

THE EFFECTS OF SENTENCE EXPANSION INSTRUCTION
ON THE READING COMPREHENSION AND WRITTEN
COMPOSITION OF THIRD-GRADERS

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Susan Lynn Kurushima

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Chapter 1

RATIONALE OF THE STUDY

The major purpose of this study was to investigate the effects of a program of sentence expansion instruction on the written composition and the reading comprehension of third grade pupils. Sentence expansion instruction is a method of teaching students to expand or elaborate kernel sentences to produce more complex sentences in terms of the number of transformations involved. This technique has received considerable attention in the recent literature on language study.

Several researchers have used the term sentence combining to refer to a process of combining two or more kernel sentences to produce one sentence. Others have used the term sentence expansion to describe a method of adding modifiers, phrases, or clauses to a kernel sentence. Although the approaches are slightly different, both sentence combining and sentence expansion programs involve manipulation of kernel sentences and direct instruction in ways of consolidating T-units. Both are concerned with helping students to produce sentences which are expanded or elaborated in some way. In this report, the term sentence expansion is used to refer to either one or a com-

bination of these two approaches.

Sentence expansion programs have been successfully used by researchers to help seventh-grade students write more complex sentences (Mellon, 1969; O'Hare, 1973; Hughes, 1975; Combs, 1976), and Miller and Ney (1968) have experimented with oral sentence expansion at the fourth grade level. There have been only a few reports of attempts to use sentence expansion techniques at the primary grade level (Hilfman, 1970; Young, 1972). The limited sentence expansion research at the primary grade level seems to reflect the difficulty of doing research at this level and/or a belief that these younger students would not benefit from such training. In fact, Mellon (1969:17) referred to grade four as "the writing age", implying that children don't really write with ease until this age.

Sentence expansion exercises do not require students to learn to verbalize rules of grammar, but simply to use rules that are already known intuitively. Strong (1976) explains the process in terms of "tap[ping] the linguistic power they already possess". Strickland (1962) and Menyuk (1963) have provided evidence that at the age of school entrance children already have a usable grammar system and can expand and elaborate their sentences in various ways. Since primary grade children have already learned a great deal about language, it is possible that they too could benefit from sentence expansion exercises designed especially for them.

Research suggests that the syntactic complexity of reading material is related to a reader's comprehension of that material (Smith, 1970; Tatham, 1970; Peltz, 1974). One could hypothesize that this is due to readers' expecting to receive a meaningful message from the material they process. If the syntactic structures contained in the material are also in the reader's repertoire of structures, the reader may more easily obtain a meaningful message. Instruction in sentence expansion may serve to add to the repertoire of syntactic structures that a student has at his command. A sentence expansion task, because of the manipulation of kernel sentences and the discussion of the appropriateness of alternative solutions, may serve to make students aware of the deep structure of sentences or of "the way differences in sentences produce differences in meaning" (Deverell, 1974:253). If this were the case, sentence expansion training may aid comprehension of syntactically complex reading material.

Some of the studies of sentence expansion programs have included tests of reading comprehension (Crews, 1968; Fisher, 1974; Hughes, 1975; Klassen, 1976), but the results have been inconclusive. It is possible that the syntactic complexity of materials used to test reading comprehension determines whether or not sentence expansion treatments appear to have had significant effects. If test materials are either too simple or too complex in terms of syntactic structures used, treatment effects may not be detected.

There is a need, therefore, to determine whether a sentence expansion program affects reading comprehension of materials written at specified levels of syntactic complexity but not at other levels.

A study of the research on sentence expansion reveals two main concerns that have not been explored to any great extent. Firstly, since research on sentence expansion has mostly been confined to students above the primary level, it seems important to add to the body of knowledge concerning the effects of this type of training on primary grade students. Secondly, because the research results have been inconclusive regarding the possible effect of sentence expansion practice on reading comprehension, and because syntactic complexity of tests has not been described or controlled in previous studies, it is necessary to determine whether a sentence expansion program could aid reading comprehension of materials written at varying levels of syntactic complexity. In this study, an attempt was made to address both of these concerns.

Several researchers have documented the development of syntactic maturity in written language. From the work of Hunt (1965), O'Donnell et al. (1967), Golub and Frederick (1970), and Loban (1976), it appears that mean T-unit length is a good indicator of syntactic maturity. All of these researchers reported that mean T-unit length consistently increased with advancement through the grade levels. Consequently, the present study examined students' writing in

terms of mean T-unit length.

In addition to this measure, some of the compositions were subjected to a more detailed analysis of selected rhetorical factors from the Evaluation Guide for Children's Compositions (Sundbye, 1973).

Since one of the purposes of this study was to assess the effect of sentence expansion practice on reading comprehension, some measure of reading comprehension was required. One of the objectives of a sentence expansion program is for students to learn to effectively use what linguistic powers they already have. A cloze completion task was selected as the means of measuring this learning since it requires the reader to rely heavily on the use of context to supply the missing words (Rankin, 1959). Traditional cloze tests (every fifth word deleted) were written at three different levels of syntactic complexity in order to explore the possibility that sentence expansion practice might help students to comprehend materials at some levels of complexity and not others.

Four groups were used in the study in order to permit several comparisons to be made. Group 1 received the sentence expansion treatment. Group 2 was given a program of Directed Reading Thinking Activities or DRTA's (Stauffer, 1975). Group 3 had "free time" in place of any experimental treatment. Group 4 was given no treatment at all and was used as the comparison group. The inclusion of Group 2, the

DRTA treatment, was intended to allow detection of any possible effects due to participation in small groups or due to the presence of the experimenter but not directly resulting from the sentence expansion program. The inclusion of Group 3, the "free time" group, was intended to allow detection of a possible novelty effect caused by departure from the usual class routine. If Group 1, the sentence expansion group, proved to be superior to Group 4, the control group, but not superior to the other groups on any of the variables, the effects could not be attributed solely to the sentence expansion treatment. Instead the participation in group discussions and/or the departure from routine could be considered to be the significant factor.

The present study examined the effects of a sentence expansion program for third-graders on: a) reading comprehension as measured by cloze tests written at different levels of syntactic complexity, and b) maturity of written language as measured by mean T-unit length. It also explored the relationship between mean T-unit length and several rhetorical aspects of written compositions. The sentence expansion program was compared to a program of DRTA's as well as to two other comparison groups.

STATEMENT OF THE PROBLEM

The problem of this study was to determine whether sentence expansion practice for third-graders would have a

significant effect on their reading comprehension and their written compositions. The following main questions were considered:

1. After the treatment period, will there be differences among groups in performance on "every fifth-word deletion" cloze tests written at three levels of syntactic complexity?

2. After a delay of three weeks, will there be differences among groups in performance on "every fifth-word deletion" cloze tests written at three levels of syntactic complexity?

3. Will there be differences among groups with respect to mean T-unit lengths calculated from compositions written at either posttest or delayed posttest times?

4. Will there be a relationship between mean T-unit length and any of the rhetorical factors measured by the Sundbye scale?

DEFINITION OF TERMS

The following terms are defined operationally:

Kernel Sentence - A simple sentence in which no optional transformations have taken place.

Deep Structure - The abstract level of language that expresses the content in terms of meaning or semantic interpretation (After Chomsky, 1965).

Surface Structure - The concrete level of language that indicates the form in terms of written or spoken words.

(After Chomsky, 1965).

Complex Sentence - A sentence generated from several kernel sentences; an independent clause which has a number of other sentences embedded in it (After Loban, 1976).

T-unit - One main clause plus any clauses or non-clausal structures attached to it or embedded in it (After Hunt, 1965).

Productive Level - The level of syntactic complexity, measured in mean T-unit length, that is characteristic of average students of a given grade level.

Reading Comprehension - The percentage of exact restorations on a cloze test constructed by leaving the first and the last sentences intact and deleting every fifth word in the remainder of the passage.

Sentence Expansion - A technique by which kernel sentences are expanded and elaborated by incorporating other kernel sentences to produce sentences that are more complex than either of the original sentences. The sentences produced by sentence expansion contain one or more of the following features:

- a) adjectives or adverbs
- b) prepositional or appositive phrases
- c) subordinate clauses beginning with who, which, that, where, or when
- d) co-ordinated predicates.

Syntactic Complexity - The degree of complexity of grammatical structures used in writing, i.e. mean T-unit length, ratio of clauses per T-unit, mean clause length,

ratio of T-units per sentence.

Syntactic Maturity - The extent of a student's ability to use complex sentences in speech and/or in writing. This term is used interchangeably with "syntactic fluency" and "syntactic competence".

THEORETICAL FRAMEWORK

Learning a language code has been described by Fries as "learning the signals by which meanings or messages are sent and received" (Fries, 1962:103). These signals consist of both lexical meanings and grammatical meanings and are the same whether the messages are conveyed by speech or by print. Sentence expansion instruction may be one way of helping students to understand grammatical signals.

The assumptions underlying sentence expansion instruction are based on transformational generative grammar theories. These assumptions are:

- a) that all sentences are either kernel sentences or transformations of kernel sentences.
- b) that there is a system of transformational rules that permit kernel sentence ideas to be combined.
- c) that the deep structure of a sentence may be translated into a variety of surface representations without changing the underlying relationships (Chomsky, 1965).

The distinction between the deep structure and the

surface structure of language is especially important. The physical aspects of a sentence, the sound waves or graphic display, are derived from the surface structure while the meaning is derived from the deep or underlying structure. The application of syntactic rules provides a bridge between the surface and deep structures (Smith, 1973).

Sentence production can be viewed as a three step process. Messages or thoughts are first paired with deep structures. Then deep structures are paired with surface forms. Lastly, messages must be paired with surface forms in the event that some properties of sentences are represented at the semantic level and in the surface structure but not in the deep structure (Fodor et al, 1970). The actual procedure by which deep structures are paired with surface forms is not known. In sentence recognition, the process is reversed. From surface forms deep structure must be obtained, and from deep structure the message must be obtained.

Fodor et al, propose two models of sentence production and recognition. In their "analyses by analysis" model, the sender applies transformational rules to the deep structure of a message to arrive at surface form. The receiver reverses the transformation of the incoming sentence to uncover the deep structure. In the "analysis by synthesis" model, the sender compares his message with

the internally generated output of possible structural descriptions to arrive at an acceptable surface form. The receiver uses his knowledge of grammar to generate possible structural descriptions which are tested one by one against the incoming message. In either of these models it is apparent that the more grammatical operations involved in generating a sentence the more difficult it ought to be to produce and also to understand the sentence (Fodor et al, 1970). The idea behind sentence-combining instruction is to let students practice using various transformations so that eventually these structures will be internalized and will be available to them to use in generating and receiving sentences.

In order to explain how a knowledge of the transformational rules might aid reading ability we must describe the reading process. For the purposes of this study reading will be viewed as a "psycholinguistic process by which the reader reconstructs, as best he can, a message which has been encoded by a writer as a graphic display" (Smith, 1973:22). In reconstructing messages the reader uses graphophonic, semantic, and syntactic cues simultaneously as he seeks to infer a deep structure from the surface form. The more use the reader can make of the syntactic cues available from his knowledge store, the more efficient his reading should be. Possible outcomes of sentence expansion instruction are: a) that students will

increase their knowledge store of syntactic structures, and b) that they will be made more aware of the relationship between these structures and the deep structure of language.

LIMITATIONS OF THE STUDY

1. The analysis of written compositions examined mean T-unit length and selected factors from the Sundbye Evaluation Guide for Children's Compositions. Other composition errors were not analyzed.

2. Comprehension was measured by means of "every fifth-word deletion" cloze tests of varying levels of syntactic complexity. Comprehension of specific types of transformations was not tested.

3. Students wrote compositions only in the narrative mode and the length of compositions was not controlled.

4. There was no control over writing experiences in the classroom aside from the actual treatments. Teachers were aware of the main focus of the study and there was no guarantee that this knowledge did not influence their teaching practices.

5. Assignment of students to groups was not random since intact classroom groups were used.

OVERVIEW OF THE STUDY

This study was designed to investigate the effects

of a program of sentence expansion exercises on the reading and writing abilities of third grade students. Chapter 1 has outlined the rationale and underlying theoretical framework. A review of research related to the problem is found in Chapter 2. Chapter 3 presents the experimental design, description of instruments used, and the statistical procedures. In Chapter 4, data are summarized, results of statistical tests are reported, and the findings are discussed. Chapter 5 includes a summary of the procedures used, conclusions drawn from the findings, and implications for research and instruction.

Chapter 2

REVIEW OF RELATED LITERATURE

The major purpose of this study was to assess the effects of sentence expansion instruction on the reading comprehension and written composition of third-graders. Research reports of positive effects of sentence expansion programs on the syntactic fluency of written language led to the hypothesis that sentence expansion training may enhance language development in general, and therefore, may affect reading comprehension. This hypothesis was based on the assumption that syntactic competence is a significant factor underlying fluency in both reading and writing. The literature reviewed pertains to the relationships among reading, writing, and language development. These relationships will be discussed under the headings - Syntactic Maturity, Instructional Procedures, and Reading Comprehension.

SYNTACTIC MATURITY

A number of researchers have studied the question of how syntactic maturity develops. The term syntactic maturity is used synonymously with syntactic fluency and syntactic competence and refers to the extent of a person's

ability to use complex grammatical structures in speech and/or in writing. The search for methods of analyzing language and for adequate measures of syntactic maturity began with studies of oral language.

Strickland (1962), in a study of children's oral language, identified the phonological unit as a unit of speech ending with a distinct falling intonation which signals a terminal point. The length of the phonological unit was not found to be a good indicator of language maturity because this measure varied more widely within than between grade levels. The main contribution of this study was the development of a method of analysis in which phonological units were broken down into patterns of fixed slots and movables. It was found that children in grades two, four, and six used the same basic patterns and expanded or elaborated these basic sentences through the use of movables and elements of subordination. The most commonly used patterns were subject+verb+object, and subject+verb to be+predicate nominative.

Loban (1963) reported on a longitudinal study of children from grade one to grade six in which he further developed the linguistic analysis used by Strickland. In addition to phonological units, this study measured communication units identified by semantic meaning. Length of communication units was found to increase with chronological age and therefore was considered to be a promising

new index of language maturity. Loban found that, although subjects varied little in their use of the basic patterns, flexibility within structure patterns was a discriminating feature. Use of subordination increased with chronological age and was more common in the group rated high in language ability than in the average and low groups.

Strang and Hocker (1965), studying the oral language of first grade children, found that the following three basic sentence patterns were dominant: 1) subject+verb+object, 2) subject+verb to be+predicate nominative, 3) subject+verb. These researchers agreed with Loban that flexibility within sentence patterns was a significant aspect of language development. The context in which children spoke was found to influence both language patterns and sentence length.

In each of these three studies of oral language development, it was concluded that all children use the same basic patterns of fixed slots but differ in the way that they expand or elaborate the basic patterns through the use of movables and elements of subordination. Flexibility within these basic patterns appeared to be a sign of maturity in the oral language of elementary school children. The communication unit, identified by semantic meaning, was shown to be a better index of maturity than the phonological unit, identified by intonation. The study of written language also involved a search for adequate measures of

maturity.

A method for the quantitative analysis of grammatical structures in written language was devised by Hunt (1965), and has since been used by many other researchers. This method of analysis is based on the concept of the minimal terminable unit, or T-unit, which is defined as one main clause plus any subordinate clauses or nonclausal structures attached to it. This measure is the written equivalent of Loban's communication unit used for oral language analysis since it is identified by semantic meaning and not by punctuation. Hunt proposed five indices of syntactic maturity; the number of words per clause, the number of clauses per T-unit, the number of T-units per sentence, the number of words per sentence, and the number of words per T-unit.

Using these five indices, Hunt studied developmental trends in the syntactic maturity of written language of students from grade four to grade twelve. Analysis of writing samples revealed that the mean number of words per T-unit was the best indicator of grade level, and that the number of short T-units (≤ 8 words) was almost as good an indicator and had the advantage of being easier to calculate. The developmental trends noted from grade four to grade twelve were toward increased T-unit length, increased clause length, increased number of clauses per T-unit, and decreased number of T-units per sentence. It was concluded

that, as students mature, they learn to consolidate T-units by using various sentence-combining transformations and thus say more in fewer words. A sentence-combining transformation is an operation by which one kernel sentence is joined to or embedded in another.

O'Donnell, Griffin, and Norris (1967) analyzed the oral and written language behavior of kindergarten and elementary school children to determine the validity of Hunt's analytic measures. Taped oral language samples from children in kindergarten and grades one, two, three, five, and seven were analyzed in addition to writing samples from the children in grades three, five and seven. It was found that T-unit length increased with grade level in both modes of expression and that the ratio of sentence-combining transformations to T-units also increased with grade level.

