

AN INVESTIGATION OF STUDENTS'
COMPREHENSION OF ELLIPSES
IN GRADES TWO, FOUR AND SIX

A THESIS PRESENTED TO THE
FACULTY OF GRADUATE STUDIES
THE UNIVERSITY OF MANITOBA

IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE
MASTER OF EDUCATION

BY

MARILYN ANN RAMAN



May 1985

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BY

MARILYN ANN RAMAN

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

MASTER OF EDUCATION

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ABSTRACT

The purpose of this study was to obtain empirical data on the ability of students in Grades Two, Four and Six to comprehend text containing nominal, clausal, and verbal ellipses and to relate this comprehension to reading achievement. To achieve this purpose the Test of Comprehension of Ellipses (TOCE) was developed and administered by the researcher; reading achievement was assessed using a standardized group reading test.

The sample used in the study consisted of 138 subjects, the entire Grades Two, Four and Six population of a school considered to be representative of a middle-class socioeconomic area in a Western Canadian city.

The Test of Comprehension of Ellipses (TOCE) and the Metropolitan Achievement Test (MAT) were administered to the subjects in the Spring of 1981.

After a descriptive analysis of the data, scores on the Test of Comprehension of Ellipses (TOCE) and the Metropolitan Achievement Test (MAT) were examined using measures of central tendency, and the observation of the dispersion of scores within each test through an examination of ranges and standard deviations. In the final phase of the analysis, scores were analyzed using two-way analysis of variance, and three-way analysis of variance with repeated measures on one factor. The Newman-Keuls Test was used to probe significant effects.

On the basis of the findings and limitations imposed by the study, the following main conclusions were drawn:

1. There is a significant positive relationship between grade and total score on the Test of Comprehension of Ellipses (TOCE).
2. There is a significant positive relationship between reading achievement and total score on the Test of Comprehension of Ellipses (TOCE).
3. There is a significant positive relationship among grade, reading achievement and total score on the Test of Comprehension of Ellipses (TOCE).
4. There is a significant positive relationship between reading achievement and scores on the three sub-tests of the Test of Comprehension of Ellipses (TOCE).
5. There is a significant positive relationship among grade, reading achievement and scores on the three sub-tests of the Test of Comprehension of Ellipses (TOCE).
6. There is no significant relationship between grade and scores on the three sub-tests of the Test of Comprehension of Ellipses (TOCE).

The individual interviews conducted with a random sample of students in each of the grades who failed to meet the criterion for passing the Test of Comprehension of Ellipses (TOCE) did not provide the anticipated insights into students' difficulties in comprehending ellipses.

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CHAPTER I
NATURE AND SIGNIFICANCE OF THE PROBLEM

Authors of instructional reading materials have traditionally employed several means of controlling the level of difficulty. In order to determine the level of difficulty, a common practice has been to apply a readability formula which focuses on the linguistic factors of vocabulary and syntactic complexity. However, when the level of difficulty of basal readers is to be adjusted, the most common method has been the reduction of sentence length.¹

The reduction of sentence length in reading materials is accomplished in several ways. Firstly, complex ideas are expressed in a series of short simple sentences as in the following example from a fourth grade reader:

Ragtime music began as piano music. Then the brass bands came along and they played ragtime, too. There were black brass bands and white brass bands. They would bring to life anything that happened.²

¹ Ruth Strickland, The Language of Elementary School Children: Its Relationship to the Language of the Reading Textbooks and the Quality of Reading of Selected Children, "Bulletin of the School of Education", no. 38, (Bloomington, Indiana: Indiana University Press, 1962), cited by Alvin Granowski and Morton Botel, "Background for a New Syntactic Complexity Formula", The Reading Teacher, 28 (October 1974), p. 33.

² Louise Matteoni, Wilson Lane, Floyd Sucker, Thomas Yawkey, Theodore Harris and Harold Allen, Thundercover, (Oklahoma City, Oklahoma: The Economy Company, 1978), p. 30.

This series of three short sentences contributes to a lower readability rating than one long complex sentence containing the same information and vocabulary. However, Granowski and Botel³ question the adequacy of using sentence length as the sole criterion when determining the syntactic complexity of reading materials. They illustrate the shortcomings of this standard with the following quotation from Shakespeare:

"To be or not to be, that is the question."⁴

They maintain that a numerical count of the words in this sentence does not give a true indication of its syntactic complexity. Further, they suggest that the level of the vocabulary contained in this sentence is a poor indicator of the overall difficulty of the sentence.

A second means of reducing sentence length is the omission of words and/or phrases to form ellipses. For example:

"I was really trying to be good," sobbed Katie. "I really was Ø."

The ellipsis occurs in the second sentence and is marked by the symbol Ø. Durkin⁵ draws attention to the potential

³ Alvin Granowski and Morton Botel, "Background for a New Syntactic Complexity Formula", The Reading Teacher, 28 (October 1974), P. 31.

⁴ Ibid., p. 32.

⁵ Dolores Durkin, "What Is the Value of the New Interest in Reading Comprehension?", Language Arts, 58 (January 1981), p. 35.

problems created by the use of ellipses in sentences. She suggests that the amount and type of information left out in elliptical sentences increases the amount of inferencing required and thus increases comprehension difficulties for some students. She speculates that these comprehension difficulties may be related to the use of anaphora in text, for if the reader does not recognize the anaphoric nature of expression, there is no way for him to build a correct model of the text. In view of the possible difficulties posed by anaphora, Durkin expresses concern over the limited attention given to their use in readers. She raises the question of whether this limited attention reflects a lack of knowledge about "their pervasiveness in our language, or insufficient appreciation of their difficulty."⁶

The number of studies which have examined the extent to which children understand written text containing anaphoric devices is very limited. An emerging line of research in this area is based on Halliday and Hasan's⁷ concept of "cohesive ties" with the term "cohesive ties" referring to all anaphoric devices, including ellipses. To date, however, no studies dealing with children's ability to understand elliptical cohesive ties have been published. In view of the recent concern and interest expressed in this area, some

⁶ Ibid., p. 35.

⁷ M.A.K. Halliday and Ruqaiya Hasan, Cohesion in English, (London: Longman Group Ltd., 1976).

basic research on ellipses is indicated. The findings of the present study should add to the growing body of research on the topic of text analysis and perhaps contribute to the development of a new approach to analyzing reading materials.

PURPOSE OF THE STUDY

The purpose of this study was to determine if readers in Grades Two, Four and Six were able to comprehend passages containing ellipses. Comprehension was assessed by means of a sentence completion test developed specifically for this study. This Test of Comprehension of Ellipses (TOCE) assesses students' ability to understand what is implied by the three types of ellipses identified by Halliday and Hasan:⁸ nominal, verbal and clausal. The study examined the relationship between achievement, grade, and the ability to comprehend ellipses.

Thus the question for the study was: Having decoded the selected text, which cohesive ties within the elliptical category are comprehended by readers in Grades Two, Four and Six?

⁸ Ibid., p. 143.

HYPOTHESES

Hypothesis #1 - There will be a relationship between grade and total TOCE scores.

Hypothesis #2 - There will be a relationship between reading achievement and total TOCE scores.

Hypothesis #3 - There will be an interaction between grade and reading ability on the total TOCE scores.

Hypothesis #4 - There will be an interaction between grade and TOCE scores (3 sub-tests).

Hypothesis #5 - There will be an interaction between TOCE scores (3 sub-tests) and reading achievement.

Hypothesis #6 - There will be an interaction between the TOCE scores (3 sub-tests), grade and achievement.

DEFINITION OF TERMS

For the purposes of this study, certain terms will have the following definitions:

Reading Achievement - For the purposes of this study, reading achievement is defined as the students' reading score on the Metropolitan Achievement Test.

Average Reader - An average reader is a student whose scores on the Metropolitan Achievement Test fall within five months of his grade placement.

Cohesive Tie - A cohesive tie is the occurrence of a pair of cohesively related items.⁹

Cohesion - Cohesion is the semantic relations of meaning that exist within a text.¹⁰ Cohesion exists when the interpretation of some element in a text is dependent on that of another.

Ellipsis - Halliday and Hasan¹¹ define an ellipsis as something understood, when "understood" is used in the special sense of going without saying. Ellipses may also be defined as "substitution by zero".¹²

Nominal Ellipsis - A nominal ellipsis is an ellipsis within the nominal group. It clearly requires that the information required to fill it out is available to the reader. Normally the source of information is a preceding nominal group.¹³

Verbal Ellipsis - A verbal ellipsis is an ellipsis within the verbal group, presupposing one or more words from a previous verbal group with no possibi-

⁹ Ibid., p. 3.

¹⁰ Ibid., p. 4.

¹¹ Ibid., p. 143.

¹² Ibid., p. 143.

¹³ Ibid., p. 14.

lity of "filling out" with any other items.¹⁴

Clausal Ellipsis - A clausal ellipsis is an ellipsis within the clausal group. A clausal ellipsis involves elements which are external to the verb itself.¹⁵

Comprehension - Comprehension on the TOCE is the ability to identify the referent implied by the ellipsis.

Anaphora - Anaphora, is defined by the Oxford Concise Dictionary as the repetition of words or phrases.¹⁶ In this study the term will refer to backward references only.

PROCEDURES

The procedures for the study were undertaken in the following order:

1. The reading sub-tests of the Metropolitan Achievement Tests were administered to all subjects in the study.

The following levels of the tests were used:

Grade Two - Primary II Form F

Grade Four - Elementary Form F

Grade Six - Intermediate Form F

¹⁴ Ibid., p. 167.

¹⁵ Ibid., p. 143.

¹⁶ Oxford Concise Dictionary, 5th ed., s.v. "Anaphora".

The results of the tests were used to classify students as Above Average, Average, or Below Average readers.

2. The Test of Comprehension of Ellipses (TOCE) was administered to all subjects in the sample.
3. A random sample of ten students in each grade who failed to meet the criterion of 12/15 correct on the TOCE was interviewed individually. The purpose of this interview was to determine if test scores reflected difficulties other than poor comprehension of ellipses. Word recognition and understanding of the task were screened. In addition, observations which might provide insights into the processing of ellipses were recorded.
4. Finally, statistical analysis was undertaken.

ASSUMPTIONS

There were two assumptions underlying the study.

1. The pilot study showed that the TOCE which was developed for this study contained sentences which are part of the subject's typical language pattern.
2. Satisfactory performance on the TOCE indicated satisfactory comprehension of ellipses.

LIMITATIONS

There were two limitations operating in this study.

1. The findings cannot be generalized beyond the suburban middle class population used for this study.
2. As the study was under the direct control of the investigator, it may have unconsciously been biased.

OVERVIEW OF THE STUDY

This study was designed to investigate students' ability to understand ellipses in Grades Two, Four, and Six and to explore the relationship between reading achievement, grade, and type of ellipsis read. Although there is only a limited amount of research available regarding the effect of ellipses and other linguistic features on the level of difficulty of reading materials, this area is of concern to reading educators. A better understanding of the difficulties which these features pose to children of various ages should lead to the preparation of reading materials which reflect children's ability to comprehend them. This study was an exploratory study in the area of the comprehension of ellipses as defined by Halliday and Hasan. Chapter II reviews the related literature, Chapter III describes the design of the study, and Chapter IV contains an analysis of the data with the appropriate tables. Finally, Chapter V consists of a summary of the research findings, conclusions based on these findings, and implications for future research.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

One of the major concerns of reading instruction is comprehension. Reading comprehension has been described as "thinking",¹ "reading to interpret"² and "to grasp with the mind".³ The factors that are thought to affect reading comprehension range from understanding individual letters to understanding a total selection. According to Flesch,

Reading means getting meaning from certain combinations of letters. Teach the child what each letter stands for and he can read.⁴

The emphasis which has been placed on the word as the unit of instruction in reading is reflected in the way children themselves define reading. In a study of children's perceptions of reading, Harste⁵ found that many children view reading simply as "learning hard words". These perceptions

¹ Donald D. Durrell, Improving Reading Comprehension, (Yonkers on Hudson: World Book, 1956), p. 10.

² James Kerfoot, "Problems and Research Considerations in Reading Comprehension", Reading Teacher, (January 1956), pp. 250-256.

³ Emmett Albert Betts, "Research on Readings as a Thinking Process", Journal of Educational Research, (September 1965), p. 1.

⁴ Rudolf Flesch, Why Johnny Can't Read, (New York: Harper and Row, 1955), p. 10.

⁵ Jerome Harste, "Understanding the Hypothesis, It's the Teacher That Makes the Difference: Part II", Reading Horizons 18, (Winter 1978), p. 92.

illustrate how the theories of learning which were widely accepted during the late 1950's and early 1960's affected the field of reading. Reading researchers adapted Bruner's⁶ spiral model of learning to a model of reading which suggested that an individual gradually develops the ability to understand larger and broader concepts. In the field of linguistics, this theory equated with the theory that children acquire the ability to analyze first at the word level, and then the phrase and sentence levels.⁷

During the 1960's and early 1970's research focused mainly on readers' comprehension at the sentence level. Noam Chomsky's^{8,9} concept of surface and deep structure introduced the sentence rather than the individual word as the unit of meaning in language. Psycholinguists also adopted the sentence as the unit of meaning. Goodman,¹⁰ Goodman,¹¹

6 Jerome Bruner, The Process of Education, (New York: Vintage Books, 1960).

7 Rita Brause, "Developmental Aspects of the Ability to Understand Semantic Ambiguity, With Implications for Teacher", Research in the Teaching of English II, (Spring 1977), p. 42.

8 Noam Chomsky, Syntactic Structure, (The Hague: Mouton, 1957).

9 Noam Chomsky, Language and the Mind, (New York: Harcourt Brace Jovanovich, 1968).

10 Kenneth S. Goodman, "A Linguistic Study of Cues and Miscues in Reading", Elementary English 42, (1965), p. 640.

11 Yetta Goodman, "A Longitudinal Study of Children's Oral Reading Behavior", (Washington, D.C.: USOE Project No. 9 E062) in D. Allen (Ed.) Findings in Miscue Analysis, (Urbana, Illinois: ERIC Clearinghouse, 1976), p. 16.

and Smith¹² observed that students made use of grapho-phonemic, syntactic, and semantic information at the sentence level. The Cajon Valley Study¹³ is typical of research based on this principle. The study explored the extent to which students relied on three cuing systems (grapho-phonemic, syntactic and semantic) within sentence to gain meaning. As research in this area progressed, researchers such as Brause¹⁴ felt that the structure of the single sentence was not adequate to signal the underlying relationships on which comprehension depends. Thus, interest in the readers ability to integrate knowledge and generate inferences beyond the sentence level grew.

Stein and Glenn¹⁵ studied the effect of overall story structure on reading comprehension. These overall structures or "story grammars" represent the standard format of familiar story types, defining the units in a story and the relationships among the units. They found that a story must contain a fairly predictable storyline for the young reader to under-

¹² Frank Smith, Understanding Reading, (New York: Holt, Rinehart and Winston, 1970).

¹³ Cajon Valley Union School District, "Psycholinguistic Approach to Reading (PAR)", (Cajon California: Eric Document Reproduction Service, ED 108 150, 1974).

¹⁴ Brause, "Developmental Aspects of the Ability to Understand Semantic Ambiguity, With Implications for Teacher", pp. 39-48.

¹⁵ N.L. Stein and G.G. Glenn, "An Analysis of Story Comprehension in Elementary School Children", Multidisciplinary Approach to Discourse Analysis, Ed. R. Freedle (Hillsdale, N.J.: Ablex Inc., 1977).

stand it. Thus, according to Stein and Glenn, knowledge of the story grammar of the fairy tale facilitates comprehension of all fairy tales. They attribute this comprehension to the fact that familiarity with a story grammar allows students to make better predictions as they read, with the result that comprehension increases.

Another approach has studied the effects of specific linguistic features on comprehension. This approach attempts to identify the words or structure which affect the cohesiveness, and thus the coherence of text.¹⁶ Included in this area of research are three types of studies: developmental reading and language studies examining children's comprehension of anaphora, linguistic studies of text structure based on knowledge integration theory, and most recently, reading and language studies dealing with children's comprehension of "cohesive ties" as defined by Halliday and Hasan.¹⁷ The review which follows includes studies from each of these areas.

Developmental Studies of Children's Comprehension
of Anaphoric Structures: Language and Reading Studies

Because of the recency of this topic, the number of

¹⁶ Mary Theresa Murphy, "Anaphora: A Cross Disciplinary Approach to Research and Theory", (Madison, Wisconsin: Eric Document Reproduction Service, ED 185-540, December 1979), p. 60.

¹⁷ M.A.K. Halliday and Ruqaiya Hasan, Cohesion in English, (London: Longman Group Ltd., 1976), pp. 1-6.

studies which have examined children's ability to understand anaphora is limited. Most of these studies have been conducted during the last decade and they have attempted to identify developmental trends in the ability to comprehend anaphoric references. Primarily there have been two types of studies: language and reading, both being based on the premise that in order to comprehend anaphoric references, a child must know and apply syntactic rules. The following discussion concentrates first on the language studies and then on the reading studies.

Language Studies

Carol Chomsky¹⁸ conducted a study based on the premise that certain syntactic structures are acquired later than others due to their variance with generalized language patterns. She studied the ability of children ranging in age from five to ten years of age to comprehend pronominal reference in several types of structures. Using a single sentence presentation under three reference conditions, Chomsky observed that the identification of a referent often forces the reader or listener to go beyond the single sentence level. She suggested that the ability to deal with anaphora cannot be explained in terms of syntax alone. While her statistics showed that children do not demonstrate

¹⁸ Carol Chomsky, *The Acquisition of Syntax in Children From Five to Ten*, (Cambridge, Ma.: M.I.T. Press, 1969).

mastery of the rules governing pronominal co-referencing until the age of five years and six months, the single sentence presentation format of her study did not allow for the study of the identification of antecedents outside of the sentence. Although she did establish the lower limits of co-referencing, she did not identify a developmental sequence in the development of this ability.

