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**THE RELATIONSHIP BETWEEN UNDERSTANDING GRAMMATICAL  
CONJUNCTION AND READING COMPREHENSION IN NATIVE  
AMERICAN CHILDREN**

*The University of Oklahoma*

**PH.D. 1982**

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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE RELATIONSHIP BETWEEN UNDERSTANDING GRAMMATICAL  
CONJUNCTION AND READING COMPREHENSION  
IN NATIVE AMERICAN CHILDREN

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

RUTH EDDLEMAN LOEFFLER

Norman, Oklahoma

1982

THE RELATIONSHIP BETWEEN UNDERSTANDING GRAMMATICAL  
CONJUNCTION AND READING COMPREHENSION  
IN NATIVE AMERICAN CHILDREN

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#### ACKNOWLEDGMENTS

In the collection of data and the preparation of this study, I have received the assistance and cooperation of many individuals. It is with pleasure that I take this opportunity to acknowledge these persons.

To Dr. Richard P. Williams, under whose direction this study was conducted, my sincere appreciation for his guidance through the program and his counsel and assistance in developing this study.

To Dr. Omer Rupipe., Dr. Robert Bibens, Dr. Gerald Kidd, and Dr. William Impey, who served as committee members, grateful recognition is given for their reading of the manuscript, encouragement, and suggestions.

Ms. Pat Ross and the Staff of the Indian Enrichment Program, Moore Public Schools, were generous with their time and enthusiastic. Without their cooperation and effort, the data collection would have been impossible.

And finally, my thanks to my family, to my children, Kristin and Kevin, my mother, Gladys Eddleman, my sister and brother-in-law, Ernestine and Paul Ruggiers, whose love and support helped me sustain this project through to its completion. I would also thank special friends and fellow graduate students, Rosa Lea Everidge, Nola Bedingfield, and Karen Gunter, who helped with the scoring of tests and gave encouragement.

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THE RELATIONSHIP BETWEEN UNDERSTANDING GRAMMATICAL CONJUNCTION  
AND READING COMPREHENSION IN NATIVE AMERICAN CHILDREN

CHAPTER I

INTRODUCTION AND PROBLEM

Introduction

The understanding of sentence structure and its relationship to reading comprehension emerged as a dominant factor during the earliest period of reading research. In his landmark study on comprehension, Thorndike identified the inability to use connecting words or phrases "to group like ideas together in the proper relationships" as one of the three major causes of error in reading comprehension.<sup>1</sup> He suggested that a reader's accurate assessment of the "potency" of ideas and details within a paragraph depended upon the reader's understanding of both the syntax, or order of words and phrases in the sentence, and the cueing words which signal the relationship between words and phrases.<sup>2</sup>

During the decades that followed Thorndike's work, the study of reading comprehension shifted away from research on sentence structure in response to changing trends in educational research. The curriculum focus of the 1930's, the affective "whole child" philosophy of the 1940's,

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<sup>1</sup>Edward L. Thorndike, "Reading as Reasoning: A Study of Mistakes in Paragraph Reading," Journal of Educational Psychology 8 (June, 1917): 323-332.

<sup>2</sup>Ibid.

and the focus on behaviorist theories and beginning reading problems in the 1950's all played a dominant role in shaping research on reading comprehension. But the linguistic studies of the 1960's returned the focus to sentence structure as a key to reading comprehension.

The orthodoxy of this subject was heralded in 1971 by the International Reading Association's choice of the outstanding dissertation, a syntactic study by William T. Fagan, who analyzed the effect of various types of sentence structures on children's reading comprehension in grades four, five, and six. His findings led him to the following conclusion:

For children to comprehend what they read, they must be able to understand the written language structures by which ideas, information and concepts are conveyed. Although children may be fluent in their use of oral language and may have acquired control over the basic sentence patterns of the English language by the time they enter school, . . . it must be remembered that the task of manipulating more and more complex structures still lies before him.<sup>3</sup>

Thus, just as English teachers were consigning grammar books to boiler rooms upon the assumption that "there is no research evidence that grammar as traditionally taught in the schools has any appreciable effect on the improvement of writing skill,"<sup>4</sup> reading research entered upon a very rich period of syntactic studies to ascertain the nature and development of the relationship between understanding of grammar and reading.

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<sup>3</sup>William T. Fagan, "Transformation and Comprehension," The Reading Teacher 25 (November, 1971): 169.

<sup>4</sup>Henry C. Mechel, "Research on Teaching Comprehension and Literature," Handbook of Research on Teaching, ed. N.L. Gage (Chicago: Rand McNally, 1963), p. 981.

The timing was auspicious, for the writings of Noam Chomsky<sup>5</sup> were beginning to make a significant impact upon studies into the relationship of comprehension and syntax in the fields of linguistics and psychology.<sup>6</sup> The interplay of these two disciplines thus gave birth to one of the most fruitful fields of reading research in the 1970's, that of psycholinguistics.

Although psycholinguistic research had ranged from cognitive explorations into the nature of thought and language to sociolinguistic studies of the environment and language, there were three strands of investigations germane to the present study: the development of syntactic fluency in written and oral language, the relationship of reading comprehension to syntactic structures, and, more specifically, the relationship of reading comprehension to the understanding of those cue words which signaled syntactic conjunction.

Conjunctions are among the most frequently used words in the English language. They are connective words which join words, phrases, or clauses. But more than that, they indicate the relationship between the words or word groups joined. For example, the two clauses we will plant the garden and it rains can be meaningful when joined by before, after, or if; but the meaning of the relationship will change with each conjunction.

Studies of the development of child language indicated that conjunctions were among the last major parts of speech acquired by young

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<sup>5</sup>Noam Chomsky, Syntactic Structures (Hawthorne, N.Y.: Mouton, 1957).

<sup>6</sup>Noam Chomsky, Aspects of the Theory of Syntax (Cambridge: MIT Press, 1965).

children. The first words used by children were nouns, verbs appeared next, and then adjectives and adverbs. Around two years of age, children began to use an increasing number of verbs, articles, conjunctions, prepositions, and pronouns.<sup>7</sup> In transformational studies, age four was cited as a time of "continuous expansion of base structure rules, and the use of conjunction".<sup>8</sup>

In a longitudinal study of the development of children's written and oral language from kindergarten through twelfth grade, Loban found that fourth and fifth graders were "beginning" to use clauses of concession.<sup>9</sup> Robertson studied pupils' understanding of connectives, including conjunctions, in reading, and found a significant increase from grade to grade in this comprehension task.<sup>10</sup>

In comparison to these broader syntactic studies, a more recent study by Stoodt focused on the understanding of conjunctions in particular, as related to reading comprehension, and as related to a hierarchy of difficulty among various conjunctions. Both of these relationships were found to be significant.<sup>11</sup>

The longitudinal studies of broader language variables by Loban

<sup>7</sup>Elizabeth B. Hurlock, Child Development (New York: McGraw-Hill Book Co., Inc., 1956), p. 370.

<sup>8</sup>Paula Menyuk, Sentences Children Use (Cambridge: MIT Press, 1969), pp. 38-9.

<sup>9</sup>Walter Loban, The Language of Elementary School Children, Research Report No. 3 (Urbana, Ill.: NCTE, 1965).

<sup>10</sup>Jean A. Robertson, "Pupil Understanding of Connectives in Reading," Reading Research Quarterly (Spring, 1968), pp. 387-415.

<sup>11</sup>Barbara Stoodt, The Relationship Between Understanding Grammatical Conjunction and Reading Comprehension (Columbus: Ohio State University Research Foundation, 1970).



and others provided invaluable information and guidelines for more intensive studies. The specific studies of particular maturation levels provided research design strategies for continued investigations of a developmental nature. The review of this research indicated both a readiness and a need for further investigations into the nature of the relationship between the understanding of grammatical conjunctions and reading comprehension in a developmental context. The need for research in this area was even more critical with respect to minority populations, such as Native American children, currently enrolled in public schools in growing numbers, due to population shifts and the closing of many Indian schools.

#### Problems Investigated by the Study

This problem was approached in three ways. One of the problems was to investigate the relationship of reading comprehension and the understanding of conjunctions at three upper elementary grade levels of Native American children and to note significant changes or shifts in that relationship. The second problem was to identify the most difficult conjunctions and trace any changes in rankings of difficulty through maturation. The third problem was identification of significant changes in any of these relationships through maturational growth.

#### Significance of the Study

While there was a discerned need for research to document the maturational changes in psycholinguistic factors of comprehension through the crucial upper elementary grades, there existed an even more imperative need for maturational information about the Native

American children. Many of these children were from families who were, if not bilingual, at least bicultural. The broad attitude towards verbal communication in the Native American culture had been recognized as contrary to the mainstream culture.

Silence is used to a great extent in Indian communications. . . . The Indian, in his wisdom, has found silence to be very helpful . . . .Non-Indians perceive silence as ignorance or inability to communicate. . . .Indian youngsters who are being exposed to the fast-moving, complex, diversified, non-Indian technological, neurotic society soon may lose this beautiful concept of silence.<sup>12</sup>

The effect of such divergent attitudes towards verbal communication and maturational acquisition of verbal language components was largely unknown. The data base of research on language development of Native American children was minimal.

A survey of the literature in ERIC/RCS<sup>13</sup> and in the Canadian studies from the Ontario Institute<sup>14</sup> revealed only one study which attempted to deal with syntactic growth in language development of Native American children. In this study comparing the syntax and vocabulary of Spanish, Indian and Anglo-American children, Serapiglia found that bilingual Spanish and Indian children were less able to understand and produce English syntactic structures. Of the various syntactic

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<sup>12</sup>Delworth Keith Young, "Some Aspects of the Use of Ego Defense Mechanisms by Navajos," Papers on Navajo Culture and Life, ed. Ruth Roessel (Chinle, Ariz.: Navajo Community College Press, 1970), pp. 124-25.

<sup>13</sup>ERIC/RCS, Bilingual, Bicultural, and Bidialectal Studies Related to Reading and Communication Skills: Abstracts of Doctoral Dissertations Published in Dissertation Abstracts International, July through October, 1978 (Vol. 39 Nos. 1 through 4) ED 161 083, 1978.

<sup>14</sup>Theresa Serapiglia, "Comparison of the Syntax and Vocabulary of Bilingual Spanish, Indian and Monolingual Anglo American Children," Working Papers in Bilingualism, No. 16 (Toronto: Ontario Institute for Studies in Education) ED 165 477, 1978.

elements analyzed, there were significant differences in indefinite pronouns, personal pronouns, and conjunctions. Concerning the understanding of conjunctions, the Indian children were significantly lower (.01) than Spanish or Anglo, while the Spanish children showed significantly higher scores than the Anglo children. Peak differences showed up in the third and fourth grades. Across syntactic measures, Indian children scored higher than Spanish in the fourth grade. Serapiglia commented that "there is a conspicuous lack of information that would be useful to teachers in planning language instruction for minority children".<sup>15</sup>

In comparison to the "conspicuous lack of information" concerning language development of minority children in general, studies concerning language development of Native American children were almost nonexistent. In a recent bibliography of studies dealing with the teaching of English, the distribution of studies by minority group was as follows:

	Hispanic	Black Amer.	Native Amer.	Hebrew	Maine Dn.East
RTE <sup>16</sup>	4	7	2	0	0
ERIC/RCS <sup>17</sup>	7	4	2	1	1

In regard to language development, according to these surveys, the only "minorities" who elicited less interest were Hebrew and Maine Down East. Furthermore, of the four studies dealing with Native

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<sup>15</sup>Ibid.