Braun (1969) studied the syntactic development of monolingual and bilingual children in Manitoba. In addition to comparisons between these two groups, three ability levels and two grade levels were compared. Significant differences in mean T-unit length and number of sentence-combining transformations were found between grade four and grade six and also among the three ability levels. The nominal sentence-combining transformations were found to account for more of the difference than either adverbial or co-ordinate sentence-combining transformations.

Frequency of subordinate clauses was found to be significantly different among ability levels but not between grade levels.

Loban (1976), in a longitudinal study of language development, selected a high language proficiency group and a low language proficiency group on the basis of teacher ratings. These groups were found to be significantly different on the measure of mean T-unit length in both oral and written language. This difference was found to be related to measures of syntactic elaboration of subjects and predicates, frequency of sentence-combining transformations, and the use of dependent clauses.

Figure 2.1 shows that a progression can be observed in the measures of mean T-unit length when the findings for Loban's random group and Braun's monolingual group are combined with the findings from the O'Donnell and Hunt studies. These researchers all support Hunt's conclusion that mean T-unit length is a good measure of syntactic maturity.

Fox (1972) and Ciani (1976) explored the developmental trend of syntactic maturity in the oral language of children from kindergarten to grade three. The results of these studies also confirmed the T-unit as a good indicator of maturity.

Golub and Fredrick (1970) analyzed the linguistic structures used by fourth and sixth graders in written language and studied the relationship between these struc-

	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Hunt(1965)		8.51				11.34
O'Donnell(1967)	7.67		9.34		9.99	
Braun(1969)		8.74		9.10		
Loban(1976)	7.6	8.02	8.76	9.04	8.94	10.37

Figure 2.1

Mean T-unit Lengths for Grades 3, 4, 5, 6, 7 and 8
as Reported by Hunt, O'Donnell et al,
Braun, and Loban

tures and the rated quality of writing. The sixth graders were found to use significantly longer T-units, more clauses per T-unit, and more subordinate adjective clauses. The rated quality of writing was found to be related to length of composition and proportion of errors, but not to syntactic structures used. Since the three raters were reported only to have labelled compositions "high", "medium", or "low" in quality, it cannot be ascertained how they interpreted the term quality. Quality may have been taken to mean grammatical correctness, and such rhetorical factors as organization, style, content, wording and phrasing may not have been considered. The term quality cannot necessarily be assumed to mean rhetorical quality in this case. In this particular study, therefore, little specific information was gained concerning the relationship between syntactic structures used and rhetorical aspects of the quality of writing.

Biesbrock and Veal (1969) compared the syntactic maturity and the global quality of the writing of second- and third-graders. Global quality was evaluated by comparing essays to seven sample essays, each of which represented a level of quality. Mean T-unit length was not found to be significantly correlated with global quality, however, essay length was found to be highly correlated with quality.

Rosen, in an unpublished dissertation, is reported

to have found that mean T-unit length varies between one kind of writing and another. Differences between categories of work done by sixteen year olds were found to be greater than Hunt's difference between fourteen and eighteen year olds. In addition there was evidence that the best writers had the greatest T-unit differences between categories of writing (Britton, 1975). This finding implies that, although mean T-unit length is generally a good index of maturity, the student may vary T-unit length to suit his writing purposes.

The studies discussed in this section lead to several conclusions which give us some indication as to how syntactic maturity develops. It seems that all children use the same basic sentence structures. As children mature, they learn to vary the ways in which they expand or elaborate these structures through the use of various sentence-combining transformations. It is this flexibility within the basic structures or patterns that is the discriminating feature of language usage. The situation in which language is evoked apparently influences the complexity and the types of structures used. Mean T-unit length is generally a good index of syntactic maturity and is related to the proportion of sentence-combining transformations.

There is considerable ambiguity regarding the relationship between syntactic complexity and the rhetorical quality of students' writing. In some cases quality ap-

pears to have been interpreted to mean grammatical correctness rather than any rhetorical aspects of the writing. The low correlations found between syntactic complexity and quality of writing (Golub and Fredrick, 1970; Biesbrock and Veal, 1969) may reflect the difficulties in evaluating quality rather than the absence of a relationship between the two factors.

INSTRUCTIONAL PROCEDURES

Once syntactic development was measured and charted, researchers began studying ways of increasing syntactic maturity as compared to the established norms.

Bateman and Zidonis (1966) investigated whether a two year study of transformational-generative grammar improved the structural complexity and the proportion of well-formed sentences used in the writing of twenty-five tenth-graders. The analysis of structural complexity consisted of reducing each sentence to kernels and counting the number of transformations that had taken place. It was concluded that the experimental group had significantly improved its writing in terms of structural complexity and in proportion of well-formed sentences, but the control group which had studied traditional-generative grammar had not improved significantly.

In a similar study, Gale (1968) found that fifth-graders in a transformational-generative grammar class

improved their writing in terms of average clause length, predicate expansion, and the use of noun phrases.

According to these studies, the study of transformational-generative grammar is more effective than the study of traditional grammar in improving the syntactic complexity of the writing of fifth- and tenth-grade subjects. Several other researchers have studied the possibility that direct instruction in sentence-combining transformations would affect students' writing.

Mellon (1969) first advanced the hypothesis that sentence combining instruction would increase growth in sentence structure diversification. Three groups of seventh-graders were compared: an experimental group which studied transformational grammar and sentence combining, a control group which studied traditional grammar, and a placebo group which did not study any grammar but was instructed in techniques for varying sentence structure in writing. It was found that the experimental group significantly exceeded the other groups in twelve factors of syntactic fluency, including T-unit length and ratio of subordinate clauses. The control group exceeded the others in rating of overall writing quality. Because the treatment included transformational-generative grammar study in addition to sentence combining, Mellon's conclusion that sentence combining exercises result in increased syntactic fluency may be questioned. The effects of the sentence combining and the

transformational-generative grammar study cannot be separated.

O'Hare (1973) adapted Mellon's sentence combining program by eliminating the study of transformational-generative grammar and simplifying the instructions. Over a period of eight months, he found that his experimental group showed significant growth on the six factors of syntactic maturity measured. The growth of the control group was not significant. In contrast to Mellon's findings, the compositions of O'Hare's experimental group were rated higher in overall quality than those of the control group. Combs (1976), in replicating O'Hare's study, found essentially the same thing and also found that the experimental group had retained their gains on a delayed posttest. Combs and O'Hare both concluded that sentence combining practice improved the quality of students' writing. Both used a system of forced choices in which raters made "a single intuitive judgment of the relative quality of each pair of compositions" (Combs, 1976:141). All compositions were typewritten with spelling and punctuation errors corrected. This procedure narrowed the range of factors which raters may have considered in making their evaluations of quality. The specific factors actually considered, however, cannot be determined.

Miller and Ney (1968) found that fourth-graders who were instructed in oral and written sentence combining

wrote longer compositions with proportionately more complex sentences than control students. Green (1973) compared the effectiveness of three programs: composition with sentence combining, composition with error correcting, and a traditional language program. Although there was a trend toward improved syntactic fluency in the sentence combining group, it was not found to be significant. Fisher (1974) reported that his sentence combining program improved syntactic complexity in written composition, but not reading comprehension of students in grades five, seven, and nine.

The results of these studies by O'Hare, Combs, Miller and Ney, Green, and Fisher seem to support Mellon's position that direct instruction in sentence expansion, even without studying transformational-generative grammar, can improve the syntactic fluency of children's writing at or above the intermediate grade level.

Hilfman (1970) used a sentence expansion technique with eighteen second-graders and one first-grader. The students were taught to expand simple three word sentences by filling in blanks labelled "Where?", "When?", "How?", "Why?", and "What Kind?" A slight increase in the subordinate clause index (ratio of subordinate clauses to main clauses) in written compositions was found after a six week treatment period. It was reported that the students also improved in their ability to read longer, more complex

sentences. This, however, is assumed to have been based on a subjective evaluation since no test of reading ability was included in the design of the study.

Young (1972) compared the effects of a text-work-book approach to sentence-building, sentence expansion practice using pencils and papers, and sentence expansion practice using tape recorders. The sentence expansion practice appeared to improve the writing of the second-graders in terms of the frequency of their use of adverbial phrases and clauses and adjectives used before nouns.

On the basis of the evidence provided by these studies, it appears that syntactic fluency can be increased through instruction and that the study of transformational grammar seems to have a positive effect. It is possible that these effects are due to incidental learning that results from the manipulation of kernel sentences rather than to the verbalization of the rules of transformational grammar. Direct instruction and practice in combining kernel sentences has been shown to result in increased syntactic maturity, and in some cases, improved overall quality of the students' writing.

READING COMPREHENSION

The studies reviewed in this section pertain to the question of how reading comprehension is related to the grammatical structure of reading materials and to students' knowledge of these structures.

Some studies have shown that the reading comprehension of students is related to the syntactic complexity of the materials they are reading. Nurss (1968) measured oral and silent reading comprehension and listening comprehension using sentences of varying degrees of syntactic complexity. Listening comprehension was found to be better for complex sentences than for compound or simple sentences. On the other hand, oral and silent reading comprehension were poorer for complex sentences than for compound or simple sentences. Analysis of oral reading errors revealed that, in less complex sentences, fewer hesitations occurred at non-grammatical junctures and more of the substitutions "made sense". Nurss recommended that, as complex syntactic structures begin to appear in reading materials, children should be instructed in ways of dealing with these structures.

Sauer (1970) studied fourth-grade students' comprehension of grammatical structures as incorporated in reading materials. Tests were constructed using Loban's concept of basic sentence patterns and incorporating single words, phrases, and clauses in basic sentence pattern slots. Her results suggested a sequence of levels of structural complexity. Sentences containing single words in sentence pattern slots were easiest to comprehend. Next easiest were sentences with phrases, and sentences with clauses in pattern slots were the most difficult to comprehend.

Smith (1970) wrote an "every fifth word deletion" cloze test in three versions comparable to the syntactic maturity of the average students in grades four, eight, and twelve in Hunt's study. His purpose was to test whether syntactically more complex structures increased reading difficulty. One hundred twenty students were randomly divided into three groups and each was given one of the cloze tests with no verbal instructions, no assistance, and no time limit. Students in grades four to six read fourth grade writing best, but students in grades eight to twelve read eighth grade writing more easily than fourth or twelfth grade writing. It was concluded that the productive level of syntactic maturity might be the best receptive level as well.

Tatham (1970) devised two reading comprehension tests using language patterns frequently used in children's oral language. A language pattern was defined as "a unit in oral or written language that indicates the sequence of slots and movables" (Tatham, 1970:31). Vocabulary, content, and grammatical complexity were held constant. The reading comprehension of second- and fourth-grade students, measured by means of a picture matching task, was found to be significantly higher for the frequently used patterns than for the infrequently used patterns.

Peltz (1974) rewrote social studies passages to approximate the syntactic patterns found in the writing of

tenth-grade students. Each of the thirty-four randomly selected students completed eight "every fifth-word deletion" cloze and four multiple choice tests, alternating between original and rewritten passages. Analysis of variance indicated that on the cloze tests the rewritten material had a significant positive effect on comprehension, but on the multiple choice tests no such effect was found. This was interpreted to mean that the cloze and multiple choice tests measured different comprehension factors.

The results of these studies suggest that reading comprehension is at least partly dependent on the syntactic complexity and the types of structures used in the text, and that reading comprehension is best when textual materials are similar in organization to the reader's own oral language. Other researchers have tried to discover specific sources of reading comprehension difficulties.

Bormuth et al (1970) investigated fourth-grade students' reading comprehension of between- and within-sentence syntactic structures. Comprehension was evaluated through written answers to questions based on materials containing these structures. Between-sentence structures, cases where one sentence determines the meaning of another, were found to cause the most difficulty. Twenty-five percent or more of the students had difficulty with the following structures: comparatives, subordinates, relative clauses, nominalizations, and adjective compliments.

Fagan (1971) studied the effects of five types of transformations on readers' comprehension by constructing cloze tests containing the transformations. The grade four, five, and six students in the study had more difficulty reading the embedding and deletion transformations than the other transformations. The comprehension of sentence meaning was affected more than paragraph meaning because of the limited context. The number of transformations within a sentence did not seem to be related to comprehension difficulty. Fagan concluded that reading comprehension is to some extent dependent upon the types of syntactic structures contained in the text.

Kamm and Askov (1975) tested second-, third-, and fourth-graders to determine whether the use of embedded parts in reading material would affect comprehension. The embedded parts were interruptions between the subjects and verbs of sentences. These interruptions consisted of up to three words and contained details which were necessary to answer the comprehension questions. A comprehension test was rewritten for the experimental group to include interruptions of one to three words between the subject and verb wherever possible. The test was rewritten for the control group to eliminate any interruptions between subjects and verbs. A significant interaction between sex and treatment group was found, with girls performing better than boys on the experimental version, but the overall difference between

the two versions was not significant. The investigators concluded that the inclusion of embedded parts was not a significant factor in reading comprehension. This contradiction to Fagan's findings may be a result of the very short embedded parts used by Kamm and Askov.

The lack of consensus among Bormuth, Fagan, and Kamm et al means that no generalizations can be made as to specific sources of reading comprehension difficulty. Another area where research results are inconclusive is in the studies investigating students' reading comprehension as related to their use of syntactically complex structures in oral and written expression.

Bougere (1969) attempted to determine specific oral language factors which could predict reading achievement. Language samples were analyzed using a method very similar to that of O'Donnell, Griffin, and Norris. Mean T-unit length in oral language was found to add significantly to the predictive value of the Metropolitan Readiness Test in predicting reading comprehension achievement. T-unit length, however, was not found to be a particularly reliable measurement since it varied widely within individuals depending on the contexts in which the language samples were obtained.

Harris (1975) tried to determine the relationship among oral and written syntax attainment and reading achievement of second-grade children. Seventeen measures of syntactic competencies were obtained using an oral and a written

test. Reading achievement was measured by the Metropolitan Achievement Test and intelligence by the Slosson Intelligence Test. The correlation of syntax attainment and reading achievement was found to be significantly greater than the correlation of reading achievement and I.Q. Redundancy coefficients revealed that syntax attainment better accounted for reading achievement than vice versa. Written syntax attainment was more highly correlated than oral syntax attainment with reading achievement.

Bougere and Harris each found that students' reading achievement was in some way related to their use of language. Some of the researchers who used instructional procedures to increase the syntactic complexity of students' writing also explored the possibility that the use of complex structures resulted from increased syntactic competence which may have also improved reading comprehension indirectly.

Hilfman (1970), in her study of the effects of sentence expansion instruction, reported that after the six-week treatment her second-graders were able to read longer, more complex sentences. No test of significance was reported. Hughes (1975) tested the hypothesis that a sentence expansion program would increase reading comprehension measured by the Reading Miscue Inventory (Goodman and Burke, 1971). The greatest gains in reading comprehension appeared among the lower and middle groups. Hughes

concluded that reading comprehension increased at a slower rate than growth in awareness of grammatical functions. Klassen (1976) found that a sentence expansion program for ESL students produced a trend toward improved reading comprehension as measured by a cloze test. The improvement, however, was not statistically significant.

On the other hand, Crews (1968) found that a transformational grammar program increased the variety of sentence structures used in students' writing but did not improve their reading comprehension. Fisher (1974) reported that his sentence expansion program influenced writing ability but not reading comprehension, as measured by a standardized reading test.

From these studies it is difficult to make any generalizations as to whether reading comprehension improves as a result of increasing students' use of complex structures, since reading comprehension was measured in many different ways. In addition, the various instructional programs may have varied in the emphasis placed on the comprehension of the meaning of the structures produced. In a study by Reed (1967) a program of lessons was designed to emphasize comprehension skills through the study of syntax and paragraph structure. This approach resulted in improved comprehension as measured by the Paragraph Comprehension subtest of the Nelson Reading Test. It is possible

that any program of sentence expansion lessons will be effective in promoting reading comprehension only insofar as there is an emphasis on the comprehension of complex structures that students produce.

It seems that there is no clearcut answer to the question of how reading comprehension is related to the grammatical structure of reading materials and to students knowledge of those structures. There is some evidence that reading comprehension is facilitated when reading materials contain language similar to that which would be produced by the reader. There is no consensus of opinion as to which specific structures are likely to cause reading comprehension difficulties. Although there is some evidence that a student's use of complex syntactic structures may predict reading achievement, we cannot be sure whether or not it is possible to improve reading comprehension by increasing a student's use of complex structures.