A related study by Alvermann¹⁹ compared the acquisition of anaphoric language in disabled readers with that of the normal readers in Chomsky's study. Alvermann wanted to determine if the emergence would be the same for the two groups. Results of the study indicated that the majority of the disabled readers did perform like the subjects in Chomsky's group, but a delay of up to two years - three months was observed in the disabled group.

Maratsos²⁰ conducted a study in order to test children's ability to interpret sentences in which emphatic stress provided a cue to the intended antecedent of the pronoun. One hundred and six children ages three, four and five acted out sentences such as these:²¹

19 Donna E. Alvermann, "Reading Achievement and Linguistic Stages: A Comparison of Disabled Readers and Chomsky's 6-10 Year Olds", paper presented at the Annual Meeting of the National Reading Conference, Dallas, December 2-5, 1981. ED 212 994.

20 M.P. Maratsos, "The Effects of Stress in the Understanding of Pronominal Co-reference in Children", Journal of Psycholinguistic Research 1, (1973): 1-18.

21 Ibid., p. 3.

- 1) Suzie jumped over the old woman and then Harry jumped over her. (her is the stressed pronoun)
- 2) Suzie bumped into the old woman and then she bumped into Harry. (she is the stressed pronoun)

The ability to interpret unstressed pronouns was high and stable across age groups but the results for the stressed pronouns were quite different. Accuracy ranged from .47 for three year olds to .78 for five year olds. Maratsos then regrouped the students on the basis of linguistic competence as measured by an imitation task. Accuracy then ranged from .28 to .81 for the lowest to highest groups. Maratsos concluded that children use a generalized cognitive strategy in which a sentence is interpreted so as to change the roles of the participants as little as possible. Because the interpretation of stressed pronouns violates this strategy, comprehension of stressed pronouns lags behind the comprehension of unstressed pronouns. Maratsos' study demonstrated the improvement that comes with age.

Chipman and deDardel²² also studied children's interpretation of pronominal reference. They focused on children's comprehension of the pronoun "it" in various linguistic contexts. In their study, forty-five children ages three years nine months to six years eleven months were presented materials which corresponded to the referent types associated

²² H. Chipman and C. deDardel, "Developmental Study of the Comprehension of the Pronoun 'it'", Journal of Psycholinguistic Research 3, (1974), pp. 91-99.

with the pronoun "it": the collective noun, the count noun, and the collective or count noun. They found that children have no problem understanding the referential nature of the pronoun "it". For the youngest children, "it" seemed to mean a piece or one piece of material. Children's ability to understand reference to continuous quantities improved with age. The possible influence of cognitive development as well as the linguistic development underlying this observed comprehension was not ruled out by the researchers.

In summary, the range of questions which these studies addressed indicated that anaphora is a complex system. These studies pointed out the variety of perspectives from which anaphora may be viewed: the role of syntax in normal²³ and disabled²⁴ readers, the influence of emphatic stress,²⁵ and the ability to deal with a range of antecedents which may occur for an anaphoric element.²⁶ A common conclusion reached by these researchers was that children develop competence with anaphoric language at an early age. The referential nature of pronouns appeared to be established in

²³ Chomsky, The Acquisition of Syntax in Children from Five to Ten, p. 23.

²⁴ Alvermann, "Reading Achievement and Linguistic Stages: A Comparison of Disabled Readers and Chomsky's Six to Ten Year Olds".

²⁵ Maratsos, "The Effects of Stress on the Understanding of Pronominal Reference in Children", p. 2.

²⁶ Chipman and deDardel, "Developmental Study of the Comprehension and Production of the Pronoun 'it'", p. 92.

oral language as early as three with co-referencing developing later. The influence of emphatic stress appeared to be significant in five to six year olds, and six year olds appeared to be aware of the range of antecedents for the pronoun "it". While these studies confirmed that there is a syntactic component in the comprehension of anaphoric structures, they also showed that syntax must be defined in terms of the operation of anaphoric structures within a particular linguistic environment.

Reading Studies

Several studies in the field of reading comprehension have attempted to identify a hierarchy of difficulty among anaphoric structures. The concept that anaphoric structures increase the level of difficulty of a text is a departure from other measures of difficulty such as readability formulae which use procedures to measure complexity indirectly through the analysis of vocabulary and sentence length. Studies by Bormuth, Manning, Carr, and Pearson,²⁷ Richek,²⁸

²⁷ J. Bormuth, J. Manning, J. Carr, and D. Pearson, "Children's Comprehension of Between and Within-Sentence Structures", Journal of Educational Psychology 61, (1970), pp. 349-357.

²⁸ M.A. Richek, "Reading Comprehension of Forms in Varying Linguistic Contexts", Reading Research Quarterly 2, (1977), pp. 155-192.

Lesgold,²⁹ and Barnitz³⁰ investigated anaphora as features which increase the complexity and thus the difficulty of text. Because anaphora is a term which covers a wide range of structures, these researchers attempted to identify a hierarchy among the types.

Bormuth et al³¹ wanted to identify a hierarchy of difficulty among anaphoric structures in text for students in Grade Four. The students read short paragraphs and responded to questions presented in a multiple-choice format. The responses of the sixty students were categorized using Menzel's³² taxonomy of anaphoric structures which deals mainly with the surface features of text. The relatively low accuracy of students' performance in a number of categories was interpreted as support for the hypothesis that anaphora contribute to comprehension difficulties. This study revealed that personal pronouns were the most difficult anaphoric structures for students in Grade Four while pro-clause anaphoric structures were the least difficult.

²⁹ A. Lesgold, "Variability in Children's Comprehension of Syntactic Structures", Journal of Educational Psychology 66, (1974), pp. 333-338.

³⁰ J.G. Barnitz, "Syntactic Effects on the Reading Comprehension of Pronoun-Referent Structures by Children in Grades Two, Four and Six", Reading Research Quarterly 15, (1980), pp. 268-289.

³¹ Bormuth et al, "Children's Comprehension of Between and Within - Sentence Syntactic Structures", p. 350.

³² P. Menzel, "Linguistic Bases of the Theory of Writing Items for Instruction Stated in Natural Language", Cited in Bormuth et al, "Children's Comprehension of Between and Within-Sentence Syntactic Structures", p. 351.

Lesgold's³³ study was partly a replication of the Bormuth study. Lesgold wanted to determine if syntax is a valid basis for the establishment of a hierarchy among anaphoric structures. He hypothesized that a replication of Bormuth's results would confirm a hierarchy based on syntax alone. Lesgold made several changes in Bormuth's design. He used oral responses as opposed to the multiple-choice format and he controlled the number of semantically plausible antecedents. He counter-balanced the location of the target structure within the passage in order to reduce the amount of processing required to get from a syntactic parsing to an underlying cognitive representation. On the basis of the negative correlation of his results with those of Bormuth, Lesgold concluded:

Syntax is not the basis of a hierarchy of comprehension skills that have not been completely acquired by the time children are in the fourth grade.³⁴

An examination of Lesgold's study raises concern about the ambiguity of the oral questions asked, and the variations between items testing different structures. As a result, the study does not resolve the question of whether anaphora in themselves increase the level of difficulty in the text.

Richek's³⁵ study addressed itself to this problem and

³³ Lesgold, "Variability in Children's Comprehension of Syntactic Structures", pp. 333-338.

³⁴ Ibid., p. 336.

³⁵ Richek, "Reading Comprehension of Syntactic Structures", pp. 155-192.

demonstrated that the complexity of a text is a result of the inter-action between the anaphoric structure and the linguistic context. Richek controlled kernels, lengths, and parallelism as she tested the ability of Grade Three students to comprehend paraphrase sentences containing alternate anaphoric forms. For example:

- 1) Noun form - "John saw Mary and John said hello to Mary."
- 2) Pronoun form - "John saw Mary and he said hello to her."
- 3) Null form - "John saw Mary and said hello to her."

Richek found a hierarchy in the hypothesized direction with noun forms the easiest and the null forms the most difficult. The expected interaction between kernel, length, and parallelism failed to materialize. She found two or three sentences constructed from each frame to be similar in difficulty; sentences from different frames were found to be relatively dissimilar in difficulty.

Barnitz's³⁶ study focused on children's ability to understand the pronoun "it" in varying contexts during reading. The three general categories of contexts studied were referent type, reference orders, and referent distance. These categories were sub-divided in the following way:

³⁶ Barnitz, "Syntactic Effects on the Reading Comprehension of Pronoun-Referent Structures by Children in Grades Two, Four and Six", pp. 268-289.

referent type

- a) contexts in which the referent for "it" is a noun or noun phrase.
- b) contexts in which the referent is a clause or sentence.

reference order

- a) contexts in which "it" comes after its referent.
- b) contexts in which "it" precedes the referent.

reference distance

- a) contexts in which "it" and the referent are in the same sentence.
- b) contexts in which "it" and the referent are in different sentences.

Barnitz hypothesized that comprehension would be best:

1) when the referent type was a noun or noun phrase, 2) when the referent preceded the anaphor, and 3) when the referent and anaphor were in the same sentence. The data validated the first two hypotheses but not the third. Barnitz offers one possible explanation for the lack of confirmation of the third hypothesis; although the pronoun and referent appeared in the same sentence they did not always occur in the same clause.

Thus, the findings of the reading studies failed to establish a hierarchy among anaphora on the basis of syntactic structures as they defined the term. The reading researchers' view of syntax differed from that of Chomsky³⁷ and Alvermann³⁸. In the Chomsky and Alvermann studies, the

³⁷ Chomsky, The Acquisition of Syntax.

³⁸ Alvermann, "Reading Achievement and Linguistic Stages: A Comparison of Disabled Readers and Chomsky's Six to Ten Year Olds".

syntactic structure consisted of the lexical item plus the immediate linguistic environment of the sentence. In the reading studies, syntactic structure is viewed as only the particular lexical items which signal the anaphoric reference. Rather than comparing the lexical items of a single anaphoric structure across controlled linguistic environment, the reading studies cited made comparisons among a variety of anaphoric structures in relatively unstructured linguistic environments.

It may be concluded from these language and reading studies that the question of anaphora as a cause of reading difficulty remains unresolved. The need to clarify the influence of the context in which an anaphora is found is clearly indicated by these studies.

Since the early 1970's, the study of the nature and function of context as it applies to reading comprehension has expanded beyond the sentence level to include inter-sentence relationships. This period saw reading defined in terms of language function and psycholinguistics. With the emergence of the concept of meaning as an inter-sentence entity came the need to explore the means by which sentences are linked. One answer came in the knowledge integration theory proposed by Bransford and Franks.³⁹ They presented evidence to support their notion that readers abstract ideas

³⁹ J.D. Bransford and J.J. Franks, "The Abstraction of Linguistic Ideas: A Review", Cognitive Psychology 2, (1971), pp. 317-332.

semantically related sentences in order to construct the overall meaning of the text.

The section which follows reviews knowledge integration based studies which deal with readers' comprehension of text under a variety of learning conditions. They examine the organization and interpretation of information gathered during reading.

Knowledge Integration Theory

Knowledge integration is a model-based theory of comprehension that suggests people create a complex scenario or model within which the events described in a text might plausibly occur. This model-based view of text understanding rests on the theory of the representation of knowledge which was developed by researchers in cognitive science and artificial intelligence. According to this theory, knowledge is organized and represented in data structures that are variously called frames, scripts or schemata. For example, schemata as defined by Rumelhart and Ortony⁴⁰ refer to:

data structures for representing generic concepts under objects, events, actions and sequences of actions. Schemata are not atomic. A schema contains as a part of its specifications the network of interrelationships that is believed to generally hold among the constituents of the concept in general.

An important feature of schemata is that they contain

⁴⁰ D.E. Rumelhart and A. Ortony, "The Representation of Knowledge", In R. Anderson, R. Spiro and W. Montague (Eds.), Schooling and the Acquisition of Knowledge, (New Jersey: Lawrence Erlbaum Associates, 1977).

variables which influence comprehension. Comprehension is achieved by selecting one or more schemata and filling in the missing variables either from explicit information in the text or through inference. Thus, a model of a text consists of the information stated in the text, as well as the inferences generated by the reader. This theory was tested by Bransford and Franks⁴¹ when they presented participants with semantically related ideas which were components of a single complex idea. They found that subjects "recognized" inferences as confidently as they recognized the sentences that had actually been presented. Based on these findings, they concluded that learners spontaneously integrate the information expressed in related ideas, resulting in a semantic memory representation containing more information than is usually presented in the text. They presented seminal data and argument which support the position that the proper unit of analysis in memory must be an overall understanding of the text structure rather than the individual sentence. They also demonstrated that when subjects are presented with related words they do not encode or store individual strings of words but integrate the knowledge communicated by the sentences to construct more holistic semantic structures. This constructive knowledge integration theory became the basis for future related studies which

⁴¹ Bransford and Franks, "The Abstraction of Linguistic Ideas", p. 320.

focused on the nature of the comprehension process within the learner.

Kintsch⁴² extended the findings of Bransford and Franks with a series of experiments testing response latencies to explicit and implicit statements. Kintsch interpreted his data to support the idea that readers may infer information during reading in order to integrate and comprehend explicitly presented propositions. He concluded that inferred propositions are stored in memory as part of the meaning of the printed text. Kintsch concurred with Bransford and Franks idea that both expressed and inferred information are present in propositional memory, and added his finding that memory for surface features of a text may produce faster response times to explicit statements immediately after presentation.

Fredericksen⁴³ reported recall data relevant to the role of integration in discourse comprehension. The subjects in his study were able to produce conceptual and related responses that were derived from, but not necessarily expressed in the presented text. Repeated exposures did not eliminate these derived structures indicating that inferences made during acquisition become an integral part of the learner's memory representation of the text. Fredericksen

⁴² W. Kintsch, "The Representation of Meaning in Memory", Reviewed in Journal of Reading Behavior, (1976), pp. 90 & 222.

⁴³ C.H. Fredericksen, "The Effects of Context-Induced Processing Operations on Semantic Information Acquired from Discourse", Cognitive Psychology 7, (1975), pp. 139-166.

interpreted this finding as an indication of the occurrence of processes of adjustment to information overload during acquisition rather than as a reconstructive process during recall.

Taking a different approach, Rumelhart and Ortony⁴⁴ showed how a general "problem-solving schema" might be evoked in the absence of a more specific schema. The variables in the problem-solving schema are assigned in the following way:

Person (P) Event (E) Goal (G)

1. (E) causes (P) to event (G).
2. (P) tries to get (G) until (P) gets (G) or gives up.

Within this schema the researchers suggest that comprehension increases as subjects resolve more and more of the variables in the model and develop new and better models.

Collins et al's⁴⁵ studies of readers who were dealing with difficult text lent support to the model-based view of text comprehension. Their analysis of readers' protocols provided evidence that readers use a variety of general problem-solving strategies as they construct a model of the text. Their analysis revealed that the first step in understanding a text is deciding upon an appropriate question,

⁴⁴ Rumelhart and Ortony, "The Representation of Knowledge", p. 101.

⁴⁵ A. Collins, J.S. Brown and K.M. Larkin, Inference in Text Understanding, (Cambridge MA: Bolt, Beranek and Newman Inc., 1977).

and that some readers fail to understand because they choose the wrong question. Frequently used strategies in reading were the process of "re-binding", the search for the "most likely case", and the "near or distant shift of focus". Thus strategies appeared to be general problem-solving strategies and not specific to one or another linguistic structure.

Several proponents of the knowledge integration or constructive view of comprehension examined elements in the presentation of text which could influence comprehension. For example, Moeser⁴⁶ showed that semantically related sentences presented as discrete items are not necessarily incorporated into an integrated memory structure. She found that specific aspects of the input situation appeared to affect whether or not integration occurred.

Moeser conducted four experiments in which she used materials very similar to those used by Bransford and Franks⁴⁷ with two significant methodological changes. During the acquisition phase, Moeser presented complex sentences several ways. One group heard intact versions of complex wholistic ideas, while the second group received a random order presentation of the propositions. Her second modification added a forced choice method of retrieval.

⁴⁶ S.D. Moeser, "Inferential Reasoning in Episodic Memory," Journal of Verbal Learning and Verbal Behavior, 10, (1978), pp. 79-90.

⁴⁷ Branford and Franks, "The Abstraction of Linguistic Ideas."

This forced-choice inference test required subjects to choose between true and false inferences. Moeser's results indicated that independently presented verbal items can be stored as discrete memory units and when two items containing related information are stored independently, inferences based on the relationship between them cannot be retrieved.

Moeser's results are consistent with the findings of Frase⁴⁸ who also studied the effects of the order of presentation on comprehension. He used the same three input conditions and he also found that the grouping or sequence of the elements of a text can affect the learner's representation of the text and subsequent performance on recall items.

Manelis and Yekovich⁴⁹ studied the effect of the repetition of propositional arguments in sentences. The main conclusion of this study was that the repetition of arguments across propositions does facilitate the immediate processing of sentences. The effect of repetition was demonstrated in their study by a comparison versus no comparison condition to test the hypothesis that propositions in text are at least minimally connected by repeated arguments; each proposition was connected to one or more proposition by at least one common feature. The study showed that this criterion of

⁴⁸ L.T. Frase, "Integration of Written Text", Journal of Educational Psychology 65 (1973), pp. 252-261.

⁴⁹ L. Manelis and R.F. Yekovich, "Repetitions of Propositional Arguments in Sentences", Journal of Verbal Learning and Verbal Behavior 15, (1976), pp. 301-312.

minimal connectedness does facilitate immediate processing. The researcher attributed this to the fact that when a proposition is repeated, it identifies a place in memory where the separate proposition can be attached. Without repetition, further processing would be necessary, accounting for the observed increase in time required for comprehension. A second explanation offered by the researchers for the effect of repetition was in terms of retrieval; they concluded that because the memory for a structure is more likely to be connected once a component of the structure has been accessed, it should be relatively easy to retrieve the rest of the structure and the recall should be more complete than for a disconnected sentence.

Haviland and Clark's⁵⁰ study lent further support to this line of thought. They also observed that a sentence is comprehended faster when it is preceded by a sentence that identifies given information than when it is preceded by a sentence that does not.

