven months. The ages were equally distributed within six-month age groups. All subjects represented middle-class families who spoke Standard English and all scored between 85 and 115 on the Peabody Picture Vocabulary Test. The percentiles of DSS scores for the 160 children were used to establish guidelines from normative data for comparison with data from children receiving clinical treatment.

C. Chomsky (1971, 1972).[1] Chomsky's later study reported some slight differences from those reported in Acquisition of Syntax (1969), differences which Chomsky attributed to improved testing procedure, with the later results being more accurate. In the 1972 study, 36 predominately middle-class children, ages six to ten,

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[1]This is the same study, completed under a USOE grant and reported in ERIC in 1971, in The Harvard Educational Review in 1972. Children were interviewed in the Fall, 1969.

were tested for comprehension of eight relatively complex
syntactic structures. Five of the structures proved to be
acquired in sequence, revealing five stages in the
acquisition of syntax. The experimental design was the
same as the 1969 study: the child's comprehension of a
statement was judged by having him carry out tasks,
manipulate toys, identify pictures, or engage in conversa-
tion. Examples of the five structures included in the study
are listed below:

1. The doll is easy to see.

2. Bozo promises Donald to stand on the book.

3. Seymour asked Gloria what to paint.

4. Mother scolded Gloria for answering the phone,
   and I would have done the same.

5. Mother scolded Gloria for answering the phone,
   although I would have done the same.

Chomsky reported that the structures are acquired in the
following order:

Structure	Acquired Between Ages:
1. easy to see	5.9 - 9.5
2. promise	6.1 - 9.9
3. ask	7.2 -10.0
4. and	7.2 -10.0
5. although	7.6 - 9.9

Chomsky reported that the order prevailed consistently:
that is, the child who could do item three could also do
one and two but never the reverse. The one who could do

item two could not necessarily do item three. Based on a Guttman scale analysis, Chomsky concluded that mastery of item three assumed mastery of one and two and so on throughout the sequence.

A second part of Chomsky's (1972) study surveyed the children's reading background and their current reading activity through questionaires to parents and children and daily records kept at home of all reading and listening to reading a child did during a one week period. Chomsky calculated the amount and complexity of independent reading and listening and the recall and recognition of books that had been read or heard.

Given the small sample size and the fact that most of the relationships reported in the study were first-time observations, Chomsky very cautiously concluded that exposure to more complex language available from reading shows positive correlation with increased language competence. Socioeconomic status was found to be an important factor only in the youngest children. Chomsky speculated that "results may have implications with regard to language programs in the elementary schools and the philosophy underlying curriculum design and selection of materials" (p. 32).

Menyuk (1972) . Drawing on her earlier works (1963, 1969, 1971) in a presentation to the International Reading

Association, Menyuk described "universal aspects and individual variations" in language development. At the end of the preschool period, the child can, according to Menyuk, generate some sentences by embedding, but only with certain verbs and at the end of sentences. His elaboration of noun phrases is limited and he does not use structures which disturb the subject-verb-object order.

Menyuk described a sequence of development for conjoined sentences that express logical relationships. The child entering kindergarten uses and understands conjunctions which place few restrictions on the conjoined elements (and) or which signal concrete cause and effect (because). Kindergarten children rarely use and don't completely understand conditional (if, so) and antithetical (but) relationships. Children express and understand causal, temporal, and antithetical relationships in the following order:

1. causal

2. temporal
   a. temporal simultaneous
   b. temporal sequential (before, after)

3. antithetical

Still later they understand such structures as I promised him to go, in which the object separates the subject from the verb. In fact, some adults do not use and understand structures of this type. "The most important linguistic

development from kindergarten on is the acquisition of more and more complete descriptions of relationships within and between sentences" (p. 7), stated Menyuk. Menyuk interpreted Kohlberg and Gilligan's (1971) finding that almost 50 percent of American adults never reach adolescence in the Piagetian cognitive sense to indicate that different structures are "available" to different children in various stages of development and that some structures may never become available to certain children.

In the child's acquisition of language, "universal trends reveal themselves as fairly fixed sequences in the acquisition of basic structures of the language" (Menyuk, 1972, p. 12). They can be attributed to maturation of the child's neurophysical and cognitive capabilities, functions of language, and the structure of the system he is learning. The individual variations (differences in rate and in level of analysis) are due to language experience and intelligence. Menyuk related both universal trends and individual variations to beginning reading:

> Both these factors, universal trends and individual variations, should be considered when planning for the child's acquisition of reading. The universal aspects indicate why and how a child goes about acquiring a language system. The individual variations may prescribe his level of competence at the time of school entrance or where he is "at" at the beginning of the reading acquisition process. (p. 13)

Lee (1974). Lee revised the Developmental Sentence
Scoring (Lee and Canter, 1971), using a reciprocal
averaging procedure to reweight the syntactical categories
(p. 227). The rank order of structures on the Reweighted
DSS are similar to the original version, but within
grammatical categories 32 of the 48 weightings were changed.
Like the original version, the Reweighted DSS scores eight
grammatical categories: indefinite pronouns and noun
modifiers, personal pronouns, main verbs, secondary verbs,
negatives, conjunctions, interrogative reversals, and wh-
questions. Within each category, specific forms are
weighted--a range of one through eight--according to order
of mastery by normal children.

In addition, Lee expanded her normative population to
include an additional 40 children in the age range from
two years to two years, eleven months. The total normative
group, with the additional 40 children, included 200 normal,
white, monolingual children from middle-class homes where
Standard English was spoken.

The average DSS sentence score for the population
studies showed a progressive, systematic increase from
3.73 for the two-year-old group to 10.94 for the six-
year-old group (p. 229). A "series of investigations of
the validity and reliability of the DSS procedure and its
reweighted scoring system strongly support its usefulness

as an objective measure of syntax development in children"
(Lee, 1974, p. 267), according to Roy Koenigsknecht.

Many of the studies reviewed in the preceding section
on sequence of syntax development also identified specific
structures that are difficult for young children to under-
stand. A few studies have been designed specifically to
test which of certain selected patterns are more difficult
to comprehend; these studies will be reviewed next.

Rystrom (1972). Rystrom listed intensifiers less
and quite in certain contexts, and than when it follows
a comparative form adjective (Are you taller than your
father?) among "vocabulary items frequently not understood
by primary children." Other researchers would seem to have
concluded that these are syntactic features rather than
vocabulary items. Also frequently not understood, according
to Rystrom, are several subordinating conjunctions,
particularly the conditionals: unless, since, while, whether
(with or not implied) and relative pronouns ending in -ever:
whatever, wherever, whoever, whichever.

Rystrom stated that primary children do not understand
sentences with a subordinate clause first, especially if
the clause is introduced by although, after, or before,
such as, "after I point to you, put your arms down." Nor
do primary children understand directions contained in two
or more sentences with the final sentence conditional upon

a previous sentence as in, "I want you to raise your arms
over your head; but before you do, walk to the door and
back." Rystrom observed that children usually responded
to this directive by raising their arms and then walking
to the door and back. He suggested two explanations:
(a) too much information and (b) understanding directions
in the order they are received. Rystrom's data and other
studies point toward the second possibility: children
carry out instructions in syntactic order rather than
semantic order (Rystrom, 1972, p. 151). Katz and Brent
(1968) observed a preference up to age eleven for the
linguistic order of clauses to mirror the actual order of
events.

Primary children typically do not understand sentences
in which one or more kernels are embedded and the sentence
becomes more difficult when in addition to one sentence
being embedded, the order of the elements within the kernel
is disrupted. Children frequently misunderstand this type
of "disjunctive embedding," according to Rystrom. He
suggested that teachers should be careful in giving
directions that use syntactic structures not understood by
children. Teachers may assume the child did not know an
answer when, in fact, he could not understand the directions
(Rystrom, 1972, p. 152). Brown (1971) made a similar
suggestion about the problems involved in giving directions,
based on his study of relative pronoun clauses.

Summary of Oral Language Studies

Language development research shows that a typical order for mastery of the syntactic features of language can be predicted. Furthermore, certain constructions are particularly difficult, even for upper elementary school children.

Center embeddings, multiple embeddings and deletions continue to be difficult past first grade. Conjunctions that imply logical relationships of condition, cause and effect, time, or discordance are among the more difficult forms.

Some researchers have suggested direct teaching of the more difficult constructions. Others have suggested a programming of instructional materials for beginning readers so that the materials reflect language development research findings. At any rate, there seems to be general agreement that oral language research has significant implications for beginning reading instruction.

Cognitive Development Theory Relevant to Syntax Development and Readability

The preceding section described a typical order for mastery of the syntactic features of language that varies in terms of age or rate that particular levels are achieved. Intelligence, socioeconomic status, and sex may also influence rate of mastery, but a universal sequence seems

70

to prevail. Moreover, research concerned with comprehension of specific syntactic structures repeatedly identifies certain features that are difficult for five- to seven-year-old children to comprehend in both oral and written language. There is some evidence that written language is more difficult because certain oral language characteristics, such as intonational cues, are missing.

The predictable sequence of language development is consistent with the cognitive development stages described by Jean Piaget. In fact, cognitive development may be a significant factor in the comprehension of certain syntactic patterns that have been identified as being mastered later than other patterns. These patterns state or imply a relationship that the child has not assimilated and therefore does not understand. Not only has he not acquired certain features of syntax, he is cognitively not able to master some of the features.

According to Piaget's theory, there is a major change in logical reasoning about age seven or eight that has important implications for those who are concerned with language development and with comprehension of oral and written language by first grade children. Until a child's cognitive development enables him to comprehend the relationship that a word signals, or the relationship implicit in a certain structure, it seems obvious that he

cannot comprehend the meaning of the sentence in which it occurs. Of course, the redundancy factor in certain passages, the pictures and the context, may allow him to correctly interpret meaning from other features. He may also produce similar constructions by repetition without understanding them. One commonly hears complaints that a child can "read the words perfectly, but does not understand a thing they say."

Kohlberg and Gilligan (1971) stated that early childhood programs for "disadvantaged" children fell short of expectations because they "confused specific teaching and learning with the development of new levels of thinking truly indicative of cognitive maturity" (p. 1056). Piaget (1964) and Jerome Bruner (1960, 1966) are representative of the cognitive theorists who maintain that to enhance, possibly speed up, transition to a higher cognitive level, a child should be given a rich environment of experiences at the cognitive stage he is in; the child himself will make the shift to the next higher stage. To offer stimuli at a higher level "as a challenge" serves only to frustrate the child. While he may imitate the vocabulary and perform rote manipulations, he can understand and apply his learning to new situations only after he reaches the appropriate cognitive level.