SUMMARY

This review of research has brought out several main points. Grammatical structures in students' language can be quantitatively analyzed, and developmental trends in syntactic complexity can be detected. The main trend in the literature is that students have been found to increase their T-unit length in written composition as they

mature (Hunt, 1965; O'Donnell, 1967; Braun, 1969; Golub and Fredrick, 1970; Fox, 1972; Loban, 1976).

It appears that the syntactic complexity of students' writing can be increased through instruction. It has been found that instruction in transformational grammar leads to an increase in structural complexity of students' writing (Bateman and Zidonis, 1966; Gale, 1968; Davis, 1967). It has also been found that sentence expansion practice can lead to a similar increase (Mellon, 1969; O'Hare, 1973; Combs, 1976; Miller and Ney, 1968; Fisher, 1974).

Improvement in the syntactic complexity of students' writing appears to be associated with improvement in overall quality of their writing (O'Hare, 1973; Combs, 1976).

There is some evidence that reading comprehension is facilitated when reading materials are similar to the students' productive language in terms of syntactic complexity and types of structures used (Smith, 1970; Tatham, 1970; Peltz, 1974). In addition, there is some evidence that a student's reading comprehension is related to his oral use of syntactically complex structures (Bougere, 1969; Harris, 1975). On the other hand, there is little agreement as to which syntactic structures cause comprehension difficulties, or whether increasing students' use of complex structures is an aid to reading comprehension.

Chapter 3

DESIGN AND PROCEDURES

The main purpose of the study was to investigate the effects of a sentence expansion program on the reading comprehension and written composition of third-grade students. The experimental sentence expansion program was compared to a program of Directed Reading Thinking Activities (DRTAs), a group which was given "free time" in place of a treatment, and a third group which did not depart at all from its regular coursework. Reading comprehension was measured by means of cloze tests written at three different levels of syntactic complexity. Traditional cloze tests (every fifth word deletion pattern) of fifty deletions were used. One cloze passage was written with approximately the same mean T-unit length as the students' own compositions and was considered to be at their productive level in terms of syntactic complexity. This was labelled PL, for productive level. A second cloze passage, PL+4, was written with a mean T-unit length approximately four words longer than the productive level, and PL+8 had a mean T-unit length eight words longer than the productive level. These three cloze passages were used to compare reading comprehension performance at three levels of syntactic complexity.

Each student wrote narrative compositions in response to pictures at pretest time, posttest time, and again after a delay of three weeks. All compositions were analyzed for mean T-unit length. In addition, sentence expansion group compositions were evaluated for several aspects of rhetorical quality. The rhetorical analysis is described later in this chapter.

PRELIMINARY STUDY

Some preliminary work was necessary to provide a framework for developing the materials to be used in the study. In the first phase of this preliminary work, an exploratory analysis of the written compositions of third-grade students was undertaken. There were two reasons for this exploratory analysis. In the first place, it was considered necessary to determine the approximate productive level of third-graders' written compositions in terms of mean T-unit length, so that cloze tests could be constructed at and above their productive level. In the second place, a comparison of the writing of "excellent", "good", and "poor" readers was necessary to determine if there were any differences in the specific syntactic structures used by the three groups. If such differences were found, any structures used only by the best readers would be assumed to be indicative of their superior syntactic competence, and an attempt would be made to teach those structures in the sentence expansion treatment.

The second phase of the preliminary study consisted

of the development of the three cloze passages that were to be used to measure reading comprehension at three levels of syntactic complexity. Once these passages had been written, five alternate cloze test forms were constructed for each passage by varying the starting place of the "every fifth-word" deletion pattern. The five forms of each passage were then administered to small groups of third-grade students in order to find out which two forms were most equivalent in mean difficulty. The two cloze test forms of each passage selected in this way were then used as the posttest and the delayed posttest of reading comprehension in the actual study.

The students who were tested in the preliminary study were third-graders from a school in the same suburban school division from which the sample for the actual study was drawn.

Analysis of Written Compositions

The writing of twenty-two third-grade students was analyzed. Five of these students were described by their teacher as being "excellent" readers, thirteen as being "good" readers, and four as being "poor" readers. The compositions were written in class. The classroom teacher helped with spelling when asked, but she did not suggest changes in the wording or help the students to edit their compositions. The students wrote about their summer vacations.

All compositions were analyzed to determine the number

of words, number of T-units, mean T-unit length, number of subordinate clauses per hundred words, number of phrases per hundred words, and number of co-ordinated predicates per hundred words. The sentence patterns that seemed to be most commonly used in all three groups of readers were: subject + verb, subject + verb + object, and subject + verb to be + subject complement. The means of the "excellent", "good", and "poor" reading groups for several arhetorical measures can be found in Table 3.1.

The mean number of T-units produced was almost the same for the "excellent", "good", and "poor" readers. The "excellent" readers, however, produced longer compositions and longer T-units than did the "good" readers. Similarly, the "good" readers produced longer compositions and longer T-units than did the "poor" readers. The "good" readers produced a larger proportion of phrases than did either the "excellent" or the "poor" readers. The "excellent" readers produced more subordinate clauses and more co-ordinated predicates than did either of the other groups. Although the "good" readers produced an average of 1.29 subordinate clauses per hundred words, all except one of these clauses was an adverbial clause beginning with the word when. The "excellent" readers, on the other hand, produced an average of 2.4 subordinate clauses per hundred words. They too produced more when clauses than any other kind, but they also used clauses beginning with who, which, where, that, and while.

Based on this analysis, a decision was made to design

Table 3.1
 Comparison of the Means of "Excellent", "Good"
 and "Poor" Third-Grade Reading Groups on
 Six Arhetorical Measures of
 Writing Ability

Mean	"Poor" Readers	"Good" Readers	"Excellent" Readers
Number of Words	57	71	86
Number of T-Units	10.50	10.69	10.60
Number of Words/T-Unit	5.48	6.81	8.43
Number of Phrases/100 words	6.99	15.4	10.25
Number of Subordinate Clauses/ 100 words	0	1.29	2.4
Number of Co-ordinated Predicates/100 words	0	1	2

sentence expansion exercises which would elicit who, which, where, and that clauses as well as co-ordinated predicates.

Development of the Cloze Tests

The cloze passages were constructed by adapting passages taken from basal readers. Three passages were selected which a) were approximately 300 words in length, b) contained little or no dialogue, and c) did not depend on pictures to provide necessary contextual information. Any sentences that contained dialogue were rewritten to eliminate the quotations. Each passage was then checked against the Revised Word List from the Spache Readability Formula (Spache, 1953) to determine the percentage of unfamiliar words. In order to make the three passages roughly equivalent on this factor some of the unfamiliar words were replaced with synonyms which were on the Revised Word List so that no passage contained more than 2% unfamiliar words.

The mean T-unit length of each passage was then calculated. One passage, PL, was rewritten to have a shorter mean T-unit length than the original and to approximate third-grade writing in terms of T-unit length, number of subordinate clauses, and number of co-ordinated predicates. The other two passages, PL+4 and PL+8, were rewritten so that they would be increasingly complex in terms of these same factors. These passages may be found in Appendix A.

The Spache Readability Formula was then applied to



each passage to determine a readability grade level. Because the number of unfamiliar words was controlled, differences in readability levels were due mainly to differences in average sentence length, a measure related to but not equal to T-unit length.

Table 3.2 presents a comparison of the three passages with respect to number of words, number of T-units, mean T-unit length, number of subordinate clauses, number of co-ordinated predicates, and Spache readability. For each of these measures except number of T-units, an increase can be seen from passage PL to PL+4 to PL+8. The number of T-units decreased from passage PL to PL+4 to PL+8.

From each passage five forms of a cloze test were constructed. The first and last sentences were left intact and an "every fifth-word" deletion pattern was used beginning with the second word in the second sentence. The five forms represented the five possible variations resulting from beginning the deletion with different words. Bormuth (1964) reported that the means on different cloze forms made from the same passage differed significantly when tests included fifty deletions or fewer. Because it was important for the posttest and delayed posttest forms to be as nearly equivalent as possible, the five test forms of each passage were administered to groups of third-grade students. The mean cloze score for each passage was calculated as well as the

Table 3.2
 Comparison of Cloze Passages PL, PL+4 and
 PL+8 on Six Arhetorical Measures

Measures	PL	PL+4	PL+8
No. of words	281	292	299
No. of T-units	31	22	17
Mean T-unit length	9.06	13.27	17.59
No. of subordinate clauses	4	10	21
No. of co-ordinated predicates	7	8	11
Spache readability	1.9	2.48	2.97

mean score for each of the five test forms of each passage. The two forms which had means closest to the passage mean were selected to be used as the posttest and delayed posttest.

Forty students participated in the cloze test trials. Each student completed one form of each of the three cloze passages, therefore eight students completed each form of each test. Distribution of test forms to students was done on a random basis. For example, any particular student may have completed form 1 of passage PL, form 4 of passage PL+4, and form 3 of passage PL+8. Mean cloze scores for each test form of each of the three passages are found in Table 3.3. The means for forms 4 and 5 of passage PL were found to be closest to the passage mean and therefore were selected to be used as the posttest and delayed posttest. For passage PL+4, forms 4 and 5 were selected and for passage PL+8, forms 1 and 5 were selected.

The exploratory analysis of third-graders' writing and the trials of the cloze test forms were used as the basis for the actual study. The design and procedures used in the study will be described in detail in the following sections.

SAMPLE

Four intact classroom groups of third-grade students from two schools in the same suburban school division participated in the main study. The sentence expansion and DRTA

Table 3.3
Mean Cloze Scores for the Trials of Five Test Forms
of Passages PL, PL+4, and PL+8

Test Form	PL	PL+4	PL+8
Form 1	32.00	25.80	20.90
Form 2	29.80	28.30	18.10
Form 3	31.50	25.00	16.00
Form 4	31.40	26.50	23.80
Form 5	30.70	27.00	18.60
Combined Passage Mean	31.08	26.52	19.48

treatments were each given to one of the third-grade classes in one school while the classes in the other school acted as the two comparison groups. All of these classrooms were receiving reading instruction in the same basal reader, More Than Words - Level Seven in the Collier-Macmillan series (Harris and Clark, 1967).

DESIGN

Each student received only one category of treatment but several measures of his performance were obtained. Measures of reading comprehension and writing were considered separately. Samples of written composition were analyzed to determine mean T-unit length at pretest, posttest, and delayed posttest times. A cloze comprehension pretest score was used as a covariate in analyzing cloze comprehension performance. This procedure was intended to control for initial differences in comprehension ability. Each student's cloze comprehension was tested with materials of three different levels of syntactic complexity at both posttest and delayed posttest times. For each student in each of the four groups the following measurements were obtained:

Pretest	Posttest	Delayed Posttest
T-unit length	T-unit length	T-unit length
Cloze Pretest	Cloze PL	Cloze PL
	Cloze PL+4	Cloze PL+4
	Cloze PL+8	Cloze PL+8

This design may be considered a split-plot factorial design as outlined by Kirk (1969). Because of the repeated measures on the same subjects, differences among test times and among levels of complexity of test passages do not involve differences among subjects. Differences between treatment groups, however, are completely confounded with differences between sets of subjects. For this reason tests of the main effect of treatment are never as powerful as tests of the other factors or of the interactions in this type of design.

PROCEDURES

At pretest time all students were asked to write a composition and to complete a cloze test. The written compositions were done in class during regular writing lessons with the classroom teachers. Three pictures were displayed and briefly discussed. The pictures represented children engaged in different activities and were chosen to elicit narrative compositions. The same three pictures were used in each of the four classes. Students were instructed to choose one picture and write a story about it. No attempt was made to have the students edit or rewrite their compositions.

The cloze pretest was a 266 word passage with a readability of grade 2.18, calculated according to the Spache Readability Formula, and a mean T-unit length of 10.64. The first and last sentences were left intact and every fifth

word was deleted from the remainder of the passage to yield a cloze test of fifty deletions.

The cloze test was administered by the experimenter to one whole class at a time. No time limits were imposed. Because this was the first experience with a cloze passage for most of the students, each class was given a twenty-minute introduction consisting of a discussion of strategies for inferring missing words, an aural cloze exercise, and a practice cloze exercise presented on an overhead projector (Blachowicz, 1977).

Following the pretest, the sentence expansion and DRTA lessons were each given twice in every six day cycle until eight lessons had been completed. For each lesson the students were in their usual reading groups which had been established by the classroom teachers. This meant that the experimenter worked with about half of the class at one time. One group worked with the experimenter in a separate room while the other group worked with their teacher on regular course work. After a thirty-minute lesson the groups changed places. The same procedure was followed for both treatments. The "free time" group and the comparison group were not visited by the experimenter during this time.

At posttest time and again at delayed posttest time, students wrote narrative compositions following the same procedures that were used for the pretest. Each time, a different set of three pictures was used to stimulate the

written responses. The cloze tests for the posttest and delayed posttest were administered by the experimenter.

The only introduction was a brief review of the three rules:

- 1) If you can't think of a word for any space, read to the end of the sentence and go back and try again.
- 2) Write only one word in each blank.
- 3) Phonetic spelling is permissible.

Treatments

Group 1. Group 1 received a total of eight thirty-minute lessons in sentence expansion. The program consisted mainly of oral sentence expansion problems designed to elicit the following structures: adjective word embeddings; adjective phrase embeddings; adjective clause embeddings; and co-ordination of predicates. The decision to concentrate on these specific structures was based on an informal analysis of third grade compositions. This analysis revealed that adjective clauses and co-ordinated predicates occurred more frequently in the writing of students rated as "excellent" readers by their teacher, than in the writing of "good" and "poor" readers. In general, "good" and "excellent" readers used adjective word and phrase embeddings equally often while "poor" readers seldom used any of these structures.

The two existing reading groups were taught separately in order that the groups would be small enough to promote

participation and interaction. Whenever more than one solution was suggested for a sentence expansion problem, students were required to decide whether all of the solutions meant exactly the same thing. They were then asked to evaluate the solutions and decide which would be best. Students were encouraged to articulate their reasons for making this choice. It was emphasized that there are often two or more ways of saying the same thing and that, although no one way is right, a writer must choose the one that sounds best to him. For example, there are several possible ways to combine the following kernel sentences:

My neighbour is a policeman.

He rides a motorcycle.

Students might propose sentences such as "My neighbour, the policeman, rides a motorcycle", "My neighbour is a policeman who rides a motorcycle", or "My neighbour, who is a policeman, rides a motorcycle". In these discussions, attention was focussed on the different ways meaning (deep structure) could be represented in surface forms. In addition to oral sentence expansion practice and discussion, three of the lessons included written exercises. An outline of the sentence expansion lessons is found in Appendix B.

Group 2. Group 2 received a total of eight thirty-minute lessons based on the Directed Reading Thinking Activity (DRTA) as outlined by Stauffer (1975). As for Group 1, the

two existing reading groups were taught separately in order to promote participation in discussions. The materials used for the DRTAs were taken from Stories of Fun and Adventure, Level Six (Canadian Reading Development Series, 1965). These books were reserved for this purpose and were not read by the pupils at any other time.

From the title of a story, students were asked to predict what the story might be about and their predictions were recorded in writing by the experimenter. Students were then asked to read a specified portion of the story and decide which of the various predictions could be verified. Students were called upon to make new predictions, based on the information contained in the portion just read. Whenever there was a difference of opinion as to whether or not a predicted outcome was possible or whether the facts of the story confirmed a prediction, a student was required to defend his position by reading aloud the portion of the story that proved his point. In three of the lessons students were required to write predictions and verifications.

The DRTA treatment was intended to control for any effects caused by the presence of the experimenter, knowledge of participation in an experiment, and participation in group discussions.

Group 3. Group 3 received no special instruction but followed their regular course of instruction. In addition they were allowed a total of eight thirty-minute periods

of free time during which they were allowed to choose from a variety of activities. The free time was used to control for any effect on Groups 1 and 2 that might have been caused by departure from the usual routine and activities.

Group 4. Group 4 received no special instruction and followed their regular course of instruction and their usual timetable. This group served as a comparison group.

Cloze Tests

At pretest time a single cloze test was completed by each student. The scores from this test were later used as a covariate in order to partially control for initial differences among groups in cloze comprehension ability.

For both the posttest and the delayed posttest three passages written at three different levels of syntactic complexity were given as cloze tests. Cloze test PL was written to approximate third grade writing in terms of mean T-unit length, number of subordinate clauses and number of coordinated predicates. This passage was therefore considered to be at the students' approximate productive level. Cloze tests PL+4 and PL+8 were increasingly complex in terms of these same measures.

Analysis of Written Compositions

Students' compositions were not edited or rewritten prior to analysis. All compositions written at the three test times were analyzed according to the arhetorical factors.