Yekovich, Walker and Blackman⁵¹ conducted a study using sentence pairs consisting of a "context" and "target" sentence presented in that order. The context sentence con-

⁵⁰ S.E. Haviland and H.H. Clark, "What's New? Acquiring Information as a Process in Comprehension", Journal of Verbal Learning and Verbal Behavior 13, (1974), pp. 512-521.

⁵¹ Frank R. Yekovich, Carol H. Walker, and Harold S. Blackman, "The Role of Pre-Supposed and Focal Information in Integration Sentences", Journal of Verbal Learning and Verbal Behavior 18, (1979), pp. 535-548.

tained a noun phrase functioning as focal information and the target sentence contained the same noun phrase serving as an anaphoric structure. They investigated the possibility that if either the context or target failed to mark the relevant integrative agent appropriately, comprehension decreased. Their study confirmed this hypothesis. The effects held when the proximity of repeated information was controlled and the target sentences occurred in either the active or passive voice. The study viewed comprehension as involving pairs of linguistic markings common to both structures and the results demonstrated that comprehension difficulties can arise when important information is mismarked in the context.

Hayes-Roth and Thorndyke⁵² investigated factors influencing the integration of facts acquired from texts. In a series of three experiments, they demonstrated that the identical wording of facts during repeated exposures facilitated knowledge integration. A second facilitating feature of input noted was the influence of temporal proximity of the related facts in text. These findings were interpreted by the researchers as evidence supporting a retrieval model of integration, which differs from the structural model of other knowledge integration theorists in the degree of importance given to the structure of the input.

⁵² Barbara Hayes-Roth and Perry Thorndyke, "Integration of Knowledge from Text", Journal of Verbal Learning and Verbal Behavior 19, (1979), p. 107.

In another but related direction, Webber⁵³ listed and discussed the factors influencing the resolution of anaphora that are found in literature. He cited five factors influencing anaphora resolution as they relate to knowledge integration or schema theory:

1. Number/Gender Agreement - This agreement is generally accepted as the most obvious constraint.
2. Theme - Real world knowledge about story construction creates a bias in favour of the theme of the story being the most likely referent.
3. Recency - A bias towards a recent entity could be the result of the frequency with which anaphora refer to recently mentioned objects or characters.
4. Scene Shift - Characters who do not continue to play a role throughout a story cannot be re-introduced anaphorically.
5. Semantic Selectional Restrictions - Readers semantic and factual knowledge influence anaphoric resolution.

In his summary Webber pointed out that the above factors influence the resolution of anaphora - a conclusion which is plausible within the framework of schema theory.

Findings such as these have led one researcher to explore the influence of text on the integration of knowledge and the subsequent effects of knowledge integration on

⁵³ B.L. Webber, A Formal Approach to Discourse Anaphora, (Cambridge MA: Bolt and Beranek and Newman, Inc., 1977).

reading comprehension. For example, Nix⁵⁴ conducted a study based on the constructivist view of reading comprehension. He observed that the constructive process appeared to be a "linking process" between anaphoric elements and their referents within a text.

It may be concluded from the above studies that information processing is affected by a number of factors. The effects of sequential rather than random order of presentation of concepts,^{55,56} repetition of propositions across sentences,⁵⁷ and the explicit statement of concepts in consecutive sentences,⁵⁸ were observed. These studies have begun to identify some features of text structure and presentation which aid comprehension. An understanding of the relationships which occur among these features should contribute to improved methods of providing a match between the learner and the text. One system for analyzing these relationships is presented in the following section on the structure of text.

⁵⁴ Don Nix, "Linking Media Syntax in Children's Sentence Comprehension", Journal of Reading Behavior X, (1978), pp. 79-90.

⁵⁵ S.D. Moeser, "Inferential Reasoning in Episodic Memory", p. 90.

⁵⁶ L.T. Frase, "Integration of Written Text", p. 260.

⁵⁷ L. Manelis and R.F. Yekovich, "Repetitions of Propositional Arguments in Sentences", P. 310.

⁵⁸ Barbara Hayes-Roth and Perry Thorndyke, "Integration of Knowledge from Text", p. 107.

The Structure of Text

A systematic study of the structure of text carried out by Halliday and Hasan⁵⁹ serves as the basis for a new line of research which studies the role of the structure of text in reading comprehension.

Halliday and Hasan describe a system of "cohesive ties" which appears to exist in text. They analyzed text-forming structures which contribute to the cohesion of the passage.

Cohesion occurs when the interpretation of some element in the discourse is dependent on that of another. The one PRESUPPOSES (sic) the other in the sense that it cannot be effectively decoded except by recourse to it. When this occurs a relation of cohesion is set up and the two elements, the presupposing and the presupposed are thereby at least potentially integrated into a text.⁶⁰

Like the knowledge integration theorists, Halliday and Hasan support a model-based view of comprehension. Their system of cohesive ties is related to the model-based view in that cohesive ties guide the reader to the correct synthesis of the text by indicating what elements in the text and the reader's model are related. The importance of the function played by cohesive ties in the overall understanding of text may be noted in the following statement:

It is the continuity provided by cohesion that enables the reader or listener to supply all the missing pieces, all the components of the picture which are not present but are necessary to its interpretation.⁶¹

⁵⁹ M.A.K. Halliday and Ruqaiya Hasan, Cohesion in English.

⁶⁰ Ibid., p. 4.

⁶¹ Ibid., p. 299.

Halliday and Hasan identified five major categories of cohesive ties and developed a system for analyzing the cohesiveness of a text based on these categories. The five categories are:

- 1) Reference - This category includes personals, demonstratives and comparatives. Reference items signal cases in which the same entity enters into the discourse a second time. The form of the expression is termed grammatical because it relies upon the grammatical systems of person, number, proximity and degree of comparison. It is a semantic relationship as well as a relationship in meaning.

Example:

John has moved to a new house.
He had it built last year.

- 2) Substitution - Substitution relates linguistic elements rather than semantic identity.

Example:

Would you like this teapot?
 No, I want a red one.

One is a different member of the same class, the substitution implies a non-identity of meaning.

- 3) Ellipsis - An ellipsis may be viewed as a "substitution by zero" as there is an item which serves as a counter for what is left unsaid. Ellipses preserve the form of the antecedent and therefore are sub-categorized by class.

Example:

- a. Nominal Ellipsis - Three cars cross the finish line together. A fourth / was close behind.
- b. Verbal Ellipsis - Have you been jogging? Yes I have / .
- c. Clausal Ellipsis - Has the weather been rainy? Yes it has / .

- 4) Conjunction - Conjunctions express logical relations and are sub-divided into groups based on the logical relationship which they express.

Examples:

- a. Additive - And in all this time he met no one.
- b. Adversive - Yet he was hardly aware of being tired.
- c. Causal - So by night time the valley was far below them.
- d. Temporal - Then, as dusk fell, he sat down to rest.

- 5) Lexical - A lexical item refers back to another to which it is related by having a common referent. The two types of lexical ties are reiteration and collocation.

Examples:

- a. Reiteration - "I turned to the ascent of the peak."
The ascent
The climb
The task is perfectly easy.
The thing
It
- b. Collocation - An example of collocation is the occurrence of a lexical item in the context of other related lexical items such as a series of the days of the week.

A limited number of studies have used the system devised by Halliday and Hasan for analyzing text. Gutwinski⁶² examined the cohesive structure of texts in order to determine if differences in literary style would be reflected in the types of cohesive ties used by the authors. His analysis of passages by Henry James and Ernest Hemingway showed clear

⁶² W. Gutwinski, Cohesion in Literary Texts: A Study of Some Grammatical and Lexical Features of English Discourse, (The Hague: Mouton, 1976).

differences in the types of cohesive ties used. James created cohesion in his text mainly through reference while Hemingway made greater use of lexical ties. The density of cohesive ties in the two works studied was very similar. Gutwinski noted that sentences which contained no cohesive ties could be re-ordered in the passage or removed completely without affecting the general unity of the passages. Thus only sentences which were bound to the passages through cohesive ties were important to the coherence of the text.

Fishman⁶³ conducted a study based on Halliday and Hasan's theory of textual cohesion in an attempt to determine the effect of referential cohesive ties on paragraph comprehension and reading time. Subjects read four types of experimental paragraphs constructed to meet four conditions: noun phrase present/reference present; noun phrase present/reference absent; noun phrase absent/reference present; and noun phrase absent/reference absent. Subjects then took a multiple choice test to determine the influence of the various conditions on reading time and comprehension. The noun phrase organizer condition was found to increase scores significantly with the primary effect of the noun phrase related to their initial position in the paragraph. Further, she found that in anaphorically related sentences the degree of semantic distance between the categories and instances of

⁶³ Anne Stevens Fishman, "The Effect of Anaphoric Reference and Noun Organizers on Paragraph Comprehension", Journal of Reading Behavior X, 2, (Summer 1978), pp. 159-170.

that category affected reading time. However, the study was not planned to control semantic distance. In summary, the results of Fishman's study did not support the central hypothesis of the study, that references act as primary cohesive ties linking sentences. However, she noted that eight of the "no reference" condition paragraphs contained one or more repeated words which were replaced by reference words in the "reference" condition. The potential effects of repetition were not considered at the time the material was constructed, although repetitions by Halliday and Hasan's definition are a type of cohesive tie and as such should have been counted as referents. A second explanation for the findings of the study may be found in the isolated condition in which the referents were presented. The cohesive effects of reference ties were difficult to demonstrate in isolation as their effect on comprehension may be incremental.

Chapman⁶⁴ used Halliday and Hasan's work as the basis for the first of a series of studies on children's use of cohesive ties. His first study was limited to the examination of personal reference ties. In the study, children with adequate word recognition skills were tested using cloze procedure. Two cloze versions of each of fourteen stories were prepared. One set of paragraphs had the pronoun referents deleted (seven deletions per story) while the other set had

⁶⁴ L. John Chapman, "Confirming Children's Use of Cohesive Ties", The Reading Teacher 33, (December 1979), pp. 317-322.

non-anaphoric words deleted (seven deletions per story). The results showed a significant difference between the anaphoric and nonanaphoric paragraphs, the mean score being higher for the anaphoric type. There was a significant difference between the fluent and less fluent readers indicating, according to Chapman, that the ability to cope with cohesive ties is a fundamental process in fluent reading even when word recognition difficulties are controlled. Chapman speculates that his current research may show that the ability of young readers to process cohesive ties develops surprisingly late. His research has indicated that many subjects are unable to supply deleted personal pronouns until the age of nine or ten. In addition, he observed that comprehension of conjunctions (apart from additives), developed even later.

A second and related study by Chapman⁶⁵ examined children's ability to supply two types of textual cohesion: personal reference and conjunction. Chapman conducted a series of three experiments using children of varying ages and reading ability. In the initial phase he administered a cloze passage to eight year old subjects. Given the list of possible responses, the subjects were required to replace deleted pronouns that operated anaphorically in the text. It was found that although the children could recognize the pro-

⁶⁵ L. John Chapman, "The Development of the Perception of Textual Cohesion", Paper Presented at the Annual Meeting of the International Reading Association, St. Louis Missouri, May 5-9, 1980.

nouns in isolation, only fluent readers could replace them in the correct position in the text. In the second part of the study, eight, eleven, and fourteen year old children also completed a cloze passage with the added requirement of replacing conjunctions. The results showed a clear developmental pattern and suggested that the mastery of these linguistic cohesive concepts, especially conjunctions, was still being acquired at the age of fourteen. In order to eliminate the possibility that the results of these two studies were affected by the nature of the specially written texts, a cloze passage was prepared for the eleven year olds using the work of a well-known children's author. The results confirmed the earlier findings. Taken together the findings of this three-part study suggest that the mastery of cohesive ties is part of a lengthy developmental process.

Chapman⁶⁶ undertook a more extensive comprehensive study of children's perception of cohesive ties. The subjects in this study were eight, eleven and fourteen years old. Chapman was again investigating the ability of children of varying ages and reading abilities to supply elements of textual cohesion. For this study he identified three levels of reading ability H (high), M (middle) and L (low) on the

⁶⁶ L. John Chapman, "A Study in Reading Development: A Comparison of the Ability of Eight, Ten and Thirteen Year Old Children to Perceive Cohesion in Their School Texts", Paper Presented at the Annual Meeting of the United Kingdom Reading Association, Newcastle-upon-Tyne, England, 1982.

basis of standardized reading scores. Cloze passages were prepared using extracts from frequently used school books. Text was analyzed and examples of four types of cohesive ties were identified. The four types were reference, substitution, conjunction, and lexical. One end of the cohesive tie was deleted and the subjects were asked to replace the word or words which had been deleted. The expected increase in performance with age was not only clearly observable, but also regular. The growth in the proportion of exact responses was small but consistent. The cloze procedure results also closely correlated with the results of the standardized reading test. Chapman concluded, therefore, that children's perception of cohesion was a significant element in reading development.

The role of textual cohesion in reading comprehension was explored by Freebody and Anderson.⁶⁷ Their study examined the interactive effects of vocabulary difficulty and textual cohesion on the reading comprehension of Grade Six students. The subjects used in the study scored above the national mean on measures of reading comprehension and language ability. In the study, passages from a Grade Five Science textbook were re-written to control vocabulary difficulty and cohesiveness as defined by Halliday and Hasan.

⁶⁷ Peter Freebody and Richard Anderson, "Effects of Vocabulary Difficulty, Text Cohesion, and Schema Availability on Reading Comprehension", Reading Research Quarterly 18, (1983), pp. 277-293.

Comprehension was assessed using multiple choice items, sentence verification and summary writing. The analysis of the data treated cohesive ties as a one single factor with no analysis of the five sub-types being undertaken. The results indicated that for above average Grade Six students decrements in comprehension are more likely to occur when materials contain difficult vocabulary than when cohesiveness of text is diminished.

Tierney and Mosenthal⁶⁸ investigated the extent to which Halliday and Hasan's cohesion concept applied as a textual analysis system. They carried out an investigation to determine the relationship between the density of the cohesive ties in a text with the overall coherence of the text. Tierney and Mosenthal analyzed expository text generated by Grade Twelve students to determine the occurrence of cohesive ties. The analysis revealed that student's at this level used three types of cohesive ties in their expository writing - reference, conjunction and lexical. No substitution or ellipses were observed. The absence of the latter groups was consistent with Halliday and Hasan's observation that they typify more informal, conversational text, written or spoken, rather than expository text. The same passages were assessed by college level English professors on the

⁶⁸ Robert J. Tierney and James H. Mosenthal, "The Cohesion Concept's Relationship to the Coherence of Text", Research Paper Prepared at the University of Illinois at Urbana-Champaign (October 1981). ED 212 991

basis of coherence in the general sense. A comparison of the two types of data did not support the notion that the density of cohesive ties increased the coherence of a text. On the basis of their results, Tierney and Mosenthal argued against cohesion analysis as a predictor of the coherence of a text.

In a later article, Mosenthal and Tierney⁶⁹ re-affirm their belief that the effectiveness of cohesive ties in facilitating the comprehension of text depends largely on the reader. They state that a cohesive tie, in and of itself, may or may not be cohesive.⁷⁰ The potential for ambiguous use of cohesive ties, with an accompanying decrease in comprehension is suggested by the writers.

The relationship between cohesion and coherence is also discussed in the work of de Beaugrande and Dressler.⁷¹ They explain that cohesion concerns the ways in which the surface elements of a text are arranged and mutually connected within a sequence. They state that cohesion is text-centered, and includes all means of signaling surface grammatical dependencies including the system of cohesive ties outlined by Halliday and Hasan.⁷² On the other hand, they state that

⁶⁹ James H. Mosenthal and Robert J. Tierney, "Cohesion: Problems with Talking About Text", Reading Research Quarterly 19 (Winter 1984), pp. 240-244.

⁷⁰ Ibid., p. 242.

⁷¹ Robert de Beaugrande and Wolfgang Dressler, Introduction to Text Linguistics, (London: Longman Group Ltd., 1981). Reviewed by Patricia Carrell in, Language Learning: A Journal of Applied Linguistics, Vol. 34, Number 1 (March 1984), pp. 111-117.

⁷² Ibid., p. 114.

coherence goes beyond the text and is clearly not a feature of a text itself, but rather an outcome of the cognitive processes of text users. A text does not "cohere" by itself, but rather by the interaction between text-presented knowledge and the text user's stored knowledge.

The studies by Gutwinski,⁷³ Tierney and Mosenthal,⁷⁴ Mosenthal and Tierney,⁷⁵ and de Beaugrande and Dressler⁷⁶ have explored the relationship between the occurrence of cohesive ties in text and the coherence of text. Gutwinski found that cohesive ties were essential to the coherence of the works of Henry James and Ernest Hemingway. On the other hand, Tierney and Mosenthal, Mosenthal and Tierney, and de Beaugrande and Dressler found that coherence, or the comprehensibility of a text does not rest solely on the presence of special features such as cohesive ties. They suggest that comprehension of a text is dependent both on how the reader interacts with the text and on how he interprets the cohesive features of the text itself. Mosenthal and Tierney state that certain types of cohesive ties may even reduce comprehension by creating ambiguous text which inhibits the interaction of the reader and the text.

73 W. Gutwinski, Cohesion in Literary Texts.

74 R.J. Tierney and J.H. Mosenthal, "The Cohesion Concept's Relationship to the Coherence of Text".

75 J.H. Mosenthal and R.J. Tierney, "Cohesion: Problems with Talking About Text", p. 244.

76 R. de Beaugrande and W. Dressler, Introduction to Text Linguistics, p. 117.

Neilsen⁷⁷ conducted an exploratory study on the relationship of cohesion to linguistic marking, discourse structure and content familiarity in order to clarify their effects on readers' comprehension of written discourse. He used three indices of cohesion: density of ties, cohesive distance per tie, and the distribution of the types of ties. He limited the study to an examination of reference, conjunction and lexical ties. He concluded that density of ties and average cohesive distance varied reliably with differences in linguistic marking of text but not with discourse structure. Further, he found that density of ties does not appear to be a dimension of content familiarity. Neilsen treated these findings as tentative and he suggested the need for further investigation of the concept of cohesion when analyzing the demands that texts place upon readers. He agrees with other researchers that Halliday and Hasan's concept of cohesive ties is worthy of further investigation.