<sup>16</sup>Daniel J. Dieterich and Richard H. Behm, "Annotated Bibliography of Research in the Teaching of English: July through December, 1979," Research in the Teaching of English 14 (May, 1980):2, pp. 165-91.

<sup>17</sup>ERIC/RCS. Bilingual, Bicultural, and Bidialectal Studies.

Americans, three of them dealt with ESL curriculum and affective goals.

Because of the importance of the maturation of children's understanding of syntactic structure and its effect upon reading growth, and because of the relative dearth of information about this development in Native American children, research in this area could be valuable in guiding curriculum planning. This study should add knowledge to this specific growth pattern, and in turn the results should enable teachers to focus on a potential source of power in reading comprehension.

#### Statement of the Hypotheses

The following null hypotheses were formulated:

- Ho 1.0: There is no statistically significant correlation between understanding of grammatical conjunction and reading comprehension in Native American children in the fourth, fifth, and sixth grades in an urban setting.
- Ha 1.0: There is a statistically significant correlation between understanding of grammatical conjunction and reading comprehension in Native American children in the fourth, fifth, and sixth grades in an urban setting.
- Ho 2.0: There is no hierarchy of difficulty in conjunctions as understood by Native American children in the fourth, fifth, and sixth grades in an urban setting.
- Ha 2.0: There is a hierarchy of difficulty in conjunctions as understood by Native American children in the fourth, fifth, and sixth grades in an urban setting.
- Ho 3.0: There is no statistically significant maturational development based upon age in the understanding of conjunctions by Native American children in the fourth, fifth, and sixth grades in an urban setting.
- Ha 3.0: There is a statistically significant maturational development based upon age in the understanding of conjunctions by Native American children in the fourth, fifth, and sixth grades in an urban setting.

### Limitations of the Study

The following limitations were inherent within the design of the study:

1. Reading comprehension was limited to scores on the Stanford Diagnostic Reading Test, Green Level, 1976 Edition,<sup>18</sup> and on the Cloze Comprehension of Conjunctions Test.<sup>19</sup>
2. Subjects were assumed to be of average intelligence by reason of their placement in regular classes in the Moore Public Schools.
3. Subjects were assumed to be urban Native American children with various tribal and linguistic backgrounds and varying degrees of Native American influences by virtue of their enrollment in Indian Enrichment classes in the Moore Public Schools.

### Definition of Terms

1. Comprehension: defined as the process in reading by which the reader derives meaning from the printed message on the paper.
2. Conjunctions: structure words which connect, relate or join words, phrases and sentences.
3. Cloze Test: a prose passage in which every fifth word is deleted, the first and last sentences being left intact.
4. Deep structure: concept or meaning underlying the surface structure of the words spoken or written.
5. Linguistics: the science of the growth and structure of language.
6. Psycholinguistics: the study of the relationship of language and thought.
7. Surface Structure: words, phrases, clauses in the particular order spoken or written.
8. Syntax: the pattern or structure of the word order in a phrase, clause, or sentence.

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<sup>18</sup>Stanford Diagnostic Reading Test (New York: Harcourt Brace Jovanovich, Inc., 1976).

<sup>19</sup>Stoodt, p. 71.

9. Transformational Grammar: a systematic description of the operations by which persons translate deep structure (meaning) into surface structure (spoken or written utterances).
10. Urban: characteristic of the city as distinguished from the country.

#### Overview of Subsequent Chapters

Chapter II presents a review of the literature relating to the historical and contemporary theories of the function of conjunctions in language, the child's acquisition of conjunctions, perspectives on comprehension, correlations between syntax and comprehension, and studies on Native American children and language development. Chapter III presents the design, methodology, and procedures of the study. Chapter IV presents the findings of the study, and Chapter V discusses summaries, conclusions, and recommendations for further study based upon the findings.

## CHAPTER II

### REVIEW OF THE LITERATURE

The present investigation was designed to study the relationship between the understanding of conjunctions and reading comprehension in Native American children. Conjunctions are structure words which join and define relationships between words, phrases, and clauses. In the English language, conjunctions are one of the major cornerstones for increasing depth and embeddedness of meaning in sentence patterns or syntax. Embeddedness of meaning is an essential factor in the difficulty of reading comprehension.

While there were those who asserted that "no adequate definition of reading comprehension has been offered",<sup>1</sup> comprehension was generally defined as "the act or power of understanding; ability to get the meaning".<sup>2</sup> Bormuth, one of the leading research scholars in the area of comprehension offered the following definition:

Comprehension skills are a set of generalized knowledge acquisition skills which permit people to acquire and exhibit information gained as a consequence of reading printed language.<sup>3</sup>

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<sup>1</sup>Henry P. Smith and Emerald V. Dechant, Psychology in Teaching Reading (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1961), p. 213.

<sup>2</sup>The World Book Dictionary, Vol. I (Chicago: Field Enterprises Educ. Corp., 1972), p. 433.

<sup>3</sup>J.R. Bormuth, "An Operational Definition of Comprehension Instruction," in Psycholinguistics and the Teaching of Reading, ed. K.S. Goodman and J.T. Fleming (Newark, Delaware: International Reading Association, 1969), pp. 48-60.

The task of getting meaning from printed language on a third grade differs from the same task on a tenth grade level. The problem of "this paucity of knowledge. . . about the processes involved in reading comprehension" involves "more than understanding the meanings of individual words and sentences; it also requires that one understand how the ideas expressed in one sentence are related to ideas expressed in other sentences."<sup>4</sup> But, regardless of what research does or does not identify as components of reading comprehension, the requirements of literacy in the United States are rising. Many curriculum specialists and competency advocates now feel that "every high school graduate must be able to read at least at the tenth-grade level".<sup>5</sup> While competency requirements are at higher levels, the percentages of students pursuing high school diplomas have also risen. In 1979, Phi Delta Kappan reported graduation of 85% of white students, as compared to 50% in 1950, and 75% of black students, as compared to 25% in 1950.<sup>6</sup> Thus, classroom practitioners and researchers have an immediate need to probe the dimensions of comprehension of complex prose. At the heart of complex prose is the complex sentence with one or more subordinate clauses. The conjunction is the cue word to understanding the thoughts patterned into embedded sentence structures.

This chapter presents the review of the literature, following each component of the study separately, conjunction theory, comprehension

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<sup>4</sup>Linda Baker and Nancy Stein, "The Development of Prose Comprehension Skills," *Children's Prose Comprehension* (Newark:IRA,1981),p.7.

<sup>5</sup>Harold Hodgkinson, "What's Right with Education," Phi Delta Kappan (November, 1979), p. 160.

<sup>6</sup>Ibid.



theory, and language development in Native American children, and then citing studies in which components of the study were related.

### Conjunction Theory

#### History of Conjunctions

Conjunctions occupy a unique position in the English language, in that they not only perform a syntactic function of joining, but they also provide a cognitive function of specifying a direction of thought. Because of this cognitive aspect, conjunction theory tended to reflect the dominant psychology of the culture historically in the development of the English language and its forerunners, Latin and Greek.

The concept of the conjunction was traced back to ancient Greece, sometimes in a surprisingly direct way. Like many modern disciplines, the study of language was originally within the domain of the Greek philosophers. Aristotle recognized two classes of words: words with lexical meaning, thus able to function independently, such as nouns and verbs; and words without lexical meaning in isolation, which performed only a grammatical function. This second group were translated consignificantia or conjunctiones by his non-Greek commentators.<sup>7</sup>

Although Aristotelian ideas had little influence upon the Latin grammarians, his major premise surfaced again 2000 years later in the late seventeenth century rationalists' search for a universal language. In England, John Wilkins repeated the Aristotelian distinction in his classification of words into integrals, "denoting 'things,' notions or

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<sup>7</sup>Emma Vorlat, The Development of English Grammatical Theory, 1586-1737 (Leuven, Belgium: Leuven University Press, 1975), p.43.

motions," and particles, signifying syntactic connections with integral words.<sup>8</sup> On the continent, the anonymous authors of the Port-Royal Grammar based their classification upon Cartesian analysis of the functioning of the human mind and arrived at two classes; words which express mental objects with attributes, and words which express connective words which reflect "manners of thought".<sup>9</sup> This obscure grammar and the Cartesian search for a universal language effected a significant impact upon language theory 300 years later in the works of Noam Chomsky, a modern commentator on the Port-Royal Grammar, and the father of current theories in transformational linguistics.<sup>10</sup>

In contrast to this "logico-philosophical description of word classes",<sup>11</sup> which appeared periodically, English grammar derived primarily from other Greek grammarians, notably Dionysius Thrax, who recognized eight parts of speech. Conjunctions were one of these classes. Its connective function was defined either from a logical or from a linguistic viewpoint; but for centuries, the logical viewpoint prevailed, as shown in the following from Thrax: "The conjunction (connective) is a part of speech connecting the train of thought and filling in gaps in its interpretation."<sup>12</sup> The linguistic definition also occurred in ancient grammar, the conjunction being defined as

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<sup>8</sup>Ibid., p. 44.

<sup>9</sup>Ibid., pp. 47-48.

<sup>10</sup>Ibid., p. 26.

<sup>11</sup>Ibid., p. 43.

<sup>12</sup>Ibid., p. 388.

"a connector of words, clauses and/or sentences".<sup>13</sup> The two definitions existed simultaneously in the seventeenth century. The Port-Royal grammarians explained the conjunction as signalling "l'operation mesme de nostre esprit," or "indeed the operation of our mind".<sup>14</sup> Wilkins defined them as "such Particles as serve for the joyning together of words, or rather of sentences".<sup>15</sup>

In the same century, Hume reconciled the two kinds of definitions by dividing conjunctions into two types: enunciative, those which "couple the parts of a period", and rationative, those which join through a logical process.<sup>16</sup>

The eighteenth century was a period of great interest in language, and in particular, in the purification and regulation of the English language. The call for an academy, along the lines of the Academie Francaise, to purify the language so "that it can treat arts as well as sciences with the utmost perfection" was never realized.<sup>17</sup> The warring camps of grammarians continued to proliferate. Cartesian linguists continued to search for a basis for a universal language, along the lines of Aristotle and the Port-Royal grammarians, while Latin traditionalists classified language into now nine parts of speech, including conjunctions. In the Latin School Tradition, classifications were given to the ordering function of conjunctions, which is roughly adhered to today by traditional grammarians. They were copulatives

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<sup>13</sup>Ibid.

<sup>14</sup>Ibid., p. 391.

<sup>15</sup>Ibid., p. 390.

<sup>16</sup>Ibid., p. 400.

<sup>17</sup>Albert C. Baugh, A History of the English Language (New York: Appleton-Century Crofts, 1957), p. 317.

affirmatively, copulatives negatively, disjunctives, discretives, causals and illatives, conditionals, exceptives, interrogatives and dubitatives, adversatives, redditives to the same and electives.<sup>18</sup>

#### Modern Theories of Conjunctions

Modern language scholars continued theorizing about conjunctions, but the range of topics grew. Current theory concerned not only definition and function, but increasingly the conjunction's effect upon comprehension. Some rhetoricians even advocated or, at least, predicted its demise.

Traditional grammarians continued to define the conjunction as "a word that joins words or groups of words".<sup>19</sup> Linguists, in consortium with the behavioral sciences, generally preferred to stay within the bounds of a semantic definition. Fries, for instance, defined it as "a word that joins together the sentence or parts of a sentence," and described its function: the "chief meanings lie in the grammatical functions they indicate."<sup>20</sup> Whitehall described conjunctions in terms of their syntactic function: "Conjunctions are connective empty words used to link word groups in non-base relationships. . . .the only class used to establish direct connection between subjective-predicate word groups."<sup>21</sup>

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<sup>18</sup> Vorlat, pp. 395-96.