Only compositions written by the experimental sentence expansion group were evaluated for rhetorical quality. If, as had been hypothesized, this group improved in arhetorical aspects of their composition, it could be determined whether this improvement was accompanied by an improvement in rhetorical quality.

Arhetorical analysis. Each composition was segmented into T-units and the following measures were recorded: number of words excluding garbles, number of T-units, and mean number of words per T-unit (mean T-unit length). A garble was defined as being any phrase that did not make sense grammatically or semantically. The omission of one word did not result in a T-unit being classed as a garble if the context made it evident that the writer had intended to include the word. The missing word, however, was not included in the word count. Interjections like "Hi" or "Okay" and exclamations like "Oh no!" were treated like garbles and excluded from the analysis after Klassen (1976).

In calculating the total word count several guidelines were followed. Any words which would normally be written as one word were counted as only one even if the student divided it into two or more (e.g. all most, some where, etc.). Conversely, when a student joined together two or more words which are usually written separately, two or more words were counted (e.g. cupplof, oncupon, atime, etc.).

In direct discourse, the speaker tag along with the first main clause following were counted together as one

T-unit (O'Hare, 1973). The words "so" and "then" were considered as co-ordinating conjunctions signallying the beginning of a T-unit.

Rhetorical analysis. Experienced elementary school teachers evaluated all experimental group compositions according to thirteen rhetorical factors selected from the Evaluation Guide for Children's Compositions (Sundbye, 1973). In addition to factors one to twelve which are suggested for use with primary grade students, Sundbye factor eighteen was used because it deals with subordinate clauses and therefore is related to the sentence expansion treatment. A three-point rating scale was used with 2 indicating a high level for any factor, 1 indicating a medium level, and 0 a low level. Three teachers worked on the evaluations, each studying the pretest, posttest, and delayed posttest compositions of one third of the class.

The following is a description of the thirteen Sundbye factors and the standards established for the evaluation.

1. The child uses complete sentences.
 - 2 - almost always even if he uses no punctuation.
 - 1 - sometimes.
 - 0 - almost never.
2. The child uses capital letters appropriately.
 - 2 - almost always capitalizes proper nouns and the first word in a sentence.
 - 1 - uses capitals for proper nouns or first word in sentences but not in both cases, or sometimes uses capitals but misses about half of all cases

where he should use capitals, or capitalizes many words which need not be capitalized.

0 - never or almost never capitalizes words.

3. The child uses periods and question marks appropriately.

2 - almost always uses these punctuation marks correctly.

1 - sometimes omits punctuation or sometimes inserts it where it is not needed.

0 - uses little or no punctuation.

4. The child does not merely enumerate ideas, but the ideas are related.

2 - ideas are all related.

1 - puts in some ideas that don't belong.

0 - merely enumerates unrelated ideas.

5. The child maintains a simple time sequence in his story.

2 - good attempt to sequence ideas.

1 - some attempt to sequence ideas.

0 - no evident sequence, sentences could be rearranged without any effect.

6. The child uses modifiers for nouns and verbs.

2 - if he uses more than two.

1 - if he uses one or two.

0 - if he uses none.

7. The child gives his story a title.

2 - an expressive phrase.

1 - a single word or a title that is not particularly appropriate.

- 0 - no title.
8. The child inserts questions for variety in sentence structure.
- 2 - uses two or more questions if appropriate.
- 1 - uses one question.
- 0 - does not vary sentence structure.
9. The child uses co-ordinators to combine some sentence elements.
- 2 - combines whole sentences and predicates wherever possible.
- 1 - combines subjects and sometimes combines whole sentences or predicates but misses many opportunities to combine ideas.
- 0 - does not use any co-ordinators.
10. The child manipulates sounds and rhythms of words in his writing.
- 2 - at least one effective phrase.
- 1 - an attempt.
- 0 - no attempt.
11. The child uses a third person rather than an egocentric point of view.
- 2 - writes in third person.
- 1 - writes in the second person, or changes from one to another.
- 0 - writes in the first person.

12. The child uses imaginative ideas in his writing.

2 - an imaginative fictional story.

1 - relates a common event.

0 - relates a true story.

13. The child uses subordinate clauses and phrases in his sentences.

2 - uses subordinate clauses and phrases effectively.

1 - uses phrases only, or attempts to use clauses but produces incorrect or awkward structures.

0 - does not use subordinate clauses or phrases.

Each composition was given a score for each of the thirteen individual factors as well as a total Sundbye score which was obtained by simply adding the thirteen subscores. The highest possible total Sundbye score was 26 (13x2).

STATEMENT OF HYPOTHESES

The purpose of the study was to investigate the effects of a sentence expansion program on the reading comprehension and written composition of third-grade students. Effects on mean T-unit length, cloze comprehension scores, and Sundbye Evaluation scores were studied. Several main questions were considered and null hypotheses were formulated in relation to each question.

1. After the treatment period, are there differences among groups in performance on "every fifth-word" deletion cloze tests written at three levels of syntactic complexity?

- H_{1.1} - There are no significant differences among the four groups on the posttest cloze scores.
- H_{1.2} - There are no significant differences in cloze scores across the three levels of complexity of cloze passages on the posttest.
- H_{1.3} - There is no significant interaction between treatment group and level of complexity on the posttest.

2. After a delay of three weeks, are there differences among groups in performance on "every fifth-word" deletion cloze tests written at three levels of syntactic complexity?

- H_{2.1} - There are no significant differences among the four groups on the delayed posttest cloze scores.
- H_{2.2} - There are no significant differences in cloze scores across the three levels of complexity of cloze passages on the delayed posttest.
- H_{2.3} - There is no significant interaction between treatment group and level of complexity on the delayed posttest.

3. Are there differences among groups with respect to mean T-unit lengths calculated from compositions written at either posttest or delayed posttest times?

- H_{3.1} - There are no significant differences in mean T-unit length among the four groups.

H_{3.2} - There are no significant differences in mean T-unit length across the three testing periods.

H_{3.3} - There is no significant interaction between treatment group and test time.

4. Is there a relationship between mean T-unit length and rhetorical factors, as measured by the Sundbye scale?

H_{4.1} - There is no significant correlation between total Sundbye score and mean T-unit length.

H_{4.2} - There is no significant correlation between mean T-unit length and any of the thirteen Sundbye factor scores.

A .05 level of significance was necessary before any effects would be considered statistically significant.

STATISTICAL ANALYSIS

The dependent variable, mean T-unit length, was analyzed using a two-way factorial analysis of variance, considering "treatment" as a factor with four levels and "test time" as a factor with three levels.

For the dependent variable, cloze comprehension scores, the posttest and delayed posttest results were analyzed separately. In each case, pretest cloze scores were used as the covariate to control for any initial differences in comprehension ability. The analysis then consisted of a two-way factorial analysis of covariance, considering "treatment"

as a factor with four levels and "complexity" as a factor with three levels.

In both the analysis of variance for mean T-unit length and the analysis of covariance for cloze comprehension scores, the concern was mainly with the interaction effect since it would indicate that the sentence combining group behaved differently under different levels of another factor than did the three other groups. Since the subjects were not randomly assigned to treatment groups the possibility of inherent differences among sets of subjects meant that the interaction effect had more practical significance than the treatment effect (Kirk, 1969).

Although the study of Sundbye Evaluations was intended to be an exploratory analysis, statistical tests were planned. Pearson Product-Moment correlations were computed to test the significance of the relationships between mean T-unit length and total Sundbye score, and mean T-unit length and each of the thirteen Sundbye factors.

In this chapter, the preliminary study, sample, design, procedures, hypotheses, and statistical analyses have been described. The preliminary work formed the basis of the present study. The treatment, design, and hypotheses were developed as a result of the findings of the exploratory analysis of third-graders' compositions. The materials for the cloze comprehension tests were chosen on the basis of the cloze test trials. In Chapter 4, the findings and analyses of the actual

study will be reported and discussed. Chapter 5 will give a summary of the study as well as the main conclusions and implications for classroom practice and research.

Chapter 4

FINDINGS AND ANALYSES

Prior to the presentation of the findings, the design and procedures of the study are briefly reviewed.

The main purpose of the study was to assess the effects of a program of sentence expansion instruction on the syntactic complexity of students' writing and on the students' reading comprehension of syntactically complex material. The sentence expansion treatment group was compared to a group which received a program of Directed Reading Thinking Activities (DRTAs), a group which was given "free time" in place of a treatment, and a comparison group which did not depart from their regular course of instruction.

The syntactic complexity of students' writing was measured by the mean T-unit length calculated from samples of free writing done at pretest, posttest, and delayed posttest times. Reading comprehension was measured using cloze tests constructed, with an "every fifth-word" deletion pattern, from passages written at three different levels of syntactic complexity. The levels of syntactic complexity ranged from the students' productive level (PL) in terms of mean T-unit length, to a level characterized by a mean T-unit length approximately eight words longer than that of the productive

level (PL+8). Cloze comprehension was measured over these three levels of complexity at both posttest and delayed posttest times. A single cloze pretest was used as a covariate to control for differences among groups in cloze comprehension ability.

It was hypothesized that after the treatment period, the sentence expansion group might be better able than the other groups to comprehend syntactically complex reading material. Furthermore, it was hypothesized that the experimental sentence expansion group might show a greater increase in syntactic complexity of written composition from pretest to posttest to delayed posttest as compared to the other groups.

In addition, compositions written by the sentence expansion group were evaluated according to thirteen factors on the Evaluation Guide for Children's Compositions (Sundbye, 1973). This was an attempt to explore the relationship between the arhetorical measure of mean T-unit length and some rhetorical aspects of written composition.

The findings and analyses will be presented under three main headings corresponding to the three dependent variables - cloze comprehension scores, mean T-unit length, and Sundbye evaluations.

CLOZE COMPREHENSION SCORES

In the analysis of cloze comprehension scores, post-

test and delayed posttest findings were analyzed separately. In each case, the pretest cloze scores were used as covariates to control statistically any differences in cloze comprehension ability which might have been present and which might have confounded differences among treatment groups. A 4 x 3 analysis of covariance including repeated measures was performed using the BMDP 2V program (Dixon, 1975). The first factor, "treatment", consisted of the four treatment groups. The second factor, "complexity", consisted of the three levels of syntactic complexity of test passages which were labelled PL, PL+4, and PL+8. Because of repeated measures on subjects in treatment groups, critical values for the effects within groups were calculated using the formula for the Geisser-Greenhouse conservative F test (Winer, 1971:523).

Posttest

In analyzing the results of the cloze posttests, the main question being considered was whether there would be differences among groups in their performance on cloze tests written at three levels of syntactic complexity. Three null hypotheses were formulated relating to this question. The results and analyses pertaining to each null hypothesis will be discussed in this section.

H_{1.1} - There were no significant differences among the four treatment groups in posttest cloze scores.

In Table 4.1 the group means on the posttest cloze

passages are reported together with the means adjusted on the basis of the covariate. Group 3, the "free time" group, was found to have had the highest mean score on each of the three cloze passages. The mean score for this group on all three cloze passages combined was 31.227. The next highest combined mean was 23.625 for Group 1, the sentence expansion group. Group 4, the reference group, had the third highest mean, 22.611. The lowest combined mean was 20.850 for Group 2, the DRTA group.

Group 3 was also found to have had the highest mean score on the cloze pretest. Their mean score was 35.083 as compared to 31.083, 29.650, and 30.542 for Groups 1, 2, and 4 respectively. It appears that Group 3 was markedly superior to the other groups before the treatment period. In this study the subjects were not randomly assigned to the four treatment groups since intact classroom groups were used. In order to control for differences in comprehension ability among groups, all posttest mean cloze scores were adjusted using the pretest scores as covariates.

Inspection of the adjusted means revealed that, although the differences among groups had been reduced, the adjusted means for Group 3 were still consistently higher than the adjusted means for the other three groups. The adjusted means for Group 3 were 32.887, 29.487, and 25.687 on the three cloze passages PL, PL+4, and PL+8. Group 1's adjusted means were 27.931, 27.598, and 16.390

Table 4.1
 Mean Scores for Four Treatment Groups on Three
 Cloze Passages at Posttest Time Before
 and After Covariate Adjustment

Group	Covariate Pretest	PL	PL+4	PL+8	All Passages Combined
(Unadjusted)					
Sentence Expansion - 1	31.083	27.583	27.250	16.042	23.625
DRTA - 2	29.650	26.600	21.650	14.300	20.850
"Free Time" 3	35.080	34.760	31.360	27.560	31.227
Comparison- 4	30.542	29.542	23.750	14.542	22.611
All Groups Combined	31.710	29.806	26.247	18.376	24.810
(Adjusted)					
	1	27.931	27.598	16.390	
	2	27.744	22.794	15.444	
	3	32.887	29.487	25.687	
	4	30.191	24.399	15.191	

on the three cloze passages. Adjusted means for Group 2 were 27.744, 22.794, and 15.444. For Group 4 they were 30.191, 24.399, and 15.191.

The results of the analysis of covariance for post-test cloze comprehension scores are summarized in Table 4.2. The F value computed for the main effect of treatment was 10.38 ($F_{3,88} = 4.05$). Since this F value reached the .01 level of significance, $H_{1.1}$ was rejected and it was concluded that there were significant differences among groups in cloze comprehension performance after the treatment period. This conclusion must be interpreted rather cautiously. Because students in Group 3, the "free time" group, scored higher on the cloze pretest as well as on the posttests this significant effect cannot necessarily be attributed solely to differential effects of the various treatments.

The covariance procedure was used to control for initial differences among students in cloze comprehension ability. This was necessary because intact classroom groups were used for the four treatment groups. Neither the non-random assignment of groups nor the difference among group means on the covariate would necessarily invalidate or bias the analysis of covariance (Overall and Woodward, 1977). It is possible, however, that the use of the cloze pretest as a covariate did not remove all of the variation due to initial differences in cloze comprehension ability. This may

Table 4.2
 Analysis of Covariance for Cloze
 Comprehension Posttests

Source	SS	df	MS	F	P
Between Ss					
Treatment(A)	1877.98438	3	625.99463	10.38	*.01
Error	5307.23438	88	60.30948		
Within Ss					
Complexity(B)	6395.67578	2	3197.83789	120.79	*.01 ⁺
A x B	635.75781	6	105.95963	4	*.05 ⁺
Error	4712.26953	178	26.47342		

⁺critical values based on df determined by Geisser-Greenhouse Conservative F-test:
 Complexity df = 1,89
 A x B df = 3,89

have happened if the scores of the students in Group 3 displayed a ceiling effect on the cloze pretest. The mean pretest cloze score for Group 3 was $(35.08 \div 50 \times 100)$ 70.16% correct responses. This score is well above the 57% cloze score identified by Bormuth (1968) as indicating the independent reading level. This may mean that the cloze pretest was too easy to properly differentiate among students of varying ability at the upper limits of the range. If that were the case, then differences in cloze comprehension ability between Group 3 and the other groups would have been underestimated by the pretest. Consequently, the covariate adjustment in Group 3 scores would not have been great enough to control for the initial difference. The significant treatment effect, therefore, may reflect the inherent superiority of Group 3 rather than any real effect of the treatments.

H_{1.2} - There were no significant differences in cloze scores across the three levels of syntactic complexity of cloze passages on the posttest.

In Table 4.1 it can be seen that the means for each of the four groups decreased from cloze passage PL to PL+4 to PL+8. The mean cloze score for all groups combined on cloze passage PL was 29.806 correct restorations. Since there were fifty deletions, this score is equal to 59.61% correct responses $(29.806 \div 50 \times 100)$. This is above the 57% identified by Bormuth (1969) as indicating an independent reading level. The mean cloze score for all groups combined on cloze pas-

sage PL+4 was 26.247 or 52.49% correct responses. According to Bormuth's criteria this score indicates an instructional reading level. The overall mean cloze score on passage PL+8 was only 18.376 or 36.75% which indicates a frustration level.

In the analysis of covariance (Table 4.2), the F value calculated for the main effect of complexity was 120.79. The df determined by the Geisser-Greenhouse formula were $1, (N-T)$ or 1,89, therefore the main effect of complexity was considered to be significant ($P_{1,89} = 3.96$). The significant complexity effect led to the rejection of $H_{1.2}$ and it was concluded that there were significant differences in cloze scores across the three levels of syntactic complexity of passages at posttest time. This effect was to be expected because the calculated readability of the passages increased from the least complex passage (PL) the most complex passage (PL+8). The significant F test for this effect confirmed that the syntactic complexity of test passages did affect readability of those passages.