SUMMARY

It may be concluded from the research cited in this review that there is much to be learned and researched in the area of text structures as it relates to reading comprehension.

⁷⁷ Allan R. Neilsen, "An Investigation of the Relationship of Cohesion to Linguistic Marking, Discourse Structure and Content Familiarity", Paper Presented at the 30th Annual Meeting of the National Reading Conference (San Diego: December 1980), pp. 1-10.

sion. Research has identified some features of text which add to the cohesion and coherence of text. These features variously called anaphora and cohesive ties can be of help to the reader in understanding a text if he has mastered them. Halliday and Hasan have described the ties which link parts of a text. It would now be helpful to identify the ages at which the various types of ties can be read with understanding. It has been suggested that children master cohesive ties at a later age than had previously been accepted. If this suggestion is borne out by research findings, new insights into the writing and choosing of texts will have been gained. The end result of these new insights could be a better match between written text and the reader.

Of the studies which have been published to date none has investigated the elliptical class of cohesive ties. Thus, the question for this study was: Upon decoding the selected text, which cohesive ties within the elliptical category are comprehended by readers in Grades Two, Four and Six?

CHAPTER III

DESIGN AND PROCEDURES OF THE STUDY

The purpose of this study was to investigate students' comprehension of ellipses. In order to carry out this investigation it was necessary to develop a Test of Comprehension of Ellipses (TOCE) which could be used with subjects in Grades Two, Four and Six. The results of this test were compared with reading achievement and grade to determine: a) if comprehension of ellipses is related to reading achievement level and, b) if comprehension of ellipses is related to grade in school. The results were analyzed using a three-way analysis of variance.

This chapter is concerned mainly with the procedures used to gather the data for the study. First, the pilot study for the TOCE is outlined. A description of the test instruments and an account of their administration follows.

DEVELOPMENT OF THE TEST OF COMPREHENSION OF ELLIPSES (TOCE): PILOT STUDY

The pilot study served a number of purposes: 1) to determine the suitability of the sentence completion format, 2) to develop clear instructions and a standardized demonstration pattern, 3) to establish a criterion for passing the test, and 4) to determine the time required for students to complete the test.

The pilot study was conducted in the school adjacent to the school chosen for the actual study. Ten subjects were chosen from each of Grades Two, Four, and Six. None of the children used in the pilot study took part in the research study.

DESCRIPTION OF THE TEST OF COMPREHENSION OF ELLIPSES (TOCE)

The Test of Comprehension of Ellipses was developed for the purpose of sampling the ability of students to supply information signalled by an ellipsis.

The Test of Comprehension of Ellipses (TOCE) developed for this study consists of three sample items and 15 test items: five items testing each of the nominal, verbal, and clausal types of ellipses. Each test item consists of a passage which is three sentences in length followed by a sentence completion task. The sentence completion task requires the subject to write in the information presupposed by the ellipsis occurring in the third sentence of the passage. Each of the passages is controlled for sentence length, level of vocabulary and distance between the ellipsis and its referent, the referent being contained in the second sentence of the passage at a maximum distance of ten words from the ellipsis. The readability level of the test is 2.1 according to the Fry Readability Formula, 2.2 according to the Spache Readability Formula. There are no time limits for

the completion of the test.¹

An item analysis was carried out to test the discriminability of the 15 items on the TOCE. An Index of Discriminability was calculated for each item according to Tuckman's² Formula. As indicated in Table I, the discriminability of the items ranged from .75 to 1.00 in Grade Two, .51 to .74 in Grade Four, and .52 to .81 in Grade Six. The indices for the total sample ranged from .58 to .82. According to Tuckman, an index of .50 is acceptable for each item.

TABLE I
ITEM ANALYSIS FOR TOCE ITEMS USING TUCKMAN'S
INDEX OF DISCRIMINABILITY

Item	Index of Discriminability			Total Average of Grade 2, 4 & 6
	Grade 2	Grade 4	Grade 6	
1	.75	.51	.54	.58
2	.77	.51	.52	.58
3	.86	.59	.62	.68
4	.89	.59	.52	.63
5	.76	.58	.59	.65
6	.75	.58	.75	.81
7	.88	.59	.56	.64
8	.92	.70	.62	.75
9	.88	.60	.68	.67
10	1.00	.70	.62	.74
11	.86	.71	.85	.82
12	1.00	.74	.68	.77
13	.88	.63	.54	.67
14	1.00	.59	.81	.64
15	.90	.68	.81	.79

¹ See Appendix B for a copy of the TOCE.

As the item analysis revealed that all of the items on the TOCE met Tuckman's criteria for discriminability, the TOCE was deemed to be useful in determining students' ability to comprehend ellipses.

RESEARCH STUDY

Sample

The sample for the study consisted of 138 subjects from six classes: 45 in Grade Two, 55 in Grade Four, and 38 in Grade Six. The sample, participating on a voluntary basis, was representative of a middle class suburban school population. Grades Two, Four, and Six were chosen for the study as they represent the range of students included in the previous studies on cohesive ties. These studies found that Grade Two students have generally acquired the decoding skills necessary for the written tests, while Grade Six students appeared to represent the upper limits of development in this area. The Grade Four students provided a comparison.

Testing Procedures

1. The reading sub-tests of the Metropolitan Achievement Test (MAT) were administered by the researcher to classroom groups in early May with the classroom teachers assisting in the supervision of the tests. The scheduling procedures and time limits specified for the tests

were strictly adhered to. This phase of testing was conducted over a period of ten school days.

Three levels of the Metropolitan Achievement Test were used, the Primary II Form F for Grade Two, the Elementary Form F for Grade Four and the Intermediate Form F for Grade Six. Two sub-tests, Word Knowledge and Reading, were administered to each grade, yielding the Total Reading Score which was used to classify students on the basis of reading achievement for the purposes of this study. The Metropolitan Achievement Test is a widely used instrument which is described in Buros³ as a carefully developed and standardized instrument measuring important skills. The results, according to Buros, may be used as the basis for norm referenced interpretation.

2. The TOCE was administered by the researcher to classroom groups with the classroom teacher assisting in the supervision of the test. The specific procedures for the administration of the TOCE are contained in Appendix B. The tests were scored by the researcher according to the guidelines set out in Appendix C. This phase of testing was conducted in mid-May over a period of five school days.

³ Oscar Krisen Buros (Ed), The Eighth Mental Measurements Yearbook, Vol. II, (Highland Park New Jersey: The Gryphon Press, 1978), pp. 731-733.

3. Individual interviews with a random sample of ten students per grade who failed to meet the criteria of 12/15 correct on the TOCE were conducted in the seminar rooms adjacent to the classrooms. The interviews were conducted during a three week period ending in the first week in June. The format for the interviews is outlined in Appendix D.

Statistical Analysis

The statistical procedures used to analyze the data collected were the two-way analysis of variance and the three-way analysis of variance with repeated measures on one factor. The two-way analysis of variance was used to test Hypotheses 1, 2 and 3. The Newman-Keuls test was used to probe significant findings. The three-way analysis of variance with repeated measures on one factor, the TOCE (3 sub-tests), was used to test Hypotheses 4, 5 and 6. The Newman-Keuls test was used to probe significant findings.

CHAPTER IV

ANALYSES OF THE DATA

The objectives of this study were three-fold. The first objective was to collect empirical data investigating the relationship between reading achievement and students' ability to comprehend ellipses. The second objective was to investigate the relationship between grade and students' ability to comprehend ellipses. The third objective of the study was to investigate the relationship between reading achievement and grade on the type of ellipsis understood. In order to realize these objectives, scores on the MAT and TOCE were analyzed using two-way analysis of variance and three-way analysis of variance: the between subject factors being grade and reading achievement, the within subject factor being the type of ellipsis (nominal, verbal and clausal subtests of the TOCE).

Data obtained were processed using the facilities and analytical computer programs available at the University of Manitoba Computer Centre.

The initial phase involved a descriptive analysis of the data, including the assignment of students to reading achievement groups on the basis of MAT scores,¹ recording of individual subjects' TOCE scores,² calculation of measures

^{1,2} See Appendix D.

of central tendency, and the observation of the dispersion of scores within each test through an examination of the ranges and standard deviations.

In the second phase of the analysis, scores were analyzed in order to examine the relationship between TOCE scores and grade and reading achievement. Hypotheses 1, 2 and 3 were tested using two-way analysis of variance. The Newman-Keuls Test was used to probe significant effects. Hypotheses 4, 5 and 6 were tested using three-way analysis of variance with repeated measures on one factor (type of ellipsis).

DESCRIPTIVE ANALYSIS OF THE DATA

Descriptive Analysis of Subjects' Reading Achievement Levels

Grade Two: There were a total of 45 subjects in the Grade Two sample; 14 subjects in the Below Average group, 22 subjects in the Average group, and nine subjects in the Above Average group.

Grade Four: There were a total of 55 subjects in the Grade Four sample; 15 subjects in the Below Average group, 16 subjects in the Average group, and 24 subjects in the Above Average group.

Grade Six: There were a total of 38 subjects in the Grade Six sample; 19 in the Below Average group, 11 in the Average group, and eight in the Above Average group.

TABLE II

NUMBER OF SUBJECTS AT EACH READING
ACHIEVEMENT LEVEL FOR GRADES TWO, FOUR AND SIX
(N = NUMBER OF CASES)

Grade	Achievement Level			Total
	Below Average	Average	Above Average	
Grade Two	14	22	9	45
Grade Four	16	15	24	56
Grade Six	19	11	8	38
Total	N = 49	N = 49	N = 41	N = 138

Descriptive Analysis of Responses to Metropolitan Achievement
Test (MAT)

Grade Two: The range of grade equivalent scores on the MAT for the Below Average group is 1.0 - 2.1 with a mean of 1.8. The range of scores for the Average group is 2.2 - 3.2 with a mean of 2.5. The range of scores for the Above Average group is 3.3 - 6.0 with a mean of 4.5.

TABLE III

MAT SCORE RANGE, MEANS AND STANDARD DEVIATIONS FOR
READING ACHIEVEMENT LEVELS & TOTAL SAMPLE: GRADE TWO

	Below Average	Average	Above Average	Total
Range	1.0 - 2.1	2.2 - 3.2	3.3 - 6.0	1.0 - 6.0
Mean	1.8	2.5	4.5	2.7
S.D.	.37	.28	1.14	.57

Grade Four: The range of grade equivalent scores on the MAT for the Below Average group is 2.7 - 3.9 with a mean of 3.4. The range of scores for the Average group is 4.4 - 5.0 with a mean of 4.8. The range of scores for the Above Average group is 5.5 - 9.8 with a mean of 6.1.

TABLE IV

MAT SCORE RANGE, MEANS AND STANDARD DEVIATIONS FOR
READING ACHIEVEMENT LEVELS & TOTAL SAMPLE: GRADE FOUR

	Below Average	Average	Above Average	Total
Range	2.7 - 3.9	4.4 - 5.0	5.5 - 9.8	2.7 - 9.8
Mean	3.4	4.8	6.1	5.0
S.D.	.43	.24	1.07	.59

Grade Six: The range of grade equivalent scores on the MAT for the Below Average group is 2.8 - 6.0 with a mean of 4.8. The range of scores for the Average group is 6.2 - 7.1 with a mean of 6.6. The range of scores for the Above Average group is 7.8 - 9.8 with a mean of 9.0.

TABLE V

MAT SCORE RANGE, MEANS AND STANDARD DEVIATIONS FOR
READING ACHIEVEMENT LEVELS & TOTAL SAMPLE: GRADE SIX

	Below Average	Average	Above Average	Total
Range	2.8 - 6.0	6.2 - 7.1	7.8 - 9.8	2.8 - 9.8
Mean	4.9	6.6	9.0	6.1
S.D.	1.11	.31	.90	.77

Descriptive Analysis of Responses to the TOCE (Total Score)
According to Grade and Reading Achievement

Grade Two: The range of total scores on the TOCE for the Below Average group is 0 - 8 with a mean of 2.00. The range of total scores for the Average group is 4 - 11 with a mean of 6.82. The range of total scores for the Above Average group is 7 - 13 with a mean of 10.66. The highest possible score for the test is 15.

Grade Four: The range of total scores on the TOCE for the Below Average group is 2 - 14 with a mean of 9.187. The range of total scores for the Average group is 7 - 15 with a mean of 12.066. The range of scores for the Above Average group is 10 - 15 with a mean of 13.458.

Grade Six: The range of total scores on the TOCE for the Below Average group is 0 - 15 with a mean of 10.526. The range for the Average group is 12 - 15 with a mean of 14.363. The range for the Above Average group is 13 - 15 with a mean of 14.375.

TABLE VI

MEAN TOTAL TOCE SCORES ACCORDING TO
GRADE AND READING ACHIEVEMENT LEVEL

Reading Achievement	G R A D E		
	2	4	6
Below Average	2.000	9.187	10.526
Average	6.818	12.066	14.363
Above Average	10.666	13.458	14.375

Descriptive Analysis of Mean Scores on the TOCE (Three Sub-tests) According to Grade and Reading Achievement

Sub-Test 1 (Nominal Ellipses)

Below Average Readers: The mean score for the Below Average readers in Grade Two is .500. In Grade Four the mean score is 3.437 and in Grade Six the mean score is 3.736.

Average Readers: The mean score for the Average readers in Grade Two is 2.636. In Grade Four the mean score is 4.200 and in Grade Six the mean score is 4.818.

Above Average Readers: The mean score for the Above Average readers in Grade Two is 5.00. In Grade Four the mean score is 4.583, and in Grade Six the mean score is 5.00.

TABLE VII

MEAN NOMINAL SUB-TEST SCORES (SUB-TEST 1)
ACCORDING TO GRADE AND READING ACHIEVEMENT LEVEL

Reading Achievement	G R A D E		
	2	4	6
Below Average	.500	3.437	3.736
Average	2.636	4.200	4.818
Above Average	5.000	4.583	5.000

Sub-Test 2 (Verbal Ellipses)

Below Average Readers: The mean score for the Below Average readers in Grade Two is 1.071. The mean score in Grade Four is 3.437 and in Grade Six the mean score is 3.315.

Average Readers: The mean score for the Average readers in Grade Two is 2.500. The mean score in Grade Four is 3.866 and in Grade Six the mean score is 5.545.

Above Average Readers: The mean score for the Above Average readers in Grade Two is 3.00. The mean score in Grade Four is 4.250 and in Grade Six the mean score is 4.625.

TABLE VIII

MEAN VERBAL SUB-TEST SCORES (SUB-TEST 2)
ACCORDING TO GRADE AND READING ACHIEVEMENT LEVEL

Reading Achievement	G R A D E		
	2	4	6
Below Average	1.071	3.437	3.315
Average	2.500	3.866	5.545
Above Average	3.000	4.250	4.625

Sub-Test 3 (Clausal Ellipses)

Below Average Readers: The mean score for the Below Average readers in Grade Two is .428. The mean score in Grade Four is 2.312 and in Grade Six the mean score is 3.473.

Average Readers: The mean score for the Average readers in Grade Two is 1.681. The mean score in Grade Four is 4.000 and in Grade Six the mean score is 5.00.

Above Average Readers: The mean score for the Above Average readers in Grade Two is 3.666. The mean score in Grade Four is 4.620 and in Grade Six the mean score is 4.750.

TABLE IX

MEAN CLAUSAL SUB-TEST SCORES (SUB-TEST 3)
ACCORDING TO GRADE AND READING ACHIEVEMENT LEVEL

Reading Achievement	G R A D E		
	2	4	6
Below Average	.428	2.312	3.473
Average	1.681	4.000	5.000
Above Average	3.666	4.625	4.750

STATISTICAL ANALYSIS OF THE DATA: TESTING THE HYPOTHESIS

During this phase of the analysis, the six hypotheses were tested in order to determine if relationships exist between the comprehension of the three types of ellipses (Nominal, Verbal, Clausal) and the other variables in the study (Grade and Reading Achievement). All hypotheses were

tested at the .05 level of statistical significance.

Table X outlines the mean achievement on the TOCE (Total Scores for grade and achievement categories.

TABLE X
MEAN TOCE TOTAL SCORES
ACCORDING TO GRADE AND READING ACHIEVEMENT LEVEL

Reading Achievement	G R A D E		
	2	4	6
Below Average	2.000	9.187	10.526
Average	6.818	12.066	14.363
Above Average	10.666	13.458	14.375

A two-way analysis of variance was carried out to determine if a relationship exists between the dependent variable, student performance on the TOCE (Total Score), and the two independent variables, grade and reading achievement.

HYPOTHESES ONE, TWO, AND THREE

Table XI presents the results of the two-way analysis of variance used to test hypotheses 1, 2 and 3.

TABLE XI

TWO-WAY ANALYSIS OF VARIANCE FOR TOTAL TOCE SCORES WITH
STUDENTS CLASSIFIED BY GRADE AND READING ACHIEVEMENT LEVEL

Source	ss	ms	df	F	P
Grand Mean	13089.0	13089.0	1	1884.9*	0.00
Grade	918.0	458.1	2	65.9*	0.00
Reading Achievement	679.0	339.8	2	48.9*	0.00
Interaction (Gr x Ach)	87.0	21.8	4	3.1*	0.01
Error	895.0	6.9	129		

*Significant at the .05 level

The F values for each of the main effects (grade and reading achievement level) as well as the interaction effect, are all significant at the .05 level. That is, these significant F values support the acceptance of the following hypotheses:

Hypothesis #1 - There will be a relationship between grade and total TOCE scores.

Hypothesis #2 - There will be a relationship between reading achievement and total TOCE scores.

Hypothesis #3 - There will be an interaction between grade and reading achievement on the total TOCE scores.