<sup>19</sup> John E. Warriner and Francis Griffith, Warriner's English Grammar and Composition (New York: Harcourt Brace Javonovich, Inc., 1973), p. 17.

<sup>20</sup> Charles Carpenter Fries, American English Grammar (New York: Funk and Wagnalls Co., 1944), p. 195.

<sup>21</sup> Harold Whitehall, The Structural Essentials of Written English, 2nd Edit. (Bloomington: Indiana Univ., 1951), p. 90.

Chomsky, working as a linguist, describing how language operates, rather than as a grammarian, prescribing how to use language, subrogated the function of conjunctions into the class of generalized transformations, in which kernels or strings, sentences, were joined or embedded.<sup>22</sup> His theory of transformations worked much like set theory in mathematics, in that the analysis was focused on how groups or strings of words worked and differed from one another, rather than on functions of individual parts of speech. These transformations were analyzed in terms of how they connected deep structure, or meaning, with surface structure, or verbal expressions. Thus, conjunctions, while they were not classified as distinctive components, did contribute to more global transformations of meaning to surface expressions. Influenced by the seventeenth century rationalists, Chomsky developed transformational theories which would be applied universally to many languages. The overall theory reinforced the cognitive or mental aspect of language.

The complexity and the peculiarly abstract quality of many conjunctions caused many language authorities to question the comprehension problems it presented to young readers. Lloyd and Warfel, describing clause markers as "little words", remarked that no more futile advice could be given to a reader than to pay attention to the big words and let little words take care of themselves. These "little words" told the ear and the brain how to hear speech.<sup>23</sup>

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<sup>22</sup>Judith Greene, Psycholinguistics (London:Penguin Books,Ltd., 1972), p. 43.

<sup>23</sup>Donald J. Lloyd and Harry R.Warfel, American English in its Cultural Setting (New York:Alfred A. Knopf, 1957), p. 20.

Conjunctions create several levels of complexity. Sledd noted the degree of explicitness and precise relationship.<sup>24</sup> Robertson remarked on the additional information incorporated in the clause, which might also have other connectives or clauses within it. It "has a range of influence on the meaning" of other word groups within it. An example would be: "He was in the barn when the storm broke the window that he had just mended."<sup>25</sup> Another complication was the two-level ordering system of conjunctions. The conjunction signaled the clause to be of equal importance or of subordinate importance. And then it specified the relationship of the detail, a condition, a concession, a reason, a cause, or an alternative.<sup>26</sup>

Some authorities, recognizing the difficulties of conjunctions, recommended or predicted its obsolescence. Flesch, advising writers and speakers, described conjunctions as "empty words", words without an image, but not easy words. He described the meaning of "unless," "see what is happening in the next clause; then think back to what happened in the main sentence; and then cancel that in your mind, but not quite."<sup>27</sup> He advised that connectives were rarely needed in plain talk, and advocated restricted use of conjunctions by a writer.

A rhetorician who has influenced composition curriculum, Christensen espoused teaching a more professional writing style in schools.

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<sup>24</sup>James Sledd, A Short Introduction to English Grammar (Chicago: Scott, Foresman and Co., 1959), p. 313.

<sup>25</sup>Robertson, p. 28.

<sup>26</sup>Ibid, p. 29.

<sup>27</sup>Rudolf Flesch, The Art of Plain Talk (New York: Harper and Bros Publishers, 1946), p. 81.

He preferred the "loose" or "cumulative" sentence popularized by Hemingway and Joyce and advised writing teachers thus:

In modern English the typical sentence in this kind of writing (descriptive-narrative) is cumulative, the main clause merely a base to which to attach, not subordinate clauses with precise conjunctions, but loosely related appositives, prepositional phrases, participles, and absolutes.<sup>28</sup>

Using Hunt's T-unit data, he compared developing writers, nonprofessional, and professional writers, and found that professional writers incorporated more information in a more readable format through more extensive use of "free modifiers".<sup>29</sup>

Other rhetoricians predicted the obsolescence of the conjunction and subordination. Barber analyzed the development in this way:

There is some evidence to show that, in written English (at least in novels), sentences have become shorter during the past fifty years; at the same time, there has been a decline in the number of continuative relative clauses (i.e., non-defining or non-restrictive ones).<sup>30</sup>

He predicted a change in which large scale formal structures of the language, now preserved largely in writing, would be broken down and replaced by smaller syntactic units loosely connected.

#### Current Usage of Conjunctions

Because the obsolescence viewpoint directly related to the relevance of this study, the investigator sampled prose styles of major writers from the eighteenth, nineteenth, and twentieth centuries, as

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<sup>28</sup>Francis Christensen, "In Defense of the Absolute", Notes Toward a New Rhetoric, 2nd Edit. (New York: Harper and Row, Pub., 1978), p. 112.

<sup>29</sup>Ibid., pp. 143-46.

<sup>30</sup>Charles Barber, Linguistic Change in Present-Day English (London: Oliver and Boyd, 1964), p. 143.

well as current journalism. The samples were analyzed for ratio of subordinate clauses to main clauses, using Hunt's subordination index.<sup>31</sup> The samples used are given in the following text, with subordinate clauses underlined by the investigator.

### Eighteenth Century

#### Preface to A Dictionary of the English Language

It is the fate of those who toil at the lower employments of life, to be rather driven by the fear of evil, than attracted by the prospect of good; to be exposed to censure, without hope of praise; to be disgraced by miscarriage, or punished for neglect, where success would have been without applause, and diligence without regard. . . .

When I took the first survey of my undertaking, I found our speech copious without order, and energetick without rules. . . .<sup>32</sup>

Dr. Samuel Johnson

The ratio of subordinate clauses to main base clauses in this passage was .82, using Hunt's subordination index.

### Nineteenth Century

#### Pride and Prejudice

It is a truth universally acknowledged that a single man in possession of a good fortune must be in want of a wife.

However little known the feelings or views of such a man may be on his first entering a neighborhood, this truth is so well fixed in the minds of the surrounding families that he is considered as the rightful property of some one or other of their daughters.

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<sup>31</sup>Kellogg W. Hunt, "Recent Measures in Syntactic Development," Elementary English 43 (1966):737.

<sup>32</sup>Samuel Johnson: Rasselas, Poems and Selected Prose, ed. by Bertrand H. Bronson (New York: Holt, Rinehart and Winston, 1952), p. 212. First published 1755.



"My dear Mr. Bennet," said his lady to him one day, "have you heard that Netherfield Park is let at last?"

Jane Austen<sup>33</sup>

This passage from the nineteenth century yielded a subordination index of .76.

### Twentieth Century

#### The World According to Garp

Garp's mother, Jenny Fields, was arrested in Boston in 1942 for wounding a man in a movie theater. This was shortly after the Japanese had bombed Pearl Harbor and people were being tolerant of soldiers, because suddenly everyone was a soldier, but Jenny Fields was quite firm in her intolerance of the behavior of men in general and soldiers in particular. In the movie theater she had to move three times, but each time the soldier moved closer to her until she was sitting against the musty wall, her view of the newsreel almost blocked by some silly colonnade, and she resolved she would not get up and move again. The soldier moved once more and sat beside her.

. . . As all members of the Fields family were bidden to do, they rode on the right-hand side of the Boston and Maine when the train left Boston and sat on the left when they returned.

John Irving<sup>34</sup>

The subordination index for John Irving's novel, which was the best-selling novel in the United States for some sixteen weeks in 1979, was .62 on the first page and .90 for the passage from the second page. The combined ratio for the two was .72.

### Current Journalism

A sampling from a recent Newsweek article yielded a ratio of 1.0.<sup>35</sup>

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<sup>33</sup>Jane Austen, Pride and Prejudice (New York: Scholastic Book Services, 1962), p. 1. First published 1813.

<sup>34</sup>John Irving, The World According to Garp (New York: E.P.Dutton, 1976), pp. 1-2.

<sup>35</sup>Harry Anderson and Erik Ipsen, "Perks for the Merged", Newsweek (Sept. 7, 1981), p. 65.

A front page newspaper story rated a 1.2,<sup>36</sup> and a locally written sports story rated a .33.<sup>37</sup> Superior adult writers who produced articles for Harper's and Atlantic had an index of .78, according to Hunt.<sup>38</sup> It would seem that the prose produced by superior adult writers through several hundred years was more consistent in its ratio of subordinate clauses to base clauses, and in its typically readable mixture of complex and simple sentences, than many contemporary rhetoricians, such as Flesch, Christensen, and Barber, thought.

#### Acquisition of Conjunctions

Surprisingly, Aristotle's philosophical distinction of two classes of words, substantive and functional, is a developmental reality. Research in child language development in the last several decades produced evidence that the earliest words of children (about one year of age) were nouns and verbs. "Function words are almost completely lacking in the early stages of development."<sup>39</sup> However, these single word utterances functioned as sentences, in that they implied a complete thought.<sup>40</sup> The syntax of the first two and three word sentences

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<sup>36</sup>AP, "Reagan Refiguring Cuts", The Norman Transcript (Sept. 22, 1981), p. 1.

<sup>37</sup>Berry Tramel, "Okie Just Gets No Respect," The Norman Transcript (Sept. 18, 1981), p. 9.

<sup>38</sup>Frank O'Hare, Sentence Combining: Improving Student Writing Without Formal Grammar Instruction (Urbana, Ill.: NCTE, 1971), p. 22.

<sup>39</sup>Wick R. Miller and Susan Ervin-Tripps, "The Development of Grammar in Child Language," in The Acquisition of Language, ed. by Ursula Bellugi and Roger Brown, Monographs of Society in Research in Child Development (New York: Holt, Rinehart and Winston, Inc., 1964), pp. 354-80.

<sup>40</sup>Martin D.S. Braine, "The Ontogeny of English Phrase Structure: The

was characterized as "Pivot Grammar". At this stage, between one and two years, the child used a few words with great frequency. Around these familiar words, he pivoted new words, as they entered his vocabulary, such as "Allgone milk," and "Allgone shoes".<sup>41</sup> As new words entered into the open class, the child incorporated other parts of speech, experimenting with word order in a trial and error fashion, finding the sequences which elicited responses in his environment.<sup>42</sup> Braine described this as "contextual generalization".<sup>43</sup>

In contrast to stimulus-response models, Brown, Cazden, and Bellugi credited the child with developing language from an interior cognitive reference, "an induction and hypothesis-testing" process, and mapped out transformational grammars for three early stages of language production.<sup>44</sup> These earlier studies focused upon development of the transformations of simple sentences, outlined by Chomsky. Data for conjunctive relationships were not analyzed, since the child rarely put together phrases with an explicit conjunction at this stage.

One of the most unique and fruitful studies of the development of conjunction in early childhood was a recent cross-linguistic examination

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First Phase," in Studies of Child Language Development, ed. Charles A. Ferguson and Dan I. Slobin (New York: Holt, Rinehart and Winston, Inc., 1973), pp. 409-10.

<sup>41</sup>Lois Bloom, "Why Not Pivot Grammar?" Studies in Child Language Development, p. 410.

<sup>42</sup>Ibid.

<sup>43</sup>Ibid., p. 438.

