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AN INVESTIGATION OF MIDDLE-GRADE STUDENTS' COMPREHENSION OF LOGICAL CONNECTIVES FOUND IN SIXTH- AND EIGHTH-GRADE SOCIAL SCIENCE TEXTBOOKS

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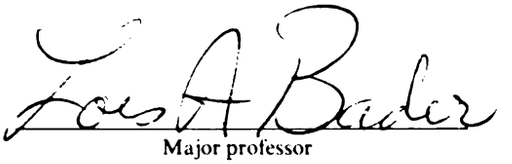

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# AN INVESTIGATION OF MIDDLE-GRADE STUDENTS' COMPREHENSION OF LOGICAL CONNECTIVES FOUND IN SIXTH- AND EIGHTH-GRADE SOCIAL SCIENCE TEXTBOOKS

By

Dorothea P. Fields

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ABSTRACT

AN INVESTIGATION OF MIDDLE-GRADE STUDENTS' COMPREHENSION OF LOGICAL CONNECTIVES FOUND IN SIXTH- AND EIGHTH-GRADE SOCIAL SCIENCE TEXTBOOKS

By

Dorothea P. Fields

The three major objectives in conducting the present study were (a) to determine whether there is a relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the Reading Comprehension and Listening Comprehension subtests of the Stanford Diagnostic Reading Test (SDRT), (b) to determine whether there is a relationship between the frequency with which selected types of logical connectives occur in social science textbooks and sixth- and eighth-grade students' comprehension of these connectives and mastery of them on the research instrument, and (c) to investigate the relationship between the specific types of logical connectives presented and taught in sixth and eighth graders' English textbooks and the students' mastery of these logical connectives on the research instrument.

To collect the data for this study, the researcher developed the Logical Connectives Inventory, which contained six types of logical connectives: additive, illative, causal, contrastive, conditional, and temporal. The instrument contained gap fill-in,

sentence completion, and multiple-choice-synonym passages. The study population comprised 41 sixth graders and 43 eighth graders who attended Holt, Michigan, Public Schools. They were on-grade-level readers, according to their scores on the SDRT. Data were analyzed using simple correlations and analysis of variance. The significance level for all tests was set at .05. Major findings were:

1. Sixth and eighth graders' mean scores on the research inventory were almost identical: 33 and 32, respectively. Students' performance on all six types of logical connectives was similar, with a range of only eight percentage points from the lowest to the highest mean percentage correct (.22 to .30).

2. One significant relationship was found--between students' scores on the Reading Comprehension subtest of the SDRT and their comprehension of selected types of logical connectives in the Logical Connectives Inventory.

3. Passages containing temporal logical connectives were the easiest for students to respond to correctly; those containing additive logical connectives were the most difficult for both groups.

4. In both the sixth- and eighth-grade English textbooks, an insignificant amount of direct instructional information was devoted to logical connectives.

To the loving memory of my parents:

John W. and Dorothea Rosa Fields;

and

To Jean Piaget, the Swiss psychologist,

who lived from 1896 to 1980.

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> But they that wait upon the Lord shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary; and they shall walk, and not faint.
>
> Isaiah 40:31

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# CHAPTER I

# INTRODUCTION TO THE STUDY

## Introduction

In The Nation's Report Card, Learning to Be Literate in America: Reading, Writing, and Reasoning, Applebee, Langer, and Mullis (1987) emphasized that:

> [The majority of young people] don't have the critical thinking skills we need in an economy like ours that's based on information and knowledge. The office, not the factory, is the center of our working lives. The backbone of the new American work force will be people who deal mainly with the formation and the refinement of ideas. (p. 3)

However, most schools today are not effectively meeting the above-mentioned challenge by teaching students skills of logic, inference, and synthesis (Venezky, Kaestle, & Sum, 1987). Instead, activities traditionally have focused on teaching surface understanding (that is, the ability to comprehend quite simple text, locate factual information, and state simple generalizations about it). Venezky et al. found that the majority of fourth and eighth graders in their study were able to achieve the basic reading level needed to comprehend everyday usage of written language found in short newspaper articles or stories (68% and 98%, respectively). On the other hand, only 1% of the fourth graders and 13% of the eighth graders were able to apply, appropriately, various types of strategies needed to comprehend the more difficult text.

Local schools, even at the middle and junior high school levels, are experiencing increasing pressure from administrators to return to the "basics" and critical-thinking skills. The back-to-the-basics movement emphasizes the mastery of subject matter and intellectual acceleration, and it requires that students employ sophisticated comprehension skills at even younger ages than in the Sputnik era. One essential critical-thinking skill is the ability to comprehend the various forms of logical connectives--linguistic forms that connect words or word groups--found in all curriculum materials at the middle-grade levels. These semantic links are basic to understanding the sentences or phrases that contain them (Gleason, 1965). Thus, sixth- and eighth-grade pupils' understanding of logical connectives was the primary focus of this research.

The inability to comprehend passages containing logical connectives is one of the most perplexing problems faced by middle-grade students in reading their content-area textbooks. Quite often, social science textbooks contain coordinate and subordinate clauses with abstract meanings that are remote from those expressed in the students' verbal and receptive vocabularies. However, understanding these more implicit logical connectives is essential to comprehending higher-level reading and speech patterns because connectives link what otherwise would be disconnected fragments of ideas. Content-area textbooks and curriculum guides are chosen to meet national and state standards of mastery, yet students receive little direct help in comprehending these materials.

The types of logical connectives used in this study were those presented in the English series for sixth through eighth grades and in Linguistics and English Grammar (Gleason, 1965). Six specific types of logical connectives were selected for examination in this study: additive, illative, causal, contrastive, conditional, and temporal. Each type is explained in the definition-of-terms section at the end of this chapter.

## Statement of the Problem

Considering the unprecedented effects that recent studies such as The Nation's Report Card (Applebee et al., 1987) and The Subtle Danger: Reflections on the LIteracy Abilities of America's Young Adults; Venezky et al., 1987), the 1983 report of the National Commission on Excellence in Education, and technological advances since Sputnik have had on education and the acquisition of knowledge, there is a need to gain a better understanding of the role of logical connectives in reading comprehension. This study was based on an earlier investigation conducted by Robertson (1968), who found significant relationships between children's comprehension of logical connectives and their reading abilities. Robertson tested 402 fourth-, fifth-, and sixth-grade children chosen by random stratified sampling. The children lived in the province of Alberta, Canada; 51% lived in the city, 37% in rural areas, and 12% in small towns. Reading, writing, and listening skills of these children were tested, using the Connectives Reading Test, designed specifically for Robertson's study. The test contained 150 items,

using 17 frequently occurring connectives; 85 of the items were single-connective items and 65 were multiple-connective items. The demographic variables of gender, mental age, chronological age, and socioeconomic status (SES) were included in the study.

Major findings of Robertson's study were as follows:

1. The rank order of the connectives, from simplest to most difficult, was as follows: *that, where, although, so when, yet, because, but, if for, which, who, and however, and,* and *thus.*

2. Children's comprehension of connectives improved significantly across the three grade levels.

3. The comprehension of connectives was highly related to children's reading abilities and the variables of gender, mental age, and listening and writing skills.

4. The children understood the usages of relative pronouns and coordinate-clause connectives equally well, and better than they comprehended such sentence linkers as *however* and *thus.*

5. The most difficult connectives for students to comprehend were *however, thus, which, although,* and *yet.*

The research discussed above indicated that comprehension of logical connectives is a multifaceted ability. The findings of Robertson's study suggested that comprehension is influenced by such factors as age, gender, and reading ability. However, few investigators have used Robertson's research findings to explore the relationship between students' comprehension of logical connectives

and their reading comprehension, using gap-filling, sentence-completion, and multiple-choice techniques with testing materials from sixth- and eighth-grade social science textbooks. The present writer attempted to gain a better understanding of some of the problems that logical connectives found in social science textbooks may present to students in the sixth and eighth grades.

## Purposes of the Study

The researcher's overall purpose in this study was to identify and examine several important elements that affect on-grade-level readers' comprehension of logical connectives and to compare these elements with other variables.

The writer had three major objectives in conducting the study:

1. To determine whether there is a relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the Reading Comprehension and Listening Comprehension subtests of the Stanford Diagnostic Reading Test (SDRT).

2. To determine whether there is a relationship between the frequency with which selected types of logical connectives occur in social science textbooks and sixth- and eighth-grade students' comprehension of these connectives and mastery of them on the research instrument.

3. To investigate the relationship between the specific types of logical connectives presented and taught in sixth and eighth

graders' English textbooks and the students' mastery of these logical connectives on the research instrument.

## Research Questions

The following questions were posed to guide the collection of data for this study:

1. Are students' scores on the Logical Connectives Inventory related to their scores on the Reading Comprehension and Listening Comprehension subtests of the Stanford Diagnostic Reading Test (SDRT)?

2. Is there a relationship between the frequency with which selected types of logical connectives occur in sixth- and eighth-grade students' social science textbooks and the students' comprehension of these connectives and mastery of them on the Logical Connectives Inventory?

3. Is there a relationship between the specific types of logical connectives taught in sixth and eighth graders' English classes and the students' mastery of these logical connectives on the Logical Connectives Inventory?

## Importance of the Study

This study is important because an attempt was made to discover possible causes of sixth and eighth graders' failure to comprehend certain types of logical connectives found in their social science textbooks. Because of apparent difficulties in perceiving syntactic relationships between words in given passages, many middle-grade

students are unable to relate ideas and to understand the meanings implied by specific logical connectives.

## Delimitations

The study was delimited in the following three ways:

1. Only sixth and eighth graders who were reading on grade level were included in the sample.

2. The logical connectives were not labeled or underlined in the research inventory. This decision was made by the committee so that the students' responses to logical connectives encountered in textbooks could be analyzed more accurately.

3. The logical connectives that the researcher selected for study and ranked in order of frequency and complexity were delimited to those found in one sixth-grade and one eighth-grade social science textbook.

## Generalizability of the Findings

The study findings may have useful implications for the teaching of logical connectives found in the middle-grade social science materials used in midwestern schools. Because the sixth and eighth graders involved in this study were attending public school and were reading on grade level, the findings should be generalizable to similar populations in other midwestern public school districts. The findings from this research are not necessarily generalizable to remedial or advanced readers.

## Definition of Terms

Definitions of the six types of logical connectives that were of interest in this study are presented in this section (Quirk, Greenbaum, Leech, & Savatvik, 1972).

Additive: Connectives that express adding or joining one concept with another (e.g., *in addition, even, also, moreover*).

Causal: Connectives that signal cause-and-effect relationships (e.g., *because, for, as, for some reason*).

Conditional: Connectives that express circumstantial or contingency relationships (e.g., *if, perhaps, whether, unless*).

Contrastive: Connectives that denote alternatives, comparisons, contractions, or differences (e.g., *on the other hand, however, still, instead*).

Illative: Connectives that indicate one concept or thought inferred, proved, or caused by another (e.g., *therefore, so, thus, as a result*).

Temporal: Connectives that express concepts of time (e.g., *until, before, meanwhile, while, after*).

## Organization of the Remainder of the Dissertation

In Chapter II, pertinent research and literature relating to the subject of this study are reviewed. The following topics are considered: research on language acquisition, theories of reading comprehension, research findings on the comprehension of logical connectives and conjunctions, and the incidence of logical connectives in textbooks. In Chapter III, the design and

methodology used in this study are described. The data collected for this research are reported and discussed in Chapter IV. Chapter V contains the major results and discussion, a comparison of the findings to those from other research, recommendations for future research, and reflections.

# CHAPTER II

# LITERATURE REVIEW

## Introduction

The review of literature is divided into four sections: (a) research on language acquisition, (b) theories of reading comprehension, (c) research findings on the comprehension of logical connectives and conjunctions, and (d) the incidence of logical connectives in textbooks.

## Research on Language Acquisition

The research findings of Chomsky (1969), Vygotsky (1962), Hurlock (1953), McCarthy (1942), Smith (1926), and Miller and Elvin (1964) supported Robertson's (1968) finding that children's comprehension of logical connectives is part of language acquisition. Chomsky suggested that both the form and meaning of a sentence are determined by the syntactic structures that are related to the sentence through interpretation. This factor lends the property of abstractness to grammatical structure. A language, then, is a set of semantic-phonetic precepts, of sound-meaning correlations. The correlations are determined by two syntactic structures: surface and deep level. Deep-level structure is an abstract representation in the mind that is not directly related to the phonetic signal (Chomsky, 1969).

Vygotsky (1962) stated that children acquire the structure of oral language by imitating their peers. Only later do they attach meanings to the structures they are using. In speaking of the relationship between thought and word, Vygotsky stated:

> The relation of thought to word is not a thing but a process, a continual movement back and forth from thought to word and from word to thought. In that process the relation of thought to word undergoes changes which themselves may be regarded as development in the functional sense. Thought is not merely expressed words; it comes into existence through them. Every thought tends to connect something with something else, to establish a relationship between things. Every thought moves, grows and develops, fulfills a function, solves a problem. . . . (p. 125)

Hurlock (1953), McCarthy (1942), and Smith (1926) discovered that the first words children use are nouns; next are verbs, then adjectives, followed by adverbs, which usually are acquired at approximately one or one-and-a-half years. Prepositions and pronouns are the last major parts of speech to appear in the child's language. Until the child is about two years old, nouns predominate. At age two, the child begins to acquire more complex parts of speech: verbs, articles, connectives, prepositions, and pronouns. By six or seven years, the youngster is able to perceive simple cause-and-effect relationships.

Miller and Ervin (1964) confirmed the preceding research findings. They stated that verbal use of connectives is acquired later than use of nouns, phrases, and verbs, such as *go ball*.

The findings of Palermo and Molfese's (1972) studies of later language acquisition were consistent with Robertson's (1968) finding

that significant language development occurs from early childhood through adolescence. They wrote:

> Particular linguistic forms are not comprehended nor produced until the underlying cognitive aspects are developed. Once such cognitive development has occurred, the child will look to the language for the means to express the new cognitive structures. Examination of the language development of children . . . indicates either that cognitive development has not reached the point where the linguistic forms in question have any meaning for the child or the child has not as yet discovered the appropriate linguistic means for expressing the meaning he does know. (p. 422)

## Theories of Reading Comprehension

As early as 400 years ago, educators were concerned with effective methods of teaching reading. During the twentieth century, innumerable educators have conducted analyses of or used models to explain the reading process. These practitioners all have stressed a common factor: that reading comprehension is a complex skill. Also, most of these educators have based their theories of reading comprehension on extensive classroom-teaching experience and/or individual tutoring skills.

Watson (1984) developed and tested a cognitive developmental theory of reading over a five-year period. He was interested in the development of oral and reading vocabularies. Watson's sample included 148 middle-class Australian children, who were tested during each of their first five years of school: kindergarten, first, second, third, and fourth grades. The results of Watson's study supported the theory that some minimal critical level of operational development is called on for the child to make "marked or extended" progress in early reading. Also, a moderate level of

operativity was required before or during the introduction of units of print and before more advanced reading skills, such as phonic synthesis and sophisticated seriation of word meanings required by sentence and paragraph comprehension. Also, Watson found the development of operativity to be irregular and sudden, whereas development of oral language was more stable and continuous.

Three early reading specialists were Huey (1908), Gray (1919), and Thorndike (1917). Huey analyzed subjects' oral responses after they had read two moderately difficult passages. He concluded that "silent reading is more than noiseless reading. Silent reading is not mere non-vocal reading. It is the complex process of getting thought from the printed page and involves an entirely new pedagogy" (p. 359).

Gray (1919) augmented the growing number of lists and taxonomies of reading-comprehension skills by providing his own list of such skills:

1. To read for the purpose of giving a coherent reproduction.
2. To determine the central thought or the most important idea of a selection.
3. To select a series of closely related points and their supporting details.
4. To secure information which will aid in the solution of a problem or in answering questions.
5. To gain a clear comprehension of the essential conditions of a problem.
6. To discover new problems in regard to a topic.

7. To determine the lines of argument which support the point of view of the author.

8. To determine the validity of statements. (pp. 25-26)

Thorndike's model of reading comprehension was published in 1917. He wrote:

> [Reading comprehension is] a very complex procedure, involving a weighing of each of many elements in a sentence, their organization in the proper relations to one another, the selection of certain of their connotations and the rejection of others, and the cooperation of many forces to produce the final response.

Thorndike found that, even when readers understood the meanings of individual words or phrases in a given paragraph, a number of them continued to answer questions incorrectly. This led him to analyze the types of errors being made. As a result of his investigation, Thorndike concluded that many readers were unable to unite the various concepts expressed in a paragraph and to give single words or separate word groups the appropriate importance in relation to one another. The following quotations summarize his findings:

> Understanding a . . . printed paragraph is . . . a matter of habits, connections, mental bonds, but these have to be selected from so many others, and given weights so delicately, and used together in so elaborate an organization that "to read" means "to think" as truly as does "to evaluate" or "to invent" or "to demonstrate" or "to verify." (p. 114)

> Understanding a paragraph is like solving a problem in mathematics. It consists in selecting the right elements of the situation and putting them together in the right relations, and also with the right amount of weight or influence or force for each. (p. 323)

Simons (1971) reviewed, analyzed, and rejected much of the traditional literature on reading comprehension because it lacked a theorist basis, which he stressed as an essential element in

understanding the psycholinguistic processes of reading comprehension. He stated that reading comprehension is both process and product:

> Process is the mental operations which take place in the reader's head while he is reading. . . . The products . . . are the behaviors produced after comprehension has taken place, such as answer[ing] . . . test questions. (p. 338)

Simons contrasted the results of many investigations of both "good" and "poor" comprehenders. He summarized his findings as follows: Poor comprehenders concentrate on decoding words separately and thus lose the meaning of relationships between words. Further, he wrote:

> If poor comprehenders were not gaining some meaning from text, the following results from other studies would be unexplainable: (1) 90 percent of the uncorrected reading errors made by both skill groups conformed to the meaning of text (Weber, 1970); and (2) poor comprehenders made more decoding errors on emotional than on neutral passages (Cromer & Wiener, 1969). (p. 339)

On the other hand, good comprehenders apparently "scan for meaning." They simultaneously concentrate on phrase-size units while looking ahead. Thus, "reading comprehension requires an active, attentive, and selective reader who, to some extent, operates independently of text to extract meaning from it" (p. 338).

Kavale and Schreiner (1979) compared the comprehension techniques used by eight average and eight above-average readers. The participants were individually tested. Also, their verbal responses were audio-taped and were later transcribed to further examine their thinking strategies. They were given a 40-item multiple-choice research instrument on which they were required to

make inferences, select main ideas, determine causes and effects, and verbalize their reasoning.

Kavale and Schreiner found that both groups used similar techniques, such as comparisons, classifications, definitions, and generalization, to obtain meaning from passages. However, the above-average readers consistently used these four strategies more appropriately to arrive at the correct answer. Sixty percent of the time they correctly used information given in the passage, compared to 47% for the average readers. Also, when the strategy was selecting specific words (from either the passage that contained them or from the choices that followed), the above-average readers were successful 26% of the time, as compared to 17% for the average readers. In general, the researchers found that above-average students displayed a wider repertoire of successful reasoning skills than those used by average readers, when asked to read for various purposes. Therefore, Kavale and Schreiner recommended that teachers model the most appropriate reasoning behaviors for responding to different types of questions.

Geva and Ryan (1985) designed and analyzed passages read by students at above-average, average, and below-average reading levels, based on their scores on the Gates-MacGinitie reading comprehension subtests. The group consisted of 93 students; 46 were in fifth grade and 47 were in seventh grade. All of them attended the same school in Ontario, Canada. The investigators' major objective in this study was to better understand some of the difficulties that average- and below-average readers encountered

when assigned expository texts. (The above-average readers were used as the control group.) There were two principal concerns: insufficient knowledge of conjunctions and/or a habit of overlooking them in passages.

The instrument contained 80 questions, consisting of 26 conjunctions in each of four modes:

1. Explicit:

Even the slightest of breezes can prevent frost. That's because wind is like a spoon. . . .

2. Implicit:

Even the slightest of breezes can prevent frost. Wind is like a spoon. . . .

3. Highlighted:

Even the slightest of breezes can prevent frost. That's **BECAUSE** wind is like a spoon. . . .

4. Deep:

Even the slightest of breezes can prevent frost. That's [1. because 2. although] wind is like a spoon. . . .

Geva and Ryan found that students in all three ability groups benefited from having the conjunctions highlighted. Students were observed to be more careful to attend to important details when reading and afterwards to answer more questions successfully when the conjunctions were highlighted. On the other hand, on the implicit passages, the scores of students in the high-ability group were significantly higher than those of the average readers, whose scores, in turn, were better than those of the below-average readers. In addition, readers in all three groups scored low on

passages of the deep type (multiple-choice cloze) (above-average readers, 77%; average readers, 70%; below-average readers, 67%). Geva and Ryan believed that having to select appropriate conjunctions actually blocked rather than helped these students respond correctly because they were distracted by the choices of conjunctions instead of reading and comprehending the printed page. Also, the less-skilled readers were unable to verbalize some of the more difficult conjunctions, such as *in fact*, *besides*, and *however*. Finally, based on their research, Geva and Ryan suggested that middle school teachers "explicitly" teach their students the meaning of conjunctions in expository texts.

## Research Findings on the Comprehension of Logical Connectives and Conjunctions

The previously reviewed research is part of a growing body of evidence confirming that children's knowledge of connectives is related to their level of cognitive growth. Robertson (1968) found significant relationships between children's comprehension of connectives and their reading abilities. She tested 402 children chosen by random stratified sampling. The children lived in the province of Alberta, Canada; 51% lived in the city, 37% in rural areas, and 12% in small towns. Robertson tested children in fourth, fifth, and sixth grades using reading, writing, and listening using a specially designed Connectives Reading Test. This test contained 150 items using 17 selected connectives; 85 of the items were single-connective items and 65 were multiple-connective items. The 17 connectives were chosen because of their high frequency of

occurrence in sentences in basal readers, the multiplicity of their meanings, their presence on other researchers' lists, and the relationships they signaled. Scores from these comprehension tests were analyzed according to the children's gender, mental age, chronological age, and socioeconomic status. The major findings of Robertson's study were as follows:

1. The rank order of the connectives, from the simplest to the most difficult, was: that, where, although, so, when, yet, because, but, if, for, which, who, and, however, that, and thus.

2. The analyses of connectives indicated that the 17 connective groups had a highly positive relationship to the Connectives Reading Test as a whole.

3. The frequency of particular types of student errors on the Connectives Reading Test was noted. The greatest percentage of errors was grammatical, with a slightly smaller percentage of incorrect connective answers. Situational errors were made the least often--approximately one-half of the wrong connective answers. The same order of errors held at each grade level.

4. From a practical point of view, the students needed additional training in looking more carefully at words; failure to note grammatical errors in print eventually reduced pupils' reading comprehension. The low constant rate among the situational errors could be improved by exaggerating situations in the test-item answers to the point at which most children would not be misled.

5. Students understood such classes of connectives as relative pronouns and coordinate-clause connectives equally well, and better than they comprehended sentence linkers (*however* and *thus*).

6. Girls consistently obtained higher marks than boys on the Written Connectives Test, and students in lower grades lagged behind those in higher grades in achievement. Children from urban areas achieved higher scores than those from small towns, who, in turn, did better than those from rural areas. However, upon further investigation, Robertson found that the strength of the test performance of girls from rural areas and of boys from small towns was pronounced.

7. Among the individual connective items, test blanks that could have been acceptably filled with *although*, *and*, and *yes* proved hard for students on the Connectives Reading Test. Sentence structures communicating concession were apparently difficult for children at these grade levels. The students did not choose to use connectives such as *thus*, but they substituted suitable connectives that were more common in their speech.