In the five- to seven-year-old period the child begins
a distinction between fantasy and reality. He develops
the ability to classify into categories, to arrange by
size or other ordering, to add and subtract, and to reverse
classes and relations--he moves into the period of concrete
operations. To say that such cognitive changes define
stages implies the following things, according to Kohlberg
and Gilligan (1971):

> (1) That young children's responses represent
> not mere ignorance or error, but rather a spontaneous
> manner of thinking about the world that is qualita-
> tively different from the way we adults think and yet
> has a structure of its own.

> (2) The notion of different developmental
> structures of thought implies consistency of level
> of response from task to task. If a child's response
> represents a general structure rather than a specific
> learning, then the child should demonstrate the same
> relative structural levels in a variety of tasks.

> (3) The concept of stage implies an invariance
> of sequence in development, a regularity of stepwise
> progression regardless of cultural teaching or
> circumstance. Cultural teaching and experience can
> speed up or slow down development, but it cannot
> change its order or sequence. (p. 1058)

Piaget defines three or four major developmental periods.
Because of the volume of his work and the time span it
covers, there is some variation, but, as the following
outlines show, the variation is in form rather than
substance.

> 1. Sensory motor period . . . birth to 2 years
>   Preoperational period . . . . .2 to 7 years
>   Concrete operational period . .2 to 11 years
>   Formal operational period . . 11 to 15 years

2. Sensorimotor period. . . . . 0 - 2 years
     Concrete operations. . . . .
        Preoperational subperiod . . . . . . 2 - 7 years
        Concrete operations subperiod. . . . 7 -11 years
     Formal operations. . . . . .11 -15 years
                                  (Phillips, 1969, p.11)

There are subdivisions within the periods and it must be
remembered that there is individual variation--the ages are
not absolute, but the sequence is predictable. Most first
grade children can be expected to be in the preoperational
period, moving into the concrete operations stage.

Certain characteristics of the preoperational child
may significantly influence his comprehension of particular
syntactic structures. The preoperational child is
egocentric (unable to take another person's point of view)
in his representations. He will talk about what he is
thinking and be surprised when he fails to communicate
because it never occurs to him that the listener may not be
thinking the same as he: "I want a red one for Teddy." Asked,
"A red what?" he replies impatiently, "Necktie!" although
neckties have not been mentioned in several hours with many
experiences and conversational topics intervening.

Centration, the tendency to center attention on one
detail of an event, inability to shift attention to other
aspects of a situation, is characteristic of the preopera-
tional child. This characteristic precludes his comprehending
syntactic structures such as reversals, negatives, discordant
conjunctions, and conditionals that require him

to keep in mind two or more elements in order to understand a sentence. The preoperational child also tends to "focus on the successive _states_ of a display rather than on the transformations by which one state is changed into another" (Phillips, 1969, p. 64). Given the task of drawing or selecting from multiple-choice the successive movements of a bar that falls from a vertical to a horizontal position, he commonly fails to draw the intermediate positions or even to recognize them when they are shown to him.

Concrete operations refers to the period when a child's logical thinking is dependent on some sort of concrete phenomena which he can manipulate and/or that is within his field of perception. The concept of concrete operations is particularly important to a consideration of language development and reading. Piaget distinguishes between a plane of action and a verbal plane. The child may be able to manipulate objects to show relationships, or he may be able to verbalize relationships as/after he manipulates concrete phenomena even though he is not able to verbalize or comprehend correctly the same relationship when he hears or sees only words.

From age seven to eleven, the child gradually acquires the ability to deduce that merely changing the shape of a ball of clay does not alter its substance, weight, or volume,

<u>provided</u> he is able to see and manipulate that which he is attempting to explain or justify.

> When, however, at the concrete level, thinking moves
> away from tangible reality, absent objects are re-
> placed by more or less vivid representations, which
> are tantamount to reality. If a child is asked to
> reason about simple hypotheses, presented verbally,
> he immediately loses ground and falls back upon the
> prelogical intuition of the preschool child. (Piaget,
> 1967, p. 62)

To Piaget, the verbal plane represents a new, altogether different reality to the concrete operational child.

> Language does not constitute a mere system of notation
> for the child. It creates in his mind a new reality
> --verbal reality which does not merely reflect the
> reality given in sensation, but is superimposed upon
> it. The child will admit on the verbal plane certain
> illogicalities which he would deny to concrete
> reality. (p. 83)

A lag exists between the concrete operational child's ability to invoke operations on the plane of action and his ability to invoke them on the plane of purely verbal thought, a lag which Piaget described as the "Law of Shifting" (meaning shifting an operation from the plane of action to that of language). Ginsburg and Opper (1969) summarized the idea:

> While children may fail a problem when its solution
> requires verbal expression, they may be quite able
> to deal with the same dilemma on a practical, behavioral
> level. However, when the child first solves problems
> on the plane of action, he must relearn his solutions
> on the plane of verbal thought. In a sense, action is
> more advanced than verbal thought (for the child from
> 7 to 11 years); the latter lags behind the former.
> (p. 113)

Karl (1971) analyzed selected works of Piaget in an attempt "to correlate Piaget's concept of logical maturity with the concept of syntactic maturity which has been reported by Hunt, O'Donnell, and others" (p.iii). Karl reported that:

> Piaget's study of . . . various connectives or conjunctions points to a definite developmental trend. That is, as the child's thinking abilities mature, there is a parallel maturation of his ability to use and understand, with increasing logical precision, these connectives. They become, in effect, a linguistic index of the growth of logical thought. (p. 147)

The connectives that Piaget found to be indicative of growth in logical thinking are (a) the because or since of logical justification, (b) the although of discordance, (c) the if . . . then of logical implication, and (d) the either. . . or of logical disjunction.

Some recent research has linked Piaget's concept of cognitive development with language and reading comprehension. O'Donnell et. al. (1967) observed the difficulty presented by the "antithetic" relationship signaled by but. Katz and Brent (1968) reported that children understand first causal, then temporal, then antithetic relationships. They also found that the "adversative" connectives but and although (Piaget called these conjunctions of discordance) present greater problems of mastery than the causal connective because. Moffett (1968) described an elementary school language arts curriculum which he based on Piaget's developmental theory.

Goodman (1970) studied "miscues" (errors) in children's oral reading. Calling reading "a psycholinguistic guessing game," Goodman observed the child's use of a variety of cues in a "selective, tentative, anticipatory process" and suggested that the child making errors may be reading what would fit his linguistic competency level at that time. That is, he is "translating" and reading what he would say rather than what is printed (p. 263).

Smart (1971) and Macomber (1972) attempted in a general way to parallel Piaget's stages and the developmental aspects involved in reading comprehension. Menyuk (1972) described a sequence in the mastery of conjunctions which parallels the child's understanding of logical relationships. Frostig (1973) pointed out that sentences involving causal relationships are among the most difficult for young children to use correctly, specifically:

> those that contain dependent clauses denoting causal relationships (I am happy because our team won"); exclusions (Everyone was happy except John"); and conditions ("If our team wins, will we be happy?"). As a rule, such sentences cannot be generated or transformed by children until they are seven and a half, eight or even nine years old. As Piaget points out, the ability to understand causal relationships does not generally develop before this age level. (pp. 228-229)

In summary, cognitive development theory--specifically Piaget's--offers some insight into growth in logical thinking that helps to explain why certain syntactic structures are difficult for primary children to understand. Piaget

·identified some of the same constructions as being most difficult to understand as did researchers in reading and oral language studies. Some recent researchers have derived specific implications for reading and language arts curriculum from Piaget's research.

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The following assumptions, drawn from the foregoing review of related research, prompted this study:

1. A child's oral language performance indicates what he can be expected to understand in written language.

2. Syntactic programming of reading textbooks to conform to the intended readers' oral language would produce more readable texts.

3. Transformational grammar provides a more powerful theory for analyzing syntactic complexity than other theories of grammar.

CHAPTER III

PROCEDURES

A number of studies have concluded that readability
can be partly determined by syntax and that a child's oral
repertoire indicates his probable comprehension level in
reading material. It was proposed in this study that
Developmental Sentence Scoring (DSS), a descriptor of the
syntax in the oral repertoire of young children, could be
used as an index of readability.

Samples from two first grade reading textbook series
were analyzed according to Lee's (1974) Developmental
Sentence Scoring procedure, using sample passages from the
textbooks in place of oral language samples. Scores for
the textbook samples were compared to the oral language
data Lee reported for first-grade age children. The two
series were compared with each other and scores for samples
from second and third grade levels of the same series were
used with the first grade samples to assess progression of
difficulty within the series.

The specific questions which the study was designed to
answer are presented below. Following this, the sample
sources, sample selection, the DSS as an analysis procedure,
and the scoring and analysis procedure will be discussed.

Questions to be Investigated

This study was designed to answer the following questions:

1. Is the beginning of Series A comparable to the oral language of first graders as measured by DSS?

2. Is the first grade level of Series A as a whole comparable to the oral language of first graders?

3. Is the beginning of Series B comparable to the oral language of beginning first graders?

4. Is the first grade level of Series B as a whole comparable to the oral language of first graders?

5. Is Series B easier (i.e., lower DSS scores) than Series A: (a) as a whole, (b) the beginning of Series B compared to the beginning of Series A, and (c) the end of Series B compared to the end of Series A?

6. Since "Starter Concept Cards" are included in the adopted materials for Series B and one might assume a delay in introducing children to the textbooks, are the first grade level books in Series B easier than the last two books of first grade level in Series A?

7. Is the first second-grade sample from Series B easier than the first second-grade sample from Series A?

8. Is the last third-grade sample from Series B easier than the last third-grade sample from Series A?

9. Is there a predictable progression of difficulty within Series A as shown by systematically increasing DSS scores?

10. Is there a predictable progression of difficulty within Series B as shown by systematically increasing DSS scores?

Sample Sources

The primary levels (grades 1-3) of two series of basal reading textbooks were selected from North Carolina State Adopted Textbooks (1974) for the 1974-1975 school year. The books from which samples were taken are listed by title, publisher, and assigned grade level in the Appendix.