$H_{1.3}$ - There was no significant interaction between treatment group and level of syntactic complexity of cloze passages on the posttest.

The analysis of covariance (Table 4.2) resulted in an F value of 4.00 for the interaction effect. Again the Geisser-Greenhouse formula was used to determine $df = (T-1)$, $(N-T) = 3,89$. Because $P_{3,89} = 2.72$ the interaction effect was considered to be significant. $H_{1.3}$ was therefore re-

jected and it was concluded that there was a significant interaction between treatment group and level of syntactic complexity of test passage at posttest time. This was interpreted to mean that the treatment groups behaved differently at different levels of complexity.

This significant interaction was further probed by performing a trend analysis using orthogonal polynomials (Keppel, 1973). The purpose of the trend analysis was to specify the nature of the interaction between treatment group and complexity of test passage. The questions being investigated were: a) What is the nature of the trend in cloze scores across levels of complexity? b) Were the trends in cloze scores across levels of complexity the same for all groups? c) If the trends were not the same for all groups how did they differ? The results of the trend analysis are presented in Table 4.3.

The answer to the first question, "What was the nature of the trend in the cloze scores across levels of complexity?" was obtained by using orthogonal polynomials to determine whether the trend was primarily linear or quadratic. Figure 4.1 gives illustrations of linear and quadratic trends.

The F value for the linear component of the complexity effect was found to be 201.86. Since $F_{.01, 1, 89} = 6.96$, it was concluded that there was a significant linear component in the trend of cloze scores across levels of complexity. The F value for the quadratic component of the trend was 12.4.

Table 4.3

Summary of the Trend Analysis for
Posttest Cloze Scores

Source	SS	df	MS	F	P
(Linear)					
Complexity	6114.79297	1	6114.79297	201.86	*.01
Complexity x Treatment	384.31860	3	128.10620	4.23	*.01
Complexity for Treatment 1	1598.52	1	1598.52	52.77	*.01
Complexity for Treatment 2	1512.9	1	1512.9	49.94	*.01
Complexity for Treatment 3	647.998	1	647.998	21.39	*.01
Complexity for Treatment 4	2699.9	1	2699.9	89.13	*.01
Error	2696.07007	89	30.29291		
(Quadratic)					
Complexity	280.88403	1	280.88403	12.4	*.01
Complexity x Treatment	251.4453	3	83.81509	3.7	** .05
Complexity for Treatment 1	473.06	1	473.06	20.88	*.01
Complexity for Treatment 2	19.24	1	19.24	.85	N.S.
Complexity for Treatment 3	.67	1	.67	.03	N.S.
Complexity for Treatment 4	46.69	1	46.69	2.06	N.S.
Error	2016.20288	89	22.65396		

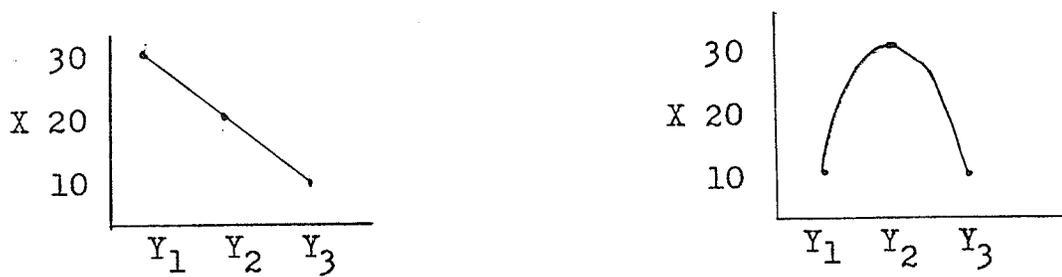


Figure 4.1

Illustrations of Linear and Quadratic Relations
Between Dependent and Independent Variables

This also was significant ($P_{1,89} = 6.96$). Since the sum of squares for the main effect of complexity was 6395.67578 and the sum of squares for the linear component of the complexity effect was 6114.79297, the linear component accounted for 95.6% ($6114.79297 \div 6395.67578 \times 100$) of the trend in cloze scores across levels of complexity. It was concluded therefore that, in general, cloze scores decreased from passage PL to PL+4 to PL+8 and that the decrease was fairly systematic.

In order to answer the question, "Were the trends in cloze scores across levels of complexity the same for all groups?", the linear and quadratic components were computed for the interaction between treatment group and syntactic complexity of cloze passages. The trend components of the interaction consist of the variability among groups in the trends after the variability due to the trend components of the main effect of complexity have been removed (Keppel, 1973).

In Table 4.3, it can be seen that the F value for the linear component of the complexity x treatment interaction was 4.23. This was significant at the .05 level ($P_{3,89} = 2.72$). It was concluded that there were significant differences among groups in the linear components of their trends in cloze scores across levels of complexity.

The F value for the quadratic component of the interaction was also significant ($F_{3,89} = 3.7$, $P_{3,89} =$

2.72). This means that there were also significant differences among groups in the quadratic components of their trends in cloze scores across levels of complexity.

The question "How do the four groups differ in their trends of cloze scores across levels of complexity?" was probed by performing a trend analysis of simple main effect (Keppel, 1973). This was done by partitioning the simple main effects into linear and quadratic trend components. In other words, the trend components were tested separately for each group as if the calculations were being performed on four separate single-factor experiments.

The linear trend components calculated for each of the four groups are reported in Table 4.3. The F values were 52.77 for Group 1, 49.94 for Group 2, 21.39 for Group 3, and 89.13 for Group 4 ($F_{1,89} = 6.96$). The linear component of the trend was significant for each of the separate groups. This means that, for each group, cloze performance decreased from the least complex passage (PL) to the most complex passage (PL+8). Treatment Group 3, the "free time" group, contributed the least to the linear component of the trend, showing that the decrease in cloze scores across levels of complexity was less marked for this group than for the other groups. This may indicate that the effect of the complexity of the passage on reading comprehension is greater when the material is difficult for the reader than when it is relatively easy.

In Table 4.3 it can also be seen that the quadratic component of the trend was significant only for Group 1, the sentence expansion group. The F value for this group was 20.88 ($F_{.01, 1, 89} = 6.96$). F values for Groups 2, 3, and 4 were .85, .08, and 2.06 respectively. These F values were not found to be significant at the .05 level ($F_{.05, 1, 89} = 3.96$). This means that, although cloze scores for all groups decreased from PL to PL+8, the shape of the curve in the cloze scores when plotted on a graph was significantly different for Group 1. The performance of this group was constant from PL to PL+4 and then decreased to PL+8. In all other groups, the cloze scores decreased systematically from PL to PL+4 to PL+8. These performance trends can be seen in Figure 4.2.

Delayed Posttest

In analyzing the results of the delayed posttest of cloze comprehension, the main question being considered was whether, after a delay of three weeks, there would be differences among groups in their performance on cloze tests written at three levels of syntactic complexity. The three null hypotheses formulated and the analyses of results were the same as for the posttest.

$H_{2.1}$ There were no significant differences among the four treatment groups on the delayed posttest cloze scores.

Group means on the delayed posttest cloze passages

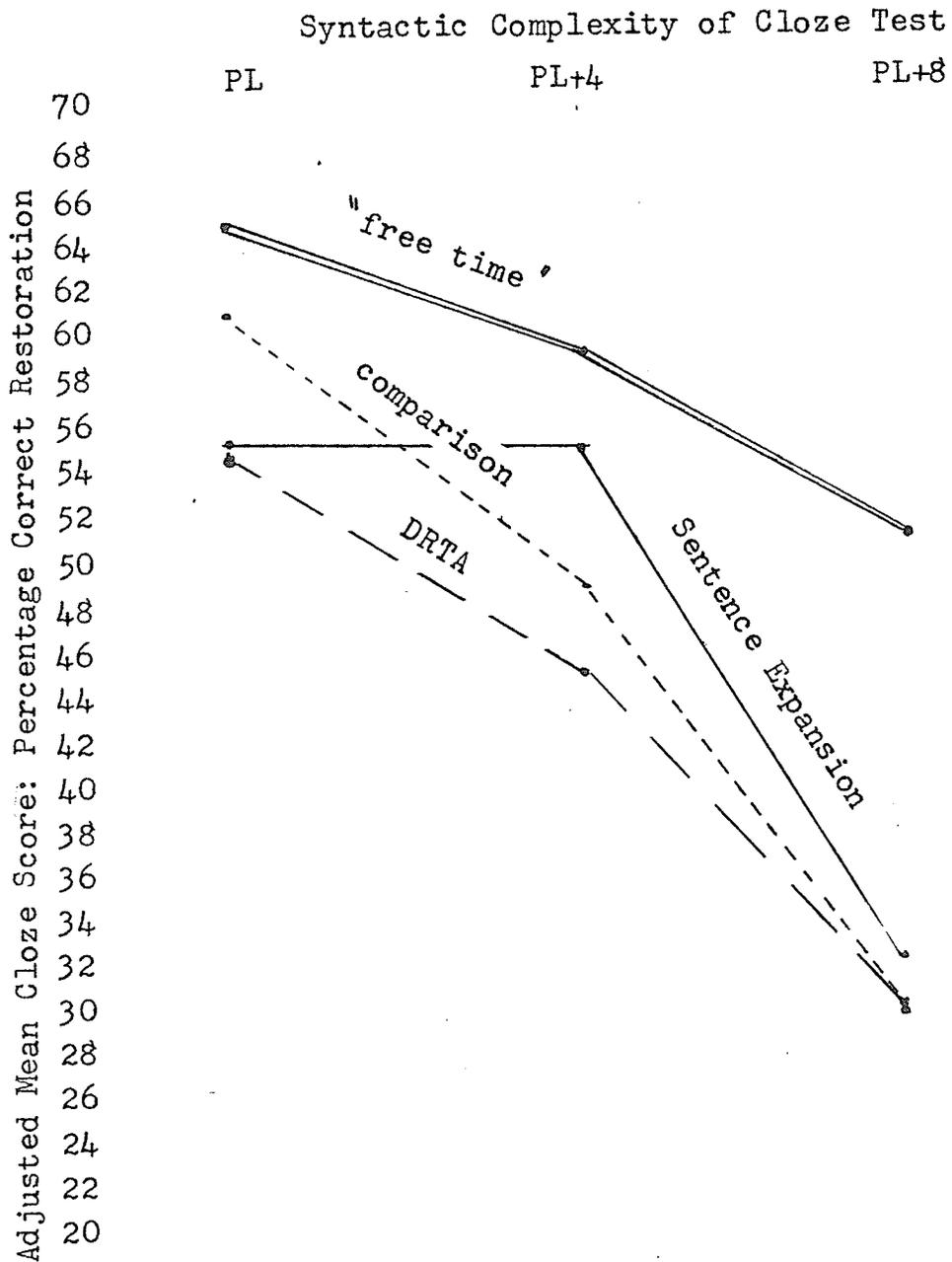


Figure 4.2

The Trend of Posttest Cloze Performance Across Three Levels of Syntactic Complexity for Four Treatment Groups

are reported in Table 4.4 along with group means adjusted on the basis of the covariate, pretest cloze scores. Again, it can be seen that Group 3, the "free time" group consistently scored higher than all other groups. Their mean score for the three passages combined was 34.139 as compared to 28.524, 22.870, and 27.806 for Groups 1, 2 and 4. Even after the covariate adjustment, the means for Group 3 were higher than those of the other groups on each cloze passage.

Results of the analysis of covariance for the delayed posttests (Table 4.5) were similar to those for the posttest. The main effect of treatment was found to be significant ($F_{3,82} = 5.81$; $P_{.01,3,82} = 4.07$). $H_{2.1}$ was therefore rejected and it was concluded that there were significant differences among the four treatment groups in cloze comprehension scores on the delayed posttest. As on the posttest this significant treatment effect reflects the superiority of Group 3, the "free time" group, rather than any differences due to the actual treatments.

$H_{2.2}$ - There were no significant differences in cloze scores across the three levels of syntactic complexity of cloze passages on the delayed posttest.

In Table 4.4 it can be seen that the mean cloze score for all groups combined on the passage PL was 36.437. In passage PL+4 it was 30.034 and on passage PL+8 it was 19.544. In the analysis of covariance (Table 4.5), the

Table 4.4

Mean Scores for Four Treatment Groups on Three Cloze Passages at Delayed Posttest Time Before and After Covariate Adjustment

Group	Covariate Pretest	PL	PL+4	PL+8	All Passages Combined
(Unadjusted)					
Sentence Expansion - 1	31.083	36.238	31.524	17.810	28.524
DRTA - 2	29.650	30.778	22.333	15.500	22.870
"Free time" 3	35.080	39.792	35.333	27.292	34.139
Comparison- 4	30.542	27.500	29.208	16.708	27.806
All Groups Combined	31.710	36.437	30.034	19.544	28.705
(Adjusted)					
1		36.680	31.966	18.252	
2		32.270	23.825	16.992	
3		37.522	33.064	25.022	
4		38.263	29.971	17.471	

Table 4.5
 Analysis of Covariance for Cloze Comprehension
 Delayed Posttests

Source	SS	df	MS	F	P
Between Ss					
Treatment(A)	1528.96094	3	509.65356	5.81	*.01
Error	7198.09766	82	87.78168		
Within Ss					
Complexity(B)	12239.35156	2	6119.67578	189.83	*.01 ⁺
A x B	644.59375	6	107.43228	3.33	*.05 ⁺
Error	5351.84766	166	32.23703		

⁺critical values based on df determined by Geisser-Greenhouse Conservative F-test:
 Complexity df = 1,83
 A x B df = 3,83

main effect of complexity was found to be significant ($F_{1,83} = 189.83$, $P_{.01,1,83} = 6.99$). As in the analysis of posttest results, the Geisser-Greenhouse formula was used to determine df for the within-subjects effects. On the basis of the analysis of covariance, $H_{2.2}$ was rejected and it was concluded that there were significant differences in cloze scores across the three levels of syntactic complexity of delayed posttest cloze passages.

$H_{2.3}$ - There was no significant interaction between treatment group and level of complexity of cloze passages on the delayed posttest.

The analysis of covariance (Table 4.5) resulted in an F value of 3.33 for the interaction between treatment and complexity. Since $P_{.05,3,83} = 2.73$, the effect of the interaction was considered to be significant. $H_{2.3}$ was rejected and it was concluded that there was a significant interaction between treatment group and complexity of test passage. The trend analysis of simple main effects for delayed posttest results is summarized in Table 4.6. As in the posttest findings the main effect of complexity was characterized by a significant linear component ($F_{1,83} = 284.93$, $p < .01$), and a significant quadratic component ($F_{1,83} = 9.26$, $p < .01$).

The significant linear component of the interaction ($F_{3,83} = 3.64$, $p < .05$) means that the groups differed in the

Table 4.6

Summary of the Trend Analysis for Delayed
Posttest Cloze Scores

Source	SS	df	MS	F	P
(Linear)					
Complexity	12033.4219	1	12033.4219	284.93	*.01
Complexity x Treatment	461.7815	3	153.9272	3.64	** .05
Complexity for Treatment 1	3565.9316	1	3565.9316	84.43	*.01
Complexity for Treatment 2	2100.6923	1	2100.6923	49.74	*.01
Complexity for Treatment 3	1875.0000	1	1875.0000	44.40	*.01
Complexity for Treatment 4	5187.5222	1	5187.5222	122.83	*.01
Error	3505.3464	83	42.2331		
(Quadratic)					
Complexity	205.9292	1	205.9292	9.26	*.01
Complexity x Treatment	182.8169	3	60.9390	2.74	** .05
Complexity for Treatment 1	283.5013	1	283.5013	12.75	*.01
Complexity for Treatment 2	7.7870	1	7.7870	.35	N.S.
Complexity for Treatment 3	51.3613	1	51.3613	2.31	N.S.
Complexity for Treatment 4	70.8401	1	70.8401	3.185	N.S.
Error	1846.0049	83	22.2410		

linear components of the trends in their cloze scores across levels of complexity. The F value for the quadratic component of the interaction was 2.74, a figure which barely reached significance since $F_{.05,3,83} = 2.73$. It was concluded that the groups also differed in the quadratic components of the trends in their cloze scores across levels of complexity.

The trends in performance across levels of complexity for all groups were characterized by a significant linear component. The F values were 84.43, 49.74, 44.40, and 122.83 for Groups 1, 2, 3, and 4 ($F_{.01,1,83} = 6.99$). In each group cloze scores decreased across levels of complexity. The quadratic component, however, was significant only for the sentence expansion group. The F values were 12.75, .35, 2.31, and 3.185 for Groups 1, 2, 3 and 4 ($F_{.01,1,83} = 6.99$, $F_{.05,1,83} = 3.97$). It was concluded that cloze scores for Group 1, the sentence expansion group, did not decrease systematically across the three levels of complexity. In Figure 4.3 the performance trends for the four treatment groups are compared.