Like Robertson, Stoodt (1972) found significant relationships between children's understanding of connectives and their reading ability. Stoodt used the cloze technique to analyze the following conjunctions: *and*, *as*, *because*, *but*, *for*, *if*, *how*, *now*, *either*, *or*, *since*, *so*, *than*, *that*, *though*, *where*, *when*, *while*, *why*, and *yet*. Stoodt tested fourth-grade students who had been selected by stratified random sampling from students at three socioeconomic levels in the Mansfield, Ohio, Public School District.

Stoodt had three purposes in conducting this study: (a) to analyze and explore the relationship between subjects' understanding of conjunctions and their reading comprehension; (b) to explore the difference in the difficulty of various conjunctions; and (c) to determine whether there was a relationship between students' understanding of conjunctions and the demographic variables of socioeconomic status, gender, and intelligence. Major findings of Stoodt's investigation were as follows:

1. A statistically significant relationship was found between reading comprehension and comprehension of conjunctions. The partial correlation between scores on the Comprehension of Conjunctions Test and reading comprehension scores was statistically significant at $p < .02$.

2. The correlation coefficients between gender and the measures of comprehension and conjunctions showed that girls achieved higher scores than boys on these measures. However, a statistically significant difference in achievement was found on only one measure, the Cloze Comprehension of Conjunctions Test, written with a high number of conjunctions. The probability for this measure was $p < .01$.

3. A highly positive relationship was found between socio-economic level and all measures of comprehension of conjunctions. The probability on every measure was $p < .001$.

4. A highly positive correlation was found between comprehension of conjunctions and intelligence quotient, with a probability of $p < .001$ on every measure.

5. Concerning difficult conjunctions on the Comprehension of Conjunctions Test, *when* was significantly more difficult than the others at the .001 level. *So* was significant more difficult than all other conjunctions except "but" at the .001 level. *But* (meaning other than) was significantly more difficult than all other conjunctions except *so* at the .001 level. *Or* was significantly more difficult than all other conjunctions except *when*, *so*, *but*, and *where* at the .01 level. *Where* was significantly more difficult than all other conjunctions except *when*, *so*, *but*, and *or* at the .01 level. *So* was significantly more difficult than all other conjunctions except *when*, *but*, *or*, and *where* at the .01 level.

6. With regard to easy conjunctions on the Comprehension of Conjunctions Test, *and* was significantly easier than all other conjunctions at the .001 level. *For* was significantly easier than all other conjunctions except *and* at the .001 level. *As* was significantly easier than all other conjunctions except *and* and *for* at the .005 level.

Keller-Cohen (1986) explored the way 32 children, ages three and five, used the following temporal logical connectives: *Before*, *after*, *when*, *while*, *just before that*, and *and after that*. The researcher found that the learned sequence of specific temporal connectives helped the children determine contextual usages. At age three, youngsters were able to use *before* and *after* but not *while*. However, by age five, they were beginning to master *while*. *Before* and *after* were being applied in both the logical and reversal

positions (such as *before*, *but before that*, *after*, and *and after that*) if and when they were able to dramatize their usages. These findings suggest that children do not depend exclusively on the logical order of clause context for their comprehension of temporal terms.

## The Incidence of Logical Connectives in Textbooks

Several researchers have compiled and analyzed the number of types of logical connectives found in textbooks at different grade levels (Gardener, 1980; Negin, 1982; Rogers, 1974; Wishart & Smith, 1982). Rogers analyzed a list of logical connectives contained in 7 of the 35 textbooks currently used in grades 6 and 12. He used only those connectives that linked ideas and tabulated their frequency of occurrence per 100 print pages. Rogers's findings are shown in tabular form in Table 2.1.

Table 2.1.--Incidence of connectives in each subject area.

| Level and Subject of Text | Average No. Connectives Per Text | Average No. Pages Per Text | Connectives Per 100 Pages |
|---|---|---|---|
| Grade 6 Social Studies | 1,226 | 206 | 595 |
| Grade 6 Science | 664 | 101 | 677 |
| Grade 10 History | 1,523 | 282 | 540 |
| Grade 12 Geography | 1,197 | 208 | 575 |
| Grade 12 Chemistry | 2,578 | 372 | 693 |
| Grade 12 Biology | 2,642 | 323 | 880 |
| Grade 12 Physics | 3,558 | 403 | 883 |

Source: D. Rogers, "Which Connectives? Signals to Enhance Comprehension," Journal of Reading 17 (March 1974): 463.

According to Rogers, the 20 most frequently used connectives in sixth- and twelfth-grade textbooks, in order of frequency, were the following:

**Science and social studies:** *but, if, when, because, as, then, even, also, perhaps, however, although, while, for example, since, yet, so that, such as, too, until, whether.*

**Geography:** *but, when, however, although, because, so, thus, as, if, also, while, for example, then, therefore, since, yet, where, that is, perhaps, in fact.*

**History:** *but, while, although, thus, if, as, even, however, because, since, until, when, then, yet, in fact, therefore, meanwhile, whether, perhaps, despite.*

**Chemistry:** *but, if, since, for example, however, when, thus, if so, also, as, because, although, therefore, while, so, perhaps, yet, that is, until, such as.*

**Biology:** *but, if, however, thus, for example, since, as, because, when, while, although, even, then, therefore, such as, also, yet, perhaps, that is, so.*

**Physics:** *if, but, because, when, therefore, as, then, however, for example, also, although, since, while, thus, so, in other words, so that, on the other hand, consequently, furthermore.*

Gardner (1983) employed science-education majors to search most of the textbooks used in Victoria, Australia, for logical connectives. He used the findings to compose two types of measurements of logical connectives: multiple choice and gap

filling/sentence completion using everyday and scientific speech. Gardner tested students in grades 7 to 10 in Victoria and found that:

> The grand means were 23.5, 25.7, 28.4 and 30.6 for grades 7-10. Thus the typical student in the first year of secondary school can answer over half the items presented; by the fourth year, the fraction has risen to three-quarters. The standard deviations of the tests are high (around 6-9), indicating a very wide range in the extent of understanding of logical connectives at each grade level . . . [and also] the internal consistencies of the test, as measured by the Cronbach alpha coefficients. The 100 values (25 tests, computed separately at each of the four grade levels) are remarkably high, ranging from .97 to 1.00. (p. 228)

Some students experienced difficulty in comprehending the following types of connectives:

1. Logical connectives signaling inference (*and*, *so*, *clearly*, *consequently*, *evidently*, and *hence*).
2. Similarities, comparisons, and contrasts (*alternatively*, *as [= like]*, *conversely*, *despite*, *in contrast*, *similarly*).
3. Additive terms (*again* [= furthermore], *also*, *besides*, *further*, *furthermore*, *in addition*, *moreover*, *so*, *also*, *and together with*).
4. Opposition and order (*for instance*, *in turn*, *namely*, *respectively*, *that is*).
5. Logical-reasoning terms (*conversely*, *if/then*, *say*, *suppose*, *and if*).

Wishart and Smith (1982) based their research model on Gardner's research. They analyzed nine textbooks for 15 selected logical connectives (nine were the same as Gardener used) and used the findings to construct two types of tests. These were gap-fill-in and sentence-completion forms. The researchers compared the formal written language used in history textbooks to that of everyday speech. They selected for the study 216 students (71%

girls and 29% boys) of high academic ability at three grade levels from two secondary schools.

Wishart and Smith examined the effects of age, gender, test type, and differences in schools on students' ability to comprehend logical connectives. They found that:

1. The formal language used in history textbooks consisted of many abstract words that were not part of the spontaneous speech of students at any of the three grade levels.

2. The mean score on Wishart and Smith's history test was 53%. This was slightly lower than the score established by Gardner on his science test (54.6%). This marginally lower mean score might have resulted because Gardner's test was purposely written for students with a wide range of abilities, using the familiar informal speech of 12- to 15-year-old secondary school students.

3. The high-academic-ability students in Wishart and Smith's study scored higher on the usage of "everyday" connectives than did the students with a wide range of abilities in Gardner's sample (83% and 65%, respectively).

3. No significant difference was found between girls and boys in terms of obtained scores.

4. The data showed no significant between-school differences.

Wishart and Smith concluded that "preparation for the two different examinations with two different declared emphases in the syllabuses produced no difference in performance in the understanding of logical connectives in the history items" (p. 102).

Negin (1982) analyzed connectives found in five industrial-arts textbooks. He found a total of 35,884 connectives in the 29,139 sentences analyzed. Negin's findings were as follows:

1. There were 1.23 connectives per printed page.

2. The 44 most highly encountered logical connectives occurred 32,997 times, or in 92% of the items.

3. Only eight connectives were the same as those on Rogers's (1974) list; thus, connectives used in secondary industrial-arts textbooks were somewhat different from those found in other subject-matter textbooks.

The connectives that Negin found in the industrial-arts textbooks he analyzed are shown in Table 2.2, by category, frequency, and rank.

## Summary

Three early reading theorists were Huey (1908), Gray (1919), and Thorndike (1917); their research findings became the basis for other investigations. Thorndike concluded that comprehending a paragraph and solving a mathematical problem are similar: Both require the participant to select the "right elements of the situation and [to put] them together in the right relations, and also with the right amount of weight or influence or force for each" (p. 323).

Robertson (1968) investigated fourth-, fifth-, and sixth-grade students' comprehension of connectives, using instruments she designed for that purpose. A significant relationship was found

Source

Table 2.2.--Negin's list of connectives by category, frequency, and rank.

| Category/Word | Freq. | Rank | Category/Word | Freq. | Rank |
|---|---|---|---|---|---|
| Conjunction | | | Contrast | | |
| and | 8,366 | 1 | less than | 195 | 27 |
| also | 803 | 10 | greater than | 182 | 32 |
| in addition to | 326 | 20 | more than | 100 | 40 |
| Disjunction | | | Condition | | |
| or | 4,046 | 2 | if | 1,131 | 7 |
| either/or | 194 | 28 | | | |
| and/or | 100 | 40 | Circumstance/ Time | | |
| Causality | | | | | |
| | | | then | 637 | 12 |
| as | 799 | 11 | always | 301 | 22 |
| because | 362 | 18 | until | 248 | 24 |
| that | 330 | 19 | after | 190 | 30 |
| when | 249 | 23 | never | 116 | 37 |
| therefore | 206 | 26 | when | 111 | 39 |
| since | 193 | 29 | while | 100 | 40 |
| as a result | 113 | 38 | usually | 100 | 40 |
| Purpose | | | Location | | |
| to | 2,230 | 3 | in | 1,324 | 6 |
| for | 1,324 | 6 | at | 936 | 9 |
| that | 1,000 | 8 | by | 526 | 14 |
| so | 312 | 21 | across | 183 | 31 |
| so that | 129 | 34 | between | 122 | 35 |
| Concession | | | Manner | | |
| but | 1,650 | 4 | with | 1,413 | 5 |
| however | 447 | 16 | as | 538 | 13 |
| while | 230 | 25 | by | 484 | 15 |
| | | | like | 424 | 17 |
| | | | so | 139 | 30 |
| | | | such as | 119 | 36 |

Source: G. A. Negin, "Logical Connectives in Industrial Arts Textbooks," Reading Improvement (1982): 170-172.

between students' comprehension of connectives in reading and gender, mental age, and listening, reading, and written-language skills. Robertson also found that there was a significant increase in students' comprehension of connectives from one grade to the next.

Robertson's (1968) research findings indicated that comprehension of logical connectives is a multifaceted ability and that such comprehension is a part of language acquisition. Similarly, other researchers have found significant relationships between children's comprehension of logical connectives and their levels of cognitive growth and reading abilities (Geva & Ryan, 1985; Kavale & Schreiner, 1979; Keller-Cohen, 1986; Simons, 1971; Smith, 1969; Stoodt, 1972).

Several researchers whose findings are important to the present study are Rogers (1974), Gardner (1983), Negin (1982), and Wishart and Smith (1982). They tabulated and analyzed the numbers and types of logical connectives found in textbooks at various grade levels and concluded that there are wide variations in the use of connectives between and within curricula and textbooks. They also noted that children need to be able to comprehend logical connectives in order to reach a level of mature intellectual development and language acquisition. Therefore, some of the numerous meanings and usages of logical connectives should be taught to those average and below-average readers who demonstrate a lack of understanding of unfamiliar connectives and their resulting syntactical relationships. Students' specific needs might be

determined by analyzing their use of logical connectives in spontaneous or everyday written and informal speech.

# CHAPTER III

# METHODOLOGY

## Introduction

The methodology employed in conducting the study is described in this chapter. The population is identified, and the method of selecting the sample is described. The research questions and null hypotheses are stated, development of the instrument is described, and procedures used in collecting the data are presented. The method of analyzing the data also is discussed.

## The Population and Sample Selection

The population under investigation consisted of sixth- and eighth-grade students in the Holt, Michigan, School District. The district has eight schools: five elementary schools (K-5), one middle school (grades 6 and 7), one junior high school (grades 8 and 9), and one high school (grades 10 through 12). The school district has an enrollment of 17,144 students: 97% of them are Caucasian, according to the 1980 census. Most residents of the district are semi-skilled, working-class people who work in Lansing for General Motors and for the State of Michigan.

Two groups of students were selected for the study: 41 sixth graders (21 males and 20 females) and 43 eighth graders (22 males and 21 females). The 84 sample members were selected from a list of

all the sixth and eighth graders who were reading on grade level, according to their reading scores on the Stanford Diagnostic Reading Test (SDRT). The SDRT was used because both sixth and eighth graders' scores on this test were available in their cumulative folders. A stratified random sampling procedure was used in selecting the sample, using a table of random numbers.

## Research Questions

The following questions were posed to guide the collection of data for this study:

1. Are students' scores on the Logical Connectives Inventory related to their scores on the reading comprehension and listening comprehension subtests of the Stanford Diagnostic Reading Test (SDRT)?

2. Is there a relationship between the frequency with which selected types of logical connectives occur in sixth- and eighth-grade students' social science textbooks and the students' comprehension of these connectives and mastery of them on the Logical Connectives Inventory?

3. Is there a relationship between the specific types of logical connectives taught in sixth and eighth graders' English classes and the students' mastery of these logical connectives on the Logical Connectives Inventory?

## Research Hypotheses

The following null hypotheses, and their related subhypotheses, were constructed to test the data collected in the study:

Hypothesis 1: There is no relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension and listening comprehension subtests of the Stanford Diagnostic Reading Test (SDRT).

Ho 1a: There is no relationship between sixth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension subtest of the SDRT.

Ho 1b: There is no relationship between eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension subtest of the SDRT.

Ho 1c: There is no relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension subtest of the SDRT.

Ho 1d: There is no relationship between sixth-grade students' scores on the Logical Connectives Inventory and their scores on the listening comprehension subtest of the SDRT.

Ho 1e: There is no relationship between eighth-grade students' scores on the Logical Connectives Inventory and their scores on the listening comprehension subtest of the SDRT.

Ho 1f: There is no relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the listening comprehension subtest of the SDRT.

Hypothesis 2: There is no relationship between the frequency with which 24 selected logical connectives occur in sixth- and eighth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

Ho 2a: There is no relationship between the frequency with which 24 selected logical connectives occur in sixth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

Ho 2b: There is no relationship between the frequency with which 24 selected logical connectives occur in eighth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

Ho 2c: There is no relationship between the frequency with which 24 selected logical connectives occur in sixth- and eighth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

Hypothesis 3: There is no relationship between the specific types of logical connectives presented and taught in sixth- and eighth-grade students' English textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

## Development of the Instrument

An instrument, the Logical Connectives Inventory, was developed specifically for this study to gather information on students' comprehension of six types of logical connectives: additive, illative, causal, contrastive, conditional, and temporal. The instrument contained three parts: gap-fill-in or cloze, sentence completion, and multiple-choice synonyms. Steps followed in constructing the inventory are discussed in the following paragraphs.

### The Pre-pilot Test

First, a pre-pilot-test inventory was constructed. It included only ten items: six cloze and four multiple-choice synonym selections. Six categories of logical connectives were represented in this inventory: additive, causal, conditional, contrastive, illative, and temporal.

After developing the instrument for the pre-pilot test, the investigator met with the principal and reading consultant at a middle school in East Lansing, Michigan, to decide on a date and time when the pre-pilot inventory could be administered. On

November 5, 1984, the researcher administered the inventory to ten middle school students (five sixth graders and five eighth graders) who the school's reading consultant had indicated were reading on grade level. Based on the results and feedback from this pre-pilot testing, the first pilot inventory was constructed.

## The First Pilot

On November 11 and 12, 1984, the investigator met with the same ten students who had participated in the pre-pilot test. After a brief introduction that included directions, the Logical Connectives Inventory was given. Each participant's time was noted. At the conclusion of the group session, the students were given an opportunity to express their reactions and concerns.

Based on the results from this first pilot instrument, the second pilot inventory was constructed. Several logical connectives (*neither-nor*, *rather than*, *rather*, and *although*) did not appear in the sixth-grade text, so they had to be discarded. Also, the entire cloze section, which contained 14 gaps, proved to be very confusing to the students, so it also was dropped.

## Second Pilot

The second pilot test was constructed, based on the following recommendations of the investigator's committee members:

1. Eliminate the underlined guide words.

2. Have three parts with 24 items each (Part I: Cloze, Part II: Sentence Completion, Part III: Multiple-choice Synonym).

4. Field test the instrument again to determine whether, in fact, it measures what it is purported to measure.

The investigator reanalyzed the sixth- and eighth-grade social science textbooks that were being used in the Holt School District for all possible occurrences of the 26 selected logical connectives. Half of the passages were chosen from the sixth-grade textbook and half from the eighth-grade textbook.

On May 18, 1985, the second pilot inventory was administered to a group of 12 on-grade-level readers (six sixth graders and six eighth graders) in Bath, Michigan. Based on the results and feedback from the first and second pilot tests of the inventory, the version of the data-collection instrument that was used in a field test was developed.

To compose a balanced inventory, several steps were followed. First, a list of the 24 selected logical connectives was compiled and cross-referenced to ensure that the words appeared in both the sixth- and eighth-grade social science textbooks (see Table 3.1).

Selection of the Logical Connectives

In selecting the logical connectives to be included in the instrument, the researcher considered the following factors:

1. Vocabulary lists.

2. Frequency-of-usage lists.

3. Lists of logical connectives developed by other researchers in the field (see Table A.1, Appendix A).

4. Definitions of the selected logical connectives.

Table 3.1.--The 24 logical connectives selected for this study.

| Type of Connective | Example of Textbook Use of Connective |
|---|---|
| **ADDITIVE** | |
| In addition | In addition signals: besides, also, likewise, & and.<br><br>Children learned tribal ways by listening, taking part in ceremonies, and helping adults with necessary work. In addition, toys were often small versions of things used by adults. (Eighth-grade textbook, p. 61) |
| Even | Even signals: also, likewise, and, & besides.<br><br>. . . You can buy almost anything you want there [in the city of Onitsha, Nigeria]--food, clothing, radios, soap, rugs, spare parts for a car, furniture, even elephant tusks and hippopotamus teeth. (Sixth-grade textbook, p. 276) |
| Also | Also signals: besides, and, too, & in addition.<br><br>The Spanish also introduced wheat and rice. (Sixth-grade textbook, p. 226) |
| Moreover | Moreover signals: besides, and, too, in addition, also, & furthermore.<br><br>They [the American people] were able to produce goods more efficiently in large factories. And these economies often meant lower prices for the consumer. Moreover, large corporations were necessary if a product was to be sold over the country. (Eighth-grade textbook, p. 442) |

Table 3.1.--Continued.

| Type of Connective | Example of Textbook Use of Connective |
|---|---|
| **ILLATIVE** | |
| Therefore | Therefore signals: so, thus, consequently, & hence.<br><br>Each city was run like an independent state or country. Therefore, we call them city-states. (Sixth-grade textbook, p. 89) |
| So | So signals: with the result that, thus, finally, & therefore.<br><br>The railroads were needed to get American farm goods to the coasts so they could be shipped to starving people overseas. (Eighth-grade textbook, p. 644) |
| Thus | Thus signals: hence, consequently, therefore, & finally.<br><br>Nixon and Kissinger wanted to lessen tensions between the United States and the Soviet Union and thus lower the chances of nuclear war. (Eighth-grade textbook, p. 695) |
| As a result | As a result signals: the result, consequently, therefore, & finally.<br><br>The Koran also forbids paintings and sculpture. As a result, the need to create beauty has been channeled into creating mosques, homes, and other buildings, and into the making of many lovely things to be used in these buildings. (Sixth-grade textbook, p. 189) |

Table 3.1.--Continued.

| Type of Connective | Example of Textbook Use of Connective |
|---|---|
| **CAUSAL** | |
| Because | Because signals: as, for this reason, for, on account of, & for this purpose.<br><br>Fish died in some lakes because the water was unclean. (Sixth-grade textbook, p. 345) |
| For | For signals: because, in view of the fact that, & as.<br><br>Greek civilization isn't remembered for its great power. It is remembered for its ideas. (Sixth-grade textbook, p. 88) |
| As | As signals: because, for the purpose of, for the cause that, & for.<br><br>Throughout history, people have used earth's waters as roads on which to move themselves and their goods by boat. (Sixth-grade textbook, p. 60) |
| For some reason | For some reason signals: because, on account of, for, & for this purpose.<br><br>By the year 1100, the Anasazi were living in huge, beautiful buildings that housed hundreds of people. Round ceremonial chambers, or kivas (ke vez), were scattered throughout the community. For some reason, the people of Mesa Verde began leaving their homes on the mesa top. (Eighth-grade textbook, p. 55) |
| **CONTRAST** | |
| On the other hand | On the other hand signals: an opposite, however, in spite of, & yet.<br><br>To the Indians the idea of a person or family owning land permanently made no sense. When the European settlers bought or traded land, on the other hand, they considered it theirs to keep. (Eighth-grade textbook, p. 257) |

Table 3.1.--Continued.

| Type of Connective | Example of Textbook Use of Connective |
|---|---|
| However | However signals: in spite of, on the other hand, nevertheless, instead, otherwise, but, & yet.<br><br>The demand for coal has also increased. Coal is plentiful in the United States and in some other countries. However, many kinds of coal pollute the air when burned. (Sixth-grade textbook, p. 367) |
| Still | Still signals: in spite of a preceding event, or consideration, yet, & but.<br><br>William Paterson of New Jersey presented his state's plan. Three days later, Alexander Hamilton of New York suggested still another plan. (Eighth-grade textbook, p. 212) |
| Instead | Instead signals: rather, otherwise, or an alternative to something expressed or implied.<br><br>Often the goods shown on the chart are not available to Soviet consumers even if they have the money. Instead consumers put their names on a list. (Sixth-grade textbook, p. 291) |
| **CONDITIONAL** | |
| If | If signals: whether, on condition that, even though, although, perhaps, and provided.<br><br>About seventy minutemen led by Captain John Parker were waiting for the British. Knowing the minutemen could not stop the British, Parker told his troops not to fire first, but to hold their ground. "If war is to come, let it begin here," he said. (Eighth-grade textbook, p. 186) |

Table 3.1.--Continued.

| Type of Connective | Example of Textbook Use of Connective |
|---|---|
| Perhaps | Perhaps signals: maybe, or an alternative condition or possibility.<br><br>When you are introduced to an adult, what do you do? Probably you smile, say hello, and perhaps shake hands. (Sixth-grade textbook, p. 175) |
| Whether | Whether signals: an alternative condition or possibility, maybe, and if.<br><br>In Japan's past, almost everything an individual had in life, or could look forward to, came from the family. This was true whether it was a peasant family, a samurai family, or a noble landowning family. (Sixth-grade textbook, p. 214) |
| Unless | Unless signals: on the condition that, or except that, if, nor, & provided that.<br><br>It was difficult to bring avocados from far away, because if they became too soft, avocados started to rot. Tizoc knew one woman who sometimes sold them. The woman was kind and did not sell an avocado to Tizoc unless it was a very good one. (Sixth-grade textbook, p. 159) |
| **TEMPORAL** | |
| Until | Until signals: before, or used to indicate continuance as in an action, condition, or state of time.<br><br>Drunkenness is a sin against Islam, so the drunkard is lashed 80 times in public. A driver who carelessly hits someone must stay in jail until the injured person recovers. (Sixth-grade textbook, p. 191) |

Table 3.1.--Continued.

| Type of Connective | Example of Textbook Use of Connective |
|---|---|
| Before | Before signals: earlier than the time when, or sooner than.<br><br>Lyndon Johnson of Texas became President after Kennedy was assassinated. He had been an important senator before his election as Vice-President. (Eighth-grade textbook, p. 685) |
| Meanwhile | Meanwhile signals: while, during the interval of time, for the time being, or at the same time, & now.<br><br>The Huguenots (French Protestants) arrived in northeastern Florida and set up the town of Fort Carolina. Meanwhile, the Spanish viewed this settlement with alarm. (Eighth-grade textbook, p. 92) |
| While | While signals: as long as, during the time that, during the same time, meanwhile, or during.<br><br>One hundred thousand men took part in the battle of Shiloh in western Tennessee. The Union had 13,047 killed and wounded while the South had 10,099 killed or wounded. (Eighth-grade textbook, p. 397) |
| After | After signals: next, later, subsequently, succeeding, or following in time.<br><br>Before the Industrial Revolution, almost 90 percent of England's population lived on farms. After the Industrial Revolution, most people lived where factories were located--in towns and cities. (Sixth-grade textbook, p. 115) |

Sources: Sixth-grade textbook: Our World Today. New York: Scholastic Book Services, 1981. Eighth-grade textbook: America! America! Glenview, Ill.: Scott, Foresman and Co., 1985. Webster's Third New International Dictionary. Springfield, Mass.: Merriam-Webster, 1981.