The Macmillan Reading Program Series (Series A in this study) is a traditional basal reading series intended for the average child. Excluding workbooks, spirit masters, and other supplementary materials offered by the publisher, but not on the adoption list, Macmillan provides for children's use at first grade level: three paperback preprimers (these were treated as one book in this study), one hardbound primer and one hardbound first reader. There are two second-grade and two third-grade level books.

The Open Highways Series (Series B in this study) is designated by the publisher as a "diagnostic and developmental" program for the child who is having or may be expected to have difficulty learning to read--the "slow

starter." At first grade level there are "Starter Concept Cards" on the adoption list for teachers' use. There are two hardbound books each for first, second, and third grade.

Sample Selection

Samples were taken from the beginning and end of each book (with Macmillan's three preprimers counted as one book) to yield ten samples for first grade. In addition, four samples were taken from the second and third grade levels of each series for a total of eighteen samples in all.

Sample	1	Beginning of Preprimers	Series A
Sample	2	End of Preprimers	Series A
Sample	3	Beginning of Primer	Series A
Sample	4	End of Primer	Series A
Sample	5	Beginning of First Reader	Series A
Sample	6	End of First Reader	Series A
Sample	7	Beginning of Book 2.1	Series A
Sample	8	End of Book 2.2	Series A
Sample	9	Beginning of Book 3.1	Series A
Sample	10	End of Book 3.2	Series A
Sample	11	Beginning of Book 1, Part 1	Series B
Sample	12	End of Book 1, Part 1	Series B
Sample	13	Beginning of Book 1, Part 2	Series B
Sample	14	End of Book 1, Part 2	Series B
Sample	15	Beginning of Book 2, Part 1	Series B
Sample	16	End of Book 2, Part 2	Series B
Sample	17	Beginning of Book 3, Part 1	Series B
Sample	18	End of Book 3, Part 2	Series B

In selecting the samples to be scored, the following procedure was used:

1. For each sample, a number from one through ten was randomly selected.

2. For samples from the beginning of a book, the first content page was located--a page on which there was a

sentence to be read by or to the child. After counting forward the number of pages indicated by the number selected, the sample was begun at that point. For example, if the number 5 were selected for Sample 1, and the first content page in the book for Sample 1 were page 3, one would count forward to the fifth page from page 3 (counting it as 1) and begin the sample on page 7. In the event no sentence occurred on page 7, the sample would begin with the first sentence after page 7.

3. For samples from the end of a book, the randomly selected number indicated the number of pages to count back toward the center of the book. For example, if the number 5 were selected for sample 2, and the last content page were page 222, one would count back to the fifth page from 222 (page 218). The last sentence on page 218 in this instance would be the last sentence in Sample 2. To locate the beginning point of the sample would require counting back an additional 50 sentences toward the center of the book.

4. When the starting point of the sample had been determined in the way described above, the next 50 sentences comprised the sample.

For DSS purposes, a sentence is defined as at least a noun (or noun substitute) and verb in subject-predicate relationship. Imperative interjections (look, see, etc.)

and "sentence tags" (you know, I think, etc.) are counted
as separate, complete sentences. Lee's (1974, pp. 57-81)
directions for taking a language sample were followed as
closely as possible in selecting and transcribing textbook
samples for this study. Identical sentences were omitted.
Non-sentence labels and story titles were omitted. Story
titles and picture captions were included if they were
sentences. Glossary entries and other "helps" were
omitted.

DSS as an Analysis Procedure

Lee (1971, 1974) used the accepted sequence of oral
language development within the theoretical framework of
transformational grammar to devise a scale of syntax
acquisition which could serve as a criterion for evaluating
the development of children enrolled in a speech clinic.
The scale also was intended to provide guidelines for
systematically introducing more complex structures to clinic
patients. The DSS is an accepted evaluation instrument
for clinical speech practice. It is based on the
spontaneous speech performance of normal, middle-class
children who speak Standard English.

The first version of the DSS (Lee and Canter, 1971)
projected a developmental sequence that was based on reports
of children's language learning and on observation of
children in the Northwestern University Speech and Language

Clinic. A reciprocal averaging procedure was used later
"to determine whether the developmental order of structures
in each grammatical category in the first DSS version was
verified by computer analysis of . . . 200 speech samples
of normally developing children" (Lee, 1974, pp. 132-133).
According to Koenigsknecht, "the validity of the DSS
construct was indicated by the confirmation of the
grammatical hierarchies in the reciprocal averaging
procedure" (Lee, 1974, p. 228). As a result of the
reciprocal averaging, assigned weights within categories
(not rank order) were adjusted so that comparisons by
numbers could be made across categories.

The subject group used in establishing the normative
data base for the DSS consisted of 200 normally developing
children between the ages of two years and six years,
eleven months. All subjects were from monolingual homes
where Standard English was spoken. All except three came
from middle-income families as judged by using the seven-
point Warner scale for rating fathers' occupations.
The children included in the study exhibited no unusual
developmental or social histories, no hearing-sensitivity
problems, and no discernible behavior problems. Only
children who scored within one standard deviation from
the mean score for their age level on the Peabody Picture
Vocabulary Test were included (a modified procedure for the
PPVT was used with two-year-olds) (Lee, 1974, pp. 222-225).

In the DSS procedure, eight grammatical categories are scored: indefinite pronouns and noun modifiers, personal pronouns, main verbs, secondary verbs, negatives, conjunctions, interrogative reversals, and wh-questions. There is a downward progression within each category. Specific structures are assigned a numerical value from one to eight according to sequence of mastery. The numerical values (scores) are comparable across categories. That is, an item which scores 3 in the personal pronoun category is comparable to a secondary verb or conjunction that scores 3 in that all items receiving the same score emerge in speech at about the same time and are assumed to be comparable in difficulty. The chart of DSS reweighted scores, reproduced as Figure 2, shows the assigned values in each category.

To avoid making the DSS so cumbersome that it would not be useful for clinical practice, Lee grouped some related structures. For example, the developmental sequence in mastery of passive forms is not evident in the scoring since all passives receive the same score of seven (Lee, 1974, p. 146). Lee acknowledged such concessions to practicality and, to compensate for them, she specified that a "sentence point" be added to the score of a sentence if it is in all ways correct according to adult standard dialect.

	NOUN MODIFIERS	PRONOUNS	MAIN VERBS	SECONDARY VERBS	NEGATIVES	CONJUNCTIONS	INTERROGATIVE REVERSALS	WH-QUESTIONS
1	it, this, that	1st and 2nd person: I, me, my, mine, you, your(s)	A. Uninflected verb: I see you. B. copula, is or 's: It's red. C. is + verb + ing: He is coming.		it, this, that + copula or auxiliary is, 's, + not: It's not mine. This is not a dog. That is not moving.		Reversal of copula: Isn't it red? Were they there?	
2		3rd person: he, him, his, she, her, hers	A. -s and -ed: plays, played B. irregular past: ate, saw C. Copula: am, are, was, were D. Auxiliary am, are, was, were	Five early-developing infinitives: I wanna see (want to see) I'm gonna see (going to see) I gotta see (got to see) Lemme [to] see (let me [to] see) Let's [to] play (let [us to] play)				A. who, what, what + noun: Who am I? What is he eating? What book are you reading? B. where, how many, how much, what . . . do, what . . . for: Where did it go? How much do you want? What is he doing? What is a hammer for?
3	A. no, some, more, all, lot(s), one(s), two (etc.), other(s), another B. something, somebody, someone	A. Plurals: we, us, our(s), they, them, their B. these, those		Non-complementing infinitives: I stopped to play I'm afraid to look It's hard to do that.		and		
4	nothing, nobody, none, no one		A. can, will, may + verb: may go B. Obligatory do + verb: don't go C. Emphatic do + verb: I do see.	Participle, present or past: I see a boy running. I found the toy broken.	can't, don't		Reversal of auxiliary be: Is he coming? Isn't he coming? Was he going? Wasn't he going?	
5		Reflexives: myself, yourself, himself, herself, itself, themselves		A. Early infinitival complements with differing subjects in kernels: I want you to come. Let him [to] see. B. Later infinitival complements: I had to go. I told him to go. I tried to go. He ought to go. C. Obligatory deletions: Make it [to] go I'd better [to] go D. Infinitive with wh-word: I know what to get. I know how to do it.	isn't, won't	A. but B. so, and so, so that C. or, if		when, how, how + adjective: When shall I come? How do you do it? How big is it?
6		A. Wh-pronouns: who, which, whose, whom, what, that, how many, how much: I know who came. That's what I said. B. Wh-word + infinitive: I know what to do. I know who(m) to take.	A. could, would, should, might + verb: might come, could be B. Obligatory does, did + verb C. Emphatic does, did + verb			because	A. Obligatory do, does, did: Do they run? Does it bite? Didn't it hurt? B. Reversal of modal: Can you play? Won't it hurt? Shall I sit down? C. Tag question: It's fun, isn't it? It isn't fun, is it?	why, what if, how come, how about + gerund: Why are you crying? What if I won't do it? How come he is crying? How about coming with me?
7	A. any, anything, anybody, anyone B. every, everything, everybody, everyone C. both, few, many, each, several, most, least, much, next, first, last, second (etc.)	(his) own, one, oneself, whichever, whoever, whatever: Take whatever you like.	A. Passive with get, any tense: Passive with be, any tense B. must, shall + verb: must come C. have + verb + en: I've eaten D. have got: I've got it.	Passive infinitival complement: With get: I have to get dressed. I don't want to get hurt. With be: I want to be locked. It's going to be locked.	All other negatives: A. Uncontracted negatives: I can not go. He has not gone. B. Pronoun-auxiliary or pronoun-copula contraction: I'm not coming. He's not here. C. Auxiliary-negative or copula-negative contraction: He wasn't going. He hasn't been seen. It couldn't be mine. They aren't big.			
8			A. have been + verb + ing: had been + verb + ing B. modal + have + verb + en: may have eaten C. modal + be + verb + ing: could be playing D. Other auxiliary combinations: should have been sleeping	Gerund: Swinging is fun. I like fishing. He started laughing.		A. where, when, how, while, whether (or not), till, until, unless, since, before, after, for, as, as if, + adjective + as, as if, like, that, than: I know where you are. Don't come till I call. B. Obligatory deletions: I run faster than you [run]. I'm as big as a man [is big]. It looks like a dog [looks]. C. Elliptical deletions (score 0): That's why [I took it]. I know how [I can do it]. D. Wh-words + infinitive: I know how to do it. I know where to go.	A. Reversal of auxiliary have: Has he seen you? B. Reversal with two or three auxiliaries: Has he been eating? Couldn't he have waited? Could he have been crying? Wouldn't he have been going?	whose, which, which + noun: Whose car is that? Which book do you want?