For further analysis, the Newman-Keuls comparison of ordered means was used to test the differences between the means for grade and achievement levels. The results of the analysis for grade are presented in Tables XII, XIII, and XIV.

Hypothesis One

According to Table XII, in Grade Two the differences between the ordered means are all significant at the .05 level. Therefore, Hypothesis 1 is supported for each of the comparisons in Grade Two.

TABLE XII

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR
BELOW AVERAGE, AVERAGE AND ABOVE AVERAGE ACHIEVEMENT LEVELS
GRADE TWO

	Below Average	Average	Above Average
Ordered Means	2.000	6.818	10.666
	2.000	-	4.818*
Differences			8.666*
	6.818	-	3.848*

*Significant at the .05 level

In Table XIII, the comparison of ordered means is given for Grade Four. Differences between the means for the Below Average (x) and Average (y), and Below Average (x) and Above

Average (z) are significant at the .05 level. However, the difference between the means of the Average (y) and Above Average (z) groups in Grade Four is not significant at the .05 level.

TABLE XIII

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR
BELOW AVERAGE, AVERAGE AND ABOVE AVERAGE ACHIEVEMENT LEVELS
GRADE FOUR

	Below Average	Average	Above Average
Ordered Means	9.187	12.066	13.458
	9.187	-	2.879*
Differences			4.271*
	12.066	-	.392
*Significant at the .05 level			

Table XIV presents the comparison of ordered means for Grade Six. Differences between the means for the Below Average (x) and Average (y), and Below Average (x) and Above Average (z) group are significant at the .05 level. However, the difference between the means of the Average (y) and Above Average (z) groups is not significant.

TABLE XIV

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR
BELOW AVERAGE, AVERAGE AND ABOVE AVERAGE ACHIEVEMENT LEVELS
GRADE SIX

	Below Average	Average	Above Average
Ordered Means	10.526	14.363	14.375
	10.526	-	3.837*
Differences			3.849*
	14.363	-	0.012
*Significant at the .05 level			

In summary, according to the analyses in Tables XII, XIII and XIV the differences between seven of the nine ordered means compared by the Newman-Keuls Test were significant at the .05 level. On the basis of these results, Hypothesis 1 was accepted.

Hypothesis Two

Similarly, the Newman-Keuls comparison of ordered means was applied to determine the significance between means of the total TOCE scores using reading achievement level as the basis for comparison. The results of the Newman-Keuls comparison are given in Tables XV, XVI and XVII for the Below Average, Average and Above Average groups respectively. The results of the testing of Hypothesis Two are contained in these tables.

According to Table XV, for the Below Average achievement groups, the differences between the mean total scores on TOCE for Grade Two and Grade Four, and for Grade Two and Grade Six are significant at the .05 level. However, the comparison of the difference between the means of Grade Four and Grade Six is not statistically significant at the .05 level. Therefore, Hypothesis 2 is supported in two of the cases but does not hold in the third comparison since the difference between the mean total TOCE scores for the Below Average group in Grades Four and Six is not significant.

TABLE XV
NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS
FOR BELOW AVERAGE SUBJECTS

	Grade 2	Grade 4	Grade 6
Ordered Means	2.000	9.187	10.526
	2.000	-	7.87*
Differences			8.526*
	9.187	-	1.339

According to Table XVI, for the Average achievement groups, the differences between the mean total scores on the TOCE for Grade Two and Grade Four, and Grade Two and Grade Six, and Grade Four and Grade Six, are significant at the .05 level. Thus, Hypothesis 2 is supported in all three comparisons.

TABLE XVI
NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS
FOR AVERAGE SUBJECTS

	Grade 2	Grade 4	Grade 6
Ordered Means	6.818	12.066	14.363
	6.818	-	5.24*
Differences			7.54*
	12.066	-	2.29*

According to Table XVII, the Newman-Keuls comparison of ordered means indicate that for the Above Average achievement groups, the differences between total TOCE means scores for Grade Two and Grade Four, and Grade Two and Grade Six are significant at the .05 level. The comparison of the difference between the total TOCE means is not statistically significant at the .05 level. Therefore Hypothesis 2 is again supported in two of the three cases but is rejected in the third, since the differences between the mean total scores on the TOCE for Above Average subjects in Grade Four and Grade Six is not statistically significant at the .05 level.

TABLE XVII
NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS
FOR ABOVE AVERAGE SUBJECTS

	Grade 2	Grade 4	Grade 6
Ordered Means	10.666	13.458	14.375
10.666 -	-	2.792*	3.709*
Differences			
13.458 -	13.458	-	0.917

In summary, on the basis of the results of the analysis in Tables XV, XVI and XVII, it is evident that the differences in seven of the nine comparisons of ordered means are significant at the .05 level. These results support the acceptance of Hypothesis 2, that is, that there will be a

relationship between reading achievement and total TOCE scores.

Hypothesis Three

The analysis of variance summarized in Table XI yields a significant F ratio value for the interaction effect between grade level and achievement level. The F ratio, 3.1, is significant at the .01 level. Hence the experimental data support Hypothesis 3, that is, that there will be an interaction between grade and reading achievement level on the total TOCE scores. In essence the significant F ratio for the interaction indicates that there is an appreciable relationship between student scores in a total test (TOCE), and the combination of the two independent variables: grade and achievement level.

The nature of the interaction effects is indicated by examining the graphical representation of the means in Figure A. Figure A represents the profiles corresponding to the simple effects of the grades for each of the achievement levels. The profiles or slopes for each of the achievement levels indicate that grades are differentially effective within each of the ability levels.

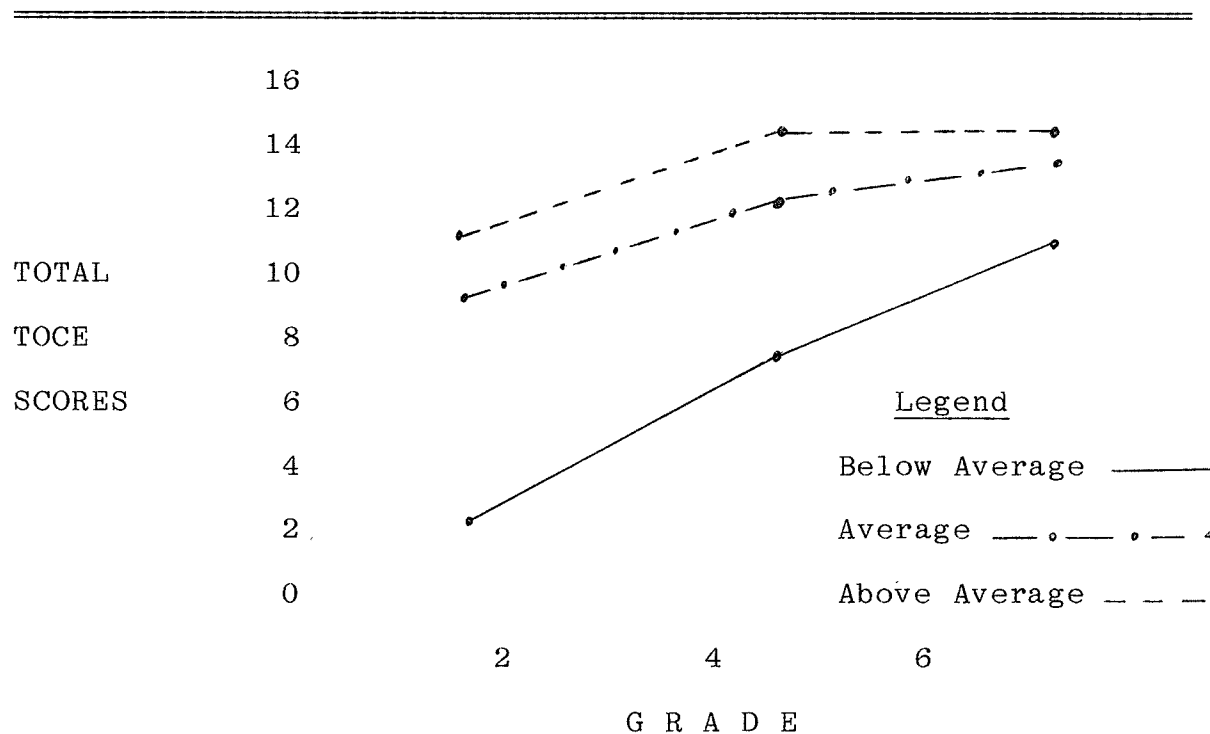
The graph displays the relationship between grade and total TOCE scores for three groups of students. The y-axis represents the total TOCE score, ranging from 0 to 16 in increments of 2. The x-axis represents the grade, with markers at 2, 4, and 6. Three data series are plotted: 'Below Average' (solid line), 'Average' (dash-dot line), and 'Above Average' (dashed line). All three groups show a positive correlation between grade and score. The 'Above Average' group consistently has the highest scores, followed by the 'Average' group, and then the 'Below Average' group. The 'Below Average' group shows a more significant increase in score from grade 2 to 4 compared to the other two groups.

Grade	Below Average	Average	Above Average
2	2.0	7.2	11.5
4	9.5	12.8	14.2
6	11.0	14.5	15.5

Similarly as indicated in Figure B, the effect of achievement level for each of the grade levels is shown. Figure B represents the profiles or slopes corresponding to the simple effects of achievement for each of the grades. The profiles or slopes for each of the grades indicate that achievement is differentially effective for each of the grades. In particular, the profile for Grade Two appears to have a slope which is somewhat different from the slope in the profiles for Grades Four and Six.

FIGURE B

PROFILES FOR TOTAL SCORES ON THE TOCE FOR
BELOW AVERAGE, AVERAGE, AND ABOVE AVERAGE SUBJECTS
IN GRADES TWO, FOUR, AND SIX



The presence of a significant interaction effect as indicated by the above graphical representation and the results in Table XI indicate that a relationship exists between the dependent variable (TOCE Score) and the combined interacting of the two independent variables, grade level and achievement level. On the basis of these results, Hypothesis 3, that is, that there will be an interaction between grade and reading achievement on the total TOCE scores, was accepted.

Hypotheses Four, Five and Six

In order to test Hypotheses 4, 5, and 6 as stated below, a three-way analysis of the variance was applied to the data.

Hypothesis #4 - There will be an interaction between grade and TOCE scores (3 sub-tests).

Hypothesis #5 - There will be an interaction between TOCE scores (3 sub-tests) and reading achievement.

Hypothesis #6 - There will be an interaction between TOCE scores (3 sub-tests), grade and reading achievement.

The results of the analysis of variance are summarized in Table XVIII. As indicated by Table XVIII the overall main effect of the three sub-tests is significant at the .05 level. The results of this analysis reveal that the mean scores differed significantly on the three sub-tests of the TOCE.

TABLE XVIII

THREE-WAY ANALYSIS OF VARIANCE FOR TOCE SCORES
(3 SUB-TESTS) CLASSIFIED BY GRADE AND READING ACHIEVEMENT

Source	SS	MS	df	F	P
<u>Between Groups</u>	4363	4363.0	1	1884.98	0.000
Grade	305	152.7	2	65.98	0.000
Reading Achievement	226	113.2	2	48.95	0.000
Interaction	29	7.2	4	3.15	0.016
Error (Between)	298	2.3	129		

Source	ss	ms	df	F	P
<u>Within Groups</u>					
Tests	7.2	3.6	2	5.33*	0.005
Grade x sub-tests	2.9	0.7	4	1.08	0.364
Achievement x sub-tests	8.7	2.1	4	3.19*	0.013
Interaction (Grade x					
Achievement x sub-tests)	14.9	1.8	8	2.74*	0.006
Error (Within)	176.3	0.68	258		

The mean achievement values on the TOCE for all subjects in Grades Two, Four and Six are given in Table XIX.

The highest mean score was achieved on sub-test one. The mean decreases for sub-test two. The lowest mean score was achieved on sub-test three.

TABLE XIX
MEAN TOCE SCORES (THREE SUB-TESTS) FOR ALL SUBJECTS
IN GRADES TWO, FOUR AND SIX

Sub-Test	x
1	3.572
2	3.347
3	3.210

A Newman-Keuls comparison of the differences between ordered means given in Table XX indicates that the differences between the means are significant between sub-test one and sub-test three, and between sub-test one and sub-test two. The scores on sub-test one are, in both cases, significantly greater than the scores on sub-tests two and three.

TABLE XX

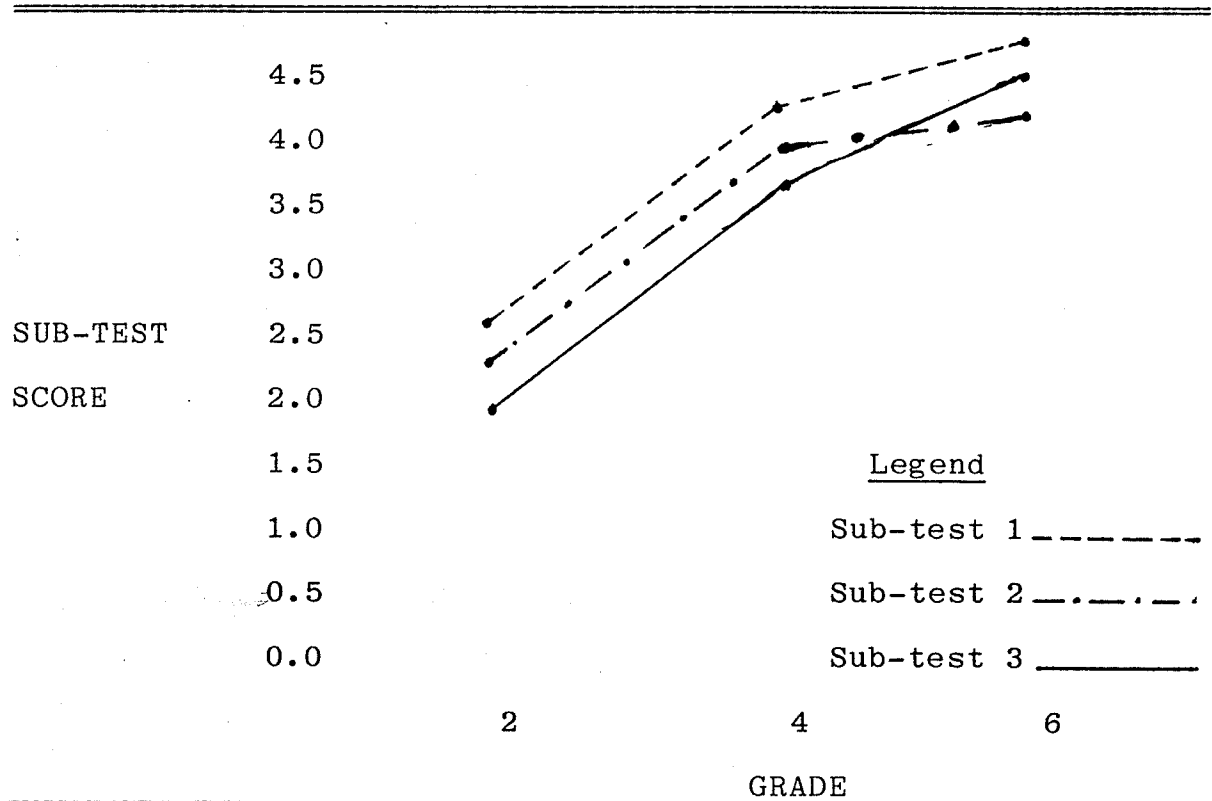
NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS
FOR TOCE SCORES (3 SUB-TESTS) FOR ALL SUBJECTS
IN GRADES TWO, FOUR AND SIX

	Sub-Test 3	Sub-Test 2	Sub-Test 1
Ordered Means	3.210	3.347	3.572
	3.210	-	.362*
Differences			
	3.347	-	.225*
*Significant at the .05 level			

A graphic representation of the mean scores on the TOCE (three sub-tests) is presented in Figure C. It may be noted that the profiles for sub-tests one and two are similar for Grades Two, Four and Six. The profile for sub-test three differs at the Grade Six level.

FIGURE C

PROFILES OF MEAN TOCE SCORES (3 SUB-TESTS)
FOR TOTAL SAMPLE IN GRADES TWO, FOUR AND SIX



Hypothesis Four

According to Table XVIII the interaction between the TOCE (three sub-tests) and grade is not significant. Therefore, Hypothesis 4, that is, that there will be an interaction between grade and TOCE scores (three sub-tests) is rejected.

Hypothesis Five

Table XXI presents the means for three sub-tests of the TOCE for each of achievement groups.

TABLE XXI

MEAN TOCE SCORES (3 SUB-TESTS) FOR
BELOW AVERAGE, AVERAGE, AND ABOVE AVERAGE
ACHIEVEMENT LEVEL SUBJECTS: ALL GRADES POOLED

Sub-Test	ACHIEVEMENT LEVEL		
	Below Average	Average	Above Average
1	2.557	3.885	4.527
2	2.607	3.637	3.958
3	2.071	3.560	4.347

A Newman-Keuls comparison between the ordered means for the Below Average subjects in all grades is presented in Table XXII.

TABLE XXII

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE SCORES
(3 SUB-TESTS): BELOW AVERAGE SUBJECTS - ALL GRADES POOLED

	Clausal	Nominal	Verbal
Ordered Means	2.071	2.557	2.607
	2.071	-	.486*
Differences			.536*
	2.557	-	.050

*Significant at the .05 level

According to Table XXII, the difference between the means for the sub-tests one and three, and sub-tests two and three are significant at the .05 level. The difference

between the means for sub-tests one and two are not significant at the .05 level.

Table XXIII presents the results of the Newman-Keuls comparison of ordered means for the Average subjects in all grades.

TABLE XXIII
NEWMAN-KEULS COMPARISON OF ORDERED MEANS FOR TOCE
(3 SUB-TESTS): AVERAGE SUBJECTS - ALL GRADES POOLED

	Clausal	Nominal	Verbal
Ordered Means	3.560	3.637	3.885
3.560 -	-	.077	0.29
Differences			
3.637 -		-	0.24

The comparison of ordered means for the Average subjects indicates that the differences between the means on the TOCE (three sub-tests) are not significant for the Average subjects.