The quadratic component of the trend in scores of the experimental sentence combining group had decreased considerably between the time of the posttests and the delayed posttests. The F value had decreased from 20.88 to 12.75. The difference in the trends of the sentence combining group scores at these two test times can be seen in Figure 4.4.

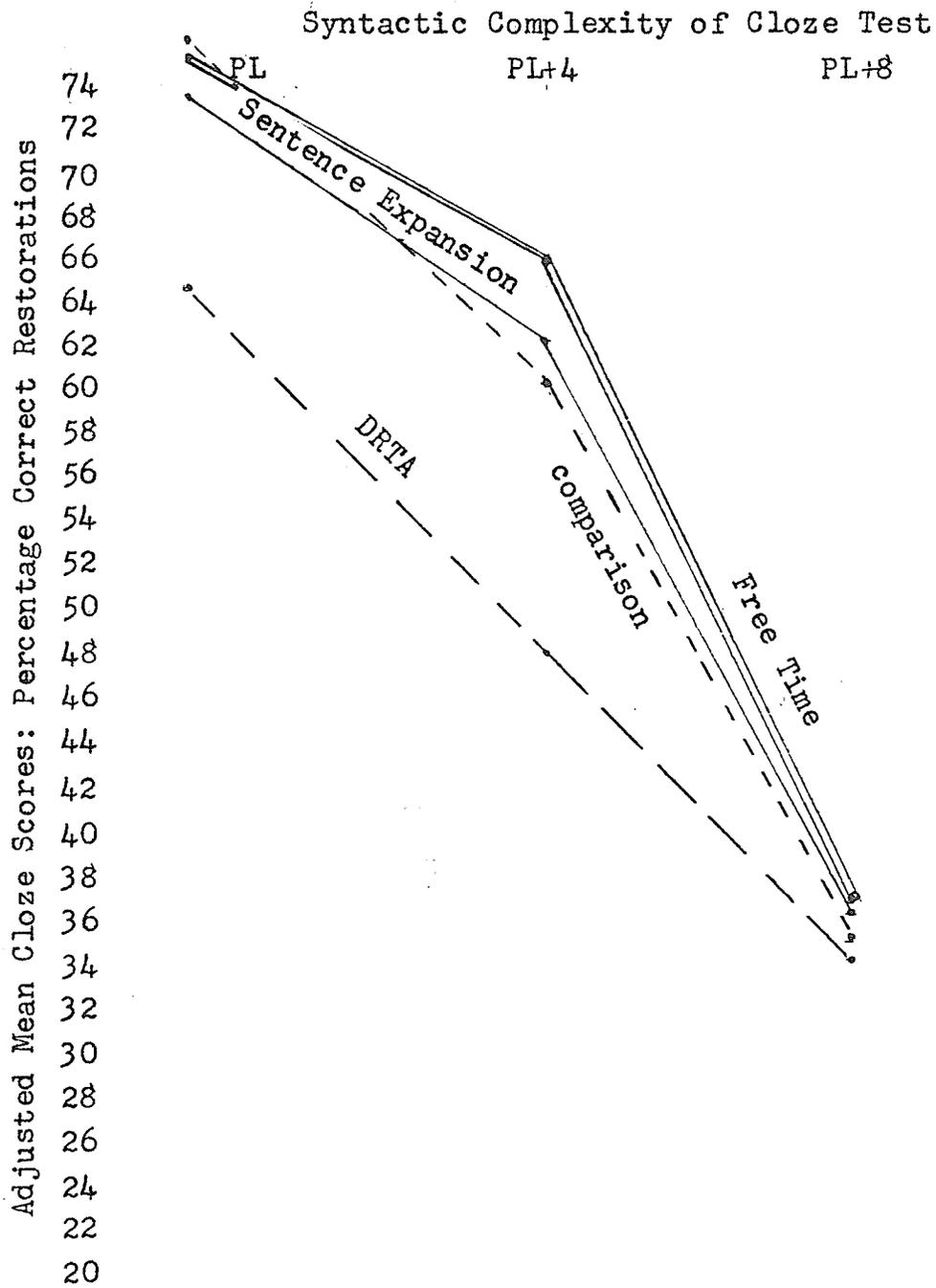


Figure 4.3

The Trend of Delayed Posttest Cloze Performance Across Three Levels of Syntactic Complexity for Four Treatment Groups

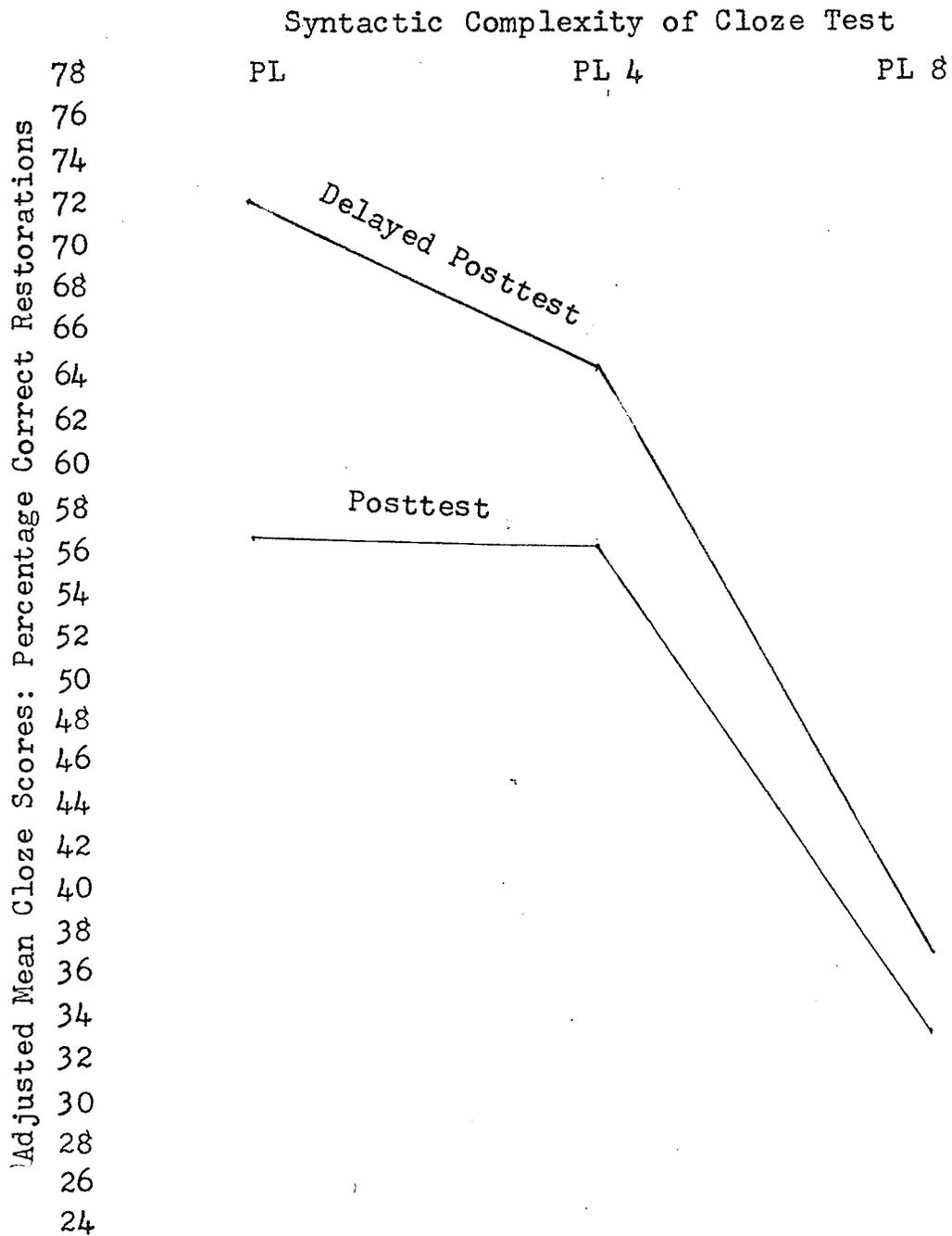


Figure 4.4

Comparison of Trends in Sentence Expansion Group
Cloze Scores on Posttests and Delayed Posttests

This decrease in the quadratic component of the trend seems to indicate that the effects of the sentence expansion treatment on cloze comprehension, although still significant after a three week delay, may not be long lived.

These findings for the cloze comprehension tests led to the conclusion that the sentence expansion treatment did affect the students' reading comprehension. The effect was an improvement in the reading comprehension of passage PL+4, but not of passage PL+8. This could mean one of two things. Perhaps the sentence combining expansion had the effect of improving comprehension of reading material written at a level slightly above the students' productive level in terms of syntactic complexity, but was not able to affect comprehension of a passage considerably more complex than the productive level. Alternatively, because of the many sentence-combining transformations involved in the writing of the most complex passage, PL+8, it may have been too complex to make much sense to anyone. The overall mean cloze scores for passage PL+8 were 18.376 or 37.75% correct responses on the posttest and 19.544 or 39.09% correct responses on the delayed posttest. The percentages are both below the 44% criteria set by Bormuth for instructional level and therefore this passage could be considered to be at the frustration level of these students.

Cloze Completion Errors

Because the error rate was so much higher on cloze

passage PL+8 than on passage PL, a comparative analysis of the types of completion errors made in these two passages was undertaken. Five subjects were randomly selected from the sentence expansion group. Although in the original analysis of cloze tests an exact scoring method was used, the post-test cloze responses of these five subjects were studied to determine what percentage of cloze completion errors were acceptable words. In making the decision as to whether a completion response was acceptable, punctuation was ignored. If a response made sense semantically and grammatically, it was considered acceptable even if the punctuation was then incorrect. The judgment of semantic and grammatical acceptability was based on the guidelines proposed in the Reading Miscue Inventory (Goodman and Burke, 1972). A response was considered acceptable if it resulted in a sentence that was meaningful within the context of the passage. If a completion response produced two T-units where the original passage had only one, it was labelled a "simplifying" response.

e.g. Wallace had not gone far when he came to a
river in the woods he sat down to think...

The results of this error analysis are summarized in Table 4.7. Over 20% of all errors made on cloze passage PL+8 by these five students were simplifying responses. No simplifying responses occurred on passage PL. Apparently, students tried to simplify this syntactically complex passage by increasing the number of T-units, thereby reducing

Table 4.7

Qualitative Analysis of Posttest Cloze Completion
 Errors of Five Subjects Selected at Random

Randomly Selected Subjects	Passage	$\frac{\text{\#acceptable words}}{\text{\#exact score errors}}$	%	$\frac{\text{\#simplifying responses}}{\text{\#exact score errors}}$	%
1	PL	10/13	77%	0/13	0%
1	PL+8	21/28	75%	7/28	25%
2	PL	8/11	73%	0/11	0%
2	PL+8	17/23	74%	3/23	13%
3	PL	9/11	82%	0/11	0%
3	PL+8	19/23	83%	6/23	26%
4	PL	8/9	89%	0/9	0%
4	PL+8	16/17	94%	4/17	24%
5	PL	8/17	47%	0/17	0%
5	PL+8	16/30	53%	5/30	17%

the mean T-unit length. This was accomplished by undoing some of the sentence-combining transformations.

MEAN T-UNIT LENGTH

At pretest time the mean T-unit length for written compositions calculated across the total sample of third-graders was 8.45. This figure is slightly higher than Hunt's (1965) mean of 7.67 and Loban's (1976) mean of 7.60 for third-grade samples. This difference may be partly accounted for by the fact that Hunt and Loban examined expository writing while the present study dealt with narrative writing.

In analyzing the results for the dependent variable mean T-unit length, the main question being considered was whether there would be differences among groups in mean T-unit length at either the posttest or the delayed posttest times. Three null hypotheses were investigated and each will be discussed in the following section.

H_{3.1} - There were no significant differences among groups in mean T-unit lengths calculated from their written compositions.

The mean T-unit lengths found for each group at pretest, posttest, and delayed posttest times are recorded in Table 4.8. Treatment Group 3, the "free time" group, had the highest mean T-unit length at pretest time. Their mean was 8.912 as compared to 8.746, 8.182 and 7.840 for Groups

Table 4.8

Mean T-Unit Lengths in Written Compositions
of Four Treatment Groups at
Three Test Times

Group	Pretest	Posttest	Delayed Posttest	Combined
Sentence Expansion-1	8.746	8.745	9.106	8.866
DRTA -2	8.182	7.742	7.747	7.890
"Free Time"3	8.912	9.026	8.148	8.696
Compari- son 4	7.840	8.774	8.485	8.366
Combined	8.454	8.607	8.386	8.482

1, 2, and 4 respectively. At posttest time, Group 3 still had the highest mean T-unit length. Their mean was 9.026 as compared to 8.745, 7.742, and 8.774 for Groups 1, 2, and 4. On the delayed posttest, however, Treatment Group 1, the sentence expansion group, had a mean T-unit length of 9.106 which was higher than the means of 7.747, 8.148, and 8.485 found for Groups 2, 3, and 4.

When the overall mean T-unit length was calculated by combining results for the pretest, posttest, and delayed posttest compositions, the mean for Group 1 was 8.866, which was higher than the means of 7.890, 8.696, and 8.366 found for Groups 2, 3, and 4.

A 4 x 3 factorial analysis of variance including repeated measures was executed using the BMDP 2V program (Dixon, 1975). The first factor, treatment group, consisted of: 1) experimental sentence expansion treatment, 2) DRTA treatment, 3) free-time, and 4) control. The second factor, test time, consisted of the repeated measures: 1) pretest, 2) posttest, and 3) delayed posttest. Table 4.9 summarizes the results of this analysis of variance.

The main effect of treatment was not found to be significant ($F_{3,81} = 2.45$, $P_{.05,3,81} = 2.73$). $H_{3.1}$ was therefore accepted and it was concluded that there were no significant differences among the four treatment groups in mean T-unit length.

$H_{3.2}$ - There were no significant differences in the

Table 4.9
 Analysis of Variance for Mean
 T-Unit Length

Source	SS	df	MS	F	P.05
Between Ss					
Treatment(A)	33.7615	3	11.2538	2.45	2.73
Error	372.5298	81	4.5991		
Within Ss					
Test Time(B)	1.8396	2	0.9198	0.43	3.05
A x B	22.2356	6	3.7059	1.74	2.77
Error	344.8635	162	2.1288		

mean T-unit length of written compositions written at pretest, posttest, and delayed posttest times.

In the analysis of variance (Table 4.8) the main effect of test time was not found to be significant ($F_{2,162} = 0.43$, $P_{.05_{2,162}} = 3.05$). $H_{3.2}$ was accepted and it was concluded that there were no significant differences in mean T-unit length at pretest, posttest, and delayed posttest times.

$H_{3.3}$ - There was no significant interaction between treatment group and test time for the dependent variable mean T-unit length.

The F value found for the treatment x test time interaction was 1.74. This value failed to reach significance at the .05 level ($P_{.05_{6,162}} = 2.77$). $H_{3.3}$ was accepted and it was concluded that there was no significant interaction between treatment group and time of test.

SUNDBYE EVALUATIONS

Pretest, posttest, and delayed posttest compositions of the experimental sentence expansion group were evaluated for rhetorical quality using thirteen selected factors from the Evaluation Guide for Children's Compositions (Sundbye, 1973). The main purpose of this part of the analysis was to explore the relationship between rhetorical and arhetorical aspects of students' writing. Two specific null hypotheses will be discussed in this section and also several incidental

observations.

$H_{4.1}$ - There was no significant correlation between mean T-unit length and overall Sundbye evaluation of written compositions.

Pearson product-moment correlation coefficients were computed to ascertain the relationships among three measures - total Sundbye score, mean T-unit length, and total cloze comprehension scores. Table 4.10 reports the results of these computations. Significance levels are based on eighteen pairs of observations. The correlation coefficient for total Sundbye score and mean T-unit length did not reach the .05 level of significance ($r_{18} = .24$, $p > .05$). $H_{4.1}$ was therefore accepted and it was concluded that there was no significant correlation between mean T-unit length and overall Sundbye evaluation of written compositions.

Neither the correlation between cloze comprehension and mean T-unit length ($r_{18} = .09$, $p > .05$) nor the correlation between cloze comprehension and Sundbye scores ($r_{18} = -.04$, $p > .05$) were found to be significant. It appears that, in this study, there was little or no relationship among the three dependent variables.

$H_{4.2}$ - There was no significant correlation between mean T-unit length and any one of the individual Sundbye factors.