Figure 2. The Developmental Sentence Scoring (DSS) Reweighted Scores. (From *Developmental Sentence Analysis* by Laura Lee, 1974, 134-135. Reprinted by permission of the author and Northwestern University Press.)

The score for a particular item is determined by the context in which it occurs. Lee cautioned that one "should bear in mind that he is evaluating grammatical development, not individual words. He should analyze a sentence, not word by word, but construction by construction" (p. 146).

The DSS score is the mean of the 50 sentence scores within a sample. The specific structures within each sentence are scored. The scores recorded for each item within a sentence are totaled, including a sentence point if the entire sentence is correct, to arrive at an individual sentence score. The sentence scores within a sample are summed and the total divided by 50 (N = 50), to determine the DSS score for the sample.

Several features of the DSS recommend it as a measure of readability for first grade textbooks: (a) it is based on normative data from preschool and first grade children; (b) the theoretical framework is transformational grammar; (c) the middle-class, Standard English is comparable to textbook language; and (d) the instrument has been validated in clinical experience. Reading research since Strickland's (1962) study has established ample precedent for using the same measure for both oral and written language analysis. However, one must bear in mind that the DSS was developed from oral language data for use in evaluating oral language

performance. It measures grammatical structure in expressive language, whereas reading involves comprehension, or receptive language. Research studies have presented compelling evidence that a child's expressive language is a valid indicator of what he can be expected to comprehend in written language. Even so, some adjustments must be made in applying an oral language measure to written materials.

Printed materials lack the intonational cues that determine sentence segmentation and, to some extent, meaning in oral language. Punctuation and natural reading rhythm must be substituted for intonation in written materials. In the present study, terminal punctuation was used to determine ends of sentences with the following exception:

1. Exclamation marks appear frequently in beginning reading materials. In many instances it was obvious from capitalization and other features of the text that the exclamatory remark should be separated from the remainder of the line and recorded as a separate sentence. When there was some doubt, a conservative segmentation was followed. For example, Look! Eddie can read was recorded and scored as two separate sentences.

2. Poetry and song lyrics presented some questions about sentence termination. An attempt was made to follow

natural reading and speaking rhythm in segmentation and
to follow Lee's directions as nearly as possible. The
following example (More Power, Scott Foresman, p. 11) was
taken from Sample 15.

Text:

> Elephants work
> and elephants play
> and elephants walk
> and feel so gay.
>
> And when they walk--
> It never fails
> They're holding hands
> By holding tails.

Segmentation for scoring:

> 1. Elephants work and elephants play.
> 2. (And) elephants walk and feel so gay.
> 3. (And) when they walk--it never fails.
> 4. They're holding hands by holding tails.

The break in the first sentence of the text above was
dictated by Lee's directives concerning the conjunction
and. Young children tend to string together independent
clauses with and, producing very long sentences. DSS allows
only one and per sentence between independent clauses; the
next one is written as the first word in another sentence
and enclosed in parentheses to show that it is not to be
scored (Lee, 1974, pp. 74-76). With no conjunction to
justify combining the third and fourth sentences for scoring,
they were separated as shown above.

As was pointed out earlier, DSS evaluates grammatical constructions, which involves some differences in interpretation and, therefore, some variation in scoring. DSS was developed by a professor of speech and language pathology to be used by clinicians in evaluating language development. One can assume a degree of common background and familiarity with the language development sequence between the one who developed the DSS procedure and its intended users. When Lee stated, for example, that "there may be other uses of negation which have not yet appeared in our data, and in such cases the clinician is invited to use his own judgment about scoring" (p. 154), it would seem reasonable to expect that because of his training and experience, a speech clinician would recognize where a construction should fall developmentally, compared to others on the scale. In this study, a speech and language pathologist scored selected samples and contributed guidance in making some arbitrary decisions about scoring in the process of adapting DSS for use with written materials.

In the sentence, <u>She didn't pay much, 'cause he wasn't very big</u>, the intended conjunction <u>because</u> is clearly indicated by the apostrophe. The abbreviated form was used in song lyrics where the additional syllable would have interrupted the rhythm. In this case, '<u>cause</u> was assigned a score of 6.

Wh-words used as adjectives, e.g., did not know which
way to go, in what class he belonged, were not scored.
This would seem to be a departure from DSS procedure (Lee,
1974, p. 142). However, the first example above is
comparable to did not know the way to go. The second
example is a form children would not use. The pathologist
felt that a score of 6 (personal pronoun category) for
wh-words used as adjectives was not consistent with the
rest of the category. Lee (1974) cautioned that wh-pronouns
must be analyzed carefully:

> Wh-pronouns introduce further syntactic complexi-
> ties such as the relative clause and the wh-pronoun
> with infinitive, and a score of 6 is given for
> these constructions. The two wh-pronouns, who
> and what, appear first in children's speech in
> wh-questions, and the clinician must be careful
> not to confuse their various syntactic uses.
> Words such as who, what, and that have multiple
> grammatical functions and each sentence must be
> closely analyzed to give each construction its
> proper score. (p. 141)

The decision not to score wh-words used as adjectives was
consistent with the practice of scoring questionable items
conservatively. Only four examples of the construction
appeared in the textbook samples, not enough to distort
DSS scores.

Scoring and Analysis

Each of the 18 textbook samples was randomly assigned
a number from 1 to 18 with no grade level, book title, or
other identifying information. After all scoring had been

completed, the samples were matched with book content and again numbered in the sequence shown on page 82. The textbook samples were scored according to the procedure described by Laura Lee in her book, <u>Developmental Sentence Analysis</u> (1974), with the adjustments described in the preceding section.

The reliability of the investigator's scoring was checked in two ways:

1. After all samples had been scored once, another person randomly selected six samples to be rescored by the investigator, independent of the first scoring.

2. A speech and language pathologist, proficient in the use of DSS, randomly selected and scored six of the eighteen samples. A sample scoring sheet may be found in the Appendix.

Scores for the rescored samples and for the samples scored by the pathologist were compared with the original scores for each sample. Differences were reconciled and questions of interpretation agreed upon, drawing on Lee's data and discussion and the pathologist's experience. Whenever doubt remained about the proper scoring of a particular item, it was scored conservatively.

After all items within the sentences had been scored, the scores for each sentence were summed and the total divided by 50 to arrive at the sample score. The results of the scoring and analysis will be presented in chapter IV.

CHAPTER IV

RESULTS AND DISCUSSION

Eighteen content samples from two primary reading
series were analyzed to determine whether the textbook
content is syntactically comparable to the oral language
of first grade children. Samples were taken from the
beginning and end of each book at the first grade level
and from the beginning and end of second and third grade
levels of each series.

The samples were scored according to Lee's (1974)
Developmental Sentence Scoring procedure for evaluating
oral language. The scoring was verified by a speech and
language pathologist. Differences in scoring and inter-
pretation of procedure were reconciled and agreed upon,
with a conservative decision accepted whenever arbitrary
decisions had to be made. The scoring and analysis of
the 18 textbook samples provided the data which is
presented in this chapter.

Comparison of Textbook and
Oral Language Samples

Three considerations for this study were specified.
Subsequently, ten questions were posed for investigation.
The first part of the problem to be considered and the

first four questions deal with whether the language of the textbooks examined is comparable to the language of their intended readers.

Tables 2 and 3 present the DSS score for each of the samples in the study. The DSS score is the mean of the 50 sentence scores in each sample. The individual sentence scores were obtained by totaling the scores in the eight grammatical categories of the DSS for a given sentence.

North Carolina first graders (public schools) must be six years old on or before October 15, of the year they enter first grade, which means that the age range within a first grade class at the beginning of the school year (late August) is five years, ten months to six years, ten months. Therefore, the data from the two oldest groups in Lee's (1974) study were used for comparison: (a) 40 subjects, ages five years to five years, eleven months, and (b) 40 subjects, ages six years to six years, eleven months. Table 4 shows the range of individual scores (i.e., an individual child's DSS score, which is the mean sentence score for a 50 sentence sample) and the mean DSS score for each age group (Lee, 1974, p. 230).

Lee (1974) reported a systematic increase in DSS scores for oral language with increasing age.

> The over-all DSS measure, or average DSS sentence
> score, displayed a quantifiable and progressive

Table 2

Developmental Sentence Scores (DSS)

for Textbook Samples, Series A

Samples	Level	Beginning or End	DSS
1	Preprimers	Beginning	6.08
2	Preprimers	End	6.56
3	Primer	Beginning	7.44
4	Primer	End	9.18
5	First Reader	Beginning	8.34
6	First Reader	End	13.46
7	Second Grade (2.1)	Beginning	10.84
8	Second Grade (2.2)	End	12.10
9	Third Grade (3.1)	Beginning	14.32
10	Third Grade (3.2)	End	15.30

Note. Samples 1-6 are all first grade level.

Table 3

Developmental Sentence Scores (DSS)

for Textbook Samples, Series B

Samples	Level	Beginning or End	DSS
11	Book 1, Part 1	Beginning	5.84
12	Book 1, Part 1	End	7.68
13	Book 1, Part 2	Beginning	8.00
14	Book 1, Part 2	End	8.12
15	Second Grade (2.1)	Beginning	9.64
16	Second Grade (2.2)	End	8.74
17	Third Grade (3.1)	Beginning	9.74
18	Third Grade (3.2)	End	8.34

Note. Samples 11-14 are all first grade level.

Table 4

Range and Mean Developmental Sentence Scores (DSS)

for Oral Language Samples

Age Group	n	Range	Mean DSS
5-0 to 5-11	40	6.04-13.40	9.19
6-0 to 6-11	40	6.64-15.84	10.94

Note. The data in this table are from Lee, 1974.

increase in syntactic development throughout the
2-0- to 6-11-year age period. The mean DSS score,
boys and girls combined, progressed from 3.73 for
the two-year-old group to 10.94 for the six-year-
old group. (p. 229)

A comparison of Tables 2 and 3 with Table 4 shows

the DSS scores for all first grade textbook samples from

both series to be lower than the mean scores for Lee's

five- and six-year-old subjects, with the exception of

one sample from Series A. The ranges for first grade

samples--6.08 to 13.46 for Series A, 5.84 to 8.12 for

Series B--are well within the range Lee reported for six-

year-olds. Series B is lower than the range Lee reported

for five-year-olds, and Series A is quite close to the

five-year-old range even though the textbook samples

included 50 sentence points each, whereas Lee's samples

probably included fewer sentence points.