5. The limits of the vocabulary used in the two social science textbooks.

6. Results of the pilot tests conducted for this study.

7. Recommendations of the researcher's doctoral committee.

Another chart was constructed, which contained the following six types of information: (a) the 24 selected logical connectives listed as they appeared in the correct responses, (b) placement of the connectives in the textbook (beginning, middle, or end), (c) grade level of textbook (sixth or eighth); (d) page numbers on which connectives appeared), (e) frame number of key options, and (f) types of logical connectives (see Table A.2, Appendix A). A sequential chart was compiled to record the placement of logical connectives in the inventory (see Table A.3, Appendix A). Finally, a composite chart was constructed that contained the following seven types of information: (a) number of passages in which the 24 logical connectives were located, (b) the specific logical connectives used, (c) whether connectives were located in sixth- and/or eighth-grade textbooks, (d) location of the logical connectives in the inventory, (e) their location in the sixth- and eighth-grade textbooks; (f) the page numbers on which they were located, and (g) the response number containing key options (see Table A.4, Appendix A).

## Instrument Items

The final inventory was given to three readers--two English teachers and one reading consultant--to critique. The investigator

met with the reviewers personally and presented the six selected types of logical connectives. Afterwards, the investigator again met with the reviewers individually and went over their suggestions and remarks. On the basis of their recommendations, further revisions were made before the inventory was administered in the fall. This version of the Logical Connectives Inventory contained 72 items. It was constructed in three parts, each containing 24 items. The three parts of the instrument are discussed in the following pages.

Part I: Cloze. For each item in the cloze section of the inventory, students had to select the logical connective that would make the statement complete and meaningful and write that word in the blank. In this section, the researcher intended that responses (a) be specific, clear, and as brief as possible and (b) require reasoning rather than guessing.

In this set of 24 items, the blanks were placed at the beginning of 3 passages, in the middle of 4 passages, and at the end of 17 passages. The average passage contained 63 words. The shortest passage contained 22 words, and the longest one contained 105 words. Twenty-two of the 24 items in this section required one-word responses; only two items necessitated two-word answers.

Part II: Sentence Completion. The sentence-completion section of the inventory required students to use prior knowledge or schemata in selecting the one response that best matched the relationship implied in the passage (Cox, 1987). They had to

comprehend the written structures of the logical connectives presented in the stems, as well as those given in the possible responses. Robertson's (1968) research findings indicated that, although children verbally used connectives early in life, often before entering school, their cognitive awareness of many types of connectives developed gradually as they matured.

In this section, the responses were designed to have from 4 to 15 syllables. All of the responses were approximately the same length. The gaps were placed at the end of each passage. The average passage contained 63 words. The shortest passage had 28 words, and the longest one had 112 words.

Part III: Multiple-Choice Synonyms. In the multiple-choice synonyms section of the inventory, students were required to read a given passage and choose the logical connective that most closely fit the meaning of the connective in the last sentence of the passage. The students had to use their metacognitive skills, such as monitoring, making inferences, and using schemata (Brown, 1980) to decide which synonym best fit the meaning of the logical connective in the last sentence. At times, students needed to go outside of their experience base of social science materials to form hypotheses about the unfamiliar relationships of logical connectives. At other times, they were required to hold several concepts given in a passage while postulating, accepting, or rejecting the logical connective synonyms presented in the responses.

In this section, the responses to all of the items (a) had one to five syllables, (b) were approximately the same length (usually the same number of letters and words), and (c) had the same number of syllables. The average passage contained 62 words. The shortest passage had 25 words, and the longest one had 120 words.

Field Testing the Inventory

The Logical Connectives Inventory was field tested in September 1985. Twelve average, on-grade-level readers participated in the field test. Six of these students were in the sixth grade and six were in the eighth grade in Bath, Michigan.

The students were given the inventory as a group in the school library. The investigator noted the time it took each student to complete the inventory. At the conclusion of this session, the researcher interviewed two sixth graders and two eighth graders to obtain their suggestions for how the inventory might be improved. On the basis of these informal interviews, the directions for completing the inventory were revised.

The inventory also was given to two classroom English teachers and one reading consultant to critique. The investigator met with the reviewers personally to discuss their suggestions for improvement. On the basis of these reviewers' recommendations, further revisions were made before the inventory was administered to students in the study sample. (See Appendix B for the final version of the inventory.)

Administering the Logical Connectives Inventory

On September 24, 1985 (two weeks before administering the inventory), the investigator met with the sixth- and eighth-grade students who had been selected for the study. During this meeting, the rationale for giving the Logical Connectives Inventory was presented and discussed. Also, the dates, locations, and times of the testing were announced. In addition, letters asking for parental permission were distributed to the students (see Appendix B).

The investigator, assisted by the middle school reading consultant, administered the Logical Connectives Inventory to both sixth and eighth graders on October 3, 1985. In the morning, the sixth graders took the inventory. In the afternoon, the eighth graders completed the instrument. Each session was scheduled for an hour and 40 minutes. A make-up session had to be scheduled at the junior high school, partly because a "surprise" football rally occurred in the middle of the session. At least one-third of the students participating in the study had to take the Logical Connectives Inventory on another day.

On October 9, 1985, the investigator met with all of the eighth graders who could not come to the first session. They were told the rationale behind the study and were asked to participate. They then were given another letter requesting parental permission. The students were also told the time, location, and date (October 15, 1985) of the next administration of the inventory.

Students and their parents were assured that all information of a personal nature, such as the students' scores on the research instrument and the Stanford Diagnostic Reading Test, would be held in strict confidence. Each participant was given a code number, which was placed on the test instrument and used solely for data-analysis purposes. Thus, there was no reference to students' names or any possibility of identifying individual participants at a later date.

## Content Analysis of the Social Science Textbooks

Hypotheses 2a through 2c concerned the relationship between students' ability to comprehend the 24 selected logical connectives and the frequency with which these connectives occurred in the students' social science textbooks. To address these hypotheses, the researcher did a content analysis of the sixth- and eighth-grade social science textbooks for the presence of these logical connectives. The frequency with which each of the 24 logical connectives selected for the study appeared in the sixth- and eighth-grade social science textbooks was recorded.

In addition, the sixth- and eighth-grade English textbooks were examined to determine which logical connectives were taught at these grade levels. This information was used in addressing Hypothesis 3. The results of the content analyses are reported in Chapter IV.

## Methods of Analyzing the Data

The students' responses to the items in the Logical Connectives Inventory were entered into a computer for data processing. The

Statistical Package for the Social Sciences (SPSS) program was used to analyze the data. Several statistical procedures were employed in this investigation, including simple correlations, analysis of variance (ANOVA), and Pearson product-moment correlation. A partial correlation was used to remove the effects of age, grade, form reading, reading comprehension, listening comprehension, and intelligence quotient from the scores obtained on the research instrument. The .05 alpha level was selected as the criterion for statistical significance.

## Summary

The methodology used in conducting the study was described in this chapter. The Logical Connectives Inventory was administered to 84 on-grade-level readers: 41 sixth graders and 43 eighth graders. These students were selected on the basis of information obtained from their cumulative records at the school: grade level, scores on the reading comprehension subtest of the SDRT, and scores on the listening comprehension subtest of the SDRT.

The null hypotheses formulated for testing in the study were stated. The methods used to construct and field test the pilot instrument were explained. Also, the data-analysis methods were delineated. In Chapter IV, the results of the data analyses are presented and discussed.

# CHAPTER IV

# PRESENTATION AND ANALYSIS OF THE DATA

## Introduction

This study was based on an earlier investigation conducted by Robertson (1968), who found significant relationships between children's comprehension of logical connectives and their reading abilities. Robertson tested 402 fourth-, fifth-, and sixth-grade children chosen by random stratified sampling. The children lived in the province of Alberta, Canada; 51% lived in the city, 37% in rural areas, and 12% in small towns. Reading, writing, and listening skills of these children were tested, using the Connectives Reading Test, designed specifically for Robertson's study. The test contained 150 items, using 17 frequently occurring connectives; 85 of the items were single-connective items and 65 were multiple-connective items. The demographic variables of gender, mental age, chronological age, and socioeconomic status (SES) were included in the study.

Major findings of Robertson's study were as follows:

1. The rank order of the connectives, from simplest to most difficult, was as follows: *that, where, although, so when, yet, because, but, if for, which, who, and however, and,* and *thus.*

2. Children's comprehension of connectives improved significantly across the three grade levels.

3. The comprehension of connectives was highly related to children's reading abilities and the variables of gender, mental age, and listening and writing skills.

4. The children understood the usages of relative pronouns and coordinate-clause connectives equally well, and better than they comprehended such sentence linkers as *however* and *thus*.

5. The most difficult connectives for students to comprehend were *however*, *thus*, *which*, *although*, and *yet*.

Stoodt (1970) tested 95 forth graders who attended the Mansfield, Ohio, Public Schools on their comprehension of conjunctions, which she defined as empty words or structure words. Conjunctions are connectives that serve to relate or join words, phrases, and sentences. One of Stoodt's findings confirmed that of Robertson's (1968) earlier study--that there was a significant relationship between children's comprehension of conjunctions and their reading ability. In addition, Stoodt found that the following conjunctions were used most frequently through the fourth grade: *and*, *as*, *because*, *but either*, *for*, *if*, *how*, *now*, *neither*, *or*, *since*, *so*, *than*, *that*, *though*, *where*, *when*, *while*, *why*, and *yet*. Both Stoodt and Robertson noted that the role conjunctions play in determining the readability of reading materials should be investigated. Stoodt believed that the comprehension of children who experience difficulty in comprehending the various relationships

signaled by conjunctions might be improved if the students received instruction on those conjunctions.

The present investigator had three major objectives in conducting this study:

1. To determine whether there is a relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension and listening comprehension subtests of the Stanford Diagnostic Reading Test (SDRT).

2. To determine whether there is a relationship between the frequency with which selected types of logical connectives occur in social science textbooks and sixth- and eighth-grade students' comprehension of these connectives and mastery of them on the research instrument.

3. To investigate the relationship between the specific types of logical connectives presented and taught in sixth and eighth graders' English textbooks and the students' mastery of these logical connectives on the research instrument.

The investigator developed the Logical Connectives Inventory for use in this study. This instrument was administered to a sample of sixth and eighth graders who were judged to be average readers, based on the scores they had obtained on the Stanford Diagnostic Reading Test (SDRT). These scores were found in the students' cumulative records in the school files. In addition, a content analysis was performed to obtain a count of the frequency

with which the 24 selected logical connectives appeared in the sixth and eighth graders' social science and English textbooks.

The methods used in collecting and analyzing the data were described in Chapter III. The results of the statistical analyses as they relate to the hypotheses formulated for the study are presented and discussed in the following pages.

## Results of Hypothesis Testing

### Hypothesis 1

> There is no relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension and listening comprehension subtests of the Stanford Diagnostic Reading Test (SDRT).

In testing Hypothesis 1, the relationships between the two independent variables--scores on the reading comprehension and listening comprehension subtests of the SDRT--and sixth- and eighth-grade students' scores on the Logical Connectives Inventory (the dependent variable) were analyzed for significance. Six subhypotheses were formulated to test the relationship between the two dependent variables and the dependent variable for sixth graders, eighth graders, and the total group. In the following paragraphs, each subhypothesis is restated, followed by the results for that subhypothesis.

> Ho 1a: There is no relationship between sixth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension subtest of the SDRT.

The correlation between sixth-grade students' scores on the reading comprehension subtest of the SDRT and their comprehension of 24 selected types of logical connectives found in the research

inventory was .384. The corresponding observed level of significance was .016. Because this p-value was less than .05, it was significant at the .05 level (see Table 4.1).

Table 4.1.--Pearson correlation coefficients of 39 sixth graders' scores on the reading comprehension subtest and their scores on the Logical Connectives Inventory.

| | Reading Comprehension | Research Inventory |
|---|---|---|
| Correlation | | .384 |
| p-value | .999 | .016 |
| Total mean | 5.818 | 33.103 |
| Total standard dev. | .721 | 5.433 |

Ho 1b: There is no relationship between eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension subtest of the SDRT.

The correlation between eighth-grade students' scores on the reading comprehension subtest of the SDRT and their comprehension of 24 selected types of logical connectives found in the research inventory was .705. The corresponding observed level of significance was .000. Because this p-value was less than .05, it was significant at the .05 level (see Table 4.2).

Table 4.2.--Pearson correlation coefficients of 39 eighth graders' scores on the reading comprehension subtest and their scores on the Logical Connectives Inventory.

| | Reading Comprehension | Research Inventory |
|---|---|---|
| Correlation | | .705 |
| p-value | .999 | .000 |
| Total mean | 7.946 | 32.282 |
| Total standard dev. | .708 | 7.178 |

Ho 1c: There is no relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension subtest of the SDRT.

The correlation between sixth- and eighth-grade students' scores on the reading comprehension subtest of the SDRT and their comprehension of 24 selected types of logical connectives found in the research inventory was .254. The corresponding observed significance level was .025. Because this p-value was less than .05, it was significant at the .05 level (see Table 4.3).

Table 4.3.--Pearson correlation coefficients of 79 sixth and eighth graders' scores on the reading comprehension subtest and their scores on the Logical Connectives Inventory.

| | Reading Comprehension | Research Inventory |
|---|---|---|
| Correlation | | .254 |
| p-value | .999 | .025 |
| Total mean | 6.882 | 32.692 |
| Total standard dev. | 1.285 | 6.337 |

Ho 1d: There is no relationship between sixth-grade students' scores on the Logical Connectives Inventory and their scores on the listening comprehension subtest of the SDRT.

The correlation between sixth-grade students' scores on the listening comprehension subtest of the SDRT and their comprehension of 24 selected types of logical connectives found in the research inventory was .058. The corresponding observed significance level was .126. Because this p-value was greater than .05, it was not significant at the .05 level (see Table 4.4).

Table 4.4.--Pearson correlation coefficients of 39 sixth graders' scores on the listening comprehension subtest and their scores on the Logical Connectives Inventory.

| | Listening Comprehen. | Research Inventory |
|---|---|---|
| Correlation | | .058 |
| p-value | .999 | .126 |
| Total mean | 6.000 | 33.103 |
| Total standard dev. | 2.154 | 5.433 |

Ho 1e: There is no relationship between eighth-grade students' scores on the Logical Connectives Inventory and their scores on the listening comprehension subtest of the SDRT.

The correlation between eighth-grade students' scores on the listening comprehension subtest of the SDRT and their comprehension of 24 selected types of logical connectives found in the research inventory was .100. The corresponding observed significance level was .543. Because this p-value of .543 was greater than .05, it was not significant at the .05 level (see Table 4.5).

Table 4.5.--Pearson correlation coefficients of 39 eighth graders' scores on the listening comprehension subtest and their scores on the Logical Connectives Inventory.

| | Listening Comprehen. | Research Inventory |
|---|---|---|
| Correlation | | .100 |
| p-value | .999 | .543 |
| Total mean | 8.077 | 32.282 |
| Total standard dev. | 2.212 | 7.178 |

Ho 1f: There is no relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the listening comprehension subtest of the SDRT.

The correlation between sixth- and eighth-grade students' scores on the listening comprehension subtest of the SDRT and their comprehension of 24 selected types of logical connectives found in the research inventory was .001. The corresponding observed significance level was .991. Because this p-value was more than .05, it was not significant at the .05 level (see Table 4.6).

Table 4.6.--Pearson correlation coefficients of 83 sixth and eighth graders' scores on the listening comprehension subtest and their scores on the Logical Connectives Inventory.

| | Listening Comprehen. | Research Inventory |
|---|---|---|
| Correlation | | .001 |
| p-value | .999 | .991 |
| Total mean | 7.038 | 32.692 |
| Total standard dev. | 2.408 | 6.337 |

Summary. Only one independent variable, scores on the reading comprehension subtest of the SDRT, was found to be significantly related to sixth- and eighth-grade students' comprehension of selected logical connectives. The other independent variable--scores on the listening comprehension subtest of the SDRT, was found not to be significantly related to students' comprehension of selected logical connectives.

Hypothesis 2

> There is no relationship between the frequency with which 24 selected logical connectives occur in sixth- and eighth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

Frequency distribution was used to analyze the data for Null Hypothesis 2. The second hypothesis was broken into three subhypotheses for analysis purposes. These subhypotheses pertained to sixth graders, eighth graders, and the total group. In the following pages, each subhypothesis is restated, followed by a discussion of the results for that subhypothesis.

> Ho 2a: There is no relationship between the frequency with which 24 selected logical connectives occur in sixth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

Before testing this hypothesis, the researcher analyzed the sixth-grade social studies textbook (419 pages) for the frequency of occurrence of each of the 24 selected logical connectives. The frequency and percentage with which the six types of logical connectives occurred in the sixth-grade social science textbook are

shown in Table 4.7. Causal logical connectives appeared most frequently (968 times), followed by contrastive (126), illative (109), additive (75), conditional (73), and temporal (46) logical connectives.

Table 4.7.--Frequency and percentage of occurrence of six types of selected logical connectives in the sixth-grade social science textbook, in rank order.

| Type of Logical Connective | Occurrence in Textbook | |
|---|---|---|
| | Frequency | Percent |
| Causal | 968 | 69.3 |
| Contrastive | 126 | 9.0 |
| Illative | 109 | 7.8 |
| Additive | 75 | 5.4 |
| Conditional | 73 | 5.2 |
| Temporal | 46 | 3.3 |
| Total | 1,397 | 100.0 |

Source: Our World Today. New York: Scholastic Book Services, 1981.

Next, the sixth graders' comprehension of these logical connectives was determined by examining the students' performance on the Logical Connectives Inventory. There were 41 sixth graders, who had the possibility of answering 72 questions each. Thus, there were 2,724 total possible responses and 1,359 correct responses.

The sixth graders performed best on temporal logical connectives (30%) as a group. Also, when they were examined closely, the following word order, from the simplest to the most

difficult, was obtained: *even*, *also*, *in addition*, and *moreover*. However, these words appeared least often (3.3%) in the textbook.

Conditional logical connectives received the next highest number of correct responses (28%) as a group. Also, when they were examined closely, the following word order was obtained, from the simplest to the most difficult: *unless*, *perhaps*, *if*, and *whether*. But, as a group, these connectives appeared next to least frequently in the sixth-grade textbook (5.2%).

As a group, contrastive logical connectives ranked third in terms of correct responses (27%); they ranked second highest in frequency of occurrence in the textbook (9%). In addition, when they were analyzed closely, the following word order was obtained, from the easiest to the most difficult: *still*, *however*, *instead*, and *on the other hand*.

As a group, causal logical connectives ranked fourth in terms of correct responses (26%); however, they ranked first in the frequency with which they were found in the textbook (69.3%). When they were analyzed closely, the following word order, from the easiest to the most difficult, was obtained: *as*, *for*, *because*, and *for--reason*.

Illative logical connectives as a group ranked fifth in terms of correct responses (24%) and third in frequency of occurrence in the sixth-grade textbook (7.8%). When they were examined closely, the following word order, from the easiest to the most difficult, was obtained: *so*, *therefore*, *as a result*, and *thus*.

As a group, additives were the most difficult logical connectives for the sixth graders to answer correctly (22%); these connectives ranked fourth in frequency of occurrence (5.4%). When the specific words were analyzed, the following word order was obtained, from the easiest to the most difficult: *even*, *also*, *in addition*, and *moreover*. See Tables 4.8 and 4.9. Based on these results, Null Hypothesis 2a was retained.

Table 4.8.--Comparison of frequency of occurrence of six types of logical connectives in the sixth-grade social science textbook and students' performance on these connectives on the Logical Connectives Inventory.

| Type of Logical Connective | Occurrence in Textbook | | | Correct Responses on Inventory | |
|---|---|---|---|---|---|
| | Rank | Freq. | % | Rank | % Correct |
| Temporal | 6 | 46 | 3.3 | 1 | 30 |
| Conditional | 5 | 73 | 5.3 | 2 | 28 |
| Contrastive | 2 | 126 | 9.0 | 3 | 27 |
| Causal | 1 | 968 | 69.3 | 4 | 26 |
| Illative | 3 | 109 | 7.8 | 5 | 24 |
| Additive | 4 | 75 | 5.4 | 6 | 22 |

Table 4.9.--Sixth grade: List of logical connectives based on correct inventory responses by category, frequency, percentage, and rank (n = 41).

| Category/Word | Freq. | % | Rank |
|---|---|---|---|
| Additive | | | |
| Even | 51 | 32 | 1 |
| Also | 48 | 30 | 2 |
| In addition | 46 | 29 | 3 |
| Moreover | 14 | 9 | 4 |
| Total | 159 | | |
| Illative | | | |
| So | 52 | 37 | 1 |
| Therefore | 46 | 32 | 2 |
| As a result | 29 | 20 | 3 |
| Thus | 15 | 11 | 4 |
| Total | 142 | | |
| Causal | | | |
| As | 63 | 29 | 1 |
| For | 58 | 28 | 2 |
| Because | 56 | 27 | 3 |
| For--reason | 34 | 16 | 4 |
| Total | 211 | | |
| Contrastive | | | |
| Still | 59 | 33 | 1 |
| However | 52 | 30 | 2 |
| Instead | 46 | 26 | 3 |
| On the other hand | 22 | 12 | 4 |
| Total | 179 | | |

Table 4.9.--Continued.

| Category/Word | Freq. | % | Rank |
|---|---|---|---|
| Conditional | | | |
| Unless | 52 | 31 | 1 |
| Perhaps | 50 | 29 | 2 |
| If | 48 | 28 | 3 |
| Whether | 21 | 21 | 4 |
| Total | 171 | | |
| Temporal | | | |
| Before | 75 | 33 | 1 |
| Until | 55 | 24 | 2 |
| After | 52 | 23 | 3 |
| Meanwhile | 44 | 20 | 4 |
| Total | 226 | | |

Total correct: 1,359 out of 2,724 possible.