<sup>44</sup>Roger Brown, Courtney Cazden, and Ursula Bellugi, "The Child's Grammar from I to III", Studies in Child Language Development, pp.295-353.

of four languages: English, German, Italian, and Turkish.<sup>45</sup> This study hypothesized an order of emergence of conjunctions, an order suggesting an underlying cognitive basis. Their conclusions were 1) that there a regular development in the surface expression of conjoined sentences; 2) that the stages became increasingly complex, both cognitively and linguistically; and 3 that the age at which the child achieved full mastery of conjoined syntax varied with specific languages because of elaboration of constructions peculiar to the languages.

This research was particularly illuminating, in that the speech of very young children, ages 2.0 to 4.8, was analyzed not only for the appearance of exact conjunctions, but also for juxtaposition of facts, which later became the basis of conjunctive syntax. An example was the following primitive coordinator (German, Age 1.5): Da is brrbrr, da sich wauwau.<sup>46</sup> ("There is horse, there see dog.") A pre-emergent and was implied by both the voice intonation and the related meaning of the clauses.<sup>47</sup> Another primitive form of coordination was the use of a "particle", another precursor of the conjunction and: "Find doggie. Doggie. Tiger too."<sup>48</sup> A primitive form of the alternative conjunction was seen in the following: "no eat. . .I play."<sup>49</sup> These early examples were considered conjunctive not simply by context and

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<sup>45</sup>Patricia Clancy, Terry Jacobson, and Marilyn Silva, "The Acquisition of Conjunction: A Cross-Linguistic Study," Papers and Reports on Child Language, No. 12 (Palo Alto: Stanford Univ., Dept. of Linguistics, 1976).

<sup>46</sup>Ibid., p. 4.

<sup>48</sup>Ibid., p. 5.

<sup>47</sup>Ibid.

<sup>49</sup>Ibid.

subject matter, but also by the child's use of a single intonation contour. A step further in development was the use of two intonation contours with a connective word between the two utterances. Still later, the child mastered the simultaneous use of the connective and a single intonation contour to conjoin related utterances. In all four languages, juxtaposition was found to express four types of relationships: coordination, antithesis, sequence, and causality.<sup>50</sup>

After coordination connectives came sequence statements, but not always with complete semantic or cognitive control. For instance, Adam's sequence statement implied causal or conditional meaning: "When its got a flat tire, it needa go to the station."<sup>51</sup>

Statements of causality followed sequence, and, at about the same time, statements of reason, which were sometimes confused. Both linguistic and cognitive factors were associated with this confusion. In some languages, particularly English, both causality and reason are indicated by the same connective, because. A cognitive factor might have been the child's egocentrism and what Piaget called "verbal syncretism", a belief that two events connected in personal experience bear a causal relationship to one another.<sup>52</sup> An Italian child, when asked why wolves bite, replied: "Because they are from Red Riding Hood."<sup>53</sup>

Conditionals were closely related to temporals and appeared, at first, to be undifferentiated. Linguistically, in German, the same word wenn is used to mean when or if. Later developments in temporal

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<sup>50</sup>Ibid., p. 8.

<sup>52</sup>Ibid.

<sup>51</sup>Ibid., p. 6.

<sup>53</sup>Ibid.

conjunction were expressions of simultaneity with the words when or while, at about age 3.11. Specific temporal words, after and before, appeared about the same time as simultaneity, and after was the first to appear in all four cultures, except Turkish.<sup>54</sup> Probably cognitive and linguistic factors accounted for this order. Cognitively, before required an inversion of the temporal order. Linguistically, in some languages, particularly Italian and French, before takes a subjunctive verb (contrary to fact).

One other study of early childhood language development was that of Menyuk, from a transformational-generative perspective, which concluded that "all the basic structures used by adults to generate their sentences can be found in the grammar of nursery school children".<sup>55</sup> However, she also had significant findings on particular conjunctions used incorrectly in the transformations she required of nursery school three-year-olds and kindergarten six-year-olds. Nursery school children incorrectly used the conjunctions so and because, while kindergarteners were significantly more successful with so.

#### Middle Childhood

Two years later, O'Donnell traced the development of children's syntax from kindergarten through the seventh grade, using a transformational analysis measure.<sup>56</sup> As such, conjunctions were not measured, but adverbial constructions in speech and writing were. O'Donnell

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<sup>54</sup>Ibid.

<sup>55</sup>Paula Menyuk, *Sentences Children Use* (Cambridge:MIT Press, 1969), p.93.

<sup>56</sup>Roy O'Donnell, Syntax of Kindergarten and Elementary School Children: A Transformational Analysis (Urbana, Ill.:NCTE, 1965).

found an unexplainable rate change in third and fifth grades. In oral expression, the most significant increase was measured for third grade girls. In writing, there was a significant increase from third to fifth grades, and an unexplainably high frequency in the compositions of fifth grade girls. Furthermore, only at the fifth grade and seventh grade, was there a reversal of the tendency to develop more complexity in terms of adverbial clauses in speech than in writing.<sup>57</sup> O'Donnell concluded:

We need, of course, to know a great deal more than we do about the hierarchy of difficulty involved in both the production and interpretation of various grammatical structures. . . (to) Improve the designing of instructional materials.<sup>58</sup>

By far the most ambitious survey and extensive corpus of data on language development was Loban's thirteen year longitudinal study of 338 subjects, completed two years after O'Donnell's.<sup>59</sup> Of the 338 kindergartners in 1953, 221 complete developmental records of writing samples, reading, listening, and speech had provided histories of the growth, development and changes in subordination and embeddedness, among other language measurements, from kindergarten through twelfth grade. The main outline of the growth in usage of adverbial clauses and conjunctions is as follows:

Age 6 and 7:	Conditional dependent clause; <u>if</u> appears.
Age 7 and 8:	Frequent use of subordinate clauses; <u>when</u> , <u>if</u> <u>because</u> are frequent.

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<sup>57</sup>Ibid.

<sup>58</sup>Ibid., p. 100.

<sup>59</sup>Walter Loban, Language Development: Kindergarten Through Grade Twelve, NCTE Research Report No. 18 (Urbana, Ill.:NCTE, 1976).

- Age 8, 9, and 10: Beginning of attempt to relate particular concepts to general ideas, using meanwhile, unless, even if.  
50% use although correctly.
- Age 10, 11, and 12: Framing of hypotheses and consequences; Use of subordinate clauses of concession; provided that, nevertheless, in spite of, unless.  
Frequency of adverbial clauses twice that of kindergarteners (speech); marked decrease in immature coordination.  
Speech: if this, then probability emerging, usually in application to temporal things, rather than abstract ideas.<sup>60</sup>

One of the invaluable aspects of this study was that rather than simply norming the data through thirteen years, the investigators stratified the subjects into High, Low, and Random groups, on the basis of teachers' identification of language proficiency. Distinctive patterns of acceleration and development, therefore, had become apparent. For example, in writing, the Low group achieved a depth and variety of embeddedness in high school which the High group achieved in Grades 4, 5, and 6.<sup>61</sup> In oral language, a transformational analysis of the syntax of the three groups at the primary level compared to their high school performance revealed the following:

GROUP	GRADES 1,2,3	GRADES 10,11,12
High	71	95
Random	62	74
Low	29	50

The data revealed steady progress of each group; still the Low group was using only 50% as many multi-base deletion transformations as the High group in their high school years. Indeed, their oral language production was

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<sup>60</sup>Ibid., pp. 81-83.

<sup>61</sup>Ibid., p. 77.



approximately 70% as effective as the High group were in the first three years of education.<sup>62</sup> They concluded:

Our charts very often show a steady nondramatic chronological development. . . suggesting that 'linguistic stages' are no more discrete, no more sudden, than the stages of physical growth reported by Gesell and Ilg. However, if one examines primary language development and compares it with grades 7-9 or 10-12, the degree of development is as apparent as physical growth.<sup>63</sup>

Another major study, which influenced language development research, both in methodology and theory, was Hunt's transformational analysis of the writing samples of fourth, eighth, and twelfth graders for various transformations, including adverbial clauses. His analysis of adverb clauses showed an increase through three grades of 82%, 93%, and 100%.<sup>64</sup> He concluded a leveling off of adverb clauses after eighth grade, but a growth in variety of introductory words, or conjunctions. Those conjunctions which showed a marked increase from grade four to grade eight were: before, until, so, and since. Those which did not appear before grade eight were: whenever, when and if, as if, as, right before, although, unless, except that, no matter how, no matter if. Fourth graders used the following conjunctions most frequently and in declining order: when, because, if, and while.<sup>65</sup> Interestingly, this was approximately the same order as that traced in the Clancy study.

A major innovation in measurement was Hunt's T-unit, or "minimum

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<sup>62</sup>Ibid., p. 76.

<sup>63</sup>Ibid., pp. 84-85.

<sup>64</sup>Kellogg W. Hunt, Differences in Grammatical Structures Written at Three Grade Levels, The Structures to be Analyzed by Transformational Methods (Tallahassee: Florida State Univ., 1964), p. 76.

<sup>65</sup>Ibid., pp. 69-71.

terminable unit". Circumventing the young child's inadequate punctuation and immature use of the coordinate and, Hunt measured the T-unit, as "exactly one main clause plus whatever subordinate clauses are attached to that main clause".<sup>66</sup>

A further extension of this measurement was his "Subordinate Clause Ratio", which was an expression of the ratio of the total clauses (main and subordinate) to the main clause. Thus, in comparing the writing of these three grade levels and superior adult writers in Harper's Magazine, Hunt showed the following data:

AGE GROUP	SUBORDINATE CLAUSE RATIO
Grade 4	1.3
Grade 8	1.4
Grade 12	1.68
Superior Adult	1.78
Professional Writer	2.36

In other words, a fourth grader would likely attach a subordinate clause to a main clause once in about every three T-units, while the professional writer used one and one-third clauses with each main clause.<sup>67</sup>

#### Acquisition of Conjunctions in Reading

A major study in elementary school children's acquisition and developmental understanding of connectives (including conjunctions) was Robertson's in 1966.<sup>68</sup> Working with the basals then used in Canadian schools, Robertson did a textual analysis to ascertain which connectives

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<sup>66</sup>Kellogg W. Hunt, "Recent Measures in Syntactic Development," Elementary English 43 (October 1966): 737.

<sup>67</sup>Ibid., p. 735.

<sup>68</sup>Jean E. Robertson, "An Investigation of Pupil Understanding of Connectives in Reading" (Doctoral Dissertation, Univ. of Alberta, 1966).

were used most frequently. From this data, she developed a Connectives Reading Test and a Written Connectives Text, which were administered to 402 children in grades four, five, and six. These data were analyzed to ascertain the hierarchy of difficulty of understanding of connectives and that relationship to comprehension. Her results indicated an increase in pupil understanding of connectives from grade to grade and varying acceleration rates for each of the seventeen connectives for each grade and for five levels of achievement within each grade. "The total student group in grades four to six understood 67% of the sentences having connectives. The understanding level rose from 57% in grade four to 66% in grade five to 75% in grade six."<sup>69</sup> Robertson's study, like Loban's, showed a wide range of achievement among the five groups identified in each grade. In the highest achievement group, percentage of correct answers rarely dipped below 80%, while those of the lowest group rarely rose above 50%.<sup>70</sup> Concerning acceleration rates, the period of greatest growth for the highest group was from grade four to grade five. The period of greatest growth for the lowest group was from grade five to grade six.<sup>71</sup>

Connectives rated highest in difficulty were: however, thus, although, which, and, and yet. Robertson concluded, "Apparently situations involving concession are hard for students to understand."<sup>72</sup>

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<sup>69</sup>Ibid., p. 405.

<sup>70</sup>Ibid., p. 406.