A similar comparison of ordered means for the Above Average subjects is presented in Table XXIV.

TABLE XXIV

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE SCORES
(3 SUB-TESTS): ABOVE AVERAGE SUBJECTS - ALL GRADES POOLED

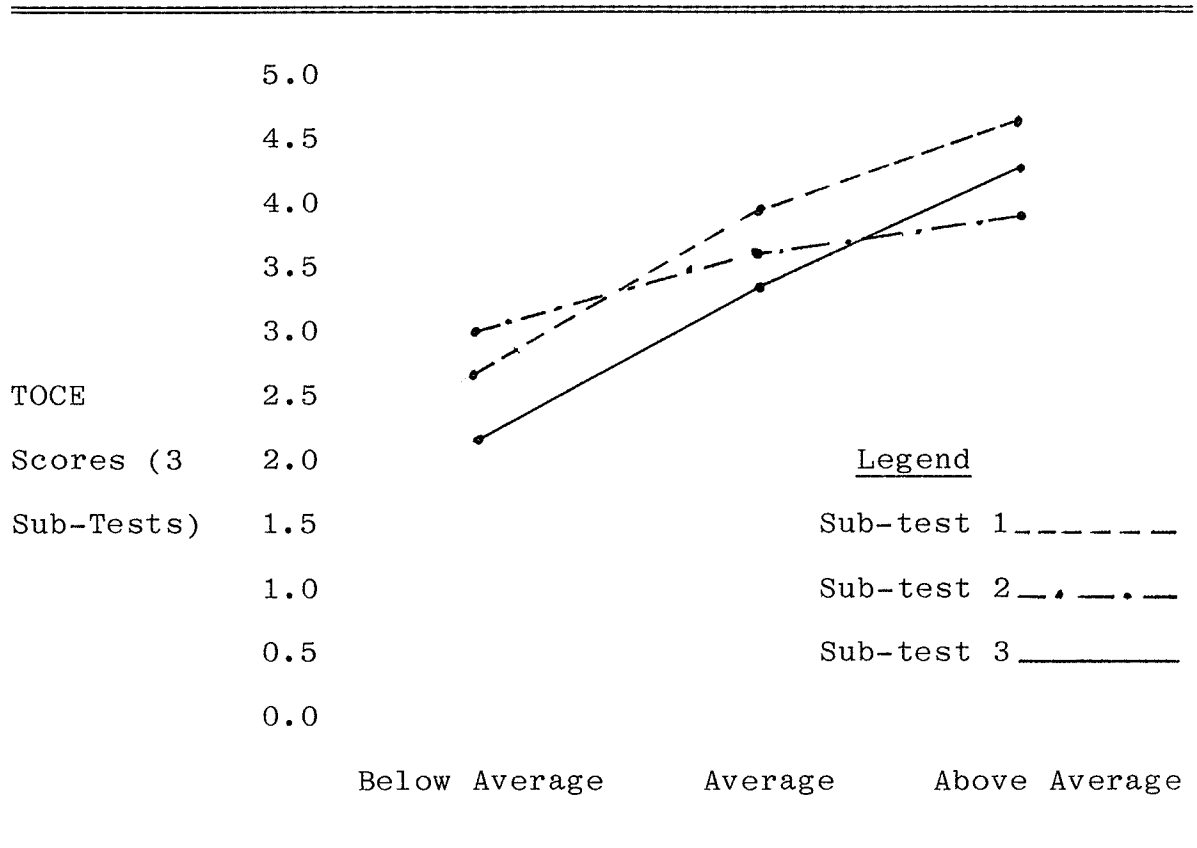
	Verbal	Clausal	Nominal
Ordered Means	3.958	4.347	4.527
	3.958	-	.389*
Differences			.569*
	4.347	-	.180
*Significant at the 0.5 level			

The results of this comparison indicate that, for the Above Average subjects, the differences between the means for sub-tests two and three, and the means for sub-tests one and two are statistically significant at the .05 level. However, the difference between the means for sub-tests one and three are not statistically significant.

In summary, as was indicated in Table XVIII, the interaction between scores on the TOCE (three sub-tests) is statistically significant at the .05 level. This indicates that the pattern of scores on the three sub-tests depends on reading achievement. The profiles corresponding to this interaction are shown in Figure D.

FIGURE D

PROFILES OF MEANS TOCE SCORES (3 SUB-TESTS) FOR BELOW AVERAGE
AVERAGE AND ABOVE AVERAGE SUBJECTS: ALL GRADES POOLED



The profiles indicate that the effect of ability upon achievement differs with the sub-test. The Below Average group scored significantly higher on sub-tests one and two, as compared with sub-test three. The Above Average subjects scored significantly higher on sub-tests one and three, as compared to sub-test two. No significant differences were found between the sub-test scores for the Average subjects. Therefore Hypothesis 5 is accepted for the Below Average and Above Average subjects but does not hold for the Average subjects.

Hypothesis Six

The means for the TOCE scores (three sub-tests) for Below Average, Average and Above Average subjects in Grade Two are presented in Table XXV.

TABLE XXV

CELL MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR BELOW AVERAGE, AVERAGE AND ABOVE AVERAGE SUBJECTS: GRADE TWO

Test	ACHIEVEMENT: Below Average	Average	Above Average
1	0.500	2.636	4.000
2	1.071	2.500	3.000
3	0.428	1.681	3.666

Table XXVI presents a comparison between the ordered means for the TOCE (three sub-tests) for subjects in Grade Two.

TABLE XXVI

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR BELOW AVERAGE SUBJECTS: GRADE TWO

	Clausal	Nominal	Verbal
Ordered Means	.428	.500	1.071
	.428	—	.072
Differences			
	.500	—	.571*

*Significant at the 0.5 level

The results show that the Below Average subjects in Grade Two score significantly higher on sub-test two, than on either of sub-tests one or three.

The results of comparisons of the results for Average students in Grade Two are summarized in Table XXVII.

TABLE XXVII

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR
TOCE SCORES (3 SUB-TESTS) FOR AVERAGE SUBJECTS: GRADE TWO

	Clausal	Verbal	Nominal
Ordered Means	1.681	2.500	2.636
	1.681	-	.819*
Differences			.955*
	2.500	-	.136
*Significant at the 0.5 level			

Grade Four students in the Average group scored significantly higher on sub-tests one and two as compared to sub-test three.

A similar comparison of ordered means for Above Average subjects in Grade Two is reported in Table XXVIII.

TABLE XXVIII

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE
SCORES (3 SUB-TESTS) FOR ABOVE AVERAGE SUBJECTS: GRADE TWO

	Verbal	Clausal	Nominal
Ordered Means	3.000	3.666	4.000
3.000	-	.666*	1.000*
Differences			
3.666	-		.334

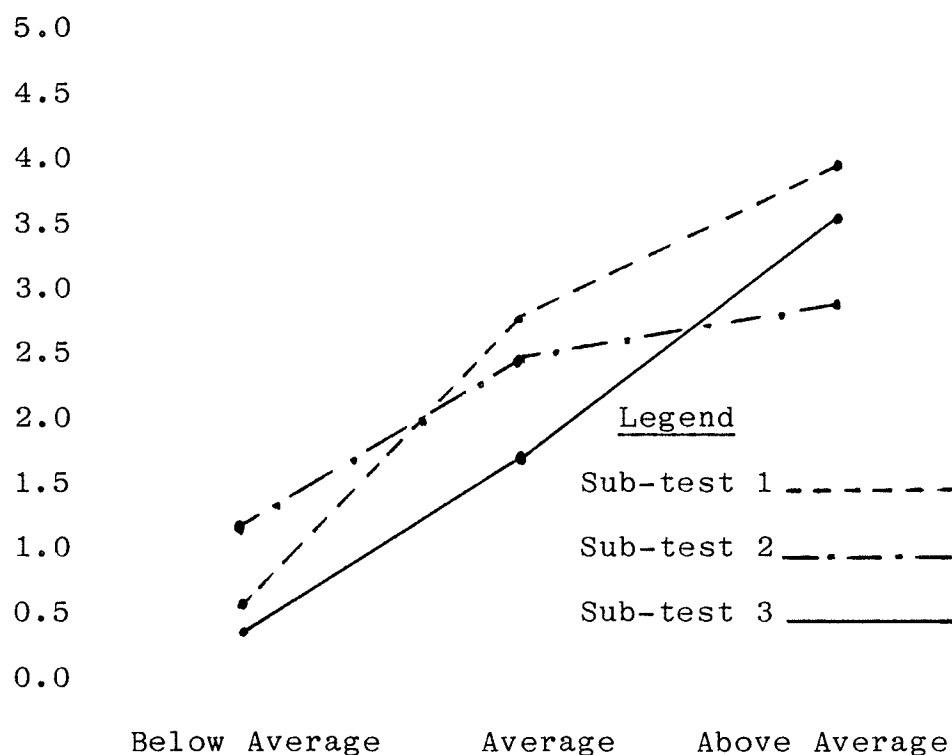
*Significant at the 0.5 level

In Grade Two, the Above Average subjects were significantly higher on sub-tests one and three, as compared to scores on sub-test two.

In summary, the interaction effect of TOCE scores (three sub-tests), grade and reading achievement is significant at the Grade Two level. The application of the Newman-Keuls test of differences between ordered means indicates that in Grade Two, Below Average readers attained significantly higher mean scores on sub-test two than mean scores on sub-tests one and three. However, the pattern differs for the Average group - on sub-tests one and two this group scored significantly higher than on sub-test three. In the Above Average group, mean scores on sub-tests one and three are significantly different and higher than mean scores on sub-test two. These results are presented graphically in Figure E.

FIGURE E

PROFILES OF TOCE SCORES (3 SUB-TESTS) FOR BELOW
AVERAGE, AVERAGE AND ABOVE AVERAGE SUBJECTS: GRADE TWO



The cell means for the TOCE scores (three sub-tests) for Below Average, Average, and Above Average subjects in Grade four are presented in Table XXIX.

TABLE XXIX

CELL MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR BELOW
AVERAGE, AVERAGE AND ABOVE AVERAGE SUBJECTS: GRADE FOUR

Test	ACHIEVEMENT:	Below Average	Average	Above Average
1		3.437	4.200	4.583
2		3.437	3.866	4.250
3		2.312	4.000	4.625

A comparison of the differences between the ordered means for the Below Average group is presented in Table XXX.

TABLE XXX

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR BELOW AVERAGE SUBJECTS: GRADE FOUR

	Clausal	Nominal	Verbal
Ordered Means	2.312	3.437	3.437
	2.312	-	1.125*
Differences			1.125*
*Significant at the 0.5 level			

This comparison of ordered means indicates that Below Average subjects in Grade Four scored significantly higher on sub-tests one and two as compared to sub-test three.

Table XXXI presents a comparison between the ordered means of the Average group in Grade Four.

TABLE XXXI

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR AVERAGE SUBJECTS: GRADE FOUR

	Verbal	Clausal	Nominal
Ordered Means	3.866	4.000	4.200
	3.866	-	.134
Differences			.334
	4.000	-	.200

As the results of Table XXXI indicate, no significant differences were found between mean scores on the TOCE (three sub-tests) for Average subjects in Grade Four.

The results of the comparison of ordered means of scores on the TOCE (three sub-tests) for Above Average subjects in Grade Four are presented in Table XXXII.

TABLE XXXII

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR ABOVE AVERAGE SUBJECTS: GRADE FOUR

	Verbal	Nominal	Clausal
Ordered Means	4.250	4.583	4.625
4.250	-	.333*	.375*
Differences			
4.583		-	.042

*Significant at the .05 level

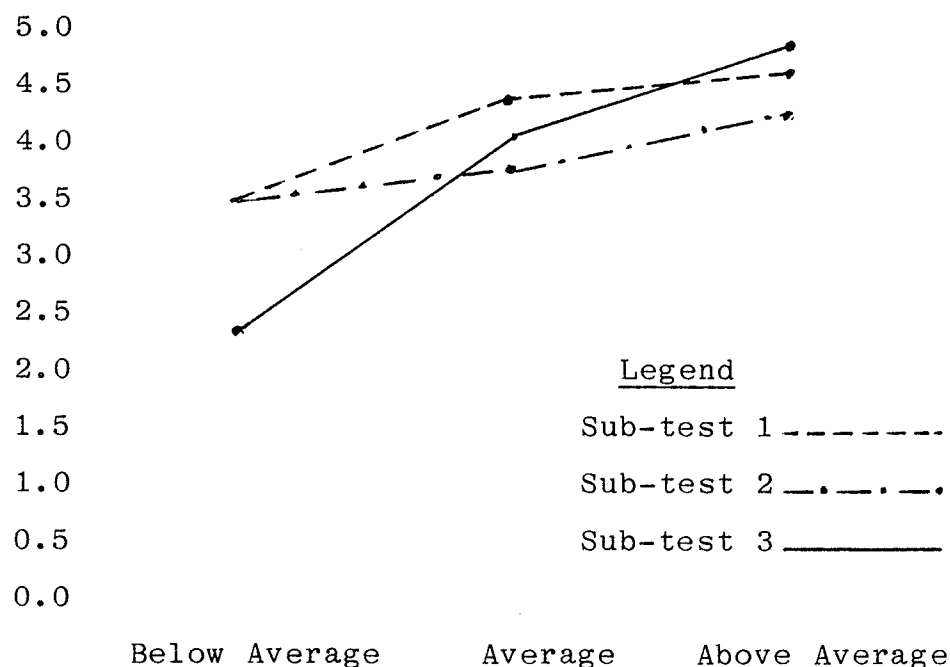
The mean scores of the Above Average subjects in Grade Four was significantly higher on sub-tests one and three as compared to the mean for sub-test two.

In summary, the interaction effects of TOCE scores (three sub-tests) and reading achievement are significant for the Below Average and Above Average subjects in Grade Four.

Figure F presents a graphic representation of mean TOCE scores (three sub-tests) for Below Average, Average and Above Average subjects in Grade Four.

FIGURE F

PROFILES OF MEAN TOCE SCORES (3 SUB-TESTS) FOR BELOW
AVERAGE, AVERAGE AND ABOVE AVERAGE SUBJECTS: GRADE FOUR



The means for the TOCE scores (three sub-tests) for Below Average, Average, and Above Average Subjects in Grade Six are presented in Table XXXIII.

TABLE XXXIII

CELL MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR BELOW
AVERAGE, AVERAGE AND ABOVE AVERAGE SUBJECTS: GRADE SIX

Test	ACHIEVEMENT:	Below Average	Average	Above Average
1		3.736	4.818	5.000
2		3.315	4.545	4.625
3		3.473	5.000	4.750

A comparison of the differences between the ordered means for the Below Average group is presented in Table XXXIV.

TABLE XXXIV

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE SCORES (3 SUB-TESTS) FOR BELOW AVERAGE SUBJECTS: GRADE SIX

	Verbal	Clausal	Nominal
Ordered Means	3.315	3.473	3.736
	3.315	-	.158
Differences			.421*
	3.473	-	.263

*Significant at the .05 level

The comparison between ordered means presented in Table XXIV indicates that in the Below Average group in Grade Six, the mean score for Test 1 was significantly higher than the mean score for Test 2. No other significant differences between means were found for this group.

Table XXXV summarizes the results of the comparison between ordered means for TOCE scores (three sub-tests) for the Average group in Grade Six.

TABLE XXXV

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE
SCORES (3 SUB-TESTS) FOR AVERAGE SUBJECTS: GRADE SIX

	Verbal	Clausal	Nominal
Ordered Means	4.545	4.818	5.000
4.545	-	.273	.455
Differences			
4.813		-	.182

Table XXXV indicates that no significant differences were found between the mean TOCE scores (three sub-tests) for the Average group in Grade Six.

The results of a similar comparison between ordered means for mean scores on the TOCE (three sub-tests) for the Above Average group in Grade Six are shown in Table XXXVI.

TABLE XXXVI

NEWMAN-KEULS COMPARISON BETWEEN ORDERED MEANS FOR TOCE
SCORES (3 SUB-TESTS) FOR ABOVE AVERAGE SUBJECTS: GRADE SIX

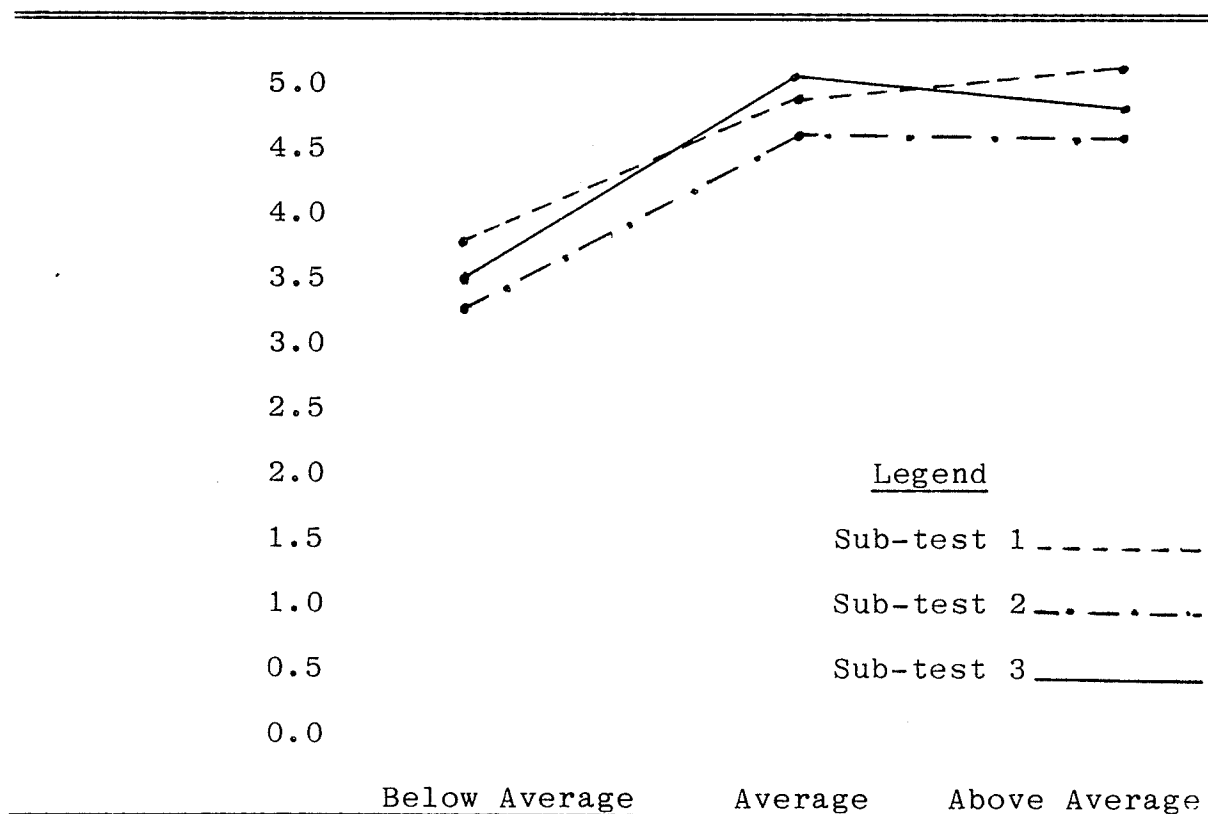
	Verbal	Clausal	Nominal
Ordered Means	4.625	4.750	5.000
4.625	-	.125	.375
Differences			
4.750		-	.250

As the results of Table XXXVI indicate, no significant differences between the mean TOCE scores (three sub-tests) for the Above Average group were found in Grade Six.