Ho 2b: There is no relationship between the frequency with which 24 selected logical connectives occur in eighth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

Before testing this hypothesis, the researcher content-analyzed the eighth-grade social studies textbook (733 pages) for the frequency of occurrence of each of the 24 selected logical connectives. The frequency with which the six types of logical connectives occurred in the eighth-grade social science textbook is shown in Table 4.10. Causal logical connectives appeared most frequently (2,181 times), followed by additive (438), temporal

(344), illative (296), contrastive (282), and conditional (280) logical connectives.

Table 4.10.--Frequency and percentage of occurrence of six types of selected logical connectives in the eighth-grade social science textbook, in rank order.

| Type of Logical Connective | Occurrence in Textbook | |
|---|---|---|
| | Frequency | Percent |
| Causal | 2,181 | 57.1 |
| Additive | 438 | 11.5 |
| Temporal | 344 | 9.0 |
| Illative | 296 | 7.7 |
| Contrastive | 282 | 7.4 |
| Conditional | 280 | 7.3 |
| Total | 3,821 | 100.0 |

Source: America! America!. Glenview, IL: Scott, Foresman and Co., 1985.

Next, the eighth graders' comprehension of these logical connectives was determined by examining the students' performance on the Logical Connectives Inventory. There were 43 eighth graders, who answered 72 questions each. There were 2,952 possible responses and 1,392 total correct responses. On the inventory, the eighth graders performed best on temporal, conditional, and illative logical connectives (all 28%) as a group.

First, temporal logical connectives were examined closely, and the following word order was obtained, from the simplest to the most difficult: *until*, *before*, *after*, and *meanwhile*. Temporals ranked

third in frequency of occurrence in the eighth-grade textbook (9.0%).

Next, conditional logical connectives were examined closely, and the following word order was obtained, from the simplest to the most difficult: *if*, *perhaps*, *unless*, and *whether*. They ranked sixth in frequency of occurrence in the eighth-grade textbook (7.3%).

Illative logical connectives then were examined closely, and the following word order was obtained, from the simplest to the most difficult: *so*, *therefore*, *as a result*, and *thus*. They ranked fourth in frequency of occurrence in the eighth-grade textbook (7.7%).

As a group, causal logical connectives had the second highest percentage correct (26%). However, they appeared most frequently in the eighth-grade textbook (57.1%). When they were analyzed closely, the following word order was obtained, from the simplest to the most difficult: *as*, *for*, *because*,, and *for--reason*.

As a group, contrastive logical connectives ranked third in terms of correct responses (25%) and fifth in frequency of occurrence (7.4%). When contrastives were analyzed closely, the following word order was obtained: *however*, *still*, *instead*, and *on the other hand*.

Additive logical connectives ranked fourth in terms of correct responses (23%); they ranked second in frequency of occurrence in the textbook (11.5%). When additives were analyzed closely, the following word order was obtained: *in addition* or *even*, also, and

***moreover***. See Tables 4.11 and 4.12. Based on these results, Null Hypothesis 2b was retained.

Table 4.11.--Comparison of frequency of occurrence of six types of logical connectives in the eighth-grade social science textbook and students' performance on these connectives on the Logical Connectives Inventory.

| Type of Logical Connective | Occurrence in Textbook | | | Correct Responses on Inventory | |
|---|---|---|---|---|---|
| | Rank | Freq. | % | Rank | % Correct |
| Temporal | 3 | 344 | 9.0 | 1 | 28 |
| Illative | 4 | 296 | 7.7 | 1 | 28 |
| Conditional | 6 | 280 | 7.3 | 1 | 28 |
| Causal | 1 | 2,181 | 57.1 | 2 | 26 |
| Contrastive | 5 | 282 | 7.4 | 3 | 25 |
| Additive | 2 | 438 | 11.5 | 4 | 23 |

Table 4.12.--Eighth grade: List of logical connectives based on correct inventory responses by category, frequency, percentage, and rank (n = 43).

| Category/Word | Freq. | % | Rank |
|---|---|---|---|
| <u>Additive</u> | | | |
| In addition | 48 | 32 | 1 |
| Even | 47 | 32 | 1 |
| Also | 45 | 31 | 2 |
| Moreover | 8 | 5 | 3 |
| Total | 148 | | |
| <u>Illative</u> | | | |
| So | 52 | 37 | 1 |
| Therefore | 46 | 32 | 2 |
| As a result | 29 | 20 | 3 |
| Thus | 15 | 11 | 4 |
| Total | 145 | | |

Table 4.12.--Continued.

| Category/Word | Freq. | % | Rank |
|---|---|---|---|
| Causal | | | |
| As | 62 | 31 | 1 |
| For | 59 | 29 | 2 |
| Because | 55 | 27 | 3 |
| For--reason | 26 | 13 | 4 |
| Total | 202 | | |
| Contrastive | | | |
| However | 59 | 31 | 1 |
| Still | 51 | 27 | 2 |
| Instead | 45 | 23 | 3 |
| On the other hand | 37 | 19 | 4 |
| Total | 192 | | |
| Conditional | | | |
| If | 68 | 37 | 1 |
| Perhaps | 49 | 27 | 2 |
| Unless | 45 | 25 | 3 |
| Whether | 20 | 11 | 4 |
| Total | 182 | | |
| Temporal | | | |
| Until | 70 | 33 | 1 |
| Before | 67 | 31 | 2 |
| After | 42 | 20 | 3 |
| Meanwhile | 36 | 17 | 4 |
| Total | 215 | | |

Total correct: 1,392 out of 2,952 possible.

Ho 2c: There is no relationship between the frequency with which 24 selected logical connectives occur in sixth- and eighth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

The frequency with which the six types of logical connectives occurred in the sixth- and eighth-grade social science textbooks is shown in Table 4.13.

Table 4.13.--Frequency of occurrence of six types of logical connectives in the sixth- and eighth-grade social science textbooks, in rank order.

| Type of Logical Connective | Frequency of Occurrence | | | | | |
|---|---|---|---|---|---|---|
| | Sixth-Grade | | | Eighth-Grade | | |
| | Rank | Freq. | % | Rank | Freq. | % |
| Causal | 1 | 968 | 69.3 | 1 | 2,181 | 57.1 |
| Contrastive | 2 | 126 | 9.0 | 5 | 282 | 7.4 |
| Illative | 3 | 109 | 7.8 | 4 | 296 | 7.7 |
| Additive | 4 | 75 | 5.4 | 2 | 438 | 11.5 |
| Conditional | 5 | 73 | 5.2 | 6 | 280 | 7.3 |
| Temporal | 6 | 46 | 3.3 | 3 | 344 | 9.0 |

The sixth and eighth graders' comprehension of these logical connectives was determined by examining the students' scores on the inventory. There were 84 sixth and eighth graders, who answered 72 questions each. There were 5,676 possible responses and 2,751 correct responses.

On the inventory, both sixth and eighth graders performed best on temporal logical connectives (30% and 28%, respectively).

However, in frequency of occurrence in the two textbooks, temporal connectives ranked in sixth place in the sixth-grade textbook and in third place in the eighth-grade textbook. In addition, they were placed in the following composite word order, from the simplest to the most difficult: *before*, *until*, *after*, and *meanwhile*.

On the inventory, both sixth and eighth graders' scores were in second place on conditional connectives (28% each). In frequency of occurrence in the two textbooks, they ranked fifth (5.2%) or next to last in the sixth-grade textbook and sixth (7.3%) in the eighth-grade textbook. They were placed in the following composite word order, from the simplest to the most difficult: *if*, *perhaps*, *unless*, and *whether*.

On the inventory, contrastive logical connectives placed in third place for both sixth graders (27%) and eighth graders (25%). But in frequency of occurrence they ranked second (9.0%) in the sixth-grade textbook and fifth (7.4%) in the eighth-grade textbook. These connectives were placed in the following composite word order, from the simplest to the most difficult: *however*, *still*, *instead*, and *still*.

Both sixth and eighth graders scored 26% on causal logical connectives on the inventory (fourth place). These connectives ranked in first place in frequency of occurrence in the two textbooks (69.3% for sixth grade and 57% for eighth grade). These connectives were placed in the following order, from the simplest to the most difficult: *even*, *in addition*, *also*, and *moreover*.

On the inventory, illative logical connectives placed in fifth place (24%) for sixth graders and first place (28%) for eighth graders. However, in frequency of occurrence in the two textbooks, illative connectives ranked third (7.8%) in the sixth-grade textbook and fourth (7.7%) in the eighth-grade textbook. These connectives were placed in the following order, from the simplest to the most difficult: *so*, *therefore*, *as a result*, and *thus*.

On the inventory, additive logical connectives were the most difficult for both sixth and eighth graders (22% and 23%, respectively). On the other hand, in frequency of occurrence, additive connectives ranked in fourth place (5.4%) in the sixth-grade textbook and in second place (11.5%) in the eighth-grade textbook. They were placed in the following word order, from the simplest to the most difficult: *even*, *in addition*, *also*, and *moreover*.

Table 4.14 contains a comparison of sixth- and eighth-grade students' performance on the six selected types of logical connectives contained in the research inventory. Based on the figures shown in Tables 4.13 and 4.14, Null Hypothesis 2c was retained. For more information on the results, see Tables A.5, A.6, and A.7, and A.8, Appendix A.

Table 4.14.--Comparison of sixth- and eighth-grade students' performance on the six selected types of logical connectives in the Logical Connectives Inventory.

| Type of Logical Connective | Correct Responses on Inventory (in %) | |
|---|---|---|
| | Sixth Graders | Eighth Graders |
| Temporal | 30 | 28 |
| Conditional | 28 | 28 |
| Contrastive | 27 | 25 |
| Causal | 26 | 26 |
| Illative | 24 | 28 |
| Additive | 22 | 23 |

Summary. Null Hypotheses 2a, 2b, and 2c were not rejected. Therefore, no measurable relationship was found between the occurrence of the 24 selected types of logical connectives found in the sixth- and eighth-grade social science textbooks and the students' comprehension of these logical connectives.

Hypothesis 3

> There is no relationship between the specific types of logical connectives presented and taught in sixth- and eighth-grade students' English textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

The relationship between sixth and eighth graders' comprehension of the 24 logical connectives presented in the research instrument and the students' exposure to these connectives in their English textbooks was examined in the fourth hypothesis.

In the sixth-grade English textbook, Building English Skills (McDougal & Little, 1984), only three types of very common logical connectives were mentioned:

1. Additive. **And** was presented on three pages on one lesson on conjunctions.

2. Contrastive. **But** and **or** were presented in the same lesson.

3. Causal. **For** was presented in one lesson. It was found 13 times on three pages.

These logical connectives were presented in only 2 of the 29 lessons contained in the textbook. Also, these four connectives were found on only 13 out of the possible 471 instructional pages analyzed, or 3%.

In the eighth-grade English textbook, The Macmillan English Series (Pollock, 1973), only two classifications of logical connectives were introduced:

1. Causal. **Because** was found on three pages, **for** was found on two pages, and **as** was used once. All three words were found in the same lesson.

2. Temporal. **Before** and **after** were presented three times. **Until** appeared in only one lesson.

These connectives were presented in one lesson on "Connecting Words," out of a possible 15 lessons contained in the textbook. In addition, these five connectives were found on only 5 of the 486 instructional pages analyzed, or 2%.

Because so few examples were found of specific logical connectives being taught in sixth and eighth graders' English classes, no statistical analysis could be performed on the data for this null hypothesis. Thus, the researcher had no basis from which to reject or not to reject Null Hypothesis 3. For more detailed information, see Table A.9, Appendix A.

## Chapter Summary

The results of the hypothesis testing were presented and discussed in this chapter. A summary and discussion of the major findings, limitations of the study, and implications for practice and future research are contained in Chapter V.

# CHAPTER V

# MAJOR RESULTS AND DISCUSSION, COMPARISON OF THE FINDINGS TO THOSE FROM OTHER RESEARCH, RECOMMENDATIONS FOR FURTHER RESEARCH, AND REFLECTIONS

## Introduction

This study was based on an earlier investigation conducted by Robertson (1968), who analyzed three basal reading series at the fourth-, fifth-, and sixth-grade levels to determine which connectives were most widely used. After analyzing her findings, Robertson constructed a research instrument, the Connective Reading Test, containing 17 of the most frequently occurring connectives. The instrument was designed to measure 402 fourth-, fifth, and sixth-graders' knowledge of connectives. The results of Robertson's research suggested that children's comprehension of connectives improved across these three grade levels, that the comprehension of connectives is highly related to reading ability.

Stoodt's (1970) research findings reaffirmed those from Robertson's (1968) study: A significant relationship was found between reading ability and understanding the functions of conjunctions (which include connectives) in sentences, and the numbers and types of conjunctions are important factors in determining the readability levels of reading materials.

The purpose of this study was to identify and examine several important elements that affect on-grade-level readers' comprehension of logical connectives and to compare these elements with other variables. The writer had three major objectives in conducting the study:

1. To determine whether there is a relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension and listening comprehension subtests of the Stanford Diagnostic Reading Test (SDRT).

2. To determine whether there is a relationship between the frequency with which selected types of logical connectives occur in social science textbooks and sixth- and eighth-grade students' comprehension of these connectives and mastery of them on the research instrument.

3. To investigate the relationship between the specific types of logical connectives presented and taught in sixth and eighth graders' English textbooks and the students' mastery of these logical connectives on the research instrument.

In this chapter, major results of the study, comparison of the findings to those from other research, and recommendations for further research, and implications are presented.

## Major Results and Discussion

Within the limits of the setting, population sampling, and methodology, the findings of this study are presented. Specific

results are reported under headings of each major hypothesis that was explored. The level of significance for all tests was set at .05.

Hypothesis 1: There is no relationship between sixth- and eighth-grade students' scores on the Logical Connectives Inventory and their scores on the reading comprehension and listening comprehension subtests of the Stanford Diagnostic Reading Test (SDRT).

Of the two relationships that were studied (reading comprehension and listening comprehension), only students' scores on the reading comprehension subtest of the SDRT and their comprehension of selected types of logical connectives were found to be statistically related. The finding that students' understanding of connectives and their reading ability were related is in agreement with the findings of research by Robertson (1968) and Stoodt (1972). However, unlike Robertson's and Stoodt's samples, the sixth and eighth graders in this study had almost identical mean scores on the research inventory (33% and 32%, respectively). In both Robertson's and Stoodt's studies, students' scores indicated growth in understanding of connectives from one year to the next. On the other hand, Wishart and Smith's (1982) research findings tended to support those of the present research--that history textbooks were written with unfamiliar, often abstract words, including connectives that were difficult to comprehend for all three levels of students examined.

Unlike Robertson, this researcher did not find students' scores on the listening comprehension subtest of the SDRT and their comprehension of selected types of logical connectives to be

related statistically. Evidently, the SDRT does not require knowledge of the various types of logical connectives included in the Logical Connectives Inventory.

> Hypothesis 2: There is no relationship between the frequency with which 24 selected logical connectives occur in sixth- and eighth-grade students' social science textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

The percentages of correct responses on the Logical Connectives Inventory were surprising because the range was quite limited--from 22% for sixth graders' mastery of additives to 30% for sixth-graders' mastery of temporals. Also surprising was that the sixth graders' score on temporals (the category in which they demonstrated the greatest mastery) was only two percentage points higher than that of the eighth graders (30% versus 28%). Both groups scored similarly on all three sections of the inventory; the total mean score for the sixth graders was 33.1026, and for eighth graders it was 32.4750.

Causal logical connectives occurred the most frequently in both the sixth-grade and eighth-grade textbooks (69.3% and 57.1%, respectively). However, students' mastery of these connectives ranked in fourth place; both sixth and eighth graders achieved 26% mastery of this type of connective. On a combined word list for both sixth and eighth graders, the following connectives, from the simplest to the most difficult, were obtained: *as*, *for*, *because*, and *for--reason*.

Contrastive logical connectives occurred second most frequently in the sixth-grade textbook (9%) and fifth (7.4%) in the eighth-grade textbook. However, sixth graders showed 27% mastery of these connectives, and eighth graders showed 25% mastery of them. On a composite word list, the following connectives, from the simplest to the most difficult, were obtained: *however*, *still*, *instead*, and *on the other hand*.

Illative logical connectives occurred third most frequently in the sixth-grade textbook (7.8%) and fourth in the eighth-grade textbook (11.5%). Sixth- and eighth-grade students' mastery of these connectives varied very little: 24% and 28%, respectively. On a composite word list, the following connectives, from the simplest to the most difficult, were obtained: *so*, *therefore*, *as a result*, and *thus*.

Additive logical connectives occurred fourth in frequency in the sixth-grade textbook (5.4%) and second in the eighth-grade textbook (11.5%). However, in terms of performance, both sixth and eighth graders' scores on these connectives were in sixth place: 22% mastery for sixth graders and 23% for eighth graders. On a composite word list, the following connectives, from the simplest to the most difficult, were obtained: *even*, *in addition*, *also*, and *moreover*.

Conditional logical connectives occurred fifth in frequency in the sixth-grade textbook (5.2%) and sixth or least often in the eighth-grade textbook (7.3%). But in terms of performance, students in both grades had their second highest level of mastery on these

connectives: 28%. On a composite word list, the following word order was obtained, from the simplest to the most difficult: *if*, *perhaps*, *unless*, and *whether*.

Temporal logical connectives occurred least frequently in the sixth-grade textbook (3.3%) and in third place in the eighth-grade textbook (9%). However, students in both grades demonstrated the best mastery of this type of connective: 30% mastery for sixth graders and 28% for eighth graders. On a composite word list, the following word order was obtained, from the simplest to the most difficult: *before*, *until*, *after*, and *meanwhile*.

A complete rank order of connectives from the simplest to the most difficult, based on sixth and eighth graders' scores, was as follows: *so*, *if*, *before*, *even*, *therefore*, *in addition*, *also*, *as*, *however*, *still*, *for*, *perhaps*, *until*, *because*, *unless*, *instead*, *after*, *as--result*, *meanwhile*, *on the other hand*, *for--reason*, *thus*, *whether*, and *moreover*.

When a list of the most difficult connectives was constructed for the purpose of further analysis, the following rank order was obtained: *meanwhile*, *on the other hand*, *for--reason*, *thus*, and *whether*. This word-order list was compared to earlier ones compiled by Robertson (1968) and Stoodt (1968), and only two connectives, *thus* and *however*, appeared on the present list and either of the two previous ones. Robertson noted that some connectives were easier to comprehend than others. In that study, the five most difficult connectives for students to comprehend were *however*, *thus*, *which*,

*although*, and *yet*. Also, Stoodt (1972) noted that children experienced difficulty in comprehending the more unfamiliar types of connectives in her study: *though*, *where*, *when*, *while*, *why*, and *yet*.

> Hypothesis 3: There is no relationship between the specific types of logical connectives presented and taught in sixth- and eighth-grade students' English textbooks and the students' comprehension of these logical connectives, as measured by their scores on the Logical Connectives Inventory.

No relationship was found between the specific types of logical connectives presented and taught in sixth- and eighth-graders' English textbooks and the students' mastery of these logical connectives on the research instrument. There were very few examples of these specific types of logical connectives in either the sixth- or the eighth-grade textbook.

In the sixth-grade textbook, only the supplementary forms of the additive (*and* for three pages), contrastive (*but* and *or* were presented on the same three pages as *and*), and causal (*for*) logical connectives were found on three pages. Also, in the sixth-grade English textbook, Building English Skills (McDougal & Littel, 1984), only three types of very common logical connectives were mentioned: *and*, *for*, *but*, and *or*. These examples of the selected classification were presented in 2 out of 29 lessons occurring in the textbook. These three examples were found on only 13 out of the 471 (3%) instructional pages analyzed.

In the eighth-grade English textbook, The Macmillan English Series (Pollock, 1973), five types of unsophisticated logical connectives were used: *and*, *because*, *as*, *for*, and *but*. These examples were similar to the ones used in the sixth-grade textbook.

They occurred in one lesson on "connecting words," out of the total 15 lessons contained in the textbook. In addition, these five examples were evident on only 5 of the 486 (1%) instructional pages examined.

Comparison of the Findings to Those From Other Research

The findings of research conducted by Vygotsky (1962), Hurlock (1953), and Palermo and Molfese (1972) would seem to indicate that children at a very young age use logical connectives orally by imitating the speech patterns of others. However, the findings of this research (based on the scores of readers of average ability) might suggest that explicit instruction on the various uses and relationships signaled by logical connectives in social science or English classes might be beneficial for homogeneous remedial reading classes and could be extended to include heterogeneous classes that contain a wider representation of readers. The findings of Robertson (1968), Stoodt (1972), and Kavale and Schreiner (1979) support this assertion.

The fact that the two social science textbooks used in this study were written in a formal style that still contained a few unfamiliar connectives might have contributed to the apparent difficulty of the inventory. Gardner (1980) and Wishart and Smith (1982) noted the possibility of such an occurrence in their studies. In the present study, only one relationship was found to be statistically significant (between students' reading comprehension scores

on the SDRT and their comprehension of selected types of logical connectives and the types of relationships they signaled).

Contrary to the findings of Robertson (1968) and Stoodt (1972), no measurable relationship was found between students' scores on the Logical Connectives Inventory and their listening comprehension. Evidently, the SDRT subtest on listening comprehension does not require knowledge of the various types of logical connectives included in the Logical Connectives Inventory. Finally, only an insignificant amount of space was devoted to logical connectives in both the sixth- and eighth-grade English textbooks.

## Recommendations for Further Research

This research should be replicated in other regions of the country and at other grade levels to determine the generalizability of the methodology. The methodology employed in this research might be useful in future studies. The inventory used and the approach of using gap fill in (cloze) and multiple-choice selections written with selected types of logical connectives might prove useful in approaching the challenge of assessing comprehension of specific classes of logical connectives. Evaluation of logical connectives in written passages continues to be a topic for further research.

Because certain logical connectives were more difficult than others for the students in this study to comprehend, several follow-up studies are needed:

1. A study should be conducted with two groups--a control group and an experimental group--with a pretest/posttest design.

2. Another study should use the research instrument as it was constructed for this study. However, in the inventory given to a second group, the classes or types of logical connectives could be indicated and underscored on the top of each page.

3. A study should be undertaken in which students were tested twice: first in the sixth grade and again in the eighth grade.

4. A study should be undertaken to compare sixth and eighth graders' oral, written, and reading comprehension of selected types of logical connectives determined beforehand. For example, do students use the more difficult logical connectives in their own informal speech and unsupervised writing?

5. A study should be conducted that compares sixth and eighth graders' reading comprehension scores with their verbal rationalizations about their reading responses.

6. A study should be conducted to update the role that logical connectives play in the readability of social science materials. Book editors recently have taken a much-too-simple approach to making texts more understandable for average and below-average readers, by merely replacing more sophisticated connectives with ambiguous short ones, such as *for*, *as*, and *so*.

7. A study should be conducted using the more abstract, sophisticated connectives and providing study guides along the pages and in teacher manuals that explain the difficult terminologies encountered in social science materials. Then, the results of such a study should be compared to another one designed similarly to

Gardner's (1980) using the more common types of connectives used in spontaneous speech.

8. A study should be designed in which teachers are provided with in-service sessions on the types and functions of logical connectives. This study also should include periodic assessment of students and observations of how they present connectives.