<sup>71</sup>Ibid., p. 409.

<sup>72</sup>Ibid., pp. 406-09.

The connective and was theorized to be difficult because of the "wide variety of meanings attributed to this connective". Difficulty with yet "indicated that children cannot hold information units in reading well while they consider other information given to them".<sup>73</sup>

Stoodt's study in 1970 investigated the relationship between the understanding of conjunctions and reading comprehension for ninety-five fourth grade children.<sup>74</sup> A second hypothesis was investigated concerning the hierarchy of difficulty of conjunctions, analyzed through data from two instruments developed by the investigator. They were a multiple choice Comprehension of Conjunctions Test and a Cloze Comprehension of Conjunctions Test. The Cloze Test had three levels: one with a high level of conjunctions, one with half as many conjunctions, and one with no conjunctions. Stoodt found the following conjunctions most difficult (in descending order of difficulty): when, so, but, or, where, while, how, that, and if. The easiest conjunctions were found to be: as, for, and, and how.<sup>75</sup> The lack of corroboration between Stoodt's and Robertson's findings might have been due to the variations in construction of the tests. A close examination of Robertson's Connectives Test revealed the presence of embedded who-clauses, also reported to be difficult for children to comprehend,<sup>76</sup>

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<sup>73</sup>Ibid.

<sup>74</sup>Barbara Stoodt, The Relationship Between Understanding Grammatical Conjunctions and Reading Comprehension (Arlington, Va.:ERIC Document Reproduction, ED 045 331, 1970).

<sup>75</sup>Ibid., pp. 114-15.

<sup>76</sup>Robertson, Appendix.

a fact which may have confounded the results of the difficulty of conjunctions.

Other factors which Stoodt found to be significantly related to understanding of conjunctions were: socioeconomic level, sex, and intelligence quotient. She found a high positive relationship between socioeconomic level and all measures of comprehension of conjunctions. On every measure, she also found the intelligence quotient factor significant.<sup>77</sup> The relationship of comprehension of conjunctions to reading comprehension was found to be significant and is discussed more fully in a later section of this chapter.

In summary, both of the studies which explored the acquisition of conjunctions in reading found there to be a hierarchy of difficulty among the conjunctions, although the hierarchies differed somewhat and the bases for inclusion were different rationales. The study with American children was restricted to fourth graders and therefore provided no indication of chronological growth. The study with Canadian children on a set of connectives, which included conjunctions, showed an increase in understanding from grade to grade.

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<sup>77</sup> Stoodt, p. 121.

### Comprehension Theory

#### Approaches to Research on Comprehension

In order to analyze the research on comprehension, it is necessary to review the approaches and major theories of comprehension, as they have developed in the past fifty years. Approach and theory are not necessarily synonymous. But there is a symbiotic relationship between what is to be measured and what can be measured, and dominance has moved from one to the other historically.

One of the first major studies of comprehension was that of Thorndike in 1917.<sup>78</sup> In it, Thorndike described comprehension:

. . . 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.<sup>79</sup>

This theory of comprehension, according to Herbert,<sup>80</sup> still exhausted the accumulated knowledge of this fundamental intellectual process, after fifty years of research. In reviewing this accumulation of research, Herbert found seven major approaches to comprehension:

1. The Skills Approach
2. The Measurement Approach
3. The Factor Analytic Approach
4. The Correctional Approach
5. The Readability Approach
6. The Introspective Approach
7. The Models Approach<sup>81</sup>

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<sup>78</sup> Edward Thorndike, "A Study of Mistakes in Paragraph Reading," Journal of Educational Psychology, VIII (1917), pp. 323-332.

<sup>79</sup> Ibid., p. 331.

<sup>80</sup> Harold L. Herbert, "Reading Comprehension: The Need for a New Perspective," Reading Research Quarterly 6:3, p. 340.

<sup>81</sup> Ibid., p. 338.

It would be difficult to find an approach to comprehension which would not fit into one of these seven categories, which seemed to be based upon various approaches to measurement, rather than on comprehension theory.

A more recent analysis by Pearson cited four major strands of research:

1. Readability
2. Cloze
3. Factor Analytic Studies
4. Psycholinguistics<sup>82</sup>

While this approach eliminated the duplications of several closely associated categories in Herbert's list, it also eliminated some historically important data.

#### Historical Development of Comprehension Research

Some of the earliest studies of the scientific period of investigation into the reading process still provided the theoretical structures and measurement techniques to modern research. Smith reported on this period, which seemed to fall into two categories: a cognitive or psychological thrust, characterized by Thorndike's definition: "reading is reasoning", and a measurements approach, concerned with objective observations. During this period of 1910 to 1925, there were numerous investigations of oral and silent reading, measured for the first time through two objective techniques: standardized tests (Gray, 1915; Starch, 1915; Monroe, 1918; Gray, 1919; and Smith, 1922) and photographic reproductions of eye movements (Judd and Buswell, 1922).<sup>83</sup> Although at that time, these two categories represented two parallel movements to replace oral reading with silent reading, they have provided a framework for analyzing comprehension well into the present

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<sup>82</sup>P. David Pearson, Address at Twenty-third Annual Convention of the International Reading Association, Houston, Texas, May 3, 1978.

<sup>83</sup>Nila Banton Smith, American Reading Instruction (Newark, Delaware: International Reading Association, 1965), pp. 161-67.

period. Thorndike's methods of analyzing errors in individual pupil responses in relation to thinking processes were closely akin to some psycholinguistic methodologies. The objective measurements movement eventually led to comprehension definitions such as that used in the massive comprehension study of fifteen countries: "Reading comprehension. . . is defined as ability to answer questions about a passage when the passage is available for reference and re-reading."<sup>84</sup>

The measurement revolution led directly to the skills approach, the correctional approach, and the readability approach. Smith said:

The appearance of tests which could be used in revealing individual weaknesses and also the large number of publications on the subject of diagnostic and remedial work combined to direct attention to individual needs.<sup>85</sup>

She cited the Maryland School Bulletin of 1924, which categorized errors on a paragraph meaning test:

1. Lack of comprehension due to inadequate vocabulary
2. Lack of comprehension due to inability to understand difficult sentences.
3. Careless expression of pupils' answers
4. Preconceived ideas
5. Introduction of irrelevant facts and ideas
6. Overpowering suggestiveness of certain elements
7. Using words not synonymous, as if they were.
8. Disregard of modifying elements.
9. Failure to follow directions.<sup>86</sup>

One might say that comprehension, during this period, was analyzed in terms of what was not comprehension and that the approach was a combination of these three: Skills, Measurement, and Correctional. Even so, Thorndike's influence from the 1917 study was easily seen.

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<sup>84</sup>Robert L. Thorndike, Reading Comprehension Education in Fifteen Countries, International Studies in Evaluation III (New York: John Wiley and Sons, 1973), p. 7.

<sup>85</sup>Smith, p. 184.

<sup>86</sup>Ibid.



In the early 1930's, attention shifted to the text itself and readability. Early readability formulas, such as those by Gray and Leary (1935) and Washburne and Morphett (1938) were based upon two relatively new techniques: standardized tests, particularly the McCall-Crabbs (1925) Standard Test Lessons in Reading, which were used in many formulas as criteria of difficulty, and Thorndike's list of the most frequently used words in English texts (1921).<sup>87</sup> Hansell noted that these early formulas reflected the influence of behavioral psychology, and the assumption that the more frequently a word appeared in print, the "easier" it was to comprehend, and noted that this theory is still prevalent in all major readability formulas of today.<sup>88</sup> Readability research in the 1940's worked toward more precision and accuracy, while many journal articles in the 1950's were concerned with simplification of computation procedures.<sup>89</sup>

#### New Approaches

It was during the 1950's that three major new approaches to comprehension were introduced, although their impact was not significant in reading research until the next decade. They were factor analytic studies, cloze procedure, and psycholinguistics. Of these, the factor analytic studies and the cloze procedure were more sophisticated extensions of two previous approaches to comprehension. Cloze procedure was originally a technique for measuring readability and was first introduced in a journalism study in 1953.<sup>90</sup>

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<sup>87</sup>T. Stephenson Hansell, "Readability, Syntactic Transformations, and Generative Semantics," Journal of Reading 19:7 (April, 1976), pp. 557-58.

<sup>88</sup>Ibid., p. 558.

<sup>89</sup>Ibid.

<sup>90</sup>W. Taylor, "Cloze Procedure: A New Tool for Measuring Readability," Journalism Quarterly 30 (1953): 414-38.

Factor analytic studies were closely related to skill identified through standardized tests, as Simons points out.<sup>91</sup> But psycholinguistics brought new directions from the fields of linguistics and psychology and was later to have a harmonious and fruitful alliance with cloze studies.

#### Factor Analytic Studies

Holmes, the father of factor analytic studies credited his initial idea to an observation by Lazar that reading failure was due to a constellation of causes, which should be investigated in their interdependence. This notion he lifted out of the diagnostic context to "generalize and formalize it into a precise, premised statement of theory." He wrote:

In essence, the Substrata-Factor Theory holds that, normally, reading is an audio-visual verbal-processing-skill of symbolic reasoning, sustained by the interfacilitations of an intricate hierarchy of substrata factors that have been mobilized as a psychological working-system and pressed into service in accordance with the purposes of the reader.<sup>92</sup>

Although Holmes took his surface terminology and data in terms of sub-skills of standardized tests (word discrimination, phonetics, vocabulary in context, etc.), he also attempted to incorporate neurological research, matching the outward behaviors with what was known about the inner processes of the human brain. He explained that the substrata-factors should be thought of as:

neurological subsystems of brain cell-assemblies, containing various kinds of information; such as, memories for shapes, sounds, and meanings of words and word parts, as well as memories for vicarious and experiential material

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<sup>91</sup> Herbert D. Simons, "Reading Comprehension: The Need for a New Perspective," Reading Research Quarterly 6 (Spring, 1971), 3:348.

<sup>92</sup> Jack A. Holmes, "The Substrata-Factor Theory in Reading: Some Experimental Evidence," Theoretical Models and Processes of Reading, ed. by Harry Singer and Robert B. Ruddell (Newark, Delaware: International Reading Assn., 1970), pp. 187-88.

. . . .Such neurological subsystems of brain cell-assemblies gain an interfacilitation, in Hebb's sense, by firing in phase.<sup>93</sup>

The mobilizers, the electrochemically bonded associations of cells, were defined psychologically as "deep-seated value systems. . . .As cognitive tendencies, with or without conscious awareness." <sup>94</sup>

Holmes' original theory contained the postulate that the hierarchy of skills would undergo a gradient shift, as reorganization of substrata factors occurred during a child's growth.<sup>95</sup> This gradient shift was investigated in the work of Singer, Holmes' student and subsequent research colleague. While Holmes' earlier work was done primarily with college and highschool subjects, Singer applied the model to elementary school children, grades three through six. Classifying the major matrices of the system as Speed and Power of Reading, Singer found that there was a "developmental shift from a predominance of visual perceptual abilities at the third grade to a more equitable organization of visual perceptual and word meaning factors at the sixth grade level."<sup>96</sup> In other words, detailed word scanning and word calling shifts into "a more efficient integration", and "both range and variety of vocabulary abilities are increasingly important".<sup>97</sup>

In a later study, Singer investigated the substrata-factors of all three levels, sixth grade, high school level, and college level, and incorporated them into the same model. In addition to the previously noted changes,

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<sup>93</sup>Ibid., p. 188. Referring also to D.O. Hebb, The Organization of Behavior (New York: John Wiley and Sons, Inc., 1949), p. 335.