In terms of over-all DSS scores, the content of the

textbooks examined does appear to be syntactically com-

parable to the oral language of first graders, with the

possible exeption of the last part of one book. Questions

one through four were, therefore, answered affirmatively.

The exceptional sample is discussed in the section on

progression of difficulty.

Comparison of DSS Scores
for Two Textbook Series

A comparison of the range of first grade scores for Series A and Series B shows Series B to be easier, with less increase in the scores from beginning to end of first grade. For Series A, a range of 6.08 to 13.46 is an increase of 7.38, whereas the 5.84 to 8.12 range of Series B scores is an increase of only 2.28 in first grade. Tables 2 and 3 show the scores for each of the first grade samples in Series B to be lower than comparable scores for Series A. The same holds true for the second and third grade samples.

Questions five through eight were answered affirmatively. Series B, intended for "slow starters" who may have difficulty with reading, is syntactically easier (i.e., has lower DSS scores) and progresses more slowly than Series A, which is designed for the average child. However, the relationship between the two series is not consistent. The size of the difference does not remain constant for the three grades, nor is there a consistently increasing difference, which should be apparent if Series B progresses more slowly, as the scores indicate. The relationship between scores for Series A and Series B at the beginning and end of first, second, and third grade respectively is illustrated graphically in Figure 3. The erratic pattern of the relationship is discussed further in the section on progression of difficulty.
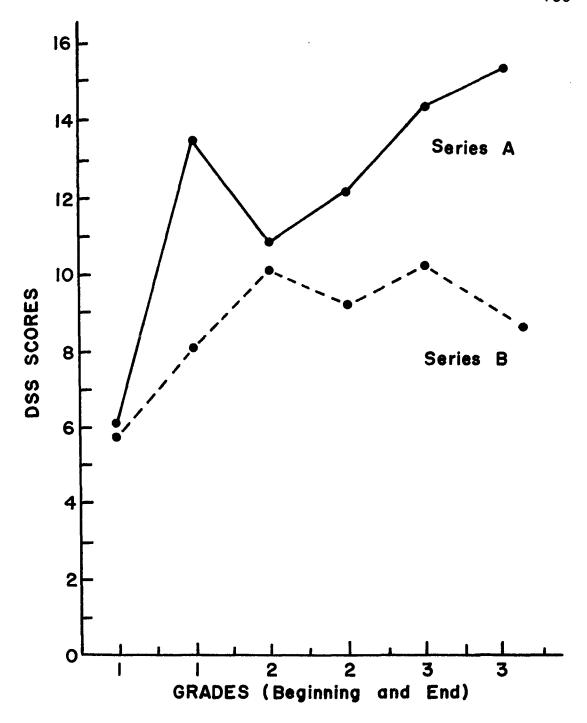
Figure 3. Relationship between scores for Series A and Series B.

Progression of Difficulty

The third area, and questions nine and ten, were concerned with the progression of difficulty--the syntactic programming--within each series examined. The answers to these last two questions were not as obvious as answers to the first eight were.

Overall Scores

At first glance, sample scores appear to follow a general progression, interrupted by one high score in Series A and relatively small digressions in Series B. Internal data reveals much greater inconsistency than the overall scores indicate.

Series A. Looking first at the sample scores in Series A, the scores progress systematically, with increasing scores and increasing differences between scores, through Sample 4, the end of the primers. Sample 5, the beginning of the first reader, is somewhat easier than Sample 4, but only by a difference of - .84 compared to + 1.74 between Samples 3 and 4. The drop might be explained in terms of reviewing at the beginning of a new book. However, a similar drop was not observed at the beginning of preceding books, nor is a decrease evident between Samples 8 and 9, even though Sample 9 represents the beginning of another grade level as well as the beginning of a new book. In other words, if the drop from Sample 4 to Sample 5

is explained in terms of review, the practice of reviewing
at the beginning of a new book is not followed consistently
in the series.

Samples 7-10, the second and third grade samples,
also show a progressive increase in DSS scores. Only
Samples 5 and 6 from the first reader interrupt the
progressive increase of sample scores for Series A.

On the basis of overall scores alone one might
conclude that one book, the first reader, is misplaced
in Series A and that otherwise an orderly, systematic
progression of difficulty prevails. Nevertheless, exam-
ination of the data within each sample shows that conclusion
to be questionable at best. The data will be analyzed in
more detail later in this section.

Series B. Within the first grade level, Samples 11-14,
Series B exhibits an apparent progression of difficulty in
progressively increasing sample scores; yet the size of the
difference between samples decreases from + 1.84 between
Samples 11 and 12 to + .12 between Samples 13 and 14.
Although the variance between samples is not large, it
takes on added significance when one remembers that Series B
is intended for children who have difficulty with reading.
For them, a greater increase within the first book than
from the first book to the second and third could be a
serious obstacle to success in learning to read.

The scores for samples from second and third grade books in Series B do not show a predictable progression of difficulty. In fact, the sample scores from the end of second and third grade are easier than the comparable beginning scores. However, the amount of variance again is relatively small and might be compensated for by pictures and other features of format.

The publisher's promotional materials describe Series B as a "diagnostic and <u>developmental</u> /italics added/ program." The publisher's Research and Information Supervisor[1] stated that "reading strategies are retaught <u>at each successive level</u> when necessary, and appealing new content, <u>of slightly greater difficulty</u> /italics added/ continually extends their reading accomplishments." DSS scores do not support the publisher's claim for Series B.

Individual Sentence Scores Within Samples

A distribution of individual sentence scores is included in the Appendix (Figure 6). Since the DSS score is the mean of the 50 sentence scores within a sample, one or two very high scoring sentences could significantly influence the score of any sample. It would seem appropriate to examine individual sentence scores to determine whether a few high scoring sentences account for the uneven progression in the mean sample scores. (See Appendix, Figure 7.)

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[1]Simpson, C. J., Personal Communication, October, 1974.

Series A. With the exception of Samples 3 and 8,
the highest individual sentence scores for samples in
Series A increase progressively from 13 in Sample 1 to
48 in Sample 10. Maverick high scoring sentences do not
account for the high DSS score in Sample 6. A more even
distribution over the range of sentence scores, with fewer
low scoring sentences does distinguish Sample 6 from
preceding samples in Series A. As Figure 4 illustrates,
Sample 6 displays a higher tendency early in the distribution
of sentence scores. To be consistent with the whole numbers
in the highest and lowest sentence scores, the "median
sentence score" represented in Figure 4 (and in Figure 5
for Series B) is the score for the 25th sentence in the
distribution (circled on the distributions in the Appendix),
not a computed median.

Sample 10, which appears in the sample scores to
represent a very nice upper limit in the progression of
scores for Series A, includes one very high maverick
score and seven others that are separated from the rest
of the distribution by at least four points. Consequently,
Sample 10 as a whole may not fit into a progression of
difficulty as well as sample mean scores seem to indicate.

The distribution of sentence scores for Series A,
Samples 1-10, shows a variety of scores within samples
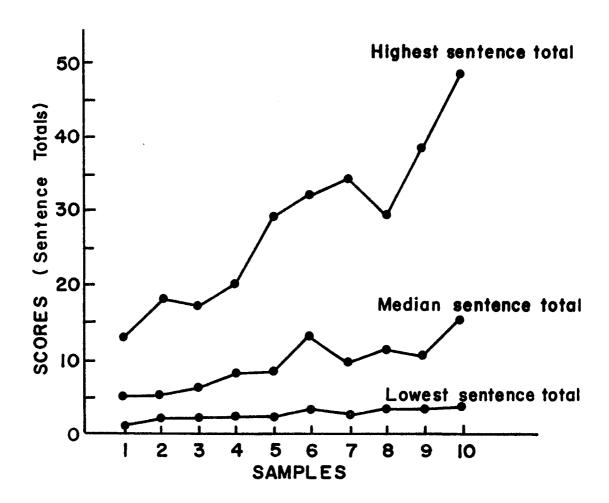and little evidence of orderly progression toward higher

Figure 4. Lowest, median, and highest individual sentence totals, Series A.
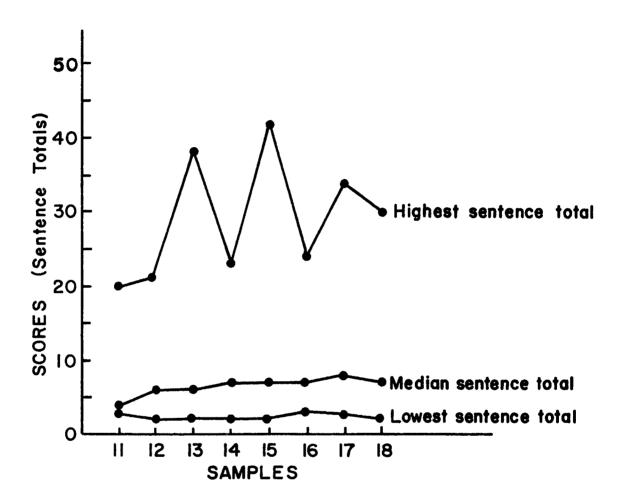
Figure 5. Lowest, median, and highest individual sentence totals, Series B.

scoring sentences. For example, in Sample 1, the greatest number of sentences score 4 and 5, whereas Sample 2 clusters at 2 and 3, and Sample 7 exhibits a bi-modal tendency, with scores of 3 and 9 occurring most frequently.

Series B. Compared to Series A, Series B samples include more low scoring sentences--almost half the sentence scores in Sample 11 are 3--but a wider range, with a few sentences scoring very high compared to the rest of the sample. No predictable progression is evident in the upper limits of the sentence score ranges, as Figure 5 illustrates.

Both series include some samples with high scoring sentences that seem inconsistent with the sample as a whole. Unless special provisions are made for introducing the readers to the more difficult sentences and explaining their meaning prior to reading the passage (something similar to what is done with unusual words), the variation in syntactic difficulty within a 50 sentence sample is totally incompatible with the programming in vocabulary and sentence length that is commonly accepted for primary reading materials.