## Reflections

At this point, the investigator will go beyond the data to share her reflections on this study. After the field testing, two classroom English teachers and one reading consultant volunteered to critique this study. Initially, they were unaware of the various terminologies, definitions, and relationships that each of the six types of logical connectives could generate in sentences and passages. Once they were aware of the importance of connectives, they were surprised and wished to learn more about them in order to help their students understand them.

In addition, during the course of the study, certain comments made by middle school and junior high school teachers made the researcher aware that, as a group, they were interested in better understanding the definitions of logical connectives and the functions of logical connectives in sentences. These educators previously had assumed that all students (above-average, average, and below-average readers) would automatically learn these connectives.

This study was restricted to the use of two social science textbooks. Many of the logical connectives in the sixth-grade textbook had been altered when the book was revised, and usages were confined to a few overused words, such as *and*, *for*, and *as*, which made it difficult for the investigator to construct a balanced research instrument.

The eighth-grade textbook in this series had been rewritten with fewer of the more sophisticated, unfamiliar logical connectives that are traditionally found in social science textbooks. With this oversimplifying of logical connectives, middle-school-age students are not exposed to the more complex connectives.

At the eighth-grade level, a surprise football rally was held right in the middle of the testing session, so several students required a make-up session. The make-up day was a half-day of school, so the halls were noisy. This disturbed the students who were taking the inventory.

In this study, the researcher investigated the relationship between students' comprehension of logical connectives found in social science textbooks and their reading and listening comprehension. If students do not have the linguistic structure necessary to understand fully the meaning of certain words, including logical connectives, they will insufficiently process written passages.

Challenging questions should be raised that force students to become cognitively aware, to analyze, and to question concepts about which they are still uncertain. Simons (1971) stated that reading

comprehension is both process and product. The mental operation is the process. The product is the resultant behaviors of comprehension: the oral and written responses. Therefore, classroom teachers should provide learning environments that challenge students to become more active, selective readers--readers who are able to analyze abstract syntactic structures in order to comprehend logical connectives whenever they are encountered.

# APPENDICES

# APPENDIX A

# SUPPLEMENTARY TABLES

Table A.1--Table of Logical Connectives.

| Fernald | Fries | Long | Mellon | Robertson |
|---|---|---|---|---|
| also | and | and | moreover | although |
| although | also | but | also | because |
| and | nor | or | furthermore | if |
| as | but | nor | besides | so |
| because | yet | both | in addition | that |
| both | then | not | nevertheless | when |
| but | therefore | either | however | where |
| either | however | neither | although | that |
| ere | after | when | whereas | which |
| for | although | how | still | who |
| except | though | if | yet | and |
| forasmuch | as | after | accordingly | but |
| however | because | that | consequently | for |
| if | before | because | thus | yet |
| lest | for | therefore | hence | however |
| neither | how | nevertheless | therefore | thus |
| nevertheless | if | | | "absent" that |
| nor | like | | | |
| notwithstanding | provided | | | |
| or | since | | | |
| provided | so | | | |
| save | than | | | |
| seeing | that | | | |
| since | unless | | | |
| so | until | | | |
| still | what | | | |
| than | when | | | |
| that | where | | | |
| then | whether | | | |
| therefore | which | | | |
| though | while | | | |
| till | who | | | |
| unless | why | | | |
| until | | | | |
| when | | | | |
| whence | | | | |
| where | | | | |
| whereas | | | | |

Table A.1 (cont'd).

| Fernald | Rogers | Stoodt | Strang | Whitehall |
|---|---|---|---|---|
| whereat | but | and | and | and |
| whereby | while | yet | not | yet |
| wherein | thus | nor | but rather | as |
| whereinsoever | if | or | sooner than | nor |
| whereinto | as | than | as well as | or |
| whereof | even | for | nor | than |
| whereto | however | so | because | for |
| whereupon | because | if | therefore | so |
| wherever | since | though | although | if |
| wherewith | until | while | for | though |
| whether | when | how | nevertheless | while |
| while | then | that | if | how |
| whither | yet | when | whether | that |
| why | in fact | where | after | what |
| although-yet | therefore | which | before | when |
| as-as | meanwhile | because | since | where |
| as-so | whether | either | so | which |
| both-and | perhaps | neither | when | who |
| either-or | despite | now | whenever | why |
| if then | | since | | else |
| neither-nor | | | | consequently |
| no-nor | | | | hence |
| so-as | | | | after |
| such-as | | | | because |
| though yet | | | | before |
| whether or | | | | provided |
| | | | | providing |
| | | | | since |
| | | | | supposing |
| | | | | unless |
| | | | | whence |
| | | | | whether |
| | | | | whither |
| | | | | also |
| | | | | furthermore |
| | | | | moreover |
| | | | | nevertheless |
| | | | | such as |
| | | | | or else |
| | | | | other than |
| | | | | otherwise |
| | | | | and so |
| | | | | so that |
| | | | | therefore |
| | | | | although |
| | | | | for all |

Table A.1 (cont'd).

| Fernald | Rogers | Stoodt | Strang | Whitehall |
|---|---|---|---|---|
| | | | | however |
| | | | | in that |
| | | | | so that |
| | | | | whatever |

Table A.2--Summary: Placement of Logical Connectives in Science Textbooks.

| Sixth Grade: Our World Today | Eighth Grade: America! America! |
|---|---|
| Beginning, pp. 1-140 | Beginning, pp. 1-244 |
| Middle, pp. 141-279 | Middle, pp. 455-488 |
| Ending, pp. 280-419 | Ending, pp. 489-732 |

| The twenty-four selected logical connectives | Book type and placement | Grade level | Page no. | Correct frame no. | Type of logical connectives |
|---|---|---|---|---|---|
| I | II | III | IV | V | VI |
| Cloze Words | | | | | |
| 1. Moreover | E | 8 | 643 | (3) | Additive |
| 2. So | M | 8 | 381 | (3) | Illative |
| 3. For some reason | B | 8 | 55 | (1) | Causal |
| 4. Still | E | 6 | 319 | (4) | Additive |
| 5. Unless | B | 8 | 191 | (2) | Contrastive |
| 6. Thus | E | 6 | 361 | (1) | Illative |
| 7. As | E | 6 | 97 | (1) | Causal |
| 8. Whatever | E | 8 | 42 | (4) | Conditional |
| 9. Until | B | 6 | 144 | (2) | Temporal |
| 10. Given | B | 6 | 123 | (2) | Additive |
| 11. However | B | 8 | 240 | (2) | Contrastive |
| 12. Instead | E | 6 | 126-7 | (1) | Contrastive |
| 13. After | B | 6 | 153 | (2) | Temporal |
| 14. Before | E | 8 | 699 | (4) | Temporal |
| 15. Meanwhile | E | 8 | 655 | (1) | Temporal |
| 16. Therefore | E | 6 | 330 | (2) | Illative |
| 17. On the other hand | E | 8 | 505 | (3) | Contrastive |
| 18. Perhaps | E | 6 | 383 | (3) | Conditional |
| 19. Also | E | 8 | 167 | (4) | Additional |
| 20. Because | M | 8 | 260 | (3) | Causal |
| 21. If | E | 6 | 125 | (1) | Conditional |
| 22. For | E | 6 | 402 | (2) | Causal |
| 23. As a result | E | 8 | 663 | (4) | Illative |
| 24. In addition | B | 6 | 163 | (1) | Additive |

Note: B = Beginning of text
M = Middle of text
E = End of text

Table A.2 (cont'd).

| The twenty-four selected logical connectives | Book type and placement | Grade level | Page no. | Correct frame no. | Type of logical connectives |
|---|---|---|---|---|---|
| I | II | III | IV | V | VI |
| Sentence Completion Words | | | | | |
| 1. In addition | B | 8 | 38 | (1) | Additive |
| 2. Whether | M | 6 | 209 | (4) | Conditional |
| 3. On the other hand | M | 8 | 257 | (4) | Contrastive |
| 4. For this purpose | M | 8 | 357 | (1) | Causal |
| 5. Even | M | 6 | 254 | (4) | Additive |
| 6. However | | 6 | 133 | (1) | Contrastive |
| 7. Unless | M | 8 | 245 | (1) | Conditional |
| 8. Before | M | 6 | 193 | (3) | Temporal |
| 9. So | E | 8 | 627 | (2) | Illative |
| 10. For a reason | M | 8 | 472 | (3) | Causal |
| 11. Therefore | B | 6 | 58 | (4) | Illative |
| 12. Meanwhile | E | 8 | 604 | (1) | Temporal |
| 13. Instead | E | 6 | 289-90 | (3) | Contrastive |
| 14. Also | M | 6 | 175 | (3) | Additive |
| 15. After | M | 6 | 162 | (4) | Temporal |
| 16. If | M | 6 | 190 | (2) | Conditional |
| 17. As | M | 6 | 176 | (2) | Causal |
| 18. Thus | M | 8 | 436 | (1) | Illative |
| 19. Still | E | 8 | 671 | (2) | Contrastive |
| 20. Perhaps | E | 8 | 634 | (3) | Conditional |
| 21. The result | B | 6 | 207 | (3) | Illative |
| 22. Until | M | 8 | 379 | (2) | Temporal |
| 23. Because | E | 6 | 334 | (4) | Causal |
| 24. Moreover | M | 8 | 410 | (2) | Additive |

Note: B = Beginning
M = Middle
E = End

Table A.2 (cont'd).

| The twenty-four selected logical connectives | Book type and placement | Grade level | Page no. | Correct frame no. | Type of logical connectives |
|---|---|---|---|---|---|
| I | II | III | IV | V | VI |
| Multiple Choice Words | | | | | |
| 1. On the other hand | M | 6 | 259 | (1) | Contrastive |
| 2. Before/Until | M | 8 | 274 | (2) | Temporal |
| 3. For/As | E | 6 | 77 | (4) | Causal |
| 4. Even/Also | M | 8 | 350 | (4) | Additive |
| 5. Still/Nevertheless | E | 8 | 182 | (2) | Contrastive |
| 6. Result/Consequently | E | 6 | 399 | (4) | Illative |
| 7. Perhaps/Maybe | M | 8 | 365 | (1) | Conditional |
| 8. Thus/Finally | B | 8 | 9 | (3) | Illative |
| 9. Because/For | E | 8 | 681 | (1) | Causal |
| 10. Unless/Provided that | B | 6 | 159 | (2) | Conditional |
| 11. However/Nevertheless | E | 6 | 410 | (3) | Contrastive |
| 12. After/Later | E | 8 | 685 | (4) | Temporal |
| 13. Therefore/Consequently | B | 8 | 182 | (1) | Illative |
| 14. Moreover/Also | E | 8 | 717 | (2) | Additive |
| 15. Meanwhile/Now | E | 6 | 389 | (1) | Temporal |
| 16. Instead/However | B | 8 | 79 | (4) | Contrastive |
| 17. So/Hence | B | 6 | 45-6 | (2) | Illative |
| 18. As/Because | E | 8 | 536-9 | (2) | Causal |
| 19. Whether/If | M | 6 | 214 | (3) | Conditional |
| 20. In addition/Likewise | B | 8 | 28 | (3) | Additive |
| 21. Until/Before | B | 6 | 18 | (3) | Temporal |
| 22. If/Provided | | 8 | 119 | (4) | Conditional |
| 23. Also/Likewise | M | 6 | 231 | (3) | Additive |
| 24. One reason/Because | M | 6 | 153 | (3) | Causal |

Note: B = Beginning
M = Middle
E = End

Table A.3--Placement of Logical Connectives in Inventory.

*Selected logical connectives

| Number of occurrences | Given logical connectives | Part I: Cloze | Part II: Sentence Completion | Part III: Multi-choice Synonyms |
|---|---|---|---|---|
| Additive | | | | |
| (6) | 1. *Moreover | 1-(3), 8-2 | 6-2, 24-(2) | 14-(2), 18-(4) |
| (7) | 2. In addition | 3-4, 23-1, 24-(1) | 1-(1), 10-2, 12-4, 13-4 | |
| (5) | 3. Also | 6-2, 19-(4) | 14-(2), 18-2 | 4-(4) |
| (4) | 4. Even | 10-(2) | 5-(4), 7-4, 20-1 | |
| (4) | 5. Likewise | 11-4, 12-3 | | 22-3, 23-(3) |
| (3) | 6. Besides | 20-1 | 23-2 | |
| (8) | 7. And | 22-1 | 4-4, 17-3, 21-4 | 3-1, 9-4, 19-2, 20-3 |
| (1) | 8. Including | | 2-2 | |
| (4) | 9. Furthermore | | | 5-4, 6-1, 10-3, 11-1 |

Additive: In addition (7); Moreover (6); Also (5); Even (4).

Total times selected logical connectives were used in inventory.

Table A.3 (cont'd).

*Selected logical connectives

| Number of occurrences | Given logical connectives | Part I: Cloze | Part II: Sentence Completion | Part III: Multi-choice Synonyms |
|---|---|---|---|---|
| Illative | | | | |
| (9) | 1. *So | 2-(3), 7-3, 21-4 | 9-(2), 16-4 | 7-2, 15-4, 19-1, 20-1 |
| (3) | 2. Hence | 5-3, 9-3 | | 17-(2) |
| (6) | 3. *Thus | 6-(1), 10-1, 19-3 | 4-3, 5-1, 18-(1) | |
| (5) | 4. *Therefore | 8-1, 16-(2) | 6-3, 11-(4) | 22-1 |
| (1) | 5. In conclusion | 17-4 | | |
| (4) | 6. *As a result | 23-(4), 24-2 | 24-1 | 1-3 |
| (1) | 7. Eventually | | 3-3 | |
| (1) | 8. Since | | 8-4 | |
| (3) | 9. Finally | | 19-3 | 8-(3), 16-1 |
| (1) | 10. *The (same) result | | 21-(3) | |
| (1) | 11. *Result (same) | | | 2-4 |
| (3) | 12. Consequently | | | 6-(4), 10-1, 13-(1) |

Illative: Therefore (5); So (9); Thus (6); As a result (4); The result (1); Result (1).

Total times selected logical connectives were used in inventory.

Table A.3 (cont'd).

*Selected logical connectives

| Number of occurrences | Given logical connectives | Part I: Cloze | Part II: Sentence Completion | Part III: Multi-choice Synonyms |
|---|---|---|---|---|
| Causal | | | | |
| (5) | 1. *As | 2-1, 7-(1), 21-3 | 17-(2) | 3-(4) |
| (1) | 2. *For some reason | 3-(1) | | |
| (19) | 3. *Because | 8-3, 11-3, 15-4, 18-1, 20-(3) | 2-1, 6-4, 7-2, 9-1, 13-1, 15-2, 23-(4) | 4-2, 8-4, 14-1, 18-2, 22-2, 23-2, 24-(3) |
| (2) | 4. *For this reason | 17-2 | 3-1 | |
| (6) | 5. For | 22-(2) | 14-2 | 9-1, 19-4, 20-2, 4-2 |
| (1) | 6. For this purpose | | 4-(1) | |
| (1) | 7. *For a reason | | 10-(3) | |
| (2) | 8. On account of | | | 1-1, 11-2 |
| (3) | 9. Cause | 14-2 | | 12-1, 21-4 |
| | 10. | | | |
| | 11. | | | |
| | 12. | | | |

Causal: Because (19); For this reason (1); For some reason (1); As (5); For a reason (1).

Total of times selected logical connectives were used in inventory.

Table A.3 (cont'd).

*Selected logical connectives

| Number of occurrences | Given logical connectives | Part I: Cloze | Part II: Sentence Completion | Part III: Multi-choice Synonyms |
|---|---|---|---|---|
| Contrastive | | | | |
| (2) | 1. Otherwise | 1-4 | | 20-1 |
| (3) | 2. Or | 2-4, 7-4 21-2 | | |
| (2) | 3. On the contrary | 3-3 | 1-4 | |
| (10) | 4. *Still | 4-(3), 5-1, 9-1, 13-4, 14-3, 19-(2) | | 2-1, 12-2, 17-4, 21-1 |
| (3) | 5. Only | 6-4, 10-3, | 5-2 | |
| (10) | 6. *However | 11-(2), 15-3, 18-2 | 6-(1), 23-1 | 8-1, 16-(4), 18-3, 23-4, 24-4 |
| (8) | 7. *Instead | 12-(1), 2-4 | 1-2, 12-2, 13-(3), 16-3, 21-1 | 7-3 |
| (12) | 8. Nevertheless | 16-4, 23-3, 24-3 | 9-3, 10-4, 11-(3), 24-4 | 5-(2), 6-3, 10-4, 11-(3), 13-3 |
| (2) | 9. *On the other hand | 17-(3) | 3-(4) | |
| (9) | 10. But | 22-4 | 4-2, 14-4, 17-4, 18-3, 22-1 | 10-4, 4-3, 15-2 |
| (1) | 11. Yet | | | 9-3 |
| (1) | 12. Otherwise | | 8-2 | |
| (1) | 13. In spite of | | | 15-(2) |

Contrastive: On the other hand (2); However (10); Still (11); Instead (8).

Total of times selected logical connectives were used in inventory.

Table A.3 (cont'd).

*Selected logical connectives

| Number of occurrences | Given logical connectives | Part I: Cloze | Part II: Sentence Completion | Part III: Multi-choice Synonyms |
|---|---|---|---|---|
| Conditional | | | | |
| (8) | 1. Provided | 1-1, 11-1, 15-(1), 16-1 | | 8-2, 14-4, 16-2, 22-(4) |
| (8) | 2. *If | 2-2, 7-2, 21-1 | 16-(2) | 3-2, 15-3, 19-(3), 4-2 |
| (12) | 3. Provided that | 3-2, 17-1, 23-2, 24-3 | 1-4, 10-1 | 1-2, 5-3, 6-2, 10-(2), 11-(4), 13-2 |
| (6) | 4. Maybe | 4-1, 9-4, 14-1 | 5-3, 22-2 | 7-(1) |
| (8) | 5. *Unless | 5-(2), 13-1 | 7-(1), 8-1 | 2-3, 12-3, 14-3, 17-1 |
| (9) | 6. *Whether | 8-(4), 12-2, 20-2 | 2-(4), 3-2, 21-2, 23-3 | 18-1, 24-2 |
| (6) | 7. *Perhaps | 18-(3) | 9-1, 11-1, 12-3, 19-1, 20-(3) | |

Total Conditional: If (8); Perhaps (6); Whether (9); Unless (8).

Total times selected logical connectives were used in inventory.

Table A.3 (cont'd).

*Selected logical connectives

| Number of occurrences | Given logical connectives | Part I: Cloze | Part II: Sentence Completion | Part III: Multi-choice Synonyms |
|---|---|---|---|---|
| Temporal | | | | |
| (2) | 1. Sometimes | 1-2, 12-4 | | |
| (1) | 2. Since | 4-3 | | |
| (1) | 3. While | 5-4 | | |
| (1) | 4. Then | 6-3 | | |
| (5) | 5. *Until | 9-(2) | 22-(1) | 2-(2), 7-4, 17-3 |
| (2) | 6. Soon | 10-4 | 14-1 | |
| (5) | 7. Before | 14-(4) | 8-(3), 15-1, 19-4 | 21-(3) |
| (7) | 8. *Meanwhile | 15-(1), 16-3 | 11-3, 12-(1), 18-4 | 16-3, 23-1 |
| (4) | 9. Earlier | 18-4 | 24-3 | 24-1, 20-2 |
| (3) | 10. *After | 19-2 | 7-3, 15-(4) | |
| (4) | 11. Now | 22-4 | | 3-(3), 9-2, 15-1 |
| (2) | 12. When | | 16-1 | 14-4 |
| (1) | 13. Later | | | 12-(4) |
| (1) | 14. Occasionally | | | 13-4 |

Total Temporal: Until (5); Before (5); Meanwhile (7); After (3).

Total times selected logical connectives were used in inventory.

Table A.4-Frequency of Logical Connectives in Inventory.

| | PART I Passage Number | PART II Given Word | PART III Book Type and Placement 6th | PART III Book Type and Placement 8th | PART IV Cloze | PART IV Sentence Completion | PART IV Synonyms | PART V Book Type | PART V Placement | PART VI Page No. | PART VII Correct Response | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1. Additive | | | | | | |
| 1 | (24) | In addition | + | | + | | | B | | 162 | (1) | Cloze |
| 2 | (1) | In addition | | + | | | + | B | | 38 | (1) | Sentence Completion |
| 3 | (20) | In addition | | + | | + | | B | | 28 | 4 | Synonym |
| 1 | (1) | Moreover | | + | + | | | | E | 643 | (3) | Cloze |
| 2 | (24) | Moreover | | + | | | + | M | | 410 | (2) | Sentence Completion |
| 3 | (14) | Moreover | | + | | + | | | E | 717 | (2) | Synonym |
| 1 | | Even | + | | + | | | B | | 123 | (2) | Cloze |
| 2 | (5) | Even | + | | | | + | M | | 254 | (4) | |
| 3 | (4) | Even | | + | | + | | M | | 350 | 4 | Synonym |
| 1 | (19) | Also | | + | + | | | | E | 167 | 4 | Cloze |
| 2 | (14) | Also | + | | | | + | M | | 175 | (3) | Sentence Completion |
| 3 | (23) | Also | + | | | + | | M | | 231 | (3) | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Number of passages taken from textbooks: | 5 | 7 | Total book placement: | 4 | 5 | 3 | Total number of selected additive logical connectives: 1=2 2=3 3=4 4=4 12 |
| | 6 | 6 | | 5 | 2 | 5 | |
| | 5 | 7 | | 2 | 5 | 5 | |
| | 6 | 6 | | 3 | 2 | 7 | |
| | 5 | 7 | | 3 | 5 | 4 | |
| | 6 | 6 | | 3 | 4 | 5 | |
| | 33 | 39 | | 20 | 23 | 20 | = 72 |
| | -3 | +3 | | -4 | -1 | +5 | |

Table A.4 (continued).

| PART I Passage Number | PART II Given Word | PART III Book Type and Placement 6th | PART III 8th | PART IV Cloze | PART IV Sentence Completion | PART IV Synonyms | PART V Book Type | PART V Placement | PART V | PART VI Page No. | PART VII Correct Response |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2. Illative | | | | | | |
| 1 (16) | Therefore | + | | + | | | | | E | 330 | (2) Cloze |
| 2 (11) | Therefore | + | | | | + | B | | | 58 | (4) Sentence Completion |
| 3 (13) | Therefore | | + | | + | | B | | | 182 | (1) Synonym |
| 1 (23) | As a result | | + | + | | | | | E | 663 | 4 Cloze |
| 2 (27) | As a result | + | | | | + | B | | | 207 | (3) Sentence Completion |
| 3 (6) | As a result | + | | | + | | | | E | 399 | (4) Synonym |
| 1 (2) | So | | + | + | | | | M | | 381 | (3) Cloze |
| 2 (9) | So | | + | | | + | | | E | 627 | (2) Sentence Completion |
| 3 (17) | So/Hence | + | | | + | | B | | | 45-6 | (2) Synonym |
| 1 (6) | Thus | + | | + | | | | | E | 361 | (1) Cloze |
| 2 (18) | Thus | | + | | | + | | M | | 436 | (1) Sentence Completion |
| 3 (8) | Thus | | + | | + | | B | | | 9 | (3) |
| | | 6 | 6 | | | | 5 | 2 | 5/12 | | |

Total number of selected Illative logical connectives: 1 = 3
2 = 3
3 = 3
4 = 3

Table A.4 (continued).