<sup>94</sup>Holmes, p. 188.

<sup>95</sup>Ibid., p. 190.

<sup>96</sup>Harry Singer, "A Developmental Model for Speed of Reading in Grades Three Through Six," Theoretical Models, pp. 215-16.

<sup>97</sup>Ibid., p. 212.

"total variance attributed to vocabulary abilities increases significantly after the fifth grade and then remains approximately the same from the sixth grade through the college level."<sup>98</sup> Singer concluded, also, that between elementary and high school levels, "auding shifts from a concrete to a more abstract level of organization," and noted that fewer fixations per hundred words accounted for 4% of College Power of Reading.<sup>99</sup> In his concluding remarks, Singer hypothesized that these stages may roughly parallel Piaget's developmental stages and concur with Bayley's longitudinal study on the growth of intelligence.<sup>100</sup> While factor-analytic studies have become passe in reading research on comprehension, the major ones incorporated an impressive amount of theory from related fields of inquiry during that time.

Similar to factor-analytic studies, more sophisticated correlational studies became possible with the development and increasing accessibility of high speed computers. Correlational approaches explored the relationship of comprehension to a number of variables: social class (Chandler, 1966), race (Cooper, 1964), sex (Gates, 1961), personality, attitude, physical growth, perceptual skill, rate of reading, oral language skill, and listening.<sup>101</sup> All of these, noted Simons, provided some of the facts which a theory of comprehension must explain, but not a theory of comprehension.<sup>102</sup>

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<sup>98</sup> Harry Singer, "Changing Patterns of Factors in Power of Reading, Elementary Through College Levels," Theoretical Models.

<sup>99</sup> Ibid., pp. 51-53.

<sup>100</sup> Ibid.

<sup>101</sup> Simons, p. 349.

<sup>102</sup> Ibid.

## Cloze Research

It was from cloze research and psycholinguistic theory that new theories and models of comprehension were to derive. The earliest research on the cloze technique was in the context of readability studies. Bormuth, in the mid-1960's, found the cloze procedure useful in determining readability of passages, allowing "a greater degree of precision by permitting more questions per word of text than the older form of comprehension questions".<sup>103</sup>

The focus of cloze studies very quickly passed from readability to measurement of comprehension and inquiries into the nature of comprehension itself. Bormuth, using 150 subjects in the fourth, fifth, and sixth grades, gave the following results:

It appears at least under the conditions of the present study that cloze tests made by deleting every fifth word measure skills closely related or identical to those measured by conventional multiple-choice reading comprehension tests.<sup>104</sup>

Jenkinson, Ruddell, and Bormuth found correlations between standardized tests of comprehension and cloze tests from .70 to .85.<sup>105</sup> Gallant, using primary grade subjects, found the split-half reliability coefficient to be between .90 and .97, using the Spearman-Brown formula.<sup>106</sup>

In addition to the statistical validity, Simons cited other advantages

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<sup>103</sup>Hansell, p. 558.

<sup>104</sup>John R. Bormuth, "Comparisons Among Cloze Test Scoring Methods," Reading and Inquiry, ed. by J.A. Figurel (Newark, Delaware: International Reading Assn., 1965).

<sup>105</sup>M.E. Jenkinson, "Selected Processes and Difficulties in Reading Comprehension," (Doctoral dissertation, Univ. of Chicago, 1957). Bormuth, p. 286. Robert B. Ruddell, "An Investigation of the Effects of the Similarity of Oral and Written Patterns of Language Structure on Reading Comprehension," (Doctoral dissertation, Indiana Univ., 1963).

<sup>106</sup>Ruth Gallant, "Use of Cloze Tests as a Measure of Reliability in the Primary Grades," Reading and Inquiry.

of using cloze rather than standardized tests for comprehension assessment: there are fewer extraneous aspects of student functioning; there are no questions to present additional comprehension problems; it does not depend on memory, in that the subject can re-examine the text; and cloze does not depend upon familiarity with the passage, to the extent that traditional tests do.<sup>107</sup>

Weaver, in exploring the theoretical aspects of the cloze procedure, stated that the cloze procedure "spreads before the subject a language sequence in a relatively normal form", but with a "gap in the sequence".<sup>108</sup> This allows a "close-up view of what is occurring at particular points in a language passage", and also opens up "the opportunity to examine semantic and syntactic effects of context".<sup>109</sup> Weaver's belief was that the semantic or lexical cloze was tied in to the cognitive and affective systems of the subject. He cited evidence from studies that the longest hesitations (in oral cloze tests) were before high information words, or semantic ones. The shortest hesitations were before structure words.<sup>110</sup> He viewed this as support for his contention that "structural elements in the language are not stored in the same sense that the lexical elements in the language are stored. . . . The structure of the language appears to me as primarily for encoding."<sup>111</sup> He described the structure words as forming a kind of matrix within what is called long term memory, while lexical information is structured within this residing matrix in the subject.<sup>112</sup> Evidence to this point was the fact

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<sup>107</sup> Simons, p. 347.

<sup>108</sup> Wendell W. Weaver, "Theoretical Aspects of the Cloze Procedure," Toward a Psychology of Reading and Language; Selected Papers of Wendell W. Weaver, ed. by Albert J. Kingston (Athens: Univ. of Georgia Press, 1977), p. 31.

<sup>109</sup> Ibid., p. 31.

<sup>110</sup> Ibid.

<sup>111</sup> Ibid., p. 27.

<sup>112</sup> Ibid.

that in recall, structure words were more often transformed into the subject's own language, while lexical words more closely conformed to the text.<sup>113</sup>

Weaver also viewed cloze procedure as a measure of the subject's "redundancy reducing capabilities".<sup>114</sup> Written language has many redundancies, somewhat like the elements that English teachers call coherence and transition (connective words, pronouns, repetition of key words). As the subject successfully completed the cloze blanks, more redundancies became available for further cueing. Weaver stated that the average fifth grade reader has the redundancy characteristics of "average adult prose, though its lexical elements show no such maturity".<sup>115</sup> Though many children probably are not comprehending the "average fifth grade reader", it was interesting that this particular level seemed to mark a "gradient shift" in a number of approaches to comprehension.

#### Psycholinguistic Research

Though psycholinguistics entered the reading research scene from a different perspective, the subject matter of the research often dealt with terms discussed in the cloze procedure, such as lexical, semantic, and structure words, cognitive strategies, and the transforming of words. Cooper described psycholinguistics as, not a method of teaching reading, but rather "the marriage of two sciences: the science of cognitive psychology and the science of linguistics".<sup>116</sup> When the term "psycholinguistics" first was used in the early 1950's, it indicated a concern with linguistic methods

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<sup>113</sup>Ibid., pp. 23-24.

<sup>114</sup>Ibid.

<sup>115</sup>Ibid., pp. 25-26.

<sup>116</sup>Charles R. Cooper and Anthony Petrosky, "A Psycholinguistic View of the Fluent Reading Process," Journal of Reading, 20:3 (Dec., 1976), p. 185.

for describing the output of language users. "Describing the output" was the process of structural analysis of linguistic units as phonemes, morphemes, and phrases. The interesting aspect of the early coalition of psycholinguists was that "linguistic analysis coexisted quite happily with information theory and learning theory approaches to describing language behavior", under the assumption that research would provide data to fit conditioned stimulus-response linguistic units into a computer-like processing model.<sup>117</sup>

However, stimulus-response learning theory was soon challenged by the transformational generative grammar theories of Chomsky. In his 1957 Syntactic Structures, Chomsky proposed a set of universals about all language users: that language utterances are generated from deep structure (a term approximating an interior meaning consciousness); that they are spoken or read at the surface structure level (the communicative level of the actual words, phrases, and strings of words chosen); and that the transformations occurring between the two structure levels comprise both the linguistic grammar and the language user's behavior. The shift in linguistic theory which followed Chomsky changed linguistics from a methodology for analyzing a given sample of data to a theory for describing the language user's "generation" of sentences.<sup>118</sup>

When Chomsky's theory was introduced to psychologists through Miller, Galanter and Pribham's seminal book, Plans and the Structure of Behavior,<sup>119</sup> the whole course of psycholinguistics was turned around. It appeared that behavioral theory was unable to account for an "infinite" number of probable

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<sup>117</sup>Judith Greene, Psycholinguistics: Chomsky and Psychology (New York: Penguin Books, 1972), p. 14.

<sup>118</sup>Ibid., pp. 47-49.

<sup>119</sup>Ibid., p. 15.



sentences, and that it would be far more efficient "for the child to develop rules for producing permissible sentence sequences".<sup>120</sup> A shift occurred from an emphasis upon conditioning from external forces to the "creative" aspect of the "language user's ability to produce novel sentences he has never uttered or heard before".<sup>121</sup>

Within a few years, psycholinguistics had become an influence in reading research. Comprehension was being discussed in terms of the recovery of "deep structure".<sup>122</sup> To investigate the strategies used to recover "deep structure", a new direction in syntactic studies appeared. Sentence patterning and intonation contours became crucial in the work of Lefevre.<sup>123</sup> Emphasis upon the primacy of spoken language over written language resulted in two major areas of research: approaches to beginning reading instruction were challenged to more closely approximate the oral linguistic grammar of the child; and the new interest in language acquisition prompted a number of serious investigations into the language of early childhood. Fries brought new empirical linguistic findings to the attention of reading teachers and criticized traditional phonics.<sup>124</sup> Brown, Cazden, and Bellugi at Harvard and Slobin at Berkeley led the search for the understanding of how and when young children learn to talk.

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<sup>120</sup> Ibid., pp. 15-17.

<sup>121</sup> Ibid. 16.

<sup>122</sup> Simons, p. 355.

<sup>123</sup> Carl A. Lefevre, Linguistics and the Teaching of Reading (New York: McGraw Hill, 1964).

<sup>124</sup> Charles C. Fries, Linguistics and Reading (New York: Holt, Rinehart and Winston, 1963).

<sup>125</sup> Brown, Cazden, and Bellugi, "The Child's Grammar from I to III;" Dan I. Slobin, "Grammatical Transformations and Sentence Comprehension in Childhood and Adulthood," Journal of Verbal Learning and Verbal Behavior, 5 (1966):219-227.

The active, selective processes of the human mind are central in psycholinguistic research. Both in evaluation of the relationships signalled in sentences through syntax and cues, and in the processing of words, "the information that passes from the brain to the eye is more important in reading than the information that passes from the eye to the brain".<sup>126</sup> From this assumption have derived a number of studies to investigate which classes of words are most used to pass this information from the brain to the eye in effective and ineffective readers. Goodman described two types of cues. The first was the correspondence of graphic sequences to patterns of oral utterances, which was a cue to appropriate phrasing. The second was the class of words called function words, "noun markers, verb markers, question markers, phrase markers, and conjunctions".<sup>127</sup> Goodman described reading (i.e., comprehension):

Reading is a psycholinguistic guessing game. . . .it involves interaction between thought and language. . . .not precise perception and identification of all elements, but skill in selecting the fewest, most productive cues necessary to produce guesses which are right the first time.

Reading is a selection process. It involves partial use of available minimal language cues selected from perceptual input on the basis of the reader's expectations.<sup>128</sup>

#### Summary of Research on Comprehension Theory

This section has described the various approaches to comprehension from an historical perspective. It has shown that a definition of comprehension derives from and is only understandable within a theoretical framework.

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<sup>126</sup> Cooper and Petrosky, p. 187.

<sup>127</sup> Kenneth S. Goodman and James T. Fleming, eds., Psycholinguistics and the Teaching of Reading (Newark, Del.: International Reading Assn., 1969), p.23.