Table 4.11 reports correlations between each of the individual Sundbye subscores with a) total Sundbye score,

Table 4.10

Intercorrelations Among Total Sundbye Score,
Mean T-Unit Length, and Total Cloze Score

	Sundbye	T-Unit	Cloze
Sundbye	-	.24	-.04
T-Unit	-	-	.09
Cloze	-	-	-

(N = 18)

$P_{.05} = .468$

Table 4.11

Correlations of Sundbye Subscores with Total Sundbye Score, Mean T-Unit Length, and Total Cloze Score

Subscore	Total Sundbye Score	Mean T-Unit Length	Cloze Comprehension Score
1	-.23	-.21	.01
2	.07	.03	.04
3	.42	-.11	-.03
4	-.20	.13	.22
5	.77**	.32	.06
6	.56*	.27	.06
7	.54*	.35	.22
8	.02	.10	-.32
9	.72**	.00	-.04
10	.52*	.01	-.30
11	.68**	.17	-.13
12	.39	-.05	.15
† 18	.49*	-.06	-.13

(N = 18)

** $P_{.01_{18}} = .590$

* $P_{.05_{18}} = .468$

† Factor 18 is not normally used with primary grade students.

b) mean T-unit length, and c) cloze comprehension score. Since none of the Sundbye subscores were found to be correlated with mean T-unit length at a level beyond $p = .05$, $H_{4.2}$ was accepted and it was concluded that there was no significant correlation between mean T-unit length and any of the individual Sundbye factors.

In addition, it was noted that none of the Sundbye factors was significantly correlated with cloze comprehension. As could be expected, several of the individual Sundbye factors were found to be significantly correlated with total Sundbye score. The single subscores which were significantly correlated with total Sundbye score, in order of their predictive value, were:

- #5 The child maintains a simple time sequence in his story ($r_{18} = .77, p < .01$)
- #9 The child uses co-ordinators to combine some sentence elements ($r_{18} = .72, p < .01$)
- #11 The child uses a third person rather than an egocentric point of view ($r_{18} = .68, p < .01$)
- #6 The child uses modifiers for nouns and verbs ($r_{18} = .56, p < .05$)
- #7 The child gives his story a title ($r_{18} = .54, p < .05$)
- #10 The child manipulates sounds and rhythms of words in his writing ($r_{18} = .52, p < .05$)
- #18 The child uses subordinate clauses and phrases in his sentences ($r_{18} = .49, p < .05$).

DISCUSSION

The findings for the cloze comprehension tests indicated that the syntactic complexity of the cloze passages did affect the students' comprehension of those passages. When the percentage of correct restorations for each cloze passage were compared to Bormuth's (1969) criteria for reading levels, it was noted that cloze passage PL, which was written at the students' approximate productive level, was within the range of their independent reading level. In other words, students could read such material independently with little or no difficulty. Cloze passage PL+4, written slightly above the students' productive level, was within the range of their instructional reading level. Material such as this would be suitable for instruction in reading, that is, students could read it with some help from their teacher. Cloze passage PL+8, written at a level considerably above the students' productive level, was within the range of their frustration reading level. Students would be unable to satisfactorily comprehend material written at this level.

The readability levels of the three cloze passages, calculated according to the Spache readability formula (Spache, 1953), were grade 1.9 for passage PL, grade 2.48 for passage PL+4, and grade 2.97 for passage PL+8. Since the students who participated in the study were in the latter half of grade three and the readability grade levels were all below grade three, it would seem likely that these students would

be able to read all of these passages satisfactorily. The cloze comprehension scores, however, indicated that the passage PL+8 was at the frustration level of these students. The factors contributing to the estimate of readability in the Spache formula are proportion of "unfamiliar" words and sentence length. It is apparent that syntactic complexity is a factor which affects readability to some extent, but the Spache readability formula does not take this into account.

The results of the trend analysis suggest that the sentence expansion treatment had the effect of improving students' reading comprehension of a passage written with a mean T-unit length four words longer than that of their productive level, but that it did not affect comprehension of a passage which had a mean T-unit length eight words longer than that of their productive level. This could mean that the sentence expansion treatment could only improve reading comprehension of complex syntactic structures up to a certain point. Another possibility is that in the cloze passage PL+8, because it was rewritten to have such long T-units, the language was somewhat unnatural or contrived, and therefore was difficult for anyone to understand.

Previous research findings were inconclusive regarding the effect of sentence expansion treatment on reading comprehension (Fisher, 1974; Hughes, 1975; Klassen, 1976). The lack of consistent findings could be a result of variations in the instruments used to test reading comprehension.

The findings of the present study indicate that the sentence expansion treatment improved reading comprehension of materials written at one level of syntactic complexity (PL+4), but not at the others (PL and PL+8).

After the present study was concluded, Straw (1978) reported finding that syntactic complexity of cloze passages affected reading comprehension. Straw's fourth-grade students performed significantly better on the two more complex passages (mean T-unit lengths of eight and thirteen words) than on the least complex passage (mean T-unit length of 5 words). In the present study, third-grade students' cloze scores were lowest for the most complex passage, PL+8 (mean T-unit length of 17.59 words). It appears that passages that are either much more complex or much less complex than the students' productive level are difficult to comprehend. It seems then that, if materials used to test reading comprehension are either too simple or too complex in terms of syntactic complexity, the effects of a sentence expansion treatment may not be detected.

The analysis of the errors made on the cloze completion tests revealed that, in the most complex passage, students had a tendency to try to simplify the text by reversing some of the sentence-combining transformations. The errors that they made often had the effect of changing one T-unit into two or more T-units. The students would often do this even when the punctuation made it evident that their

response was not correct. When students made this type of "simplifying" response, the result was a sentence that was meaningful within the context of the passage but somewhat different than the original text.

In the analysis of arhetorical aspects of students' written compositions, no significant differences among groups in mean T-unit length was found. It seems that either the sentence expansion treatment had no real effect on the syntactic complexity of students' writing or the variable mean T-unit length was so unreliably measured that no effects could be detected.

Other researchers have reported significant increases in the mean T-unit length of students' compositions after sentence expansion treatment (O'Hare, 1973; Hughes, 1975; Combs, 1976; Miller and Ney, 1968; Straw, 1978). There are several possible reasons for the failure to find significant results on this variable in the present study. These reasons can be separated into two categories: 1) reasons why the treatment may not have had any effect, and 2) reasons why the effect may not have been detected.

Several factors may have limited the effect of the sentence expansion treatment. The first of these factors is the length of time spent on the treatment. It is possible that the eight lessons in sentence combining were insufficient to significantly affect the writing of third grade students. The total amount of time spent on the treatment was about

four hours, considerably less than the twenty hours spent by Comb's group, and the year long programs instituted by O'Hare, and Miller and Ney.

The second factor is the grade level of the students. It is possible that third-grade students are not able to increase their mean T-unit length as easily as older students. Subjects in the O'Hare and Combs studies were seventh-grade students while Miller and Ney's subjects were fourth-graders.

A third possible factor is the emphasis of the sentence expansion treatment. It is possible that in the present study, the emphasis was on discovering the relationship between surface and deep structures, whereas in other studies the emphasis may have been on producing complex sentences. This may also explain why the sentence expansion treatment appears to have improved students' reading comprehension but not the syntactic complexity of their writing.

Several factors may have prevented the detection of possible effects of the sentence expansion treatment. The first of these factors is the length of the samples of written composition.

The written compositions analyzed in the present study were varied in length. Subjects were merely asked to write a story about a certain picture. No time limits were imposed and subjects wrote as much as they wished. The result was that compositions ranged in length from about forty-five words

to three hundred and fifteen words. Since the mean T-unit length was the measure used in the analysis of variance the differences in length of compositions did not interfere with the analysis. It is possible, however, that these samples gave an unreliable measure of mean T-unit length.

The second factor which may have prevented the detection of possible treatment effects is the fact that students were given a choice of three pictures to stimulate the writing at each test time. Although all compositions were in the narrative mode, there may have been differences in mean T-unit within subjects that were related to their choice of writing stimuli.

A third factor which must be considered is the mode of compositions. The present study dealt only with the narrative compositions whereas other researchers have considered expository compositions. It has been found that mean T-unit length varies between modes of composition within individuals (Britton, 1975). It is possible that mean T-unit length is not measured as reliably in narrative compositions as in expository compositions.

The fourth factor involved in the detection of treatment effects is the method of measuring syntactic competence. It is possible that, although students learned to produce complex sentences in a somewhat structured situation, this learning was not applied in a free writing situation. In other words, when given a number of kernel sentences and

asked to combine them in some way, students could produce complex sentences, but in their free writings they would not necessarily produce the same kinds of sentences. In a rewriting task, students are given a passage written in many short sentences and are asked to rewrite it. Hunt (1977) proposed a rewriting task as a means of testing students' syntactic maturity because it eliminates differences in the content of the writing and it requires less time. It is possible that a rewriting rather than a free writing task would better measure the kind of learning that results from sentence expansion practice.

The findings of this study indicated a very low relationship between rhetorical and arhetorical aspects of students' writing. Longer T-units were not necessarily associated with high ratings of rhetorical quality in the sentence expansion group. None of the thirteen rhetorical factors rated were significantly correlated with mean T-unit length. Of particular importance is the fact that neither the use of modifiers nor the use of subordinate clauses and phrases was found to be significantly correlated with mean T-unit length. This suggests that either long T-units were often achieved through the use of structures other than modifiers, clauses, and phrases, or the ratings of Sundbye factors were not particularly accurate.

The individual Sundbye factors which were most highly related to total Sundbye score measured the child's ability

to a) maintain a time sequence, b) use co-ordinators, c) avoid egocentricity, d) use modifiers, e) give an appropriate title, f) manipulate sounds and words to create certain effects, and g) use subordinate clauses and phrases. It seems that factors such as organization of ideas, point of view, and choice of words are more important to rhetorical quality than the use of complex sentences.

In this chapter the findings for three dependent variables have been reported and discussed. The dependent variables were cloze comprehension, mean T-unit length, and Sundbye evaluation. It appears that sentence expansion instruction improved cloze comprehension of syntactically complex material but did not improve mean T-unit length in written composition. Rhetorical and arhetorical aspects of students' compositions did not appear to be highly related.

Chapter 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

SUMMARY

The primary purpose of this study was to assess the effects of sentence expansion practice on third-grade students' reading comprehension of passages written at varying levels of syntactic maturity, and on the syntactic complexity of their written language. A secondary purpose was to explore the relationship between rhetorical and arhetorical aspects of the sentence expansion group's compositions.

The sentence expansion instruction aimed at assisting students to combine two or more kernel sentences to produce a more complex sentence indicative of more mature writing. An increase in complexity could be accomplished through the use of modifiers, phrases, clauses, or co-ordinating subjects or predicates. Previous research had shown that sentence expansion practice appeared to lead to an increase in the structural complexity of the writing of seventh-graders (Mellon, 1969; O'Hare, 1973; Combs, 1976), of fourth-graders (Miller and Ney, 1968), and even of second-graders (Hilfman, 1970; Young, 1973). The relationship between quantitative and qualitative aspects of composition is an

important one (Lundsteen, 1976; Cooper, 1977), but the sentence expansion studies did not conclusively show that increased structural complexity resulted in improvement in overall quality (Mellon, 1969; O'Hare, 1973; Combs, 1976).

There is some evidence that suggested that reading comprehension was facilitated when reading materials were patterned after the students' productive language in terms of syntactic complexity and types of structures used (Smith, 1970; Tatham, 1970; Peltz, 1974). In addition, some studies suggested that a student's reading comprehension is related to his oral use of syntactically complex structures (Bougere, 1969; Harris, 1975). There is little agreement, however, as to whether increasing students' use of complex structures through sentence expansion instruction will result in improved reading comprehension (Hilfman, 1970; Hughes, 1975; Fisher, 1976; Klassen, 1976). From a more theoretical perspective, Fodor's (1975) "analysis by analysis" model suggested that a language receiver reverses the transformations of an incoming sentence to uncover the deep structure, a process which indicates a possible relationship between sentence expansion ability and comprehension ability.

The students who participated in the study were 102 third-graders from four classes in two elementary schools in the same middle-class suburban school division in Winnipeg, Manitoba. At the time of the study, all four

classes were receiving reading instruction in the same basal reader, More Than Words, which is the seventh level in the Collier-McMillan reading series (Harris and Clark, 1970).

In this study, the experimental sentence expansion treatment and three comparison treatments were administered to groups of third-grade students for a period of four weeks. All students wrote a narrative composition and completed an "every fifth-word deletion" cloze test before the treatments began. Both after the treatment period and again after a three week delay all students wrote narrative compositions and completed three cloze tests written at increasing levels of syntactic complexity.

The measure of syntactic complexity used to assess the cloze passages and the students' compositions was mean T-unit length. Reading comprehension was measured by means of a cloze test, PL, written to approximate students' productive language in terms of mean T-unit length, as well as two cloze tests, PL+4 and PL+8, written to have successively longer T-unit lengths. Since the Evaluation Guide for Children's Composition (Sundbye, 1973) had proven valuable in working with teachers (Froese, 1977) it was selected as a means of rating rhetorical quality.

The four intact classroom groups served as the four treatment groups. Group 1 received the experimental sentence expansion treatment. They were given instruction

in combining and elaborating kernel sentences to produce complex sentences. The sentence expansion instruction was given to half of the class at a time in order to ensure participation and interaction in group discussions. Each group was given eight half-hour periods of instruction. Group 2 was given a series of Directed Reading Thinking Activities or DRTAs (Stauffer, 1975). They also received their instruction in eight half-hour periods and only half of the class was taught at a time. Group 3 was given eight half-hour periods of "free time" during which they could choose from a variety of activities. Group 4 acted as a comparison group. They were given no treatment and did not depart from their usual timetable and course of instruction.

The four groups were compared with respect to mean T-unit length at pretest, posttest, and delayed posttest times. In the analysis of cloze comprehension scores, the pretest cloze scores were used as covariates to partially control for initial differences in cloze comprehension ability. At posttest time and again at delayed posttest time, the patterns of cloze scores across the three test passages for the four groups were compared.

At posttest time and delayed posttest time, cloze comprehension scores were found to decrease from cloze passage PL to PL+4 to PL+8. When percentages of correct restorations on cloze tests were compared to Bormuth's (1969) criteria for reading levels, it was discovered that cloze

passage PL could be considered to be at the independent reading level of the students in this sample. Cloze passage PL+4 could be considered to be at their instructional reading level, and passage PL+8 to be at their frustration level.

Group 3, the "free time" group, scored consistently higher on cloze tests than any of the other groups. Because of the superiority of this group in cloze comprehension ability the results had to be interpreted cautiously. The analysis of covariance indicated significant differences among treatment groups in cloze scores at both posttest and delayed posttest times. This significant difference was believed to reflect the superiority of Group 3 rather than any effects due to the treatments.

The analysis of covariance also indicated significant differences in cloze scores across the three levels of syntactic complexity of cloze passages and a significant interaction between treatment group and syntactic complexity of cloze passage at both posttest and delayed posttest times.

The significant interaction was further probed by performing a trend analysis using orthogonal polynomials (Keppel, 1973). This analysis revealed that the trends in cloze scores across levels of syntactic complexity were primarily linear. In other words, cloze comprehension scores decreased at a uniform rate from cloze passage PL to PL+4 to PL+8. Group 1, the sentence expansion group, was found to

differ significantly from the other groups in the trend of cloze scores across levels of complexity. In this group, cloze performance remained constant from passage PL to PL+4 and then decreased to passage PL+8. Although this difference in the trends was significant at both posttest and delayed posttest times, the magnitude of the difference decreased from posttest to delayed posttest.

The mean T-unit length in written compositions was not found to be significantly different among groups or at the three different test times. There was no significant interaction between treatment group and test time.

Neither the total Sundbye score nor any of the thirteen individual Sundbye factors were found to be significantly correlated with mean T-unit length in written compositions. Seven of the thirteen Sundbye factors were found to be significantly correlated with total Sundbye score. In order of their predictive value they are:

- #5 The child maintains a simple time sequence in his story.
- #9 The child uses co-ordinators to combine some sentence elements.
- #11 The child uses a third person rather than an egocentric point of view.
- #6 The child uses modifiers for nouns and verbs.
- #7 The child gives his story a title.

#10 The child manipulates sounds and rhythms of words in his writing.

#18 The child uses subordinate clauses and phrases in his sentences.

The analyses of the findings in this study have led to several main conclusions as well as some implications for research and for classroom practice.