| PART I Passage Number | PART II Given Word | PART III Book Type and Placement | | PART IV | | | PART V | | | PART VI | PART VII | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6th | 8th | Cloze | Sentence Completion | Synonyms | Book Type | Placement | | Page No. | Correct Response | |
| | | | | | 3. Causal | | | | | | | |
| 20 | Because | | + | + | | | | M | | 260 | (3) | Cloze |
| 23 | Because | + | | | | + | | | E | 334 | (4) | Sentence Completion |
| 9 | Because | | + | | + | | | | E | 681 | (1) | Synonym |
| 3 | For--reason | | + | + | | | B | | | 55 | (1) | Cloze |
| 4 | For--purpose | | + | | | + | | M | | 357 | (1) | Sentence Completion |
| 10 | For--purpose | | + | | | + | | M | | 472 | (3) | Sentence Completion |
| 24 | For--reason | + | | | + | | | M | | 153 | (3) | Synonym |
| 8 | As | + | | + | | | | | E | 97 | (1) | Cloze |
| 17 | As | + | | | + | | | M | | 176 | (2) | Sentence Completion |
| 18 | As | | + | | + | | | | E | 536-7 | (2) | Synonym |
| 22 | For | | + | | + | | | | E | 402 | (2) | |
| 2 | For | + | | | + | | B | | | 77 | (4) | |
| | | 5 | 7 | | | | 2 | 5 | 5/12 | | | |

Total number of selected causal logical connectives:

1=4
2=3
3=3
4=4
12

Table A.4 (continued).

| PART I Passage Number | PART II Given Word | PART III Book Type and Placement 6th | PART III Book Type and Placement 8th | PART IV Cloze | PART IV Sentence Completion | PART IV Synonyms | PART V Book Placement Type | | | PART VI Page No. | PART VII Correct Response |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 4. Contrastive | | | | | | |
| 17 | On the other hand | | + | + | | | | | E | 505 | (3) Cloze |
| (3) | On the other hand | | + | | | + | | M | | 257 | (4) Sentence Completion |
| (1) | On the other hand | + | | | + | | | M | | 259 | (1) Synonym |
| 11 | However | | + | + | | | B | | | 240 | (2) Cloze |
| 6 | However | + | | | | + | B | | | 133 | (1) Sentence Completion |
| (11) | However | + | | | + | | | | E | 410 | (3) Synonym |
| 4 | Still | + | | + | | | | | E | 319 | (4) Cloze |
| 19 | Still | | + | | | + | | | E | 671 | (2) Sentence Completion |
| 5 | | | + | + | | | | | E | 182 | (2) Synonym |
| 12 | Instead | + | | + | | | | | E | 126-7 | (1) Cloze |
| 13 | Instead | + | | | | + | | | E | 289-90 | 3 Sentence Completion |
| 16 | Instead | | + | | + | | B | | | 79 | (4) Synonym |
| | | 6 | 6 | | | | 3 | 2 | 7/12 | | |

Total number of selected contrastive logical connectives: 1=3
2=3
3=3
4=4
12

Table A.4 (continued).

| PART I Passage Number | PART II Given Word | PART III Book Type and Placement | | PART IV | | | PART V | | | PART VI | PART VII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 6th | 8th | Cloze | Sentence Completion | Synonyms | Book Type | Placement | | Page No. | Correct Response |
| | | | | | 5. Conditional | | | | | | |
| (21) | If | + | | + | | | | | E | 135 | (1) Cloze |
| (16) | If | + | | | | + | | M | | 190 | (2) Synonym |
| (22) | If | | + | | + | | B | | | 117 | 4 Sentence Completion |
| (18) | Perhaps | + | | + | | | | | E | 343 | (3) Cloze |
| (20) | Perhaps | | + | | | + | | | E | 634 | 3 Synonym |
| (7) | Perhaps | | + | | + | | | M | | 365 | (1) Sentence Completion |
| (8) | Whether | | + | + | | | | | E | 42 | (4) Cloze |
| (2) | Whether | | + | | | + | | M | | 209 | (4) Synonym |
| (19) | Whether | + | | | + | | | M | | 214 | (3) Sentence Completion |
| (5) | Unless | | + | + | | | B | | | 191 | (2) Cloze |
| (7) | Unless | | + | | | + | | M | | 245 | (1) Synonym |
| (10) | Unless | + | | | + | | B | | | 159 | (2) Sentence Completion |
| | | 5 | 7 | | | | 3 | 5 | 4/12 | | |

Total number of selected conditional logical connectives: 1=3
2=3
3=3
4=3
12

Table A.4 (continued).

| PART I Passage Number | PART II Given Word | PART III Book Type and Placement 6th | PART III Book Type and Placement 8th | PART IV Cloze | PART IV Sentence Completion | PART IV Synonyms | PART V Book Type | PART V Placement | PART V | PART VI Page No. | PART VII Correct Response |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 6. Temporal | | | | | | |
| 9 | Until | + | | + | | | B | | | 144 | (2) Cloze |
| (22) | Until | | + | | | + | | M | | 379 | (1) Synonym |
| (21) | Until | + | | | + | | B | | | 18 | (3) Sentence Completion |
| 14 | Before | | + | + | | | | | E | 699 | (4) Cloze |
| (8) | Before | + | | | | + | | M | | 193 | (3) Synonym |
| (2) | Before | | + | | + | | | M | | 274 | (2) Sentence Completion |
| (15) | Meanwhile | | + | + | | | | | E | 655 | (2) Cloze |
| 12 | Meanwhile | | + | | | + | | | E | 603 | (1) Synonym |
| (15) | Meanwhile | + | | | + | | | | E | 389 | (1) Sentence Completion |
| (13) | After | + | | + | | | B | | | 253 | (3) Cloze |
| (15) | After | + | | | | + | | M | | 162 | (4) Synonym |
| 12 | After | | + | | + | | | | E | 685 | (4) Sentence Completion |
| | | 6 | 6 | | | | 3 | 4 | 5/12 | | |

Total number of selected temporal logical connectives: 1=3
2=3
3=3
4=3
12

Table A.5--Composite List of Logical Connectives Based on Correct Inventory Responses by Percentages.

| | Rank | 6th | 8th | 6th-8th |
|---|---|---|---|---|
| Additive | | | | |
| In addition | (2) | .29 | .32 | .31 |
| Moreover | (4) | .09 | .05 | .07 |
| Also | (3) | .30 | .31 | .30 |
| Even | (1) | .32 | .32 | .32 |
| Illative | | | | |
| Therefore | (2) | .32 | .31 | .32 |
| So | (1) | .37 | .32 | .34 |
| Thus | (4) | .11 | .17 | .14 |
| As a result | (3) | .20 | .19 | .20 |
| Causal | | | | |
| Because | (3) | .27 | .27 | .27 |
| For-reason | (4) | .16 | .13 | .15 |
| As | (1) | .29 | .31 | .30 |
| For | (2) | .28 | .29 | .28 |
| Contrastive | | | | |
| On the other hand | (4) | .12 | .19 | .16 |
| However | (1) | .30 | .31 | .30 |
| Still | (2) | .33 | .27 | .30 |
| Instead | (3) | .26 | .23 | .25 |

Table A.5 (cont'd)

| | Rank | 6th | 8th | 6th-8th |
|---|---|---|---|---|
| Conditional | | | | |
| If | (1) | .28 | .37 | .33 |
| Perhaps | (2) | .29 | .27 | .28 |
| Whether | (4) | .12 | .11 | .12 |
| Unless | (3) | .31 | .25 | .27 |
| Temporal | | | | |
| Until | (2) | .24 | .33 | .28 |
| Before | (1) | .33 | .31 | .32 |
| Meanwhile | (4) | .20 | .17 | .18 |
| After | (3) | .23 | .20 | .21 |

Table A.6--Sixth and Eighth Grade: List of Logical Connectives Based on Correct Inventory Responses by Category, Frequency, Percentage, and Rank.

| Category - Word | Frequency | Percentage | Rank |
|---|---|---|---|
| Additive | | | |
| In addition | 94 | .31 | 2 |
| Moreover | 22 | .07 | 4 |
| Also | 93 | .30 | 3 |
| Even | 98 | .32 | 1 |
| Total: | 307 | | |
| Illative | | | |
| Therefore | 91 | .32 | 2 |
| So | 99 | .34 | 1 |
| Thus | 40 | .14 | 4 |
| As a result | 57 | .20 | 3 |
| Total: | 287 | | |
| Causal | | | |
| Because | 111 | .27 | 3 |
| For-reason | 60 | .15 | 4 |
| As | 125 | .30 | 1 |
| For | 117 | .28 | 2 |
| Total: | 413 | | |
| Contrastive | | | |
| On the other hand | 59 | .16 | 3 |
| However | 111 | .30 | 1 |
| Still | 110 | .30 | 2 |
| Instead | 91 | .25 | 3 |
| Total: | 371 | | |

Table A.6 (cont'd).

| Category - Word | Frequency | Percentage | Rank |
|---|---|---|---|
| Conditional | | | |
| If | 116 | .33 | 1 |
| Perhaps | 99 | .28 | 2 |
| Whether | 41 | .12 | 4 |
| Unless | 97 | .27 | 3 |
| Total: | 353 | | |
| Temporal | | | |
| Until | 125 | .28 | 2 |
| Before | 142 | .32 | 1 |
| Meanwhile | 80 | .18 | 4 |
| After | 90 | .21 | 3 |
| Total: | 441 | | |

Total Correct: 2,751/5,676 = possible

N = 84

Table A.7--Composite List of Logical Connectives Based on Correct Inventory Responses by Percentage.

| Sixth grade Logical Conn. | % | Eighth grade Logical Conn. | % | Sixth-Eighth grade Logical Conn. | % |
|---|---|---|---|---|---|
| So | .37 | If | .37 | So | .34 |
| Still | .33 | Until | .33 | If | .33 |
| Before | .33 | In addition | .32 | Before | .32 |
| Even | .32 | So | .32 | Even | .32 |
| Therefore | .32 | Even | .32 | Therefore | .32 |
| Unless | .31 | Also | .31 | In addition | .31 |
| Also | .30 | Therefore | .31 | Also | .30 |
| However | .30 | As | .31 | As | .30 |
| In addition | .29 | However | .31 | However | .30 |
| As | .29 | Before | .31 | Still | .30 |
| Perhaps | .29 | For | .29 | For | .28 |
| For | .28 | Because | .27 | Perhaps | .28 |
| If | .28 | Still | .27 | Until | .28 |
| Because | .27 | Perhaps | .27 | Because | .27 |
| Instead | .26 | Unless | .25 | Unless | .27 |
| Until | .24 | Instead | .23 | Instead | .25 |
| After | .23 | After | .20 | After | .21 |
| As-result | .20 | As-result | .19 | As-result | .20 |
| Meanwhile | .20 | On the other hand | .19 | Meanwhile | .18 |
| For-reason | .16 | Thus | .17 | On the other hand | .16 |

Table A.7 (cont'd).

| Sixth grade Logical Conn. | % | Eighth grade Logical Conn. | % | Sixth-Eighth grade Logical Conn. | % |
|---|---|---|---|---|---|
| On the other hand | .12 | Meanwhile | .17 | For-reason | .15 |
| Whether | .12 | For-reason | .13 | Thus | .14 |
| Thus | .11 | Whether | .11 | Whether | .12 |
| Moreover | .09 | Moreover | .05 | Moreover | .07 |
| N = 41 | | N = 43 | | N = 84 | |
| L.C. = 24 | | | | | |

Table A.8--List of Logical Connectives Found in Sixth- and Eighth-Grade Textbooks (Summary for Hypothesis 2).

| | Sixth Grade Text | Eighth Grade Text | Total For Sixth and Eighth Grade Texts |
|---|---|---|---|
| I. Additive | | | |
| In addition | 1 | 14 | |
| Moreover | 0 | 5 | |
| Also | 40 | 320 | |
| Even | 34 | 99 | |
| | 75 | 438 | 513 |
| II. Illative | | | |
| Therefore | 10 | 19 | |
| So | 58 | 198 | |
| Thus | 19 | 36 | |
| As a result | 19 | 43 | |
| (The result) | (3) | 43 | |
| | 109 | 339 | 467 |
| III. Causal | | | |
| Because | 51 | 97 | |
| For that reason | 1 | 12 | |
| As | 440 | 975 | |
| For | 476 | 1097 | |
| | 968 | 2181 | 3149 |
| IV. Contrastive | | | |
| On the other hand | 3 | 14 | |
| However | 102 | 110 | |
| Still | 10 | 112 | |
| Instead | 11 | 46 | |
| | 126 | 282 | 408 |
| V. Conditional | | | |
| If | 49 | 214 | |
| Perhaps | 15 | 35 | |
| Whether | 7 | 26 | |
| Unless | 2 | 5 | |
| | 73 | 280 | 353 |

Table A.8 (cont'd).

| | | | | |
|---|---|---|---|---|
| VI. | Temporal | | | |
| | Until | 11 | 71 | |
| | Before | 31 | 167 | |
| | Meanwhile (while) | 2 | 92 | |
| | After | 2 | 14 | |
| | | 46 | 344 | 390 |

Note: Sixth grade textbook, p. 464; Eighth grade textbook, p. 752. On an informal glance, the increased number of pages in the eighth grade textbook apparently influenced the correlation between the sixth grade and eighth grade texts. The eighth grade book had two times more (or 1.62) logical connectives than the sixth grade book.

Table A.9--Summary: Logical Connectives Lessons in English Textbooks.

| 4a. | | SIXTH | EIGHTH | TOTAL |
|---|---|---|---|---|
| I. | ADDITIVE | | | |
| | In addition | -- | -- | 0 |
| | Moreover | -- | -- | 0 |
| | Also | -- | -- | 0 |
| | Even | -- | -- | 0 |
| | (And-supplementary) | 296,299,430 305,306,500 532,546,547 568 | 431,431,432 | 6-11,8-3 |
| II. | ILLATIVE | | | |
| | Therefore | -- | -- | 0 |
| | So | -- | -- | 0 |
| | Thus | -- | -- | 0 |
| | As a result | -- | -- | 0 |
| III. | CAUSAL | | | |
| | Because | -- | 430,431,232 438,440 | 8-5 |
| | For...reason | -- | -- | 0 |
| | As | -- | 440 | 8-1 |
| | For | 288,289,291 | 431,432 | 6-3,8-2 |
| IV. | CONTRASTIVE | | | |
| | On the other hand | -- | -- | 0 |
| | However | -- | -- | 0 |
| | Still | -- | -- | 0 |
| | Instead | -- | -- | 0 |
| | (But-supplementary) | 296,297,305 306 | 431,432 | 6-4,8-2 |
| | (Or-supplementary) | (same) | -- | 6-4 |
| V. | CONDITIONAL | | | |
| | If | -- | 431,432,440 | 8-3 |
| | Perhaps | -- | -- | 0 |
| | Whether | -- | -- | 0 |
| | Unless | -- | 440 | 0 |
| VI. | TEMPORAL | | | |
| | Until | -- | 440 | 0,8-1 |
| | Before | -- | 440,441 | 8-2 |
| | Meanwhile (while) | -- | -- | 0 |
| | After | -- | 440,441 | 8-2 |

# APPENDIX B

# THE LOGICAL CONNECTIVES INVENTORY

## COMPREHENSION OF LOGICAL CONNECTIVES

## GRADES 6 AND 8

DEFINITION: Logical connectives are words such as because, unless, before, likewise, and therefore which link or tie a sentence together.

STANDARD: Students will identify and comprehend the meanings of the appropriate logical connectives when used in a sentence or passage.

SKILL: Students will identify the logical connectives in a passage and choose from among four multiple-choice items, the most appropriate logical connective that fits a given context or is a synonym for the one they have identified.

This set of logical connectives consists of 72 items. It is constructed in three parts, containing 24 items each:

PART I: Cloze
PART II: Sentence completion
PART III: Multi-choice synonym

CLOZE

PART I

Directions for cloze: Read the following passages and check the most appropriate logical connective for each selection.

SAMPLE ITEM:

A bill of rights can have meaning only when citizens have enough power and enough courage to protect it. _____ it's just a piece of paper.

_____ 1. Provided

_____ 2. Therefore

_____ 3. Moreover

_____ 4. Otherwise

1. Cloze

Economic problems occupied much of the nation's attention in the months following World War II. During the war, many Americans had high-paying jobs producing wartime goods. Now that the war was over and wartime goods were no longer needed, they feared that they would lose their jobs. _____ millions of soldiers would now be coming home to look for work.

_____ 1. Provided

_____ 2. Sometimes

_____ 3. Moreover

_____ 4. Otherwise

2. Cloze

In the middle of July, a Union army under General Irvin McDowell reluctantly left Washington for the little town of Manassas Junction, Virginia. McDowell didn't want to attack the Confederate army at Manassas. He said his troops weren't ready to fight. But everyone in Washington wanted action. Soldiers who had left their hometowns with flags waving and bands playing were tired of drilling in army camps. They wanted to do some real fighting. Members of Congress and other people who lived in Washington feared a Confederate attack on the city. Manassas Junction was only twenty-five miles from the capital! _____ Lincoln ordered McDowell to attack.

_____ 1. As

_____ 2. If

_____ 3. So

_____ 4. Or

3. Cloze

During these years, the skills of the Anasazi grew quickly. They improved as farmers, and their arts became more specialized. Their pueblos also improved. By the year 1100, the Anasazi were living in huge, beautiful buildings that housed hundreds of people. Round ceremonial chambers, or **kivas** (ke' vez), were scattered throughout the community. _____, the people of Mesa Verde began leaving their homes on the mesa top. They moved back to the ledges and huge open caves below the mesa top.

_____ 1. For some reason

_____ 2. Provided that

_____ 3. On the contrary

_____ 4. In addition

4. Cloze

The system of checks and balances works in this way. Suppose the Congress passes a new law. A new law does not go into effect until the President signs it. Now suppose that the President does not like the law. The President can veto (refuse to sign) it. The new law does not take effect because the President has checked the power of Congress. The President's power to veto also has limits. Congress can _____ pass the law if more than two-thirds of its members vote in favor of the law.

_____ 1. maybe

_____ 2. least

_____ 3. since

_____ 4. still

5. Cloze

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, _____ those people would relinquish the right of representation in the legislature, a right inestimable to them and formidable to tyrants only.

_____ 1. still

_____ 2. unless

_____ 3. hence

_____ 4. while

6. Cloze

The machines we use to do work all run on energy, too. Usually the more work a machine does, the more energy it uses. An electric can opener does a small amount of work. A giant bulldozer moving tons of earth every minute does a huge amount of work. _____ it uses far more energy than an electric can opener.

_____ 1. Thus

_____ 2. Also

_____ 3. Then

_____ 4. Only

7. Cloze

The Romans banned the Christian religion and tortured and killed Christians. Unarmed Christians were made to fight lions _____ entertainment for Roman audiences. Finally, the roman Emperor Constantine ended this persecution in 313 A.D.

_____ 1. as

_____ 2. if

_____ 3. so

_____ 4. or

8. Cloze

Laws differ from customs and traditions in that they are written down or recorded in some way. Often laws were established by a leader, such as a chief or a religious figure. At other times, representatives of the community made the laws. Some Indian tribes had councils that passed laws.

Rules of conduct, _____ customary, traditional, or legal, make it possible for people to live together in groups.

_____ 1. therefore

_____ 2. moreover

_____ 3. because

_____ 4. whether

9. Cloze

_____ about 2,000 years ago, the lands south of the Sudan were lightly populated. Then a great movement of people began. People who spoke a language called Bantu (BAHN-too) began moving south. They took with them a knowledge of how to farm and how to make iron.

_____ 1. Still

_____ 2. Until

_____ 3. Again

_____ 4. Maybe

10. Cloze

Gradually [in the 1500's B.C.] the invaders called Aryans (Air-ee-unz), conquered most of India. The Aryans invented the caste (kast) system. They put themselves at the top of the system. At the bottom were people not in any caste. Called "Untouchables," they did the jobs no one else wanted to do. High caste people would have nothing to do with Untouchables. In fact, the high castes did not _____ want the shadow of an Untouchable to touch them.

_____ 1. thus

_____ 2. even

_____ 3. only

_____ 4. soon

11. Cloze

**Early Ratifications**

Delaware, Pennsylvania, and New Jersey all approved the Constitution in special state conventions before the end of the year. Georgia and Connecticut followed in January, 1788. Of these five, only Pennsylvania was a battle. The **Federalists**, those in favor of the Constitution, worked with leaflets to attract people who had been unhappy with some earlier laws. The **Antifederalists**, those opposed, spread word that Benjamin Franklin opposed the document. In the end, _____, the Federalists won.

_____ 1. provided

_____ 2. however

_____ 3. because

_____ 4. likewise

12. Cloze

The Chinese did not have an alphabet such as the one we have in English. _____ the Chinese used symbols, or characters. In English each letter stands for a sound. In Chinese each character stands for an idea or a thing.

_____ 1. Instead

_____ 2. Whether

_____ 3. Likewise

_____ 4. Tomorrow

13. Cloze

The land of the Mardudjara (Mar-dood-JAH-rah) has very little rainfall. Some years only about five inches (13 centimeters) falls all year. _____ a heavy rainfall, a few creeks fill up.

_____ 1. Unless

_____ 2. After

_____ 3. Besides

_____ 4. Still

14. Cloze

The sixties began with the stirring call for peace and social change of John F. Kennedy's inaugural address. But President Kennedy was killed _____ he could accomplish many of his plans for social change at home.

_____ 1. maybe

_____ 2. because

_____ 3. still

_____ 4. before

15. Cloze

American leaders were faced with a major decision. The United States in the past had not wanted any "entangling" peacetime military alliances. But Europe had nearly been destroyed. Many European cities and factories were in ruins. Governments were weak. _____, the Soviet Union was supporting Communist takeovers in Romania, Bulgaria, and Poland.

_____ 1. Meanwhile

_____ 2. Provided

_____ 3. However

_____ 4. Because

16. Cloze

There are more than 35 million members of the Chinese Communist party. The heart of the Communist party is its Central Committee. This Central Committee has about 200 members. These 200 people actually make the major governing decisions . . . .

As you can see, the ruling power in China lies in the hands of one group, the Central Committee. _____, we say that the Communist Chinese political system has a centralized government.

_____ 1. Provided

_____ 2. Therefore

_____ 3. Meanwhile

_____ 4. Nevertheless

17. Cloze

To the Indians, the land belonged to the tribe or clan, not to individuals. Settlers believed just the opposite.

But conflicting views about land ownership were not solely responsible for the Indian Wars on the Great Plains. The differences between the governments of the Indians and the United States caused many problems and misunderstandings. The United States, _____, had a central government that represented all the people.

_____ 1. provided that

_____ 2. for this reason

_____ 3. on the other hand

_____ 4. in conclusion

18. Cloze

* An American exchange student living with a family in Nairobi, Kenya . . . .

* A French businesswoman talking by telephone to her company's office in Tokyo, Japan . . . .

* A family in Kansas watching a TV news program from Tel Aviv, Israel . . . .

How many examples of people from one country meeting people from another country could you add to this list? Perhaps there are families in your community who come from other lands. _____ someone in your class has lived in another country.

_____ 1. Because

_____ 2. However

_____ 3. Perhaps

_____ 4. Earlier

19. Cloze

In the Southern colonies, life was somewhat different. The highest class included the great plantation owners, who tried to live like the nobility in England. The few Southern towns had a middle class that ran the shops and performed needed services. The middle class _____ included farmers. Some parts of the Southern colonies had many wealthy planters and a class of very poor farmers. Almost half of the Southern workers were slaves. They were not considered members of any class. Certainly, slaves had no chance to move up into another class.