<sup>128</sup> Kenneth S. Goodman, "Reading: A Psycholinguistic Guessing Game," Theoretical Models, p. 260.

Comprehension is meaning, and "meaning, indeed, dominates and unitizes the perception of words and phrases. . .until. . .it dominates all perceptions" (Huey).<sup>129</sup> Reading comprehension is composed "of the same skills that reading comprehension tests measure" (Simons on skills approach).<sup>130</sup> Reading comprehension has been described in terms of pedagogical techniques, similar to the table of contents in a textbook on developmental reading (Herbert,<sup>131</sup> Cooper on skills approach).<sup>132</sup> Comprehension is the functioning and formation of sequences of meaning responses (Staats on behavioral learning theory).<sup>133</sup> "Comprehension is an almost perfect gestalt."<sup>134</sup> Lefevre stated that "reading must be regarded as a language-related process".<sup>135</sup> To this linguistic generalization, Spache added that comprehension "depends upon the reader's ability to hear (to think) the written word in its normal inflection and to hear the combination of stress, tone, pitch, and junctures of the sentence as he reads".<sup>136</sup> "Reading is a process of communication by which a message is transmitted graphically between individuals."<sup>137</sup> "Reading is reasoning," states the older Thorndike.<sup>138</sup> "Reading comprehension is defined

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<sup>129</sup>Ibid.

<sup>130</sup>Ibid.

<sup>131</sup>Herbert, p. 344.

<sup>132</sup>Cooper, p. 186.

<sup>133</sup>Arthur Staats, Learning, Language and Cognition (New York: Holt, Rinehart and Winston, Inc., 1968), p. 504.

<sup>134</sup>George D. Spache, "What is Comprehension?" Problems, Programs and Projects in College-Adult Reading, Eleventh Yearbook of the National Reading Conference (Milwaukee: National Reading Conference, Inc., 1962), p. 17.

<sup>135</sup>Carl A. Lefevre, Linguistics and the Teaching of Reading (New York: McGraw-Hill, 1964), p. xii.

<sup>136</sup>Spache, p. 262.

<sup>137</sup>A.J. Kingston, Jr., Summer Reading Workshop (Norman, Oklahoma: University of Oklahoma, 1980).

<sup>138</sup>Ruddell, Elementary English, p. 404.

as the ability to answer questions about a passage when the passage is available for reference and re-reading," states the younger Thorndike.<sup>139</sup> Comprehension theory would seem to have come full circle from Huey ("Meaning . . . dominates all perceptions,") to Goodman ("Reading is a selection process. . . .on the basis of the reader's expectations ").

#### Correlation between Syntax and Comprehension

The effect of syntax upon comprehension is one of the newer developments in reading research stimulated by psycholinguistic theory. Fortunately, linguistic research has provided more realistic units of measurement for analysis of children's oral language. As Ruddell comments, "Until recent years. . . readability research encompassing the study of language structure has been hampered by the lack of an adequate tool for the analysis of structure".<sup>140</sup> Some of the studies have approached the measurement issue from a structural linguistic viewpoint, describing language by patterns and frequencies. Others have used transformational descriptions of the hypothesized number of transformations in an utterance. Hunt's T-unit was derived from transformational grammar and was reported by Hunt to be empirically valid in measuring maturation.<sup>141</sup> Often, the studies have used a combination of frequency patterns and some type of transformational analysis.

Strickland was one of the first major investigators to use a structural linguistic framework in examining 2500 oral language samples collected in children's conversations with adults. These speech samples of children in grades one through six were examined for patterns and frequencies of patterns.

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<sup>139</sup>Robert L. Thorndike, p. 7.

<sup>140</sup>Ruddell, Elementary English, p. 404.

<sup>141</sup>Hunt, Grammatical Structures, p. 31.

In addition, she analyzed sentence patterns in basal series for these grade levels. Finally, the reading comprehension of the subjects was analyzed, most extensively at the sixth grade level, and to a lesser extent, at the second grade level. Strickland found significant correlations between oral language and reading proficiency only at the sixth grade. There was no evidence that the basal series had been controlled for structural complexity. She concluded: "No conclusions can be drawn from this study. More intensive research is needed at primary grade levels to ascertain whether there is any true relationship between the use of language and the development of skill in silent and oral reading".<sup>142</sup>

Ruddell conducted an investigation of 150 fourth graders' comprehension of six cloze reading passages, reflecting Strickland's high and low frequency patterns. His findings were that reading comprehension was significantly higher on high frequency oral patterns and that the cloze scores correlated significantly with scores on a standardized test. He concluded that reading comprehension is a function of similarity of sentence patterns in reading material to oral language patterns used by children.<sup>143</sup>

Nurss examined the relationship of syntactic structure and comprehension difficulty through oral reading errors, which were then correlated to standardized test scores. The hypothesized difficulty of complex sentences was partially supported through oral reading error data; however, she also found some evidence of comprehension of deep structure with surface errors. She concluded that "strict control of sentence structure in primary grade

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<sup>142</sup>Ruth Strickland, The Language of Elementary School Children: Its Relationship to the Language of Reading Textbooks and Quality of Reading of Selected Children, Bulletin of School of Educ., Indiana Univ. (1962), 38:1-131.

<sup>143</sup>Ruddell, p. 273.

materials is probably not necessary."<sup>144</sup>

Tatham investigated reading comprehension of frequent and infrequent sentence patterns (using Strickland's data) with second and fourth graders. Reading comprehension was measured by the children's ability to read sentences of varying degrees of complexity and identify one of three pictures which would best illustrate the sentence. She found that both second and fourth graders read frequent patterns more easily than second graders.<sup>145</sup> Stotsky commented that the validity of the study may have been weakened by extensive pre-testing of items for discrimination, and by the minute distinctions between some of the picture test items.<sup>146</sup>

Using a transformational model, Bormuth, Manning, Carr, and Pearson investigated fourth graders' literal comprehension of between- and within-sentence syntactic structures written at or below fourth grade level. Of the 110 short paragraphs, twenty-five contained within-sentence syntactic structures, sixteen contained between-sentence structures, and fourteen contained anaphoric structures (pronominal references). Comprehension was tested by multiple choice questions, reflecting one of four transformational patterns. Results showed that correct student response to within-sentence syntactic structures was 73%; correct student response to between-sentence structures was 58%; correct student response to anaphoric structures was 77%. Results for types of questions transformations in percentages of correct responses

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<sup>144</sup>Joanne Nurss, "Children's Reading: Syntactic Structure and Comprehension Difficulty," Forging Ahead in Reading, ed. by J.A. Figurel, Proceedings of the International Reading Assn. (1967), 12:571-5.

<sup>145</sup>Susan M. Tatham, "Reading Comprehension of Materials Written with Select Oral Language Patterns: A Study of Grade Two and Four" (Doctoral dissertation, University of Wisconsin, 1968).

<sup>146</sup>Stotsky, p. 36.

were: verbatim questions: 77%; transformed questions: 71%; simple paraphrase questions: 69%; and transformed paraphrase questions: 67%. The researchers concluded that a large percentage of children are unable to comprehend the basic sentence patterns by which information is signaled.<sup>147</sup>

W. Smith investigated comprehension of cloze passages at four levels of complexity, using subjects from grades four through twelve. The complexity was established by Hunt's findings, and vocabulary and sentence length were controlled. His findings were that subjects from grades four through six read fourth grade syntax better than other levels. Subjects from grades eight through twelve read eighth grade level better. He concluded that the syntactic complexity of prose text influences reading comprehension.<sup>148</sup>

Working with 440 subjects in grades four, five, and six in an eastern Canadian city, Fagan examined comprehension of cloze passages written with five major types of transformations. His findings were that the presence of embedding and deletion transformations tended to make sentences and passages more difficult for children to read. He also stated that the number of transformations within the sentence is not as important as the type of transformations and level of redundancy.<sup>149</sup>

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<sup>147</sup>John Bormuth, J. Manning, J. Cars and D. Pearson, "Children's Comprehension of Between- and Within-Sentence Structures," Journal of Ed. Psych. 61 (1970):349-57.

<sup>148</sup>William Smith, "The Effect of Transformed Syntactic Structures on Reading," Paper presented at the Fifteenth Annual International Reading Assn. Convention (Anaheim, Calif.:May, 1970).

<sup>149</sup>Fagan, pp. 169-73.

Working with secondary students, Peltz analyzed writing samples of thirty-four subjects in the tenth grade to determine high frequency transformations. After identifying fifty-one transformations, Peltz constructed sixteen cloze passages from a social studies text, eight of which were in the original prose, and eight of which reflected high frequency transformations from the subjects' own writing. A second measurement of comprehension was taken with a multiple choice test over four passages in both original and repatterned forms. The findings were that there was no significant difference in comprehension on the multiple choice test between original and repatterned passages. However, there were significantly higher scores on the cloze tests repatterned to students' language than on the cloze tests from original text; scores were higher at the .05 level for exact word replacement and for exact word plus acceptable synonym.<sup>150</sup>

This section has presented the results of research studies investigating the correlation of syntax and comprehension. Of the eight studies reviewed, six reported significant relationships between syntax and comprehension, when syntactic structures were manipulated to more closely parallel the complexity of the subjects' own language, as determined from previous linguistic or transformational studies, or from the subjects' own writing samples.

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<sup>150</sup>Fillmore K. Peltz, "The Effect Upon Comprehension of Repatterning Based Upon Students' Writing Patterns," Reading Research Quarterly (1974):4, p. 603.



## Native American Children and Language Development

In a recent bibliography of studies dealing with the teaching of English, covering the period of July through December, 1979, the following breakdown by minority group was calculated:<sup>151</sup>

	MINORITY STUDIES IN <u>RTE</u> JULY - DECEMBER 1979		
	Preschool Elementary	Secondary	College Adult
Chicano	5	1	0
Black	2	1	1
Native American	0	1	0
Other	1(French)	0	0

The one study cited concerned the teaching of Native American literature in the high school. This bibliography represented the sum total of research and publications in educational journals dealing with English language skills of Native American students in an educational setting from ERIC Clearinghouse in Reading and Communication Skills for that time period.

A survey of the bibliographies for the following year revealed the following data:<sup>152</sup>

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<sup>151</sup>Daniel J. Dieterich and Richard H. Behm, "Annotated Bibliography of Research in the Teaching of English: July through December, 1979," Research in the Teaching of English 14 (May, 1980):2, pp.165-191.

<sup>152</sup>Daniel J. Dieterich and Richard H. Behm, "Annotated Bibliography of Research in the Teaching of English: January through June, 1980," Research in the Teaching of English 14(Dec.,1980):4, pp.345-79.  
Daniel J. Dieterich and Richard H. Behm, "Annotated Bibliography of Research in the Teaching of English: July through December, 1980," Research in the Teaching of English 15 (May, 1981):2, pp.175-91.

MINORITY STUDIES IN RTE JANUARY - DECEMBER 1980

	Preschool Elementary	Secondary	College Adult
Chicano	9	0	1
Black	4	4	1
Native Amer.	1	1	1

This survey revealed a decrease in studies of Native American children in comparison to other minorities. The most recent bibliography available showed a decrease in minority studies in general. More specifically, there were no studies of Native American subjects and language development, while interest in Black English and Spanish English continued, but at a decreased rate.<sup>153</sup>

There were a few studies from previous years dealing with English language development of Native American children. Golub studied the written syntax of monolinguals and bilinguals in the intermediate and upper grades. He found no significant differences at either level in written syntactic production. There were significant differences in intermediate grade students' knowledge of written syntax as measured by a written syntax test.<sup>154</sup>

Serapiglia investigated the English syntactic structures produced in spontaneous oral language and the receptive English syntactic and

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<sup>153</sup>Daniel J. Dieterich and Richard H. Behm, "Annotated Bibliography of Research in the Teaching of English: July through December 1981," Research in the Teaching of English 16 (May, 1982):2, pp. 171-98.