Inspection of the frequency distributions reveals no more than three sentences in a given sample in Series B with higher scores than the highest score in the comparable Series A sample. In other words, a very limited number of

sentences account for the higher upper limits of sentence
scores in Series B. Nevertheless, including those few
very high sentences in a sample seems particularly inappro-
priate in Series B. The sentence score distributions and
Figures 4 and 5 show more high scoring sentences in first
grade samples from Series B than from Series A.

High Scoring Items

The Developmental Sentence Scoring chart (Figure 2)
projects a vertical development across categories. That is,
all items, regardless of category, that score the same
emerge in speech at about the same time. If a textbook
series is programmed syntactically according to the sequence
of syntactic development in oral language, sample passages
from succeeding grade levels in the series should include
increasingly more high scoring items. To determine whether
this is true of the textbooks examined in this study, a
comparison of total high scoring items in each sample
(Table 5) and scattergrams of item occurrence in each sample
were made. Using a midpoint of the scoring scale--between
scores 4 and 5--to establish a line for comparison, scores
of 5 and above were called "high." As Table 5 shows,
neither series follows an orderly progression in the increase
of items scoring higher than 4, although Series B does in
first grade level samples. The scattergrams in Figure 7
(Appendix) show the occurrence of specific items within
each sample.

Table 5

High Scoring Items in Series A and B

	Series		
	A		B
Samples	Total Items Scored Over 4	Samples	Total Items Scored Over 4
1	1	11	7
2	14	12	10
3	5	13	16
4	24	14	19
5	20	15	24
6	49	16	10
7	26	17	26
8	36	18	18
9	58		
10	51		

Series A. Sample 1, from the beginning of the preprimers, includes only one item scored higher than 4, an interrogative reversal which was scored 6. Sample 2, from the end of the preprimers, had an overall sample score less than a point higher than Sample 1, yet Sample 2 includes 14 items scored higher than 4, and five interrogative reversals scored 6.

Comparing Sample 5, with 20 high scoring items and Sample 6, with 49 high scoring items, discloses an increase from 3 to 7 in main verbs that score 6. Both samples contain 2 verbs that score 7. Sample 6 includes 4 indefinite pronouns that score 7, the first occurrence of a score higher than 3 in this category for Series A. Sample 6 includes 8 negatives that score 7, compared to 1 in Sample 5, and 8 conjunctions that score 8, compared to 0 in Sample 5.

Series B. The high scoring items do show systematic increases in Series B with the exception of Samples 16 and 18. Samples 15 and 16 represent the beginning and end of second grade in Series B, Samples 17 and 18 the beginning and end of third grade. In the section on overall scores, these same four samples were identified as reversing the progression (i.e., sample from the end of the grade easier than beginning sample). The same pattern prevails in the occurrence of high scoring items: Sample 15, beginning of

second grade, includes 24 high scoring items; Sample 16,
the end of second grade, has 10; the third grade samples,
beginning and end, include 26 and 18 items respectively
that score higher than 4.

The three secondary verbs scoring 8 that appear in
Sample 11, the beginning of the first book in Series B,
are indicative of the inconsistent programming of items
in that series. In Samples 12 through 18, the remainder
of Series B, one finds the following occurrence of secondary
verbs that score 8:

<div align="center">

0 in Sample 12

1 in Sample 13

3 in Sample 14

1 in Sample 15

1 in Sample 16

0 in Sample 17

1 in Sample 18

</div>

Series B samples include noticeably fewer negatives,
interrogative reversals, and wh-questions than Series A.
However, Lee's (1974) data showed negatives and interrogative
reversals to be among the least discriminating categories of
the DSS for five- and six-year-olds. Wh-questions were
fourth in a rank order tabulation of the discriminate
function analyses for five- and six-year-olds (p. 237).

Conjunctions

Lee (1974) identified conjunctions, main verbs, and secondary verbs as the three most discriminating categories of the DSS for five- and six-year-olds.

> In comparisons of the performance of four- and five-year age groups the Indefinite Pronoun-Noun Modifier, Main Verb, and Conjunction categories continued to reveal an age effect. A significant difference was also found on the Interrogative Reversal category in this age comparison. There was a sharp drop in the Interrogative Reversal mean weighted developmental score of the older group. The six-year-old children also scored significantly higher on the Main Verb and Conjunction categories than the five-year-old children. They scored, in addition, significantly higher on the Secondary Verb category and significantly lower on the Wh-Question category. Across all age groupings, children scored significantly higher on the very important Main Verb and Conjunction categories at each successive age level. (p. 235)

Conjunctions have been identified as being significant in determining comprehensibility of reading materials also. Studies in readability, language development, and cognitive development identified conjunctions as "later developing" constructions, with the exception of and, and as causing difficulty because of the relationships implied in sentences that include conjunctions other than and.[1]

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[1]Conjunctions that imply temporal, spatial, conditional, causal, or antithetical relationships have been found to be more difficult than the coordinate conjunction and, for example: If it's raining, stay indoors (conditional), We will play when we finish this (temporal), He took the award although he did not earn it (antithetical).

DSS scores _and_ at 3 because it appears in language development later than some other structures, such as singular pronouns and uninflected verbs. _But_, _so_, _and so_, _so that_, _or_, and _if_ score 5; _because_ scores 6. All other conjunctions score 8, a ranking which seems consistent with research findings (Piaget, 1964; Hunt, 1965; Robertson, 1968; Stoodt, 1972).

A tabulation of the conjunctions in the textbook samples for this study (Table 6), reveals that Series B includes considerably fewer high scoring conjunctions than Series A. Series A apparently exercises little control over the occurrence and progression of conjunctions. In the samples from first grade materials, three conjunctions that score 8 were recorded in Sample 4. Except for those three in Sample 4, _and_ is the only conjunction that occurs in Samples 1 through 5; there are no 5 or 6 scores in the conjunction category. However, Sample 6 includes eight conjunctions that receive a score of 8. If the high scoring conjunctions are as important to understanding as research indicates, it would appear that Sample 6 represents a very difficult jump that could be eased by a more gradual intro-duction of difficult conjunctions--conjunctions that many children master later than the end of first grade.

In each of the tabulations reported, Sample 6--from the end of the last book in first grade, Series A--has appeared

Table 6

Occurrence of Conjunctions in Series A and B

Samples	Score			
	3[a]	5	6	8.
Series A				
1	3	0	0	0
2	3	0	0	0
3	0	0	0	0
4	6	0	0	3
5	3	0	0	0
6	8	3	0	8
7	4	2	0	3
8	10	2	0	5
9	2	2	0	4
10	13	5	2	8
Series B				
11	6	0	0	1
12	11	0	0	1
13	2	0	1	1
14	7	2	0	0
15	3	1	0	0
16	3	0	0	2
17	3	0	0	4
18	5	0	0	1

[a]And (score 3) is the only conjunction that scores lower than 5 in Developmental Sentence Scoring.

strikingly high and out of sequence. Since this one sample appeared to be incompatible with others in the same series, a revised sample was scored for the end of the first reader. The revised sample consisted of the first 25 sentences in the original sample and the 25 sentences that preceded them in the textbook. The DSS score for the revised sample was 13.10, only .36 lower than the original and the revised sample was 25 sentences nearer to the beginning of the book.

Although Series B appears to be easier than Series A in terms of overall scores and speed of progression, both series show an inconsistent pattern of progression in overall scores, in individual sentence scores, and in the occurrence of items that fall within the higher half of the DSS chart (scores 5 through 8). Questions nine and ten in this study were answered negatively: there is not a predictable progression of difficulty within the materials examined.

In summary, the analysis of the data obtained by subjecting 18 textbook content samples to Developmental Sentence Scoring indicated that the textbook samples examined were comparable to or even less complex syntactically (i.e., had lower DSS scores) than the oral language typical of the intended readers. A comparison of sample mean scores for the two series examined revealed that the series designed for "slow starters" had lower scores than

the series intended for average readers. The increase in
scores between successive levels of the easier series
was less than in the more difficult series. The internal
data within samples showed an inconsistent pattern, with a
few relatively difficult sentences included in otherwise
easy samples. Further inspection of the internal data
revealed no predictable progression in the occurrence of
more difficult structures, and little evidence of syntactic
programming comparable to oral language development.
Therefore, it was concluded that the internal data yielded
by DSS analysis is more valid than sample mean scores for
evaluating readability.

Discussion

The most important finding of this study was that a
consistent progression in syntactic difficulty is not
evident in the materials examined--materials that were
supposed to be highly readable. A corollary reported over
and over in the review of literature was that the more
readable materials follow closely the oral language
repertoire the child brings with him to school. The mean
DSS scores for the samples examined were found to be within
the range of DSS scores for oral language of five- and six-
year-old children. However, the DSS scores are means of
50 sentence scores and they disguise the best and the worst,
the highest and the lowest, as all means do. Only item-by-

item analysis reveals the profile. This internal analysis disclosed an irregular and unpredictable syntactic order in the reading materials, an order which does not parallel the oral language of five- and six-year-olds. This disclosure has important implications.

Reading is a complex, though fundamental, communication skill. Because reading is prerequisite to much that a child will be expected to learn in school, it is important that he learn it well. Because reading is complex, it is important that the learning process be made as easy as possible to insure success.

Many variables, not the least of which is syntactic complexity, interact to determine readability. For maximum efficiency in the learning process, it would seem logical to factor out these variables and vary one factor at a time in the instructional process. It is, of course, sound research procedure to manipulate one variable at a time (or as few as possible) while holding others constant. Moreover, children seem to know intuitively that this is the best way to learn. An early example may be observed when a child is learning to walk. Typically, he begins single-word speech at about eight or nine months of age. Couplets (two-word "sentences") usually appear at about 18 to 21 months of age. In the lag between the two, the normal child learns to walk. It is as if, when his muscular

skills, coordination, and balance are sufficiently developed to begin the task of walking, the child holds stable his talking while he concentrates on the new skill. Parents sometimes comment that a child's speech came to a virtual standstill or even regressed when he was learning to walk. At the age walking typically has been mastered, a spurt in speech and language development usually occurs.