_____ 1. only

_____ 2. after

_____ 3. thus

_____ 4. also

20. Cloze

**Land.** In 1875 about nine out of every ten American families made their livings by farming. These families were generally compared to American families of today. With such a large farming population, much of the good farmland in the original colonies was already taken. In New England, the soil was poor and rocky to begin with. The little land that was left was very expensive _____ of the demand. In the southern states, the soil's fertility was being used up by tobacco and corn. Both crops are extremely hard on the soil if fertilizer is not used.

_____ 1. besides

_____ 2. whether

_____ 3. because

_____ 4. instead

21. Cloze

The depth at which artifacts are buried may give some clues to when they were left. _____ there are many levels of earth above them, the archaeologists can estimate how long it took those layers to form. Using this method they can estimate the age of the artifacts found in each layer.

_____ 1. If

_____ 2. Or

_____ 3. As

_____ 4. So

22. Cloze

Eleanor Roosevelt was "first lady" of the United States _____ 12 years. Her husband, Franklin D. Roosevelt, was President from 1933 until 1945.

_____ 1. and

_____ 2. for

_____ 3. but

_____ 4. now

23. Cloze

Senator McCarthy was only one leader of the anti-Communist movement. Under McCarthyism people from all walks of life were publicly accused of being Communists. Producers and actors suspected of being Communists were **blacklisted** (put on a list of those not to be given jobs). Teachers and union officials were forced to tak **loyalty oaths** saying that they were not Communists.

In 1954, McCarthy's attacks became so harsh and so far from the truth that the Senate cited him publicly for conduct unbecoming a senator. McCarthy's career was ruined _____. And McCarthyism all but disappeared by the end of the decade.

_____ 1. in addition

_____ 2. provided that

_____ 3. nevertheless

_____ 4. as a result

24. Cloze

The Aztecs were strong. But they had no iron, no firearms, no horses. The Spanish had these. _____, they had another weapon: Many of the Indian groups who were neighbors of the Aztecs joined Cortes.

_____ 1. In addition

_____ 2. As a result

_____ 3. In spite of

_____ 4. Provided that

## SENTENCE COMPLETION

### PART II

Directions for sentence completion: Read the following passage and choose the one selection that has the most appropriate ending to the given incomplete sentence.

SAMPLE ITEM:

The early Romans were brave and tough. They farmed the land and defended it against all their enemies. They might lose battles, _____.

_____ 1. but they came back strong.

_____ 2. so they sailed the seas.

_____ 3. for they hated long wars.

_____ 4. and they lost their farms.

1. Sentence completion

The desert people became gatherers of many types of wild seeds. In fact, the two most common artifacts of this group are baskets that were used to gather the seeds, and milling stones that were used to grind them.

Gradually food gathering became more and more important, while hunting became less important. In time, plants supplied perhaps 80 or 90 percent of the food eaten by the desert people.

About 9,000 years ago, groups of people in what is now Mexico and Central America began to raise some of their own plants. However, they continued to use wild plants _____.

_____ 1. in addition to those they planted.

_____ 2. instead of raising their own food.

_____ 3. as a result of increased hunting.

_____ 4. provided that they were packaged.

3. Sentence completion

For centuries before the European explorers came to America, Indians had lived throughout the region. They grew corn, squash, beans, and other crops in small fields cleared in the forests. They also hunted bear, deer, squirrels, and rabbits, and fished in the many streams that ran through the woodland.

The land was large, and the Indians did not believe anyone could own it. If a piece of land was planted by a family or if someone lived on it, that land was considered theirs to use while they needed it.

When the European settlers bought or traded land, _____.

_____ 1. for this reason, they usually used it for a limited time.

_____ 2. whether in Europe or in India, they industrialized.

_____ 3. eventually, many had to sell it at lowered prices.

_____ 4. on the other hand, they considered it theirs to keep.

4. Sentence completion

A group called the American Colonization Society had a very different approach. This organization, founded in 1817, raised money to purchase slaves, free them, and then send them "back to Africa." The society helped organize a new nation in western Africa (Liberia) _____.

_____ 1. for this purpose.

_____ 2. but none stayed.

_____ 3. thus they died.

_____ 4. and they voted.

5. Sentence completion

The Mardudjara have special ways to capture scarce water. They know that water collects in the roots of the large bushes. They did into these roots and take out the water. They also know of rocky places where water collects. Family groups or bands travel to these places. Mardudjara _____.

_____ 1. thus study the clouds for snow.

_____ 2. only allow women to weave baskets.

_____ 3. maybe make no effort to survive.

_____ 4. even use frogs in their constant search for water.

6. Sentence completion

Meanwhile sculptors were busy making the pottery army. Probably the soldiers' faces were modeled after the real-life members of Shih Huang Ti's honor guard. The guards must have been very glad the statues only looked like them. At one time, Chinese rulers who died were not buried alone. Their wives, servants, guards, and horses were sealed alive in the tomb with them. Luckily for Shih Huang Ti's honor guard, this custom had vanished centuries before their time.

Even as statues _____.

_____ 1. however, the emperor's soldiers have guarded well.

_____ 2. moreover, the emperor's soldiers were then lost.

_____ 3. therefore, the emperor's soldiers were never found.

_____ 4. because of this, the emperor's soldiers were totally ruined.

7. Sentence completion

Alexander Hamilton became secretary of the treasury, and Thomas Jefferson was named secretary of state. Each man, with very different beliefs, had many followers in the country. Washington wanted to balance the ideas of Hamilton against those of Jefferson. From the very beginning, the two men gave different advice. As time passed, discussions turned into angry arguments between Hamilton and Jefferson or their followers.

The differences between the two men became clear in a battle over an economic plan Hamilton proposed. Hamilton worried that other nations would not respect the United States _____.

_____ 1. unless it showed financial responsibility.

_____ 2. because they were jealous of our patriotism.

_____ 3. after the Presidents' terms became four years.

_____ 4. even France, Spain, and England chose Japan.

8. Sentence completion

Many marriages in Saudi Arabia are arranged by parents. They decide who might make a suitable mate for their child. Then they meet with the other set of parents. They agree on the amount and kind of payment that the man's family must pay to the bride's family.

Sometimes the bride and groom have never met _____.

_____ 1. unless at night secretly.

_____ 2. otherwise they might not wed.

_____ 3. before their wedding day.

_____ 4. since their wedding day.

9. Sentence completion

By this time the Nazis were imprisoning Jews in Germany and in newly conquered territory. Still, Hitler told the world, his only aim was to bring all German people back into one Germany. The attack on the Rhineland was merely taking back what had always belonged to the German people.

Hitler used the same excuse when he invaded Austria in 1938. England and France believed that this invasion would be the end of German aggression _____.

_____ 1. perhaps now was the best time to welcome Germany.

_____ 2. so they chose to do nothing to stop Germany.

_____ 3. nevertheless they chose to join Canadian's side.

_____ 4. because they believed that Germany was weak.

10. Sentence completion

Machine politicians wanted something in return--the people's votes for machine-backed candidates. Once elected, machine candidates would do as the local bosses asked. And bosses had a lot of favors to ask. Machine politicians did favors for voters in their districts _____.

_____ 1. provided that.

_____ 2. in addition.

_____ 3. for a reason.

_____ 4. nevertheless.

11. Sentence completion

Although two thirds of Earth is covered with water, much of this water is saltwater. It cannot be used for drinking, for watering crops, or for most manufacturing purposes. Water in the form of rainfall, and in freshwater rivers and lakes, is _____.

_____ 1. perhaps one of nature's most wonderful gifts to Russia.

_____ 2. nevertheless one of industry's most polluted resources.

_____ 3. meanwhile one of man's most dangerous sources of fuel.

_____ 4. therefore one of Earth's most valuable natural resources.

12. Sentence completion

As the Depression got worse more people called on the government to help the homeless and hungry. The poor and the hungry probably did need help, Hoover admitted. But that help should come from private and local agencies, not the federal government. The most important thing was to keep the federal budget balanced. Eventually, the American system would work again, and prosperity would return.

_____ 1. Meanwhile, the mood of the nation grew worse.

_____ 2. Instead, the mood of the homeless improved.

_____ 3. Perhaps, the mood of the hungry stayed calm.

_____ 4. In addition, the mood of the rich went unheard.

13. Sentence completion

Prices may be set on the basis of the cost of production. Prices may also be set to discourage people from buying the product. For example, some television sets are produced in the Soviet Union, but they are very expensive. This means that fewer people can afford them. This in turn means that fewer sets need to be produced. Factories can _____.

_____ 1. because of their policy of price setting, match prices with workers' wages.

_____ 2. now produce the retail goods which are competitively designed and produced.

_____ 3. instead produce the goods the government considers more necessary to future growth.

_____ 4. in addition import their own foreign-produced goods to sell.

14. Sentence completion

A social custom is something done by many members of a group, again and again, without thinking very much about it. In our culture, the seventh-inning stretch at a baseball game is a custom. Throwing rice at a wedding and driving with a "Just Married" sign on the car are _____.

_____ 1. soon memories.

_____ 2. for audiences.

_____ 3. also customs.

_____ 4. but ornaments.

15. Sentence completion

At the beginning of the 1500's, the Aztecs began to hear about people to the east with white skins. These people flew over the waters in canoes with white wings. The Aztec rulers were worried. An old Aztec prophecy said that a god with white skin would one day return from the east. After this the Aztecs would lose their power. The "gods" the Aztecs heard about were Spanish explorers in ships. These explorers had started coming to the New World _____.

_____ 1. thus Christopher Columbus's last voyage in 1249.

_____ 2. in spite of Christopher Columbus's third treaty in 1924.

_____ 3. because of Christopher Columbus's second report in 1492.

_____ 4. after Christopher Columbus's first voyage in 1492.

16. Sentence completion

From ancient times, hospitality has marked the Arab culture. Whether rich or poor, Arabs are expected to make their guests comfortable. Hosts must feed their guests even _____.

_____ 1. when guests are not present.

_____ 2. if it means hosts eat less.

_____ 3. instead of giving them gifts.

_____ 4. so they are never repaid.

17. Sentence completion

Language also sets cultures apart. Every human group, large or small, has a language. In fact, there are more than 3,000 languages on Earth. Some are spoken by hundreds of millions of people. Some are spoken by only a few dozen people. More than 350 million people speak English _____.

_____ 1. but not enough to read.

_____ 2. as their native language.

_____ 3. and it is one dialect.

_____ 4. perhaps they're English.

18. Sentence completion

The need to coordinate schedules caused the railroads to develop standard time zones across the country. Before this, most cities had their own time based on local sun time. Congress later passed a law making the railroad time zones official.

New inventions helped improve America's railroad network. For a long time, stopping trains was a bigger problem than making them go. George Westinghouse's air brake enabled trains to stop faster, _____.

_____ 1. thus enabling them to travel at higher speeds.

_____ 2. also allowing them to travel at cheaper rates.

_____ 3. but building them to travel backwards quickly.

_____ 4. meanwhile using them to travel at night, too.

19. Sentence completion

By 1960 black Americans had made considerable progress toward equality. Supreme Court decisions and government actions had opened a number of doors. But most blacks still lived as "second-class" citizens. Segregation was still highly visible.

Many local and state laws discriminated against blacks. For example, many states had laws that prevented blacks from staying in the same motels as whites. Other states continued to defy the law against segregated schools.

Besides written laws that discriminated against blacks, there were many unwritten "laws" that _____.

_____ 1. perhaps didn't.

_____ 2. still existed.

_____ 3. finally died.

_____ 4. before helped.

20. Sentence completion

In 1792 a man made a suggestion that has continued to capture the interest of Americans in almost every generation. The man was Benjamin Banneker, a freeborn black who was an inventor, a mathematician, and an astronomer. His idea was a plan for a peace office. His plan appeared as the first article in the first edition of his almanac--an almanac which was published every year for a decade.

Benjamin Banneker is generally remembered for his contributions to science and mathematics. However, his suggestion for a peace office had _____.

_____ 1. thus in that day, became a clever money-making scheme.

_____ 2. in spite of the fact that it was progressive, begun the war.

_____ 3. perhaps, greater meaning for mankind than his scientific achievements.

_____ 4. in addition to politics, had theatrical goals and possibilities.

21. Sentence completion

Strength and skill with weapons would be important to a---Japanese---warrior, of course. But they were really less important than other things. More important to a warrior group were things like self-control, restraint, and obedience to one's superiors. Equally important was a state of mind in which pain, hardship, and fear could be overcome . . . .

Even politeness was in part a warrior's value. If you were impolite to another expert swordsman, _____.

_____ 1. instead of becoming angry, he probably would join your group.

_____ 2. whether intentionally or not, he would become very rude too.

_____ 3. the result could be a sword flashing at you with deadly swiftness.

_____ 4. and treated him with lack of respect, you would be sued by the group.

22. Sentence completion

Not only did southerners suffer from lack of supplies. The war was often much closer to home in the South. Many plantations, farms, and towns were looted and burned by Union armies. Southerners also lived in constant fear of a slave revolt. But very few slave uprisings occurred. Most slaves remained on plantations _____.

_____ 1. until the end of the war.

_____ 2. maybe to help the Indians.

_____ 3. for they were contented.

_____ 4. but they didn't suffer.

23. Sentence completion

The people of Communist China have little influence in the central government. True, they can vote. However, they do not have a free choice of candidates. They can vote only for Communist candidates chosen by the leaders of the Communist party.

People who want to take part in the government join the Communist party. First, they must go through a long period of training. They must show that they are worthy of membership. They must also show that they agree with party goals. They must prove that they will be obedient to party orders _____.

_____ 1. however membership is automatic only to men.

_____ 2. besides party goals are internationally set.

_____ 3. whether they are visitors or U.S. citizens.

_____ 4. because party goals can change very rapidly.

24. Sentence completion

The Civil War marked a great change in the Constitution. The question of whether the federal union was a confederation of independent states, and whether individual states could leave the Union, was settled, once and for all, on the battlefield. _____.

_____ 1. As a result, the Constitution was finally written.

_____ 2. Moreover, the war led to the abolition of slavery.

_____ 3. Earlier, every state belonged to the confederation.

_____ 4. Nevertheless, the war saved all cities' independence.

MULTI-CHOICE SYNONYMS

PART III

Synonyms are one or more words or expressions that have nearly the same meaning, such as shall and will.

Directions for multi-choice synonyms: Read the following passage and choose the synonym that best fits the meaning and case stressed by the logical connective in the last sentence.

SAMPLE ITEM:

Multi-choice synonyms

The traders passed through desert salt deposits on their way south to Ghana. They strapped blocks of salt to their camels and traded the salt in Ghana for gold and ivory.

This may seem like an unfair trade. Yet it was not.

_____ 1. Now

_____ 2. And

_____ 3. But

_____ 4. For

1. Multi-choice synonyms

In the parts of Australia that are not so dry, vast sheep and cattle ranches spread across the land. The coming of ranchers has been bad for some of the smaller kangaroos. The brush that kangaroos need for food and shelter has been cleared away. Some small roos have become extinct. Others are endangered. On the other hand, the big roos thrive on the ranches' grass and water.

_____ 1. On the contrary

_____ 2. Provided that

_____ 3. As a result

_____ 4. On account of

2. Multi-choice synonyms

Then Russian traders and fur trappers with the Russian-American Fur Company began to set up trading posts in North America. At first they settled on the Aleutian (e lu' shen) Islands. But the Russian traders soon moved to Alaska's southern coast. The largest city, and capitol, was New Archangel (or Sitka). Before the Russians left Alaska in 1867, 43 towns with 12,000 people dotted the rocky coastline.

_____ 1. Still

_____ 2. Until

_____ 3. Unless

_____ 4. Result

3. Multi-choice synonyms

A high level of art. Still another sign of civilization is the development of the arts. Sumerians built magnificent temples to their gods. They made jewelry of gold and silver. They made beautiful decorations for armor, swords, and chariots.

_____ 1. And

_____ 2. If

_____ 3. Now

_____ 4. As

4. Multi-choice synonyms

It was not the hard work or poor food and shelter that set the slaves apart. The many poor whites in the South were not much better off than the slaves in those ways. But they had rights. The slaves had none.

White Americans were free to build new homes in the West, or to try to strike it rich in California, or to make a fortune in business. But these and other simpler things such as learning to read a book or having a close family life, or just taking a Saturday walk into town, were denied to slaves.

The way a slave lived was not up to the slave. It was the slaveholder who determined how a slave would live. Sometimes even the slaveholder's power was limited.

_____ 1. If

_____ 2. For

_____ 3. But

_____ 4. Also

5. Multi-choice synonyms

These clashes became more and more frequent. On March 5, 1770, a group of Americans gathered and began shouting and throwing stones and snowballs at the soldiers. The crowd became more and more aggressive, until soldiers fired into the crowd and killed five Americans. Six others were injured. These events became known as the Boston Massacre.

British officials began to realize that the job of collecting taxes in America was costing them more than it was worth. Therefore, in April, 1770, all the duties were repealed except a tax on tea. This tax was kept to remind the colonists that they were still under the British rule.

_____ 1. Eventually

_____ 2. Nevertheless

_____ 3. Provided that

_____ 4. One causation

6. Multi-choice synonyms

Despite successes like the UNICEF programs, the United Nations has been only partially successful in achieving the goal of preventing wars. As a result of U.N. efforts, some wars have been shortened.

_____ 1. Furthermore

_____ 2. Provided that

_____ 3. Nevertheless

_____ 4. Consequently

7. Multi-choice synonyms

1854. The Kansas-Nebraska Act allowed the voters in the Kansas and Nebraska territories to decide about slavery. This, in effect, canceled part of the Missouri Compromise.

Douglas put together enough votes to pass the bill. But no one was happy with the Kansas-Nebraska Act. Many Northerners were angry because the Missouri Compromise had been destroyed. More and more people in the North began to think that the abolitionists were right. Perhaps the South was planning to make the whole country open to slavery.

_____ 1. Maybe

_____ 2. Hence

_____ 3. Instead

_____ 4. Today

8. Multi-choice synonyms

The Rocky Mountain system is young compared to the Appalachian system. Scientists believe it was formed 80 million years ago by a series of volcanic eruptions. These eruptions pushed the earth's surface upward thousands of feet, thus forming a long system of mountain ranges. (A range is a distinct row of mountains).

_____ 1. However

_____ 2. Provided

_____ 3. Finally

_____ 4. Because

9. Multi-choice synonyms

One large reason why the amendment (The Equal Rights Amendment, or ERA) had not passed has been opposition by women themselves. One group, led by Phyllis Schlafly, put together powerful lobbying efforts that helped defeat the amendment in a number of states. Her group argued that the ERA was not needed because women already have equal rights.

_____ 1. For

_____ 2. Unless

_____ 3. Yet

_____ 4. And

10. Multi-choice synonyms

Tizoc knew one woman who sometimes sold avocados. The woman was kind and did not sell an avocado to Tizoc unless it was a very good one.

_____ 1. Consequently

_____ 2. Provided that

_____ 3. Furthermore

_____ 4. Nevertheless

11. Multi-choice synonyms

Many cities have been built near the sea. In the future, however, cities may float gently like great flowers on the surface of the sea.

_____ 1. Furthermore

_____ 2. On account of

_____ 3. Nevertheless

_____ 4. Provided that

12. Multi-choice synonyms

Lyndon Johnson of Texas became President after Kennedy was assassinated. He had been an important senator before his election as Vice-President. Therefore, he knew how to work with Congress. He quickly pushed through two far-reaching laws, the Civil Rights Act of 1964 and the Voting Rights Act of 1965. Both were aimed at preventing discrimination against black Americans. After the Voting Rights Act passed, the number of black voters doubled.

_____ 1. Cause

_____ 2. Still

_____ 3. Unless

_____ 4. Later

13. Multi-choice synonyms

Three years later, without repealing the tea tax, Britain gave the radicals their excuse. In effect, it granted the East India Company a monopoly to sell tea to the colonies. A monopoly has the exclusive right to sell goods. When one of the company's ships arrived in Boston Harbor, the colonists refused to accept the tea. The ship, along with two others, sat in the harbor for twenty days. Finally a group of about 150 colonists dressed up as Mohawk Indians and boarded the ships on December 16, 1773.

_____ 1. Consequently

_____ 2. Provided that

_____ 3. Nevertheless

_____ 4. Occasionally

14. Multi-choice synonyms

One serious dispute (in the U.N.) has been over the state of Israel. Once part of the region known as Palestine, Israel was set up as a homeland for Jews from all over the world. When the Jewish state was formed in 1948, many Arab Palestinians left for nearby countries. Since then, Palestinian groups, such as the Palestine Liberation Organization (PLO), have pressed for a return to their homeland. Moreover, they have demanded an end to Israel as a nation.

_____ 1. Cause

_____ 2. Also

_____ 3. Unless

_____ 4. When

15. Multi-choice synonyms

Radio signals travel very quickly, but distances in space are very great. A radio signal sent from Earth today would not reach the nearest star for more than three years. Most stars are much, much farther away. If we ever receive a signal from space, it may have been sent hundreds or even thousands of years ago. It will take that long for our reply to reach the sender.

Meanwhile, we are sending much slower messages.

_____ 1. Now

_____ 2. But

_____ 3. If

_____ 4. So

16. Multi-choice synonyms

How did the first Americans get to the New World? Where did they come from? What route did they take? People have suggested several answers to these questions. Some people claim that the first Americans came from the northeast by way of Greenland. Others disagree. They think that that way was much too cold. Instead, they guess these people took a more pleasant route across the warm waters of the South Pacific Ocean.

_____ 1. Finally

_____ 2. Provided

_____ 3. Meanwhile

_____ 4. However

17. Multi-choice synonyms

Meridians are imaginary lines which run from north to south from pole to pole, and are used to locate places on Earth . . . .

All meridians come together at the poles, so the distance between meridians is greater at the equator than near the poles.

_____ 1. Unless

_____ 2. Hence

_____ 3. Until

_____ 4. Still

18. Multi-choice synonyms

"We don't want to fight, but, by jingo if we do,
We've got the ships, we've got the men
We've got the money too!"

From this song came the word **jingoism**, which means too much nationalism. As America's world role changed during the late 1800s, some people said that Americans were becoming "jingoistic."

_____ 1. Whether

_____ 2. Because

_____ 3. However

_____ 4. Moreover

19. Multi-choice synonyms

For much of Japan's history, people lived together in extended families. The head of the family expected and got complete obedience from other family members. In return, he was responsible for providing as much food and wealth as family rank permitted. In Japan's past, almost everything an individual had in life, or could look forward to, came from the family. This was true whether it was a peasant family, a samurai family, or a noble landowning family.

_____ 1. So

_____ 2. And

_____ 3. If

_____ 4. For

20. Multi-choice synonyms

Those doing the searching are called **archaeologists** (ar ke ol′ jists), scientists who study the physical remains left by people of the past. They are looking for skeletons. But they would be happy to discover only a few bones and perhaps a tooth. In addition, archaeologists would like to find the tools that these people used, the clothes they wore, the food they ate and the homes they made.

_____ 1. Otherwise

_____ 2. Earlier

_____ 3. Likewise

_____ 4. Provided

21. Multi-choice synonyms

Long ago, however, where people lived affected their lives more than it does today.

Until about 150 years ago, people could move from place to place no faster than a horse can run.

_____ 1. Still

_____ 2. Maybe

_____ 3. Before

_____ 4. Cause

22. Multi-choice synonyms

The Scrooby nonconformists (a group who disagreed with King Henry VII, and who at one time had lived in Scrooby, England) remained in the Netherlands for about ten years. At first, they enjoyed their safety and freedom. But after a while, parents became concerned that their children were becoming more Dutch than English. They were also afraid that war might break out between Holland and Spain. If Spain won, the nonconformists would probably be in danger.