CONCLUSIONS

Analyses of the findings of this study led to several conclusions pertaining to the dependent variables cloze comprehension score, mean T-unit length, and Sundbye evaluation. In reporting these conclusions, eleven specific null hypotheses will be discussed.

$H_{1.1}$ - There were no significant differences among groups in posttest cloze scores.

The significant treatment effect found in the analysis of covariance led to the rejection of this hypothesis. Because Group 3, the "free time" group, had the highest mean cloze score on every cloze test including the pretest, there was some doubt as to whether the covariance procedure had removed all of the variation due to initial differences in cloze comprehension ability. Although it was concluded that there were significant differences among groups in cloze comprehension scores, this conclusion has little practical significance. It was believed that the significant

difference was due largely to the superiority of Group 3 rather than to any effects caused by the treatments.

$H_{1.2}$ - There were no significant differences in cloze comprehension scores across the three levels of syntactic complexity of cloze passages on the posttest.

A significant complexity effect in the analysis of covariance led to the rejection of $H_{1.2}$. Differences in syntactic complexity did seem to affect the readability of the cloze passages as indicated by the percentage of correct restoration. Few of the subjects satisfactorily comprehended passage PL+8, written with a mean T-unit length eight words longer than that of their productive language. When percentages of correct restorations were compared to Bormuth's (1969) criteria for reading levels, it appeared that passage PL+8 was at the frustration level of the students in this sample. On the other hand, passage PL+4 was considered to be at their instructional reading level and passage PL (productive level) was considered to be at the students' independent reading level. It was concluded that there were significant differences in cloze comprehension scores across the three levels of syntactic complexity of cloze passages.

$H_{1.3}$ - There was no significant interaction between treatment group and syntactic complexity of cloze passage on the posttest.

The analysis of covariance indicated that the inter-

action effect was significant. $H_{1.3}$ was therefore rejected. When the interaction was further probed by performing a trend analysis, it was found that there were significant differences among groups in their trends of cloze scores across levels of complexity of cloze passages.

It appeared that the sentence expansion practice did have some effect on the experimental group students' reading comprehension. After the experimental treatment, these students were able to comprehend a passage written at their productive level (PL) and a passage written above their productive level (PL+4) equally well. All other groups found the second passage more difficult to comprehend. It was concluded that the sentence expansion practice had the effect of improving students' ability to comprehend syntactically complex material. This finding would seem to be in accordance with Fodor's "analysis by analysis" model.

$H_{2.1}$ - There were no significant differences among groups in delayed posttest cloze scores.

This hypothesis was rejected on the basis of the results of the analysis of covariance for delayed posttest scores. The significant difference among groups, however, probably reflects the superiority of Group 3 and therefore must be interpreted cautiously.

$H_{2.2}$ - There were no significant differences in cloze comprehension scores across the three levels of syntactic complexity of cloze passages on the delayed posttest.

As in the posttest results, the analysis of covariance resulted in a significant complexity effect. $H_{2.2}$ was rejected and it was concluded that there were significant differences in cloze scores across the levels of complexity.

$H_{2.3}$ - There was no significant interaction between treatment group and syntactic complexity of cloze passage on the delayed posttest.

A significant interaction effect in the analysis of covariance led to the rejection of $H_{2.3}$. The trend analysis used to further investigate this interaction, indicated that the trend in cloze scores across levels of complexity was significantly different for the sentence expansion group than for the other groups. As in the posttest, it was concluded that the sentence expansion treatment had the effect of improving students' comprehension of syntactically complex materials.

$H_{3.1}$ - There were no significant differences among treatment groups in mean T-unit lengths in written compositions.

$H_{3.2}$ - There were no significant differences in the mean T-unit lengths of compositions written at pretest, posttest, and delayed posttest times.

$H_{3.3}$ - There was no significant interaction between treatment group and time of test.

An analysis of variance for the dependent variable

mean T-unit length indicated no significant effects. The three hypotheses $H_{3.1}$, $H_{3.2}$, and $H_{3.3}$ were all accepted. The sentence expansion practice appears to have had little effect on the arhetorical measure of mean T-unit length. Other researchers have found a significant increase on this variable after sentence expansion practice (O'Hare, 1973; Combs, 1976; Fisher, 1976; Miller and Ney, 1968). The non-significant results in this study may have been caused by the fact that the measure of mean T-unit length lacked reliability due to insufficient sample size. It is possible, however, that in this study the emphasis in the sentence expansion treatment was on discovering the relationship between deep and surface structure, while other investigators may have emphasized the production of complex structures. The fact that sentence expansion practice appeared to have influenced reading comprehension but not mean T-unit length is in accordance with other evidence that comprehension precedes production of complex structures (Fraser, Bellugi, and Brown, 1963).

$H_{4.1}$ - There was no significant correlation between mean T-unit length and total Sundbye score.

$H_{4.2}$ - There was no significant correlation between mean T-unit length and any of the thirteen Sundbye subscores.

Both $H_{4.1}$ and $H_{4.2}$ were accepted since none of the correlation coefficients were found to be significant. It was concluded that there was little or no relationship be-

tween rhetorical and arhetorical factors since long T-units were not necessarily associated with high Sundbye ratings. The ability to use transformations which result in coordinators, modifiers, phrases, or clauses may conceivably be influenced by sentence expansion practice. Other factors, however, such as the ability to organize ideas, to avoid egocentricity, and to manipulate words for certain effects are also important to rhetorical quality.

IMPLICATIONS FOR FURTHER RESEARCH

Although the findings of this study have indicated a low relationship between rhetorical and arhetorical aspects of written composition, this is an area which may warrant further investigation. There is some doubt that the length of writing samples studied was sufficient to provide a reliable measure of mean T-unit length, and therefore, any conclusions concerning the relationship between T-unit length and rhetorical quality must be only tentative.

Because a relationship had been found between global quality ratings and mean T-unit length in previous research (O'Hare, 1973; Combs, 1976), but no significant relationship was found between Sundbye evaluation and mean T-unit length in the present study, future research could compare these two kinds of quality measures. Identification of the significant factors involved in global quality ratings would also help to explain the lack of agreement regarding the re-

relationship between rhetorical and arhetorical measures.

It may be useful to study the relationship between rhetorical and arhetorical measures in different types of writing (i.e. expository, narrative, descriptive). A related area of investigation would be to look at differences in mean T-unit length within individuals which may be related to the type of writing.

In this study it was unclear whether the failure to find significant improvements in the mean T-unit length of the students' compositions after sentence expansion treatment was caused by the lack of any experimental effect or by the difficulties in measuring such an effect. The effects of sentence expansion treatment on arhetorical aspects of compositions could perhaps be better measured if a) the students were not given a choice of writing stimuli, b) longer samples were obtained from each student, and c) the length of the treatment period were increased. In future research, it may be valuable to consider the effects of sentence expansion treatment as measured by the frequency of production of specific grammatical structures (i.e. subordinate clauses, co-ordinated predicates, etc.) instead of or in addition to mean T-unit length. Another possible way of measuring experimental effects would be to use a rewriting rather than a free writing task. A comparison of the structures produced in rewriting and free writing could also be undertaken.

There is a need for a more detailed and extensive

analysis of the cloze completion errors made on syntactically complex cloze passages in order to shed more light on the specific nature of the comprehension difficulties posed by these passages. In this study, it was noted that cloze completion errors often had the effect of reversing some of the sentence-combining transformations in the passage. Bever (1968) suggested that oral reading miscues often reveal that students are reversing sentence-combining transformations in order to reduce the complexity of the text. It may be useful to compare oral reading miscues and cloze completion errors on syntactically complex passages.

The commonly used readability formulae take into consideration only sentence length and familiarity of words used. In this study syntactic complexity appeared to increase readability. There is a need therefore to try to develop readability formulae which would include syntactic complexity as a factor. Work in this area has been begun by Granowsky and Botel (1974).

IMPLICATIONS FOR CLASSROOM PRACTICE

From the findings and conclusions of this study it is apparent that the teacher of reading must be aware of the influence of syntactic complexity on the readability of a passage. In developing the cloze passages for this study, passages from basal readers had to be simplified to approximate the students' productive level. In general, reader passages were found to have a mean T-unit length almost four words longer than that of students' productive level. Since the sentence expansion treatment in this study had the effect of improving reading comprehension of passage PL+4, it seems that sentence expansion instruction could be used to help students to cope with complex structures that they encounter in basal readers.

In teaching and evaluating writing, teachers should emphasize the rhetorical factors found to be significant indicators of total Sundbye evaluations. These factors were: the time sequence in the story, the use of co-ordinators to combine some sentence elements, avoidance of egocentricity, the use of modifiers, the appropriateness of the title, the creation of special effects by the manipulation of sounds and rhythms, and the use of subordinate clauses and phrases.

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APPENDICES

APPENDIX A

CLOZE PASSAGES

1. Pretest
2. Passage PL
3. Passage PL+4
4. Passage PL+8

PRETEST

The Quarrel

Once an elephant and a monkey had a quarrel. Both animals were very proud. The elephant was proud that he could pull down the biggest tree. The monkey was proud that he could climb that tree in the wink of an eye.

The quarrel got louder and louder. At last a wise old owl wanted to know what the quarrel was about. The owl knew how to settle the quarrel. He told the two animals to swim across the river and pick some fruit from a tree on the other side.

The elephant and the monkey hurried to the river. When the monkey saw the deep river he felt afraid to cross it. But the proud elephant told him to get on his back and he carried him across the river.

A beautiful fruit tree was growing on the bank of the river. The elephant lifted his trunk to pick the fruit but he couldn't reach it. The monkey began to laugh. He knew that the elephant needed some help. He easily climbed the tall tree, picked some of the finest fruit, and dropped it to the elephant.

Then the two animals crossed the river again and went to the owl's home in the forest. The owl said, "Being strong alone or quick alone is not enough. It

took both of you to get the fruit from the tree. The elephant was strong enough to cross the deep river. The monkey was quick enough to climb the tall tree and pick the fruit." The two animals nodded their heads. Never again did they boast or quarrel.

PASSAGE PL

Mrs. Turtle and the New Hat

Mrs. Duck looked at the big new sign in the window of her hat store. She hoped that she would* sell** many hats at her sale. They were all so beautiful.

Just then Mrs. Turtle stopped by the open door and looked in. Mrs. Duck told her to come in and find a pretty hat. Mrs. Turtle crawled into the hat store and looked all around. She wanted a little pink hat.

Mrs. Duck put a pretty little hat on Mrs. Turtle's head. It was a pink hat with a blue feather on it. It looked wonderful on Mrs. Turtle. She had never had a hat before. She bought it. She went out of the store wearing her new pink hat.

Then Mrs. Turtle met a big dog. Now Mrs. Turtle was afraid of dogs. She pulled her head into her shell, and off went the new pink hat. Soon the dog went on his way. Then Mrs. Turtle put her head out of her shell and looked all around for her new hat. It was on the grass not far away.

Mrs. Turtle had not thought of that. Her shell was her house. She could not get a hat into her house.

*posttest deletions

**delayed posttest deletions

Mrs. Turtle picked up her new hat and took it back to Mrs. Duck's store. She told Mrs. Duck that hats were not made for turtles. She put her head into her shell and showed Mrs. Duck how her hat came off.

Mrs. Duck laughed. She had learned something. Now she knew why hats were not made for turtles. Mrs. Duck put the hat back on her table. Mrs. Turtle crawled off to her own little pond.

PASSAGE PL+4

Bonnie Bess

This is the story of a beautiful black trotting horse named Bonnie Bess. Bonnie Bess was a weathervane** horse* who lived at the top of a farmer's barn. She turned around and around to show the way the wind was blowing. When the wind blew from the east, she turned around and trotted toward the east. When the wind blew from the west, Bess trotted toward the west.

One day the farmer moved away and took his hens, ducks, cows, and horses. He did not take Bonnie Bess, but left her turning in the wind. Now the house and barn were empty. Nothing but Bonnie Bess was left behind.

As the years went by, the roof of the barn fell in and the paint peeled off. One day in winter a cold wind blew Bonnie Bess right off the barn and over to the side of the road.

A man in a truck came down the road, saw Bonnie Bess, and picked her up. He took her to his little shop where he had many old things. Each day people came into the shop and bought old things, but no one wanted an old weathervane horse.

*posttest deletions

**delayed posttest deletions

One day a farmer came into the shop and looked around. When he saw Bonnie Bess he knew she was just the weathervane he wanted to put on the top of his barn. The farmer bought Bonnie Bess and took her away in his truck. The truck stopped right in front of the barn where Bonnie Bess had lived for so many years.

When the farmer put Bonnie Bess back on top of the barn, she started to work right away. She was happy to be on the old barn once more turning around and around.

PASSAGE PL+8

The Cat Who Went Wild

Wallace was a quiet black and white cat who lived with the Bird family. He was* a very good cat** who always went to sleep when he should and always ate all of the food Mrs. Bird put into his bowl.

Wallace was very very good but not very happy because he wanted to be wild and fierce like some of the wild animals he had seen on T.V. So one day Wallace left home.

Wallace had not gone far when he came to a river in the woods and sat down to think about catching something to eat. As he looked around he saw a fish swimming in the river and thought that it would make a good lunch. Wallace jumped at the fish as it swam slowly by, but missed by a foot.

Very wet and hungry, Wallace set out again to find his lunch. He went from one tree to the next, being very careful and making no noise at all. Pretty soon he saw a turtle walking along the path and thought it would make a good lunch. He jumped on the turtle and bit it so hard that he hurt his teeth. And he watched sadly as another lunch

*posttest deletions

**delayed posttest deletions

went slowly on its way.

Wallace had not gone far when he saw a skunk and thought that it would make a wonderful lunch. When he jumped on the skunk it sprayed Wallace with something that smelled so bad that Wallace could not even breathe. Wallace watched sadly as the skunk went on its way and thought about what he should do. He thought he should go back to the house where the Bird family lived and get some lunch and have a rest. After all, he had found out that it wasn't much fun being wild.

APPENDIX B

OUTLINE OF SENTENCE EXPANSION LESSONS

1. Adjective word embeddings

a. before the subject

The man lived in a cottage.

The man was old.

The man was little.

The dog ran around the yard.

The dog was excited.

The dog was little.

b. before the object

I saw a monster.

The monster was hairy.

The monster was green.

He took a cookie.

The cookie was fresh.

The cookie was chocolate.

c. before the predicate nominative

He was a farmer.

He was hard-working.

She was a movie star.

She was famous.

d. before the object of a preposition

They were in a cave.

The cave was dark.

The card was from his uncle.

The uncle was his favorite.

2. Adjective phrase embeddings

a. prepositional phrases

Joe lives in that big house.

The house is near the school.

I went to the beach yesterday.

I went with my sister.

b. appositive phrases

Mrs. Wiebe can speak French.

Mrs. Wiebe is our teacher.

Glen is my best friend.

Glen is the boy next door.

3. Adjective clause embeddings using who

Children often have cavities.

Children eat too many sweets.

The girl was given a big trophy.

The girl won the race.

Practice using kernels generated by the class.

4. Adjective clause embeddings using which

They bought a new house.

The house had a swing in the yard.

Everyone passed the test.

The test was given on Friday.

Practice using kernels generated by the class.

5. Adjective clause embeddings using that

I opened the present first.

The present was a baseball glove.

My friend told me something.

It made me angry.

Practice using kernels generated by the class.

6. Adjective clause embeddings using where

We sat down by a stream.

We had our lunch by the stream.

They all came over to our house.

The party was going to be at our house.

Practice using kernels generated by the class.

7. Co-ordinated predicates

I ran home.

I told my mom the news.

He saw a stray dog.

He took it home with him.

Practice using kernels generated by the class.

8. Multiple embeddings

Once there was a woodcutter.

He was poor.

But he was honest.

He was at work cutting trees.

He was working beside a lake.

The lake was beautiful.

He cut first on one side of a big tree.

Then he cut on the other side.

The tree was just about to fall.

His axe flew out of his hands.

It went down into the lake.

It made a big splash.

The woodcutter sat down on a log.
He put his head in his hands.

He had no axe.
He could not cut down trees.
He could not earn money.
He could not buy food for his wife.
He could not buy food for his children.

Just then something happened.
A fairy came up out of the lake.
She was dressed all in white.
She gave him the axe.

The woodcutter jumped up.
He reached for his axe.
He saw that it was made of gold.

He said, "That is not my axe.
My axe was not made of gold."

Again, the fairy went down into the lake.
She came up with an axe.

"Here is your axe," said the fairy.

"You are an honest woodcutter.

You would not take an axe.

The axe was not your own.

Now you shall have all three."

The woodcutter took the gold axe home.

He took the silver axe home.

He took them home to his wife.

She was happy.