<sup>154</sup>Lester Golub, "English Syntax of Black, White, Indian and Spanish-American Children," Elementary School Journal 2 (1974):323-34.

vocabulary skills of bilingual Spanish, bilingual Indian, and monolingual Anglo-American children in grades one through six. She found significant differences in mean scores on three grammatical forms: indefinite pronouns, personal pronouns, and conjunctions. She also noted that peak differences occurred in the third and fourth grades for the Indian children. In fact, there was an unexplained drop in scores for the Indian children on the Developmental Sentence Score in the third grade, and a slight depression in the mean score on the Northwestern Syntax Screening Test in the fifth grade. She concluded that "information concerning the language development of linguistically different children is needed to determine the extent of instructional modification necessary so that they may effectively participate in educational systems".<sup>155</sup>

Although there have been many special programs inaugurated for Native American children in the past several years, there have been very few research studies to guide curriculum developers in any special areas of language development. These children have become more and more a part of the public school system in urban settings in the past decade. They may or may not be from bilingual homes. There is very little data describing their language environment or developmental patterns.

#### SUMMARY

This chapter has presented a discussion of the function of conjunctions, in the context of historical theory and current research.

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<sup>155</sup>Serapiglia, p. 77.

It has included a review of past and present theories of approaches to comprehension. It has also reviewed recent research investigating the correlation between syntax and comprehension, and it has presented a summary of the research dealing with the English language development of Native American children.

The next chapter will describe the sample, standardized instruments, construction of instruments to measure comprehension of conjunctions, and the collection and analysis of the data.

## CHAPTER III

### DESIGN AND METHODOLOGY

The problem, herein, was to determine the relationship between the understanding of grammatical conjunction and reading comprehension in Native American children in the fourth, fifth, and sixth grades in an urban setting. The investigation was further specified to deal with three problems. The first problem was the correlation between understanding of the conjunctions selected and reading comprehension for the entire group of subjects and for each grade separately. The second problem was the hierarchy of difficulty of the conjunctions selected for the study, for the entire group and for each grade. And the third problem was the change in the relationship of the understanding of conjunctions and reading comprehension through maturational development, represented by the three grade levels.

This chapter presents the design and methodology of the investigation. It describes the design of the study in terms of the following: 1) setting and sample; 2) instrumentation; and 3) collection of the data. The methodology is described in terms of the following: 1) variables and 2) analysis of the data.

#### Setting and Sample

The Moore Public School System is adjacent to the Oklahoma City metropolitan complex, where major employment opportunities include

recently expanded manufacturing industries, petroleum production and related industries, federal government, business, and state government. These opportunities have accentuated the population shift from small towns and rural Oklahoma, drawing an unusually large number of Native American families to the Moore area. Thus, from a school population of 14,000, the Moore Public Schools serve some 2134 children of Native American origin.

The schools included in the study were restricted to those elementary schools having fourth, fifth, and sixth grade Native American children enrolled in a Title IV-A Native American Enrichment Program for reading. There were twelve elementary schools within this system enrolling approximately 175 Native American children from kindergarten through sixth grade in the reading enrichment program.

The subjects in this incidental sample were thirty-four children enrolled in nine elementary schools. Criteria for selecting subjects were: 1) subjects were currently enrolled in grades four, five, and six; 2) subjects were currently participating in a Native American Enrichment Program, having met the criteria stipulated by either the Johnson-O'Malley Act, or Title IV-A of the Office of Indian Education; 3) subjects were scheduled into the Native American Enrichment Program specifically for reading enrichment.

#### Instrumentation

The variables specified in this investigation were the understanding of conjunctions and reading comprehension. In order to study the relationships between the variables, three instruments were selected,

one standardized and two developed especially for a similar study with fourth grade children by Stoodt. The standardized instrument was the Stanford Diagnostic Reading Test, Reading Comprehension: Part A and Part B, Green Level, 1976 Edition. This test was selected for several reasons. The paragraph section was based on content of the typical elementary school curriculum, and the paragraphs contained a high degree of grammatical conjunction. The Stanford Tests had extensive statistical validation. Reliability was obtained through split-half scores, ranging from .82 to .92 with half of them over .90. Norms for this instrument were based on pupils selected from all areas of the country, all types of school systems, and all socio-economic levels.<sup>1</sup> Another reason for this selection was that Stoodt's previous study also utilized a Stanford reading test, thereby extending comparability and the corpus of known research data. Thus, the Stanford Diagnostic Reading Test (SDRT) was valid, reliable, and contributive to the body of research knowledge.

The two tests designed specifically to measure fourth graders' understanding of conjunctions were a multiple choice Understanding of Conjunctions Test and a Cloze Comprehension of Conjunctions Test in three levels by Stoodt. These tests were carefully designed in three stages. The first stage was the selection of conjunctions to reflect conjunctions of the highest frequency and the highest frequency of meanings for those conjunctions. The second stage was a pilot study of the tests. And the third stage was revision and subsequent statistical validation.

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<sup>1</sup>Manual for Administering and Interpreting, Stanford Diagnostic Reading Test (New York: Harcourt Brace Jovanovich, Inc., 1976), p.29.

### First Stage

To select high frequency conjunctions, Stoodt considered five factors:

- 1) vocabulary lists
- 2) frequency of usage lists
- 3) findings of previous research
- 4) lists of conjunctions developed by authorities
- 5) definitions of conjunctions

Original lists of conjunctions were drawn from basic vocabulary lists and conjunctions lists. Authorities in the field of grammar were consulted to narrow this list to those words most commonly considered conjunctions by authorities. For example, Fries, a contemporary linguistic grammarian, examined some 3000 letters and found that seven function words accounted for 84.9 percent of the usage of function words. With five more function words added to the list, 92.2 percent of the usage of function words was accounted for.<sup>2</sup>

In a previous research study, Robertson studied seventeen connectives on the basis of frequency of usage in three basal series widely used in Canada.<sup>3</sup> The connectives from this study which fit into the conjunctions category were also selected.

Other lists of conjunctions developed by experts in grammar and linguistics were those of Fernald,<sup>4</sup> Long,<sup>5</sup> Strang,<sup>6</sup> Whitehall,<sup>7</sup>

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<sup>2</sup>Fries, p. 207.

<sup>3</sup>Robertson, p. 394.

<sup>4</sup>James C. Fernald, Connectives of English Speech (New York: Funk and Wagnalls Company, 1901), pp. 195-275.

<sup>5</sup>Ralph B. Long, The Sentence and Its Parts (Chicago: The University of Chicago Press, 1961), p. 207.

<sup>6</sup>Strang, p. 173.

<sup>7</sup>Whitehall, p. 60.



Mellon,<sup>8</sup> and Schuster.<sup>9</sup> After comparing these lists, Stoodt compiled a list which represented the conjunctions most often included in the majority of lists by authorities and previous research.

This list was then compared to frequency lists, in particular, A General Service List of English Words by West.<sup>10</sup> Other frequency lists consulted were those by Rinsland,<sup>11</sup> Dale,<sup>12</sup> Spache,<sup>13</sup> and Dolch.<sup>14</sup>

From these lists, conjunctions appearing with the highest frequency were selected. They were: and, but, yet, nor, or, than, for, so, if, though, while, how, that, when, where, which, because, either, neither, now, and since. Words which often appear as prepositions, such as after, were excluded from the list.

After selecting the conjunctions to be used, Stoodt consulted dictionaries to establish most common definitions of the conjunctions. Dictionaries consulted were: The World Book Dictionary,<sup>15</sup> The American

<sup>8</sup>John C. Mellon, Complex and Conjunctive Transformations (Culver, Indiana: Culver Military Academy, 1964), p. 180.

<sup>9</sup>Schuster, p. 341.

<sup>10</sup>Michael West, A General Service List of English Words (New York: Longmans, Green and Co., 1953).

<sup>11</sup>Henry D. Rinsland, Basic Vocabulary of Elementary School Children (New York: The Macmillan Co., 1945).

<sup>12</sup>Edgar Dale and Jeanne S. Chall, A Formula for Predicting Readability (Columbus, Ohio: Bureau of Educational Research, Ohio State University, 1948), pp. 19-28.

<sup>13</sup>George Spache, "A Minimum Reading-Spelling Vocabulary for Remedial Work," Journal of Educational Research (Nov., 1939), pp. 161-173.

<sup>14</sup>E.W. Dolch, Methods in Reading (Champaign, Ill.: The Garrard Press, 1955), pp. 383-74.

<sup>15</sup>Clarence L. Barnhart, ed., The World Book Dictionary (Chicago: Field Enterprises Educational Corporation, 1963).

Heritage Dictionary,<sup>16</sup> and The Random House Dictionary of the English Language.<sup>17</sup>

The conjunctions selected and the definitions developed by Stoodt are as follows:<sup>18</sup>

- and     And is used to connect words, phrases or clauses that have the same grammatical function in a construction. There are several definitions for and: (1) together, also, in addition; (2) added to; (3) as a result. And signals a relationship of addition.
- as     As is used as a comparative term to express equality. As signals a relationship of comparison.
- because Because is used as a conjunction meaning "since," or "for the reason that". Because signals a relationship of qualification.
- but     But has several definitions: (1) on the contrary; (2) however, yet; (3) except, save; (4) with the (5) other than. But signals a relationship of contrast.
- if     When if is used as a conjunction, it means "in the event that"; "or on the condition that." If signals a relationship of qualification.
- for     When for is used as a conjunction, it is defined as "because" or "since". For signals a relationship of illation.
- how     When how functions as a conjunction, it is defined as "the way in which". How signals a relationship of incorporation.
- neither, nor Neither . nor means "not either" or "not in either case". Neither . nor signals a relationship of alternation.
- now     When now is used as a conjunction, it means "since" or "seeing that". Now signals a relationship of qualification.

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<sup>16</sup>William Morris, ed., The American Heritage Dictionary of the English Language (New York: American Heritage Pub. Co., Inc., 1969).

<sup>17</sup>Jess Stein, ed., The Random House Dictionary of the English Language, Unabridged (New York: Random House, Inc., 1967).

<sup>18</sup>Stoodt, pp. 62-65.

<u>or</u>	When <u>or</u> functions as a conjunction it is used to connect words, phrases, or clauses representing alternatives. <u>Or</u> signals a relationship of alternation
<u>since</u>	When <u>since</u> is used as a conjunction it is defined as "the time when," "because," or "in view of the fact." <u>Since</u> signals a relationship of qualification.
<u>so</u>	<u>So</u> is defined as "in order that" or "with the result that" when used as a conjunction. <u>So</u> signals a relationship of illation.
<u>than</u>	<u>Than</u> is used to mean in comparison with. Usually <u>than</u> is used to mean in comparison of unequal quantities. <u>Than</u> signals a relationship of alternation.
<u>that</u>	<u>That</u> is used to introduce a subordinate clause which expresses cause, reason, purpose or result. <u>That</u> signals a relationship of incorporation.
<u>though</u>	When <u>though</u> is used as a conjunction it is defined as "although," "even if," "however," or "yet." <u>Though</u> signals a relationship of qualification.
<