Observation of typical six-year-old speech leads to conjecture that the six-year-old again is exercising the natural procedure of holding one variable constant while another changes. Cognitively, the six-year-old is in a transition period. His logical reasoning capabilities are expanding--moving away from the preoperational stage toward concrete operations. His thinking and conversational topics are becoming complex and varied. While he is making great strides in thinking, his syntax in oral language remains rather simple. After the six-year-old has mastered more complex thinking, his speech patterns will become more complex. When his spontaneous speech includes the more complex structures, he will already have assimilated their meaning. The child then is capable of comprehending the more complex structures in written language.

Certain instructional sequences are prescribed by the nature of learning to read. The child must first recognize that printed symbols represent words and meaning already in

his oral repertoire, although one need not go so far as some textbooks that claim printed language is just "talk written down." While some words are recognized and taught as a whole, the child's initial instruction in "word attack" skills involves matching letters and sounds so that he can generate the pronunciation of words not in his "sight vocabulary." Then he must learn to cope with phonological discrepancies. One way he does this is to identify certain patterns of discrepancy and associate them in some way to help him remember the exceptions (e.g., "i before e except after c and when sounded like a as in neighbor and weigh"). Subsequently, the child may learn "word families," varying the initial consonant to produce bad, mad, sad, etc., or changing hop, mad, and hat to hope, made, and hate. While this process of learning the decoding skills necessary for word recognition receives primary emphasis, the syntax of reading materials should be held constant. Sentence structure should be restricted to the familiar patterns in the child's oral language so that when he recognizes the words, his understanding of what he has read provides immediate reinforcement for his decoding effort.

Probably beginning reading materials should be syntactically less complex than the child's spoken language just as vocabulary in beginning texts is not as extensive as the child's spoken vocabulary. Precisely what constitutes

a significant difference in syntactic complexity in terms
of effect on comprehension has not been determined. One can
only speculate about the effect a single sentence which
includes the antithetical conjunction <u>although</u> might have
on a child's comprehension when he is struggling with word-
by-word decoding. The word recognition task may require
such concentrated effort that he loses the sense of the
sentence that requires him to remember two elements or that
interrupts the subject-verb-object order. The difference
between <u>The boy hit the girl</u> and <u>The boy was hit by the girl</u>
is crucial and the difference between <u>hit</u> and <u>was hit</u> is a
function of syntax, not vocabulary.

Typically, comprehension is evaluated by asking ques-
tions about the passage read or by requiring certain tasks,
such as drawing pictures or role playing to demonstrate the
meaning that a child got from a passage. Unless syntactic
complexity as well as vocabulary is controlled, comprehension
tests may be unfairly weighted if a single syntactical
element determines the meaning of an entire sentence. The
following example shows how with only five words, all of them
easy and familiar by any standard, and short sentences, one
can vary the syntactic component from very easy to quite
difficult by first grade standards:

1. The boy hit.
2. The mad boy hit.
3. The mad boy was hit.
4. The boy hit was mad.

Comprehension questions might ask, <u>What did the boy do</u>?
<u>Who was hit</u>? <u>How did the boy feel</u>? <u>What happened to the
boy</u>?

It does not necessarily take a great digression from
a systematic progression to create a barrier to understand-
ing. Using an analogy to vocabulary to illustrate, one
would not talk to a first-grader about discriminable
attributes in order to get him to tell how one thing was
different from another. One would certainly reject or
brand as inappropriate the textbook that included even
one example of such difficult vocabulary. In fact, the
inclusion of such words would make the whole textbook series
suspect. To use a less extreme example, the term <u>volcanic
eruption</u> would be isolated for word attack emphasis and
pictures or experiments used to clarify the meaning. Because
of their training and the traditional emphasis on vocabulary,
teachers and textbook writers readily recognize difficult
vocabulary items, and either rewrite the passage to eliminate
them, or provide special supportive measures to help the child
understand the unusual words.

Likewise, it requires no sophisticated analysis
procedure to know that a stylized construction such as
<u>There was no time to find out in what class Johann would
belong</u> (from Sample 10 in this study) is not common to the
speech of five- and six-year-old children. The difficulty

in many other constructions is less obvious. If the discussion to this point brings to the reader's mind visions of "plot" developed around Oh! Oh! Look! Look! he may wonder if it is possible to write material that is both interesting and syntactically easy. The answer is yes. Analysis of a typical six-year-old's speech reveals mainly short sentences, subject-verb-object sentence patterns, and one conjunction, and. These three features are used in amazingly varied and interesting (and seemingly endless) conversation.

Once the child has some skill in word-recognition and is ready to attack the syntactic component in reading comprehension, it would seem reasonable to assume that maximum transfer advantage from oral language to reading would be realized if the syntax of instructional reading materials progressed in a sequence that paralleled the child's earlier learning of oral language. The later developing structures (and thus higher-scoring on the DSS) in oral language also appear to be more difficult in reading. Yet readability indices have noticeably slighted syntax as a factor in determining reading difficulty. The inconsistencies between the syntax in children's oral language and the syntax in reading textbooks may be explained by inadequate training in oral language development, especially syntax, on the part of those responsible for writing, evaluating, and using the textbooks.

A primary motivation for this study was the belief that the college and university curriculum for prospective primary and elementary teachers should be interdisciplinary in its approach to communication skills, drawing on research in language development, speech, comparative grammar, and cognitive development.

Primary and elementary school teachers need to be trained to view reading as a fundamental and important part of the communicative process. A recognition of syntactic difficulty and the sequence of acquisition, as illustrated in Developmental Sentence Scoring, may help to answer some of the questions about why a child can "call words" or "read orally" without "getting meaning from" (i.e., comprehending) what he reads.

In order to achieve effectiveness and satisfaction in teaching reading, a person needs to know something about normal speech and language development before he is schooled in how to teach reading, so that methodology is grounded in content. To train prospective teachers in reading methods without insuring that they have an understanding of the developmental aspects of other communication skills is equivalent to instructing people in how to teach history when they know little or no history. Although teachers may read well themselves, few can recall how they learned to read. It is essential for them to be able to isolate the factors

that can be controlled and varied in the process of helping children learn to read. Primary teachers need to be aware of the syntactic progression observed in oral language so that they can recognize potentially difficult structures and systematically introduce increasingly complex forms, in much the same way they analyze and program vocabulary.

The results of this study suggest that textbooks could be programmed to parallel the developmental sequence in syntax acquisition. Developmental Sentence Scoring appears to have potential as a style guide to improve the progression of difficulty within reading texts and to produce content more like spoken language.

In clinical practice, a child would be introduced gradually and systematically to increasingly difficult structures, with increasingly more of the difficult items at each successive level. The same procedure could be adopted for programming textbooks. For instance, a 50-sentence passage might have seven secondary verbs that score 2 or 3 on the DSS, five that score 4, and two or three that score 5, but none higher. Succeeding levels would include more in the 4- and 5-score category, a few that score 7, and later, those that score 8. The same programming would apply to the other seven categories.

One might draw an imaginary line across the DSS chart and include those items above the line if this procedure

(described in the preceding paragraph) were followed. Since the items across categories are mastered at about the same time, for the child who understands negatives that score 4, it would be reasonable to include verbs at that level rather than restricting verbs mainly to those that score 1 and 2 and arbitrarily including 7- and 8-level verbs. Following a developmental sequence in syntactic programming would not impose further restrictions on an already limited beginning content. It would simply redirect the emphasis in the variety of sentence structure from a vertical to a horizontal emphasis. A preprimer that allows <u>who can ride</u> (the modal + verb scores 4) should also allow third person and plural pronouns, past tense verbs, non-complementing infinitives, and a few early-developing wh-questions, but not conjunctions other than <u>and</u>, and not passive forms, gerunds, or abstract indefinite pronouns.

A publisher well might subject a new reading series to detailed analysis, using the DSS as an instrument, taking samples that overlap by 25 sentences throughout the series (sentences 1-50, 25-75, etc.). Since DSS projects a developmental sequence across categories, inappropriate sentences could be rewritten to conform to the level of syntactic complexity typical of the oral language of the children for whom the books were intended. Furthermore, the unmanageableness that would preclude the use of DSS in

clinical practice if all grammatical categories were included is not a deterrent in readability research because there is not a different text for each child. Therefore, the instrument could even be expanded to increase its sensitivity as a readability index. Adverbs might constitute an additional category for analysis. Hunt(1965) and Albanese (1972) identified adverbs as being influential in determining readability. Lee (1974) also concluded that "a study of the development of adverbs of time, place, and manner would add valuable information beyond that afforded by the DSS" (p. 154).

In addition to the implications for curriculum and teaching, specific implications for further research may be drawn from this study. The studies reporting that problem readers perform like average readers of a younger age suggest that DSS could be used effectively to evaluate the difficulty of "high-interest, low-reading-level" materials. To meet the implied criterion, the content and format of the materials would have to be interesting and varied, but the syntax as well as the vocabulary would have to be comparable to the expressive language of children younger than the intended readers. Evaluation of such materials, with item-by-item analysis, would seem to be an appropriate application of DSS procedure.

The present study was limited to textbooks children would use, presumably in an instructional setting. Workbooks, directions in teacher's manuals, and especially tests designed to accompany textbooks might well be examined to determine the occurrence and progression of higher scoring items on the DSS scale.

A particularly significant research potential lies in re-examining the correlation between oral language performance and reading comprehension. Some recent efforts to develop readability measures that incorporate the syntactic factor and take account of the sequence of syntax mastery in oral language (Granowsky, 1971; Glazer, 1973) are promising, but the effort should not be isolated from oral language studies. To do so would simply perpetuate the existing problems attendant to treating reading as a communication skill unrelated to other language competence. It is suggested, therefore, that an appropriate follow-up to the present study would be to use Developmental Sentence Scoring and syntactic complexity measures designed for reading materials to analyze the same content.

In summary, the significant finding of this study was that the primary reading textbooks examined reveal unpredictable syntactic programming that is not consistent with the developmental sequence observed in the oral language of primary age children. The inconsistencies between oral

language and instructional reading materials occur, it appears, because writers and evaluators of reading materials are not knowledgeable about the developmental aspects of syntax in oral language. The differences could be reduced as a result of (a) curriculum changes that would school teachers and evaluators in normal speech and language development and (b) use of a developmentally sequenced scale, such as the DSS, as a style guide for syntactic programming of instructional reading materials.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to determine whether certain selected reading textbooks follow the developmental order of oral language in syntactic complexity. The problem was divided into three parts: (a) to determine whether the content of the first grade textbooks examined is syntactically comparable to the oral language of first grade children; (b) to determine whether the series designated for problem readers is, in fact, syntactically easier, and therefore more readable, than the series intended for average readers; and (c) to determine whether sentence structure is progressively more difficult within each series examined.