_____ 1. Therefore

_____ 2. Because

_____ 3. Likewise

_____ 4. Provided

23. Multi-choice synonyms

There is a lot of Mexico's history in its jewelry. When the Spanish first came to Mexico, they found a culture which supported extraordinary artists and craftspeople. Among the Indians of Mexico were master potters, weavers, metalsmiths, and architects.

The first Spanish explorers took many Indian art treasures back to Spain. The Spanish admired the Indian crafts. The Spanish also had great leatherworkers.

_____ 1. Meanwhile

_____ 2. Because

_____ 3. Likewise

_____ 4. However

24. Multi-choice synonyms

The people of the Americas rarely used animals to carry goods or to pull things. One reason was that large, strong animals were not available.

_____ 1. Earlier

_____ 2. Whether

_____ 3. Because

_____ 4. However

# APPENDIX C

# CORRESPONDENCE


Scholastic Inc.
730 Broadway
New York, NY 10003
(212) 505-3000

September 8, 1983

Miss Dorothea P. Fields
1027 Abbott Road
East Lansing, MI 48823

Dear Miss Fields:

The Scholastic Social Studies series, including OUR WORLD TODAY, has been sold to Steck-Vaughn Co., 807 Brazos, Austin, TX 78768.

None of the people who worked to produce the series are associated now with Scholastic. I suggest that you refer your query to Richard Ravich in the Sales Department at Steck-Vaughn.

Sincerely,

Carolyn Jackson/dm

Carolyn Jackson
Social Studies Editor
Text Division

CJ/dm

MICHIGAN STATE UNIVERSITY

COLLEGE OF EDUCATION • DEPARTMENT OF TEACHER EDUCATION EAST LANSING • MICHIGAN • 48824-1034

April 17, 1984

Mr. Alton Stine
Holt Public Schools
Holt, MI

Dear Mr. Stine:

I am writing in support of Dorthea Field's request to use student data, specified in her March 29, 1984, letter to you, for the purpose of her doctoral study concerning reading comprehension. The dissertation plan calls for anonymity regarding student information. Data will be coded and students' names will be removed. Your support of Ms. Field's study will be most appreciated. I believe her findings will be helpful in improving the reading comprehension of upper elementary and junior high school students.

Sincerely,

Lois A. Bader
Professor
(Doctoral Advisor to Dorthea Fields)

LAB/hch

1027 Abbott Road
East Lansing, Michigan
March 29, 1984

Dear Mr. Alton Stine:

I would like your permission to secure selected information on sixth and eighth graders who are reading on grade level according to the Stanford Diagnostic Reading Test and the Gates-MacGinitie for eighth graders.

At present, I need to locate the following information found in their cumulative folders, such as: total reading Stanford Diagnostic Reading Test for both sixth- and eighth-grade students, and the Gates MacGinitie for eighth grade from their English teachers. I will also need to know their chronological ages and genders. Finally, I need to check the official listing for students who qualify for free lunch and reduced lunches for on grade level readers listed.

I would like to gather the above information during this Spring Vacation, April 2-6, 1984.

Sincerely,

Dorothea P. Fields

(Miss) Dorothea P. Fields

1027 Abbott Road
East Lansing, MI 48823
November 2, 1984

Dear Parents of _____

My name is Dorothea P. Fields. I am a doctoral candidate in the College of Education at Michigan State University.

My doctoral dissertation examines some of the connecting words found in six - eighth grades' social-science textbooks.

_____ has been selected by Dr. Barbara Zynda to be part of my pilot study.

Each participant will be individually tested by me during the week of November 5, 1984.

Sincerely,

Dorothea P. Fields

I am willing for my child to take part in this study.

Yes _____ No ____

_____

Parent/Guardian Signature

1027 Abbott Road
East Lansing, MI 48823
May 10, 1985

Dear parents of _____,

My name is Dorothea P. Fields. I am a doctoral candidate in the College of Education at Michigan State University. My doctoral dissertation examines some of the connecting words found in sixth through eighth grade social science textbooks.

_____ has been selected to participate in my pilot study because he/she is reading on grade level. Each participant will be given a group test by me on May 17, 1985.

Sincerely,

Dorothea P. Fields

Dorothea P. Fields

I am willing for my child to take part in this study.

Yes _____ No _____

_____

Parent/Guardian Signature

September 24, 1985

Dear Parents:

My name is Dorothea P. Fields. I have been a teacher in the Holt Public School System since 1973--four years as a reading consultant and eight years as a sixth-grade teacher. I am also a doctoral candidate in the College of Education at Michigan State University. As part of my dissertation, I have selected your child to take part in a group study that will be given in a classroom on Thursday, October 3, at 9:30 a.m.

My doctoral dissertation examines in depth some of the logical connectives found in social studies textbooks at the sixth- and eight-grade levels. Logical connectives are words such as because, unless, before, likewise, and therefore which link or tie a sentence together. Students will identify and comprehend the meanings of the appropriate logical connectives when used in a sentence or passage.

Please call me at 699-2194, between 8:20-9:00 or 9:20-10:10 a.m., if you want additional information or have further questions about this inventory. I will be writing you a follow-up letter describing some of the results obtained from this study.

Sincerely,

Dorothea P. Fields

(Miss) Dorothea P. Fields

---

I am willing for my child to participate in this study.

Yes ____ No ____

Permission slips are due in your child's home base by Monday, September 30, 1985.

_____

Parent/Guardian Signature

September 24, 1985

Dear Teachers:

On Tuesday, from 9:30-9:50, I will meet with students in the commons for a brief meeting. At this time, I will give them a general overview of my inventory (test) and pass out letters requesting parental permission. These are to be signed and returned to home base teachers by Monday, September 30, 1985.

On October 3, from 9:30-11:00, I will be testing. More details later.

Sincerely,

Dorothea P. Fields

Dorothea P. Fields

September 27, 1985
1027 Abbott Road
East Lansing, MI 48823

Scholastic Book Services
50 West 44th Street
New York, NY 10036

To whom it may concern:

I am a doctoral candidate in the College of Education at Michigan State University. As part of my doctoral thesis, I will analyze twenty-four logical connectives and design an inventory composed of these twenty-four specific logical connectives in order to examine responses made by approximately forty-five sixth graders and approximately forty-five eighth graders on passages taken from the adopted social studies texts on the sixth- and eighth-grade levels in Holt, Michigan.

The seventy-two item inventory consists of three parts, containing twenty-four items each: cloze, sentence completion, and synonyms. The students will be instructed to read a given passage and identify the most appropriate logical connective from four multi-choices.

I would like your permission to analyze and use thirty-six passages from the sixth-grade-level social studies text: Scholastic, Our World Today, 1981 copyright.

Also, I have attached a list of the twenty-four logical connectives being used in this sample along with a sample of a passage from your text.

Finally, I look forward to sending you a copy of my completed results.

Sincerely,

Dorothea P. Fields

(Miss) Dorothea P. Fields

September 27, 1985
1027 Abbott Road
East Lansing, MI 48823

Scott, Foresman and Company
1900 East Lake Avenue
Glenview, Illinois 60025

To whom it may concern:

I am a doctoral candidate in the College of Education at Michigan State University. As part of my doctoral thesis, I will analyze twenty-four logical connectives and design an inventory composed of these twenty-four specific logical connectives in order to examine responses made by approximately forty-five sixth graders and approximately forty-five eighth graders on passages taken from the adopted social studies texts on the sixth- and eighth-grade levels in Holt, Michigan.

The seventy-two item inventory consists of three parts, containing twenty-four items each: cloze, sentence completion, and synonyms. The students will be instructed to read a given passage and identify the most appropriate logical connective from four multi-choices.

I would like your permission to analyze and use thirty-six passages from the eighth-grade-level social studies text: America, America, 1985 copyright.

Also, I have attached a list of the twenty-four logical connectives being used in this sample along with a sample of a passage from your text.

Finally, I look forward to sending you a copy of my completed results.

Sincerely,

Dorothea P. Fields

(Miss) Dorothea P. Fields

October 2, 1985

Dear Teachers:

Jan Cochrane, the reading consultant, will be administering the test to your students from 9:20-11:00.

She will come around and get the students and take them to Room 107 for the test.

They should bring with them a sharpened pencil and an extra book to read just in case they finish Parts I and II before time (the test consists of three parts).

I sincerely appreciate your cooperation and support.

Thank you,

Dorothy P. Fields

October 3, 1985

Dear Teachers:

I will administer the test to your students from 9:20-11:00.

I will come around and get them to take the test in Room 127.

They should bring a sharpened pencil and an extra book to read just in case they finish Parts I and II before time (the test consists of three parts).

I sincerely appreciate your cooperation and support.

Thank you,

Dorothy P. Fields

**Scott, Foresman and Company** 1900 East Lake Avenue Glenview, Illinois 60025 312/729-3000

October 4, 1985

Miss Dorothea P. Fields
1027 Abbott Road
East Lansing, MI 48823

Dear Miss Fields:

Your letter of September 27 was forwarded to my office as I am in charge of the Social Studies Department here at Scott, Foresman.

I am happy to learn you are interested in analyzing and using thirty six passages from our eighth-grade level social studies text: America! America! as research for your doctoral thesis. Please accept this letter as permission to do so. We would appreciate your sending us a copy of your completed results.

Sincerely,

Barbara Flynn

Barbara Flynn
Vice President
Social Studies
and Foreign Languages

BF/imp

TO: Mr. Tom Horan

DATE: October 8, 1985

I need to come back over to the Junior High School and test again. I need at least 20 more students' results on my inventory. The ratio is 10%+ of the population at each grade level.

I would like to come over next Tuesday, the half day of school. I would be testing first thing in the morning, as soon as possible. It is important that this date, October 15, be very close to the first date in order for my study to be valid.

The pre-test given in Bath shows positive gains in eighth grade compared to sixth grade, which is what I am looking for in <u>this</u> testing session.

Sincerely,

Dorothea P. Fields

Dorothea P. Fields

October 9, 1985

Dear Parents,

My name is Dorothea P. Fields. I have been a teacher in the Holt Public School System since 1973: four years as a reading consultant and eight years as a sixth-grade teacher. I am also a doctoral candidate in the College of Education at Michigan State University. As part of my thesis, I have selected your child to take part in a group study that will be given at school on Tuesday, October 15, 1985.

My doctoral dissertation examines in depth some of the logical connectives found in social studies textbooks at the sixth- and eighth-grade levels. Logical connectives are words such as because, unless, before, likewise, and therefore, which link or tie a sentence together. Students will identify and comprehend the meanings of the appropriate logical connectives when used in a sentence or passage.

Please call me if you want additional information or have further quaetions about this inventory at 699-2194 between 8:20-9:00 and 9:20-10:10 a.m. I will be writing you a follow-up letter describing some of the results obtained from this study.

Sincerely,

Dorothea P. Fields

(Miss) Dorothea P. Fields

---

I am willing for _____ to participate in this study:

Yes _____ No _____

Permission slips are due in your child's homebase as soon as possible.

_____

Parent/Guardian signature

February, 1986

Dear Parents:

I have received the computer print-out analyzing the results of your child's responses to the logical connectives items found in the social studies textbooks used at the 6th and 8th grade levels. Logical Connectives are words which tie sentences together, such as: for that reason, moreover, and therefore.

I have just begun to carefully study and analyze the 533-page print-out. However, there are several findings that have surfaced:

1. The top scores were 36 correct out of the 72 responses given.

2. Boys and girls scored equally well.

3. Their ability to select the appropriate words were challenged by the six specific types of logical connectives presented. One example is words which signal contrast: on the other hand, however, still, instead.

Again, I would like to say thank you for your child's participation.

Sincerely,

Dorothea P. Fields

(Miss) Dorothea P. Fields

TO: Mr. Tom Horan and Staff

FROM: Dorothea P. Fields

DATE: February 26, 1986

I would like to thank you for making it possible for me to give the inventory at your school. I feel deeply indebted to all of you.

I have enclosed a letter for each student who participated in my study.

Sincerely,

Dorothea P. Fields

Dorothea P. Fields

# BIBLIOGRAPHY

# BIBLIOGRAPHY


Adams, G. S. (1964). Measurement and evaluation. New York: Holt, Rinehart & Winston.

Afflerbach, P. P. (1990, Winter). The influence of prior knowledge on expert readers' main idea construction strategies. Reading Research Quarterly, 25, 31-45.

America! America! (1985). (2nd ed.). Glenview, IL: Scott, Foresman.

Anastasi, A. (1976). Psychological testing (4th ed.). New York: Macmillan.

Baugh, A. C. (1957). A history of the English language. New York: Appleton-Century-Crofts.

Betts, E. A. (1956, September-1957, May). Research on reading as a thinking process. Journal of Educational Research, 50, 1-15.

Borg, W. R., & Gall, M. D. (1976). Educational research: An introduction (2nd ed.). New York: David McKay.

Bormuth, J. R. (1967, February). Comparable cloze and multiple-choice comprehension test scores. Journal of Reading, 5, 291.

Bradley, J. I., & McClelland, J. N. (1963). Basic statistical concepts in self-instructional text. Glenview, IL: Scott, Foresman.

Bridge, C. A., & Winograd, P. N. (1982). Readers' awareness of cohesive relationships during cloze comprehension. Journal of Reading Behavior, 14, 299-310.

Buros, O. K. (1972). Seventh mental measurement yearbook (Vol. II). Highland Park, NJ: Gryphon Press.

Byrd, D. M., & Gholson, B. (1985). Reading, memory, and meta-cognition. Journal of Educational Psychology, 77, 428-436.

Carroll, J. B., Davies, P., & Richman, B. (1971). Word frequency book. New York: American Heritage.

Catalina, T. (1987, Summer). Metacognition! What's that? A disease? The Michigan Reading Journal, 20, 11-13.

Chapman, R. L. (1977). Roget's international thesaurus (4th ed.). New York: Harper & Row.

Chomsky, N. (1969, January). Language and the mind. Psychology Today, 48.

Cox, M. B. (1976). The effect of conversation ability on reading competency. Reading Teacher, 30, 251-258.

Cronnell, B. (1981, December). Cause and effect: An overview. Reading World, 155-165.

Davelaar, E. (1971, January-March). Formal operational reasoning and its relationship to complex speech patterns and tentative statement use. Language and Speech, 20, 73-79.

Dewey, J. (1963). Experience and education. New York: Collier.

Dik, C. S. (1968). Coordination: Its implications for the theory of general linguistics. Amsterdam: North-Holland Publishing.

Dotch, E. W. (1955). Methods in reading. Champaign, IL: Garrard Press.

Earle, J. (1871). The philology of the English tongue. Oxford: At the Clarendon Press.

Ebel, R. L. (1979). Essentials of educational measurement. Englewood Cliffs, NJ: Prentice-Hall.

Eibling, H. H., Jackson, C., & Perrone, V. (1977). Foundations of freedom United States history to 1877 (2nd ed.). River Forest, IL: Laidlow Brothers.

Emerson, H. (1979, June). Children's comprehension of "because" in reversible and non-reversible sentences. Journal of Child Language, 6, 270-300.

Erickson, L., Stahl, S. A., & Rinehart, S. D. (1985). Metacognitive abilities of above and below average readers: Effects of conceptual tempo on error detection. Journal of Reading Behavior, 17, 235-252.

Esler, W. K. (1982, March). What research says. Science and Children, 19, 44-45.

Fernald, J. C. (1904). Connectives of English speech. New York: Funk & Wagnalls.

Fink, C. H. (1980, July-August). Oral reading in social studies: Use and misuse. The Social Studies, 71, 152-155.

Fries, C. C. (1944). Linguistics and reading. New York: Holt, Rinehart & Winston.

Fries, C. C. (1962). Linguistics and reading (rev. ed.). New York: Holt, Rinehart & Winston.

Gardner, P. L. (1983). The identification of specific difficulties with logical connectives in science among secondary school students. Journal of Research in Science Teaching, 17, 223-229.

Geva, E., & Ryan, E. B. (1985). Use of conjunctions in expository texts by skilled and less skilled readers. Journal of Reading Behavior, 17, 333-345.

Gleason, H. A. (1965). Linguistics and English grammar. New York: Holt, Rinehart & Winston.

Gray, W. S. (1919). Principles of methods of teaching reading as derived from scientific investigation. Eighteenth yearbook of the National Society for the Study of Education (Part II). Bloomington, IL: Public School Publishing.

Gray, W. S. (1960). The major aspects of reading. Sequential development of reading abilities. Chicago: University of Chicago Press.

Hallam, R. N. (1967). Logical thinking in history. Educational Review, 119, 182-203.

Huey, E. B. (1908). The psychology and pedagogy of reading. New York: Macmillan.

Hurlock, E. B. (1953). Child development. New York: McGraw-Hill.

Irwin, J. W. (1979). Fifth grade readers' comprehension of explicit and implicit connective prepositions. Journal of Reading Behavior, 11, 261-267.

Irwin, J. W. (1980). The effects of explicitness and clause order on the comprehension of reversible causal relationships. Reading Research Quarterly, 15, 477-488.

Jacoby, B. (1977). Readability. Mason, MI: I-45.

Katz, E. W., & Brent, S. B. (1968). Understanding connectives. Journal of Verbal Learning and Verbal Behavior, 7, 501-509.

Kavale, K., & Schreiner, R. (1979). The reading processes of above average and average readers: A comparison of the use of reasoning strategies in responding to standardized comprehension measures. Reading Research Quarterly, 15, 102-128.

Keller-Cohen, D. Context and strategy in acquiring temporal connectives. 165-183.

Long, R. B. (1961). The sentence and its parts. Chicago: University of Chicago Press.

MacGinitie, W. (1978). Gates-MacGinitie reading tests: Level D, Form 1. Boston: Houghton-Mifflin.

Macmillan English series. (1973). New York: Macmillan.

McCarthy, D. A. (1942). The language development of the preschool child. University of Minnesota Institute of Child Welfare Monograph, 4.

Mehrens, W. A., & Lehmann, I. J. (1973). Measurement and evaluation in education and psychology. New York: Holt, Rinehart & Winston.

Mellon, J. C. (1964). Complex and conjunctive transformations. Culver, IN: Culver Military Academy.

Miller, W., & Ervin, S. (1964). The development of grammar in child language: The acquisition of language. In U. Bellugi & R. Brown (Eds.), Monographs of the Society for Research in Child Development.

Mussen, P. H. (1970). Carmichael's manual of child psychology (3rd ed.). New York: Wiley.

National Commission on Excellence in Education. (1983, April 26). A nation at risk: The imperative for educational reform. Washington, DC: Government Printing Office.

Negin, G. A. (1982). Logical connectives in industrial arts textbooks. Reading Improvement, 170-172.

Nie, N. H., Hull, H. C., Jenkins, J., Steinbrenner, K., & Bent, D. H. (1975). Statistical package for the social sciences (2nd ed.). New York: McGraw-Hill.

Offutt, J. (1985). Activating children's metacognitive reading processes. Unpublished doctoral dissertation, University of Pittsburgh.

Our world today. (1981). New York: Scholastic Social Studies.

Palermo, D. S., & Molfese, D. L. 1972). Language acquisition from age five onward. Psychological Bulletin, 78, 409-428.

Penning, M. J. (1986). The relationship of text structure manipulations, discourse type and language ability to question answers and free recall responses in learning disabled children. Unpublished doctoral dissertation, Michigan State University.

Pollock, T. C., & Rounds, R. W. (1973). The Macmillan English series (seventh grade). New York: Macmillan.

Pollock, T. C., & Rounds, R. W. (1973). The progress in English (eighth grade). River Forest, IL: Laidlaw Brothers.

Quirk, R., Greenbaum, S., Leech, G., & Savatvik, J. (1972). Coordination and apposition (pp. 550-648); logical connectors (pp. 660-677). A grammar of contemporary English. Harlow, Essex: Longman Group.

Robertson, J. E. (1968). An investigation of pupil understanding of connectives in reading. Unpublished doctoral dissertation, University of Alberta.

Robertson, J. E. (1969, Spring). Pupil understanding of connectives in reading. Reading Research Quarterly, 3, 387-415.

Rogers, D. (1974, March). Which connectives? Signals to enhance comprehension. Journal of Reading, 17, 462-466.

Rosenthal, D. A. (1979, April). Language skills and formal operations. Merrill Palmer Quarterly, 25, 133-143.

Runyon, R. P., & Haber, A. (1980). Fundamentals of behavioral statistics. Reading, MA: Addison-Wesley.

Salvia, J., & Ysseldyke, J. (1978). Assessment in special and remedial education. Boston: Houghton-Mifflin.

Schneider, D. O., & Brown, M. J. M. (1980, February). Helping students study and comprehend their social studies textbooks. Social Education, 44.

Seltzer, E. (1977, June). A comparison between John Dewey's theory of inquiry and Piaget's genetic analysis of intelligence. Journal of Genetic Psychology, 130, 323-335.

Simons, H. (1971). Reading comprehension: The need for a new perspective. Reading Research Quarterly, 3, 338-363.

Smith, M. E. (1926). An investigation of the development of the sentence and the extent of vocabulary in young children. University of Iowa Studies in Child Welfare, 3.

Smith, N. B. (1969, December). The many faces of reading comprehension. The Reading Teacher, 23, 249-259.

Stanford diagnostic reading test manual: Forms E/F. (1982). New York: Psychological Corporation, Harcourt, Brace, Jovanovich.

Stedman, L. C., & Kaestle, C. F. (1987, Winter). Literacy and reading performance in the United States, from 1880 to the present. Reading Research Quarterly, 22, 8-44.

Stoodt, B. D. (1970). The relationship between understanding grammatical conjunctions and reading comprehension. Unpublished doctoral dissertation, The Ohio State University.

Stoodt, B. D. (1972, April). The relationship between understanding grammatical conjunctions and reading comprehension. Elementary English, 49, 502-504.

Strang, R., McCullough, C. M., & Traxler, A. E. (1967). The improvement of reading. New York: McGraw-Hill.

Taylor, W. L. (1951). Application of "cloze" and entropy measures to the study of contextual constraint in samples of continuous prose. Unpublished doctoral dissertation, University of Illinois.

Taylor, W. L. (1953). A new tool for measuring readability. Journalism Quarterly, 30, 415-433.

Thorndike, E. L. (1917a). Reading as reasoning: A study of mistakes in paragraph reading. Journal of Educational Psychology, 8, 323-332.

Thorndike, E. L. (1917b). The understanding of sentences. Elementary School Journal, 18, 98-114.

Venezky, R. L., Kaestle, C. F., & Sum, A. M. (1987). The subtle danger: Reflections on the literacy abilities of America's young adults. Princeton, NJ: Center for the Assessment of Educational Progress.

Vygotsky, L. S. (1962). Thought and language. Cambridge: M.I.T. Press.

Watson, A. J., Sinclair, K. C., Marsh, W. H., & Cooney, G. H. Cognitive development and learning to read: A five-year longitudinal study (Technical Report 143). (ERIC Document Reproduction Service No. ED 276 982)

Webster's third new international dictionary. (1981). Springfield, MA: Merriam-Webster.

Whitehall, H. (1956). Structural essentials of written English (2nd ed.). Bloomington: Indiana University.

Whitehall, H. (1956). Structural essentials of English. New York: Harcourt, Brace.

Wishart, E., & Smith, L. J. (1982, July). Pupils' understanding of logical connectives in selected texts in history. Paper presented at the Annual Meeting of the United Kingdom Reading Association (19th Newcastle Reports; Research/Tech. 1431).

Wishart, E., & Smith, L. J. (1983, March). Understanding of logical connectives in history. Australian Journal of Reading, 6, 19-29.

Writing test items to state specifications: A guide to using the item specifications for the state student assessment tests. (1986). Tallahassee: Florida Statewide Assessment Program.

Finis opus coronat.

(The finish crowns the work.)