The mean scores for the TOCE (three sub-tests) for Grade Six are presented graphically in Figure G.

FIGURE G

PROFILES OF MEAN TOCE SCORES (3 SUB-TESTS) FOR BELOW AVERAGE, AVERAGE AND ABOVE AVERAGE SUBJECTS: GRADE SIX



In summary, significant differences between the mean scores on the TOCE (three sub-tests) in the Grade Six were found only in the Below Average group where the mean score for sub-test one was significantly higher than the mean score for sub-test two.

On the basis of the finding reported which are relevant to Hypothesis 6, this hypothesis is accepted with the recognition that no significant differences between the mean TOCE scores (three sub-tests) were found in the Average groups in Grades Four and Six, or the Above Average group in Grade Six. These results appear to indicate that the interacting effect of TOCE (sub-tests), grade and achievement level disappears for certain combinations of the two independent variables, grade and achievement.

INTERVIEWS

The random sample of students from each grade who failed to meet the criteria of 12/15 correct on the TOCE were interviewed individually. The interviews had two purposes:

1. to determine the subjects' word recognition level on the TOCE;
2. to determine if factors contributing to poor comprehension of ellipses could be identified.

Word recognition levels were assigned according to Bett's criteria for interpreting Informal Reading Inventory performance.

TABLE XXXVII

SUMMARY OF BETT'S CRITERIA FOR INTERPRETING IRI PERFORMANCE: WORD RECOGNITION

Reading Level	Word Recognition Accuracy
Independent	99% or higher
Instructional	95 - 98%
Frustration	Lower than 95%

Description of the Interview Sample

Grade Two: The Grade Two sample consisted of two subjects from the Below Average group and eight subjects from the Average group. Total scores on the TOCE ranged from 0 - 10. Total Reading scores on the MAT ranged from 1.0 - 3.2. Individual scores and ratings are summarized in Table XXXVIII.

TABLE XXXVIII

SUMMARY OF INDIVIDUAL TOCE TOTAL SCORES,
ACHIEVEMENT RATINGS AND WORD RECOGNITION LEVELS
INTERVIEW SAMPLE: GRADE TWO

Subject	Reading Achievement	Total TOCE Score	Word Recognition Level
1	Below Average	0	Frustration
2	Below Average	0	Frustration
3	Average	4	Frustration
4	Average	5	Frustration
5	Average	6	Instructional
6	Average	5	Instructional
7	Average	7	Instructional
8	Average	5	Instructional
9	Average	8	Independent
10	Average	10	Independent

¹ Emmett A. Betts, Foundations of Reading Instruction, (New York: American Book Company, 1957), p. 439.

Grade Four: The Grade Four sample consisted of four subjects from the Below Average and six subjects from the Average Group. Total scores on the TOCE ranged from 2 - 11. Total reading scores on the MAT ranged from 2.8 - 4.6. Individual scores and ratings are summarized in Table XXXIX.

TABLE XXXIX

SUMMARY OF INDIVIDUAL TOCE TOTAL SCORES,
ACHIEVEMENT RATINGS AND WORD RECOGNITION LEVELS
INTERVIEW SAMPLE: GRADE FOUR

Subject	Reading Achievement	Total TOCE Score	Word Recognition Level
1	Below Average	2	Frustration
2	Below Average	6	Frustration
3	Below Average	7	Frustration
4	Below Average	9	Instructional
5	Average	10	Instructional
6	Average	7	Independent
7	Average	8	Independent
8	Below Average	8	Independent
9	Average	10	Independent
10	Below Average	11	Independent

Grade Six: The Grade Six sample consisted of the eight subjects in Grade Six who did not meet the criterion for the test. All of these subjects were in the Below Average Group. Total scores on the TOCE ranged from 0 - 11. Total reading scores ranged from 2.8 - 5.8. Individual scores and ratings are summarized in Table XXXX.

TABLE XXXX

SUMMARY OF INDIVIDUAL TOCE TOTAL SCORES,
ACHIEVEMENT RATINGS AND WORD RECOGNITION LEVELS
INTERVIEW SAMPLE: GRADE SIX

Subject	Reading Achievement	Total TOCE Score	Word Recognition Level
1	Below Average	0	Frustration
2	Below Average	5	Frustration
3	Below Average	5	Instructional
4	Below Average	7	Independent
5	Below Average	18	Independent
6	Below Average	8	Independent
7	Below Average	11	Instructional
8	Below Average	11	Independent

Summary of the Interviews

GRADE TWO:

Two subjects from the Below Average group read at the frustration level on the TOCE. When the element of word recognition was removed by having the researcher administer the test orally, both subjects continued to exhibit difficulty in identifying the referents signaled by the ellipses. Poor recall of details of the passages was noted in these subjects. Performance improved marginally when subjects heard the story a second time.

The Average readers' performance improved when the test items were presented one time orally. However, this group also had some difficulty in recalling details from the beginning of passages. Other trends noted in the incorrect responses of the Average readers were the identification of incorrect referents from the passages and the use of inferred responses which were not specific to the passages.

GRADE FOUR:

The performance of the Below Average subjects who scored at the frustration level varied on the oral test. One of the subjects had no difficulty in identifying the referents. In the other cases, the types of errors made were the identification of an incorrect referent and failure to identify a referent beyond the original ellipsis. Secondary questions did not improve these subjects' performance.

Difficulties among the Below Average and Average readers whose word recognition was at the independent or instructional levels were similar in nature but these subjects were able to make use of their responses to secondary questions in the identification of referents.

All of the subjects in the Grade Four sample noted that the passages made more sense when the researcher read them aloud.

GRADE SIX:

Two of the subjects interviewed scored at the frustration level in word recognition on the TOCE. When the test was given orally, one of the subjects completed the test without errors. The performance of the second subject did not improve on the oral test. This subject did not appear to understand the nature of the test.

The performance of the subjects reading at the Independent and Instructional levels improved during the oral test. On the written test, the tendency of these subjects was to supply the original responses to the sentence completion items. However, when these subjects heard the passages they supplied the correct responses. This tendency to answer with the most recent information read, in this case, the ellipsis in the last sentence of the passage, is consistent with the performance of subjects in Grades Two and Four.

CHAPTER V

The main focus of this study was the investigation of subject's comprehension of ellipses during reading. Three factors were identified as potentially related to the comprehension of ellipses: grade, reading achievement, and type of ellipses.

SUMMARY OF FINDINGS

Six hypotheses were formulated to test the relationship of these above three factors to the comprehension of ellipses. On the basis of the analyses of the data presented in Chapter IV, the hypotheses may be grouped in the following way:

Hypotheses Accepted

Hypothesis #1 - There will be a relationship between grade and total TOCE scores.

Hypothesis #2 - There will be a relationship between reading achievement and total TOCE scores.

Hypothesis #3 - There will be an interaction between grade, reading achievement and total TOCE scores.

Hypothesis #5 - There will be an interaction between reading achievement and TOCE scores (three sub-tests).

Hypothesis #6 - There will be an interaction between grade, reading and TOCE scores (three sub-tests).

Hypothesis Rejected

Hypothesis #4 - There will be an interaction between grade and TOCE scores (three sub-tests).

DISCUSSION OF FINDINGS

In general, this study revealed significant findings in the total Grade Two sample and in the Below Average samples in Grades Four and Six. An analysis of the significant findings in the light of research suggests that some common factors may underlie the poor comprehension demonstrated by these groups of subjects. In the discussions which follow, these factors will be identified and discussed in conjunction with the presentation of significant results for each grade.

Grade Two

Significant relationships between grade, reading achievement, and total TOCE scores were found in Grade Two. The Grade Two subjects scored significantly lower than Grade

Four and Six subjects on the total TOCE score. The total TOCE scores within the Grade Two sample were significantly related to reading achievement with the Below Average readers scoring the lowest and Above Average readers the highest. No hierarchy of difficulty among the three types of ellipses (nominal, verbal, clausal) was evident for the three achievement groups in Grade Two.

Several factors may have affected test performance on the TOCE in the Grade Two sample. One explanation for the subjects' poor comprehension of ellipses might rest in the findings Manelis and Yekovich,¹ and other researchers in the area of knowledge integration theory. They found that when information is repeated in consecutive sentences comprehension and recall improve. The elliptical structures used for this study, by definition, eliminated the repetition of information which knowledge integration theorists identified as crucial to the integration and storage of information into the memory structure. Thus, when a subject was required to supply a referent which had been deleted by the use of an ellipsis, the needed information was not available in the memory structure.

The poor comprehension of ellipses, as evidenced by the inability to supply a preceding referent, may also be a function of the level of cognitive development which is typi-

¹ L. Manelis and R.F. Yekovich, "Repetitions of Propositional Arguments in Sentences", Journal of Verbal Learning and Verbal Behavior 15 (1976), pp. 301-312.

cal of Grade Two students. Piaget² identified a series of developmental stages of thinking ability. The majority of the Grade Two subjects in the current study would be expected to fall into what Piaget calls the "pre-operational" period of intelligence. He identifies the phenomenon of "centration" as characteristics of children in the "pre-operational" period of intelligence. Centration is defined as the tendency to focus on a single dimension of a stimulus to the exclusion of all other dimensions of the same stimulus. During this stage of development, Gallagher³ identified difficulties in classification, serialization and conservation. He notes that the later developing period of "decentration" is characterized by the development of these abilities, as well as the ability to focus simultaneously on several ideas. Cohen, Hyman and Battistini⁴ use a familiar saying to differentiate the two concepts. Decentration, they say, is the ability to focus on "the forest as well as the trees", while centration is the ability to focus only on

² Jean Piaget, The Language and Thought of the Child, (New York: Humanitus Press, reprinted 1959).

³ J.M. Gallagher, "To Relate or to Discriminate - That is the Question", Paper presented to the Fifth Annual Symposium of the Jean Piaget Society, 1975. Cited in S. Alan Cohen, Joan S. Hyman and Edward E. Battistini, "Effects of Teaching Piagetian Decentration Upon Learning to Read", Reading Improvement 20 (Summer 1983), p. 97.

⁴ S. Alan Cohen, Joan S. Hyman and Edward E. Battistini, "Effects of Teaching Piagetian Decentration Upon Learning to Read", Reading Improvement 20 (Summer 1983), p. 103.

isolated "trees". The items of the TOCE would appear to require the development of decentration, the ability to focus simultaneously on the two aspects of an ellipsis (ellipsis and referent) in order to supply a correct response.

Studies relating the Piagetian model and the stages of development in the acquisition of reading were reviewed by Miller-Jones and Gallagher.⁵ They report the results of a study conducted by D'Onofrio and Gallagher⁶ which confirmed that the ability to identify a single attribute of an object (colour, size, shape) precedes the ability to classify and organize the same objects according to two attributes (color/size, colour/shape, etc.). Further, in this later developing phase, according to D'Onofrio and Gallagher,⁷ children arrived at an understanding of a text by balancing the limited amount of information represented by a single printed word with the range of possible meanings which underlie that printed word. They conclude that this ability to organize and re-organize is essential to the development of reading comprehension. The failure of certain subjects in the Grade Two sample to comprehend ellipses in printed text could be

⁵ Cindy Miller-Jones and Jeanette McCarthy Gallagher, "The Bird is Out of the Cage", Reading-Canada-Lecture 2 (October 1983), pp. 11-19.

⁶ A. D'Onofrio and J.M. Gallagher, "A Cognitive Base for Reading Competence", Paper Presented at Jean Piaget Society, Philadelphia, June 1983. Cited in Miller-Jones and Gallagher (1983), p. 17.

⁷ Ibid, p. 17.

interpreted as a predictable lack of development of this ability to organize and re-organize information provided by a text.

Another possible explanation for the lower TOCE results in Grade Two may rest in O'Shea and Sindelar's⁸ observation that young developing readers tend to read word-by-word, and are therefore less attentive to the relationships among words and phrases. This observed tendency to read word-by-word would help to explain why Grade Two subjects who could identify the words on the TOCE did not identify the relationship between the ellipses and their preceding referents. This observation, when considered in light of Bransford and Franks⁹ observation that individuals do not store individual strings of words, provides some insight into the difficulties experienced by students in the Grade Two sample. Concepts must be stored as holistic structures not as a series of single words to be meaningful to the reader.

Grade Four:

In Grade Four, significant results were evident mainly in the Below Average Group. Grade and reading achievement were significantly related to total TOCE test scores.

⁸ Lawrence J. O'Shea, and Paul T. Sindelar, "The Effects of Segmenting Written Discourse on the Reading Comprehension of Low- and High-Performance Readers", Reading Research Quarterly 18 (Summer 1983), p. 459.

⁹ J.O. Bransford and J.J. Franks, "The Abstraction of Linguistic Ideas: A Review, Cognitive Psychology 2, (1971), pp. 317-332.

The lack of significance of these relationships in the Average and Above Average Groups in Grade Four was the first evidence of a ceiling effect on the TOCE. This ceiling effect continued to be evident in the Average Group when the interaction of grade, achievement and type of ellipsis was analyzed, but significant differences between sub-test scores were noted in the Above Average Group. An application of the principles of knowledge integration theory which suggests that the lack of repetition of information inhibits memory does not account for this reversal as subjects in all of the ability groups were subject to the same conditions during this study.

An examination of the distribution of students to the three ability group (Below Average, Average, Above Average) reveals that the Above Average group has the greatest number of subjects assigned to it. The application of the concept of normal distribution suggests that the criteria used to assign subjects to the Average and Above Average groups may not have adequately differentiated between the two groups. Thus, some subjects labelled as Above Average readers for this study may have been over-rated, resulting in the observed digression from the overall trends of the results of this study.

The difficulties experienced by Below Average subjects in identifying referents signaled by ellipses are consistent

with Alvermann's¹⁰ observation that poor readers exhibit a delay in the development of the ability to deal with referents even at the single sentence level. Grade Four subjects may be unready to process print in the way which knowledge integrationists suggest as prerequisite to understanding and recall. That is, they may not have developed to the point where information is encoded in meaningful structures during acquisition. The added burden of inter-sentence identification of referents in the current study could underlie the difficulties experienced by the Below Average subjects in the Grade Four sample.

Grade Six:

In Grade Six, significant findings were observed within the Below Average sample. The Below Average achiever's performance on the TOCE may indicate that they remain at the upper limits of Piaget's "pre-operational" stage of development and therefore experience a lack of ability to decentre their thinking. Thus, their performance on the TOCE would be expected to resemble the performance of the younger children in the study.

¹⁰ Donna E. Alvermann, "Reading Achievement and Linguistic Stages: A Comparison of Disabled Readers and Chomsky's Six to Ten Year Olds", Paper Presented at the Annual Meeting of the National Reading Conference, Dallas, December 2-5, 1981. ED 212 994.

Mason and Kendall¹¹ identified a group of low readers at the upper elementary level using MAT scores in order to observe the effects of text manipulation on reading comprehension. They found that poor readers in this age group had difficulty identifying meaningful units even at the intra-sentence level. Comprehension at the intra-sentence level improved when the boundaries of thought units were clearly marked by the transformation of standard text to a series of short, simple sentences, or by presenting parsed versions of the standard text. In the parsed version of the text, each thought unit was presented on a separate line. An example is shown below.

Standard Text

Dick will be in Grade Five and though he enjoys math he likes art class best.

Short Sentence Format

Dick will be in Grade Five. He enjoys math. He enjoys art. He likes art class best.

Parsed Version

Dick will be in Grade Five
and though he enjoys math
he likes art class best.

They found that the comprehension of poor readers improves when text provides special cues to the reader in the form of parsed text and short sentence versions of text is significant. Their findings indicate that poor readers in

¹¹ Jana M. Mason, and Janet Ross Kendall, "Facilitating Reading Comprehension Through Text Structure Manipulation", Alberta Journal of Educational Research 25 (March 1979), pp. 68-76.

the upper elementary grades require text which contains highly regular and uncomplicated text as these students appear to be unable to see strings of words and meaningfully related unless specific cues are given. They found that structuring the format of a text was one way of cuing the poor reader.

The resulting increase in comprehension supports the notion that poor readers benefit from additional cues while reading is consistent with the knowledge integration theorists observation that certain features of text facilitate reading comprehension.¹² The knowledge integration theorists found that the repetition of ideas across sentence boundaries resulted in a similar increase in comprehension. It may be concluded that poor readers in the upper elementary grades need to be supplied with texts which contain clearly defined thought units at the single sentence level and which are sufficiently repetitious to ensure storage in the memory structure. The items on the TOCE were not constructed to meet these needs. Firstly, the relationships which the student was asked to identify were at the inter-sentence level, and secondly, the use of the ellipsis in the text eliminated the repetition of key concepts. The resulting lack of comprehension within the Below Average Grade Six sample may be a reflection of these factors.