A review of related research emphasized the need for syntactic programming in reading textbooks. Children continue throughout the elementary grades to develop competence in understanding and processing syntactic structures. Syntactic complexity was found not to be a factor in the readability formulas examined. Studies based on both structural and transformational grammar showed a child's oral language performance to be the best indicator of what he can understand in written language. Transformational grammar was judged to be the more powerful theory for

analyzing causes of difficulty. Studies reporting that
"problem readers" behave toward reading tasks like "average
readers" of a younger age suggest that beginning materials
for potential problem readers should be programmed toward a
lower level of syntactic development than the texts intended
for average readers.

Developmental Sentence Scoring (DSS), a scale of
syntax acquisition based on transformational grammar, is a
clinically validated instrument for evaluating a child's
oral language performance. Normative data has established
typical levels of syntactic development for five- and six-
year-old children.

With the typical oral language performance of first
grade age children established by DSS data, the question
remained whether the content of the textbooks examined was
syntactically comparable to those levels. The primary
levels of two reading textbook series were selected from a
list of texts adopted for use in the public schools of
North Carolina in the 1974-1975 school year. Developmental
Sentence Scoring was used to judge the syntactic difficulty
of the reading texts. Eighteen samples, 50 sentences each,
of textbook content were scored according to DSS procedure,
which assigns weighted scores in each of eight grammatical
categories. Both the sample scores, which are means of
the 50 sentence scores, and the occurrence of more

difficult items were examined to determine the syntactic difficulty of the textbooks and the progression of difficulty within each series.

The following conclusions were drawn from the data analyzed:

1. Internal (item-by-item) analysis of reading textbook content by Developmental Sentence Scoring reveals that the introduction of syntactic complexity is not predictable in the primary levels of the two basal reading series examined.

2. While the mean sample scores for the series intended for problem readers were lower than mean scores for the series for average readers, the series for problem readers included some relatively difficult sentences.

The findings reported in this study led to recommendations that curricula for elementary teachers include instruction in speech and language development to facilitate understanding of the syntactic factor in readability and to enhance the teachers' effectiveness. DSS was recommended as an instrument to evaluate existing materials, develop new materials, and judge materials being considered for adoption. Implications for curriculum and teaching were discussed and recommendations for further research were made.

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APPENDIX

Textbooks Examined

The Macmillan Reading Program Series, Macmillan, 1965.

Grade One
    Opening Books, PP1
    A Magic Box, PP2
    Things You See, PP3
    Worlds of Wonder, P
    Lands of Pleasure, 1

Grade Two
    Enchanted Gates, 2-1
    Shining Bridges, 2-2

Grade Three
    Better Than Gold, 3-1
    More Than Words, 3-2

Open Highways Series, Scott, Foresman, 1967.

Grade One
    Starter Concept Cards, T.E.
    Ready to Roll, Book 1, Part 1
    Rolling Along, Book 1, Part 2

Grade Two
    More Power, Book 2, Part 1
    Moving Ahead, Book 2, Part 2

Grade Three
    Splendid Journey, Book 3, Part 1
    Speeding Away, Book 3, Part 2

Scoring Sheet (Sample)

Sample number _____ Series _____

Title _____

Level _____ Pages _____

Date _____

DSS _____

Sentences	Noun Modifiers	Pronouns	Main Verbs	Secondary Verbs	Negatives	Conjunctions	Interrogative Reversals	WH-Questions	Sentence Point	Total
1.										
2.										
.										
.										
.										

Sample 1

```
1 2 3 4 5 6 7 8 9    11 12 13
1 2 3 4 5 6 7 8 9    11 12 13
  2   4 5   7   9    11
      4 5   7   9    11
      4 5   7
      4 5
      4 5
      4 5
      4
      4
      4
```

Sample 2

```
  2 3 4 5 6 7 8 9 10    12    14 15 16    18
  2 3 4 5 6 7 8 9 10    12    14 15
  2 3 4 5   7 8          14 15
  2 3 4 5                14 15
  2 3
  2 3
  2 3
  2 3
    3
    3
    3
    3
```

Sample 3

```
  2 3 4 5 6 7 8 9 10    12    15 16 17
    3 4 5 6 7 8 9 10          16
    3 4 5 6 7 8 9 10          16
    3 4   6 7 8                16
    3 4   6                    16
    3 4   6
        6
        6
        6
        6
        6
```

Sample 4

```
  2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17    19 20
  2 3 4 5 6 7 8 9 10 11 12    14 15 16
  2 3   5 6   8 9 10    12       15 16
    3   5                           16
        5                           16
        5
        5
        5
```

Figure 6. Distribution of sentence scores.

Sample 5

```
2 3  4  5  6  7 8 9 10 11  12 13 14 15 16 17        21              29
2 3  4  5  6    (8) 9 10 11 12      15
2 3  4  5  6     8  9 10 11
     3  4     6     9 10
     3              9 10
     3                10
     3
     3
```

Sample 6

```
3  4  5  6  7    9 10 11 12 13 14 15 16 17 18    20 21 22    24 25    28        32
3     5  6          10 11    (13) 14    16       20 21 22    24       28
3     5  6          10       13  14    16             21    24
3        6                   13
3        6
3
```

Sample 7

```
2 3    5  6  7  8  9    11 12 13 14 15    17 18      21          26        29            34
2 3    5  6  7  8  9    11 12 13 14 15    17                               29
       3    5  6  7    (9)   11    13    15    17
       3    5  6  7     9
       3               9
       3               9
```

Sample 8

```
3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24      27     29
3     5       7  8  9 10 (11) 12    14       17    19 20       24
3     5          8  9       12    14       17
3     5          8
3
3
```

Sample 9

```
3  4  5  6  7  8  9 10 11       14 15 16 17 18       21 22 23    25 26    28    30    32    34    36    38
3  4  5  6  7  8  9 10 11          15    17             23          28
   4  5  6  7  8  9 10 11          15                   23
         6     8
```

Sample 10

```
3  4  5  6  7  8    10 11 12 13 14 15 16 17 18    20 21    23          28          33       37                    48
3     5        8    10 11       15 16 17 18    20       23          28          33
3     5        8    10 11       15 16 17       20                   28
      5        8                15             20
               8
```

Figure 6. (continued)

Sample 11

```
3 4 5 6 7 8 9 10 11    13 14                    20
3(4)5 6 7      10 11    13
3 4 5 6 7              13
3     6 7
3     6
3     6
3
3
3
3
3
3
3
3
3
3
3
```

Sample 12

```
2 3 4 5 6 7 8 9 10 11 12 13 14      16       19   21
2 3 4 5 6 7 8 9 10 11 12
3 4 5 6 7 8 9 10    12
3     5 6      9 10
3     5 6      9
      5 6
      5(6)
      5
```

Sample 13

```
2 3 4 5 6 7 8 9 10 11    13 14 15    17       21       25                              38
2 3 4 5 6 7 8 9 10       13 14
2 3 4 5 6 7      10
2 3    5 6 7      10
2 3         6 7
2 3        (6)
           6
           6
```

Sample 14

```
2 3 4 5 6(7)8 9 10 11 12 13 14      16    18 19       23
2 3 4 5 6 7 8 9 10 11 12 13 14
2 3 4 5 6 7 8 9    11 12    14
2 3 4 5 6
3     6
      6
      6
```

Figure 6. (continued)

Sample 15

```
2 3 4 5 6. 7 8 9 10 11       14     16       18 19 20 21                                    42
2 3 4 5 6 7 8 9 10 11        14              18 19 20 21
2 3   5 6 ⑦   9 10                                    21
  3   5 6 7
  3   5 6 7
  3   5   7
  3   5
  3
```

Sample 16

```
3 4 5 6 7 8 9 10 11 12 13 14 15     17     19           24
3 4 5 6 7 8   10       13 14       17           24
3   5 6 ⑦ 8   10       13
3   5 6   8   10
3   5 6   8   10
3   5         10
  3   5
  3   5
  3   5
  3   5
```

Sample 17

```
3 4 5 6 7 8 9 10 11 12 13     15 16 17     19           24        27              34
3 4 5 6 7 8 9 10              15
3   5 6 7   8 9 10           15
3   5 6     8 9 10           15
3         6                  15
3                            15
3
3
3
```

Sample 18

```
2 3 4 5 6 7 8 9 10     12 13 14 15 16 17 18     21                    30
  3 4 5   7   9 10     12       15
  3 4 5       9 10             15
  3       5   9 10
  3           9 10
  3           10
  3           10
  3
  3
  3
  3
  3
  3
  3
```

Figure 6. (continued)

Figure 7. Item occurrence within samples.

Figure 7. (continued)

Sample 7

			SCORES					
8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH-Questions

Sample 5

			SCORES					
8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH-Questions

Sample 6

			SCORES					
8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH-Questions

Sample 8

			SCORES					
8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH-Questions

Figure 7. (continued)

SCORES

8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH- Questions

Sample 15

SCORES

8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH- Questions

Sample 13

SCORES

8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH- Questions

Sample 16

SCORES

8	7	6	5	4	3	2	1	
								Noun Modifiers
								Pronouns
								Main Verbs
								Secondary Verbs
								Negatives
								Conjunctions
								Interrogative Reversals
								WH- Questions

Sample 14

Figure 7. (continued)

149

Figure 7. (continued)

SCORES								
8	7	6	5	4	3	2	1	
	=				⁞		=	Noun Modifiers
	⁞	⁞			⁞	⁞	⁞	Pronouns
	=	=		⁞	⁞	⁞	⁞	Main Verbs
			-	⁞	⁞			Secondary Verbs
-		.		-				Negatives
⁞					⁞			Conjunctions
		⁞						Interrogative Reversals
-						⁞		WH-Questions

SCORES								
8	7	6	5	4	3	2	1	
	⁞					⁞	⁞	Noun Modifiers
		⁞				⁞	⁞	Pronouns
-	⁞	-		⁞		⁞	⁞	Main Verbs
-			⁞		-			Secondary Verbs
	=			-				Negatives
-		⁞		-	⁞			Conjunctions
								Interrogative Reversals
						⁞		WH-Questions