¹² C.H. Fredericksen, "The Effects of Context-Induced Processing Operations on Semantic Information Acquired from Discourse", Cognitive Psychology 7, (1975), pp. 139-166.

Finally, the persistence of the tendency to read word-by-word has been observed up to, and including, college level.¹³ As suggested in the discussion of results for poor readers in Grade Two, this style of reading results in accurate word recognition, but poor comprehension of the material read.

ASSUMPTIONS

There were two assumptions underlying the study.

1. The pilot study showed that the TOCE which was developed for this study contained sentences which are part of the subject's typical language pattern.
2. Satisfactory performance on the TOCE indicated satisfactory comprehension of ellipses.

LIMITATIONS

There were two limitations operating in this study.

1. The findings cannot be generalized beyond the suburban middle class population used for this study.
2. As the study was under the direct control of the investigator, it may have unconsciously been biased.

¹³ W. Cromer, "The Difference Model: A New Explanation for Some Reading Difficulties", Journal of Educational Psychology 61 (1970), pp. 471-483.

IMPLICATIONS FOR FURTHER RESEARCH

1. This investigation should be replicated using a larger sample in order to confirm or refute the findings of the present study for the purpose of generalizability.
2. Research on the comprehension of ellipses needs to focus on primary students in all achievement groups, and low-achieving students beyond the primary level in varying contexts as found in reading materials. The finding that Above Average Grade Two subjects achieved higher scores on the TOCE than some of the Below Average would be of special interest in view of the Grade Two readability of the TOCE.
3. The Test of Comprehension of Ellipses (TOCE) requires field testing with a larger population in order to determine the validity and reliability. The results of the current study indicate that the test is useful in Grades Two and Four. Students in Grade Six and beyond appear to require an altered version of the test. The revised edition might include some items constructed to meet the needs of poor readers in the upper elementary grades and beyond. These new items would provide the repetition of key phrases which the ellipsis does not provide. The results, therefore, would give a basis for comparison of comprehension of inter-sentence relationships under both the elliptical and non-elliptical conditions. The influence of the ellipsis on the comprehension of older readers would be clarified.

4. Future studies investigating the relationship between reading achievement might look for alternate means of determining which students are Below Average, Average and Above Average. An alternative reading assessment tool is the Test of Reading Comprehension (TORC).¹⁴ The advantages of using this test in a similar study are:

- i) The core sub-tests of TORC reflect the underlying principle that reading comprehension involves the determination of relationships which exist among words, between sentences, and within paragraphs.
- ii) Like the TOCE, the TORC consists of a single form which is used at all grade levels. The element of word recognition has been controlled. The items contain simple vocabulary which is manipulated to place increasing demands on the thinking (classifying, ordering, recalling) aspects of reading. When word recognition difficulties are suspected, the TORC is used as an IRI.
- iii) The scores of the TORC were standardized by age rather than by grade.
- iv) The reporting format of the TORC includes an identified "Average" range, thus eliminating the arbitrary delineation of the Average Group by the researcher.

¹⁴ Brown, Virginia L. et al, Test of Reading Comprehension, (Austin, Texas: PRO-ED, 1978).

5. In addition to a measure of overall reading achievement, other measures could be included to provide a more comprehensive description of the subjects. The use of additional or alternate measures to gather information on certain aspects of development which appeared to affect reading comprehension in the studies cited in this paper. The additional information which could be useful in future studies may be summarized as follows:

- i) Knowledge integration theory suggests that memory plays a major role in reading comprehension. Therefore, measures of subject's long-term and short-term memory skills could provide insights into difficulties experienced by poor readers in the comprehension of ellipses.
- ii) A measure of subject's ability to decentre thinking, as defined by Piaget, may be a useful variable in future research or the comprehension of ellipses.
- iii) The language and reading studies which have examined the development of student's abilities to comprehend various syntactic structures suggest that evaluation in this area could be of value in future research.

6. The analysis of school texts in Freebody and Anderson's¹⁵ study indicates that cohesive ties,

¹⁵ Peter Freebody and Richard C. Anderson, "Effects of Vocabulary Difficulty, Text Cohesion, and Schema Availability on Reading Comprehension", Reading Research Quarterly 18 (Spring 1983), p. 282.

including the ellipsis, are used in the Content areas in Grade Six. Further studies might analyze the occurrence of ellipses and other cohesive ties in reading materials across the curriculum and across the grades. This type of analysis would be especially useful developing materials for children in the elementary grades and in modifying materials to meet the needs of poor readers in the elementary grades.

7. A standard interview format needs to be developed in order to maximize information gathering during the individual interviews.

IMPLICATIONS FOR CLASSROOM PRACTICE

This study represented the first investigation of students' comprehension of ellipses as defined by Halliday and Hasan. Therefore the main findings of the study can only be considered as tentative. However, the findings do suggest that the use of reading materials which contain ellipses may be unsuitable for students in the primary grades and low achieving students beyond the primary level. In addition, the findings suggest that the use of ellipses in text to reduce sentence length and thus readability level is questionable.

Text complexity is presently based on only two factors, word length and sentence length. It is suggested by Mason

and Kendall¹⁶ and confirmed by the current study, that other factors such as cohesiveness enter into text difficulty and conclude that text cohesiveness is an important variable in assessing text readability.

¹⁶ Jana M. Mason and Janet Ross Kendall, "Facilitating Reading Comprehension Through Text Structure Manipulation", Alberta Journal of Educational Research 25 (March 1979), p. 76.

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APPENDIX A

TEST OF COMPREHENSION OF ELLIPSES (TOCE)

TEST OF COMPREHENSION OF ELLIPSIS

(TOCE)

Name of Student _____ Grade _____

Summary of Responses

<u>Nominal Ellipses</u>	<u>Verbal Ellipses</u>	<u>Clausal Ellipses</u>
2. _____	1. _____	6. _____
4. _____	3. _____	7. _____
8. _____	5. _____	10. _____
14. _____	9. _____	12. _____
15. _____	11. _____	13. _____
Total _____	Total _____	Total _____

Total for Test _____

Word Recognition _____

Comments:

1. Mary and Jean each got a new watch for Christmas from their grandparents. Mary's new watch works. Jean's new watch doesn't.

Jean's new watch doesn't _____

2. The class went skating but two of the boys couldn't go to the rink. Tom Brown couldn't go to the risk because he had lost his skates. Jim couldn't go because he had forgotten his.

Jim forget _____

3. Last Friday our family went to McDonald's for supper at six o'clock. Dad ate his chips but he was still hungry. He ate his Big Mac and then Mother's chips.

After he ate his chips and Big Mac Dad _____

4. Joe was too sick to go to the field meet with Mark last week. So he asked Mark.

"Did you win any races at the field meet?"

"Yes, two," answered Mark.

Mark won two _____

5. Sam and Danny wanted to watch cartoons on television. Danny called to his Mother,

"Is the T.V. in the basement working yet?"

His mother answered,

"Sorry, it's not."

The T.V. set _____

6. Robert wanted to know what was in the bag John was carrying to the car.

"What's in the bag?" Robert asked.

"Mother didn't tell me," John replied.

Mother didn't tell _____

7. We couldn't finish all of our pizza so we put it in the refrigerator for the next day. Then Dad asked Mom if she had ever eaten cold pizza.

"No, never," she replied.

Mother never _____

8. Instead of having French and Music today, we watched three movies in the gym. We enjoyed the movies. Most were good.

Most _____ were good

9. Gerry asked his teacher to help him choose some new books to take home from the library.

"Don't you like these books?" asked the teacher.

"Yes but I don't like long books," Gerry answered.

Gerry doesn't _____

10. The children were playing the piano and the T.V. was on in the basement when Dad thought he heard something.

"Is that a knock at the door?" he asked.

"I don't know," the children answered.

The children didn't know _____

11. Two boys are building a toy boat out of wood. They will finish painting the boat on the week-end. They will by Sunday night.

The boys will _____

12. The bus was leaving for the shopping center at 9:15 so we had to leave the house by 9:00 to catch it.

"Will you be ready to leave by nine o'clock?" Jeff asked.

"I think so," Ed answered.

Ed thinks _____

13. When a new boy moved in on the block the children had a fight over his age. Bart yelled,

"That boy is ten years old. The new boy told me."

The new boy told that _____

14. Last summer a crew of men set a record by paving one mile of road in a day. They worked on the road until after dark. All were tired.

All _____ were tired.

15. After the Valentine's Day party our teacher asked which games we liked to play.

"These games were fun to play," we said.

"Were those?" the teacher wanted to know.

The teacher wanted to know _____

APPENDIX B

TEST OF COMPREHENSION OF ELLIPSES (TOCE)

INSTRUCTIONS FOR ADMINISTRATION

TEST OF COMPREHENSION OF ELLIPSES (TOCE)INSTRUCTIONS FOR ADMINISTRATION

The TOCE was introduced and administered to each class as a group. It was introduced as a reading exercise which would help the researcher to determine which kinds of stories and questions were suitable for Grade Two (Four, Six) students.

The first sample passage and sentence completion task were presented on the blackboard. The researcher read the passage and first portion of the sentence completion task to the class. A volunteer from the class was asked to supply the answer orally to the sentence completion question. The answer was verified or corrected by the researcher. Next a volunteer from the class was asked to re-read the same material orally and write in the correct response on the blackboard. The answer was verified in the following way.

"Yes, that is the correct answer. We know that it is the correct answer because that is what the story tells us." (To the volunteer) "Please point to the part of the story that gave you the answer You will be able to find the answers to the other questions in the stories too. All of the words you need for each answer are somewhere in the story Are there any questions?"

The other two sample items were presented in the same manner except that each child in the class wrote the answers

to the sentence completion item on paper provided by the researcher.

The students were informed that they would be given sufficient time to do all of the questions.

APPENDIX C

GUIDELINES FOR SCORING THE TEST OF COMPREHENSION OF ELLIPSES(TOCE)

GUIDELINES FOR SCORING THE TEST OF COMPREHENSION OF ELLIPSES(TOCE)

The following key concepts were required in a student's response for an item to be scored as correct. Misspelled words were not counted as errors. No partial points were awarded.

Item:

1. work
2. his skates or skates
3. ate Mother's chips
4. races
5. is not working
6. what was in the bag or what is in the bag
7. had eaten cold pizza before or ate cold pizza before
8. movies or for the movies
9. like long books
10. if there was a knock at the door
11. finish painting by Sunday night
12. be ready by nine o'clock
13. he was ten years old
14. men or of the men
15. if these games were fun or if the games were fun

APPENDIX D

TEST OF COMPREHENSION OF ELLIPSES (TOCE)

FORMAT OF INDIVIDUAL INTERVIEWS

TEST OF COMPREHENSION OF ELLIPSES (TOCE)FORMAT OF INDIVIDUAL INTERVIEWS

1. The classroom teachers informed their classes that some members of the class were to meet with the researcher to do some reading and to discuss the questions on the reading exercise. The classroom teachers requested the subjects chosen to join the researcher, one at a time in the seminar room adjoining the classroom. The students were seated at the table to the left of the researcher. The tape recorder and reading materials were on the table to the right of the researcher.
2. The interview opened with casual conversation centered on events currently underway in the school, an interesting item of clothing worn by the child or in some cases, the renewal of a previous acquaintanceship between the subject and researcher.
3. When the researcher judged that the student was at ease, the purpose of the interview was re-introduced. Subjects were told that they were to read each passage out loud and complete the sentences which followed. The tape recorder was turned on for this part of the interview.
4. Students who read with better than 90% accuracy in word recognition were asked to read and answer orally those items which they had answered incorrectly or omitted during the group testing. Subjects whose word recogni-

tion was less than 90% listened to the researcher read the items then supplied the answers orally. Subjects who had difficulty with a sentence completion task in either the group test or the interview were encouraged to verbalize the source of their difficulties. Subjects were also asked questions which might help them to identify the correct response.

5. Students were allowed to listen to a portion of the tape if they requested to do so.

APPENDIX E

SUMMARY OF STUDENT SCORES ON THE
METROPOLITAN ACHIEVEMENT TEST (MAT) AND
THE TEST OF COMPREHENSION OF ELLIPSES (TOCE)
BY GRADE AND READING ACHIEVEMENT

GRADE TWO: BELOW AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
1.	1.0	0		0	0	0
2.	1.1	0		0	0	0
3.	1.6	0		0	0	0
4.	1.7	0		0	0	0
5.	1.7	0		0	0	0
6.	1.7	0		0	0	0
7.	1.8	3		0	3	0
8.	1.9	8		1	4	3
9.	2.0	3		2	1	0
10.	2.0	0		0	0	0
11.	2.1	2		0	1	1
12.	2.1	4		2	2	0
13.	2.1	3		0	3	0
14.	2.1	5		2	1	2

GRADE TWO: AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
15.	2.2	6		1	3	2
16.	2.2	6		2	4	0
17.	2.2	6		1	0	1
18.	2.2	4		1	2	1
19.	2.3	5		4	1	0
20.	2.3	10		4	4	2
21.	2.3	6		3	2	1
22.	2.4	8		2	4	2
23.	2.4	5		1	4	0
24.	2.4	6		2	2	2
25.	2.5	7		3	2	2
26.	2.5	6		2	2	2
27.	2.5	10		3	5	2
28.	2.5	8		4	2	2
29.	2.6	11		5	3	3
30.	2.6	4		2	1	1
31.	2.6	5		2	2	1
32.	2.6	1		1	0	0
33.	2.7	11		5	2	4
34.	2.8	11		4	5	2
35.	3.2	8		3	2	3
36.	3.2	10		3	3	4

GRADE TWO: ABOVE AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
37.	3.3	11		4	3	4
38.	3.4	7		2	2	3
39.	3.4	12		4	4	4
40.	3.5	6		3	2	1
41.	4.2	12		5	4	3
42.	5.2	12		5	2	5
43.	5.2	11		5	3	3
44.	6.0	12		4	3	5
45.	6.0	13		4	4	5

GRADE FOUR: BELOW AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
46.	2.7	6		1	4	1
47.	2.8	6		3	3	0
48.	2.8	2		1	1	0
49.	2.9	9		3	4	2
50.	3.0	7		4	1	2
51.	3.2	5		2	2	1
52.	3.3	13		5	5	3
53.	3.4	8		2	3	3
54.	3.5	13		4	5	4
55.	3.7	14		5	4	5
56.	3.7	11		5	4	2
57.	3.7	13		5	4	4
58.	3.8	9		3	4	2
59.	3.8	10		5	3	2
60.	3.9	7		2	4	1
61.	3.9	13		5	5	3

GRADE FOUR: AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
62.	4.4	12		4	3	5
63.	4.4	10		4	2	4
64.	4.6	10		4	4	2
65.	4.6	13		5	4	4
66.	4.6	10		4	4	2
67.	4.6	7		4	1	2
68.	4.8	13		3	5	5
69.	5.0	13		5	3	5
70.	5.0	14		5	4	5
71.	5.0	14		5	5	4
72.	5.0	14		4	5	5
73.	5.0	13		4	5	4
74.	5.0	13		5	4	4
75.	5.0	12		4	4	4
76.	5.0	15		5	5	5

GRADE FOUR: ABOVE AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
77.	5.5	10		3	4	3
78.	5.5	13		4	5	4
79.	5.5	14		5	4	5
80.	5.7	15		5	5	5
81.	5.7	14		5	4	5
82.	5.7	13		5	4	4
83.	5.7	10		2	4	4
84.	6.2	14		4	5	5
85.	6.2	13		4	4	5
86.	6.2	14		5	4	5
87.	6.4	12		4	3	4
88.	6.6	14		5	5	4
89.	6.6	15		5	5	5
90.	6.6	14		4	5	5
91.	6.6	12		5	3	4
92.	6.6	14		5	4	5
93.	6.6	12		5	2	5
94.	6.6	15		5	5	5
95.	6.9	14		5	4	5
96.	7.6	14		5	4	5
97.	7.6	14		5	4	5
98.	8.4	13		5	3	5
99.	8.4	15		5	5	5
100.	9.8	15		5	5	5

GRADE SIX: BELOW AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
101.	2.8	5		2	1	2
102.	3.2	0		0	0	0
103.	3.2	5		2	2	1
104.	3.4	7		2	4	1
105.	3.4	11		4	4	3
106.	4.3	15		5	5	5
107.	4.8	11		4	3	4
108.	4.8	14		5	4	5
109.	4.9	13		5	4	4
110.	5.2	14		5	4	5
111.	5.3	12		4	4	4
112.	5.7	8		3	2	3
113.	5.7	11		3	5	3
114.	5.8	14		5	4	5
115.	5.8	14		5	5	4
116.	5.8	8		2	1	5
117.	5.8	14		5	4	5
118.	6.0	12		5	3	4
119.	6.0	12		5	4	3

GRADE SIX: AVERAGE READERS

<u>SUBJECT</u>	<u>MAT</u> <u>TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
120.	6.2	15		5	5	5
121.	6.2	15		5	5	5
122.	6.4	14		5	4	5
123.	6.6	12		4	3	5
124.	6.7	14		4	5	5
125.	6.7	15		5	5	5
126.	6.7	15		5	5	5
127.	6.7	15		5	5	5
128.	6.9	15		5	5	5
129.	7.1	14		5	4	5
130.	7.1	14		5	4	5

GRADE SIX: ABOVE AVERAGE READERS

<u>SUBJECT</u>	<u>MAT TOTAL READING</u>	<u>TOTAL</u>	TOCE	<u>SUB-TESTS</u>		
131.	7.8	14		5	4	5
132.	7.8	15		5	5	5
133.	8.7	15		5	5	5
134.	8.7	15		5	5	5
135.	9.8	14		5	4	5
136.	9.8	14		5	5	4
137.	9.8	15		5	5	5
138.	9.8	13		5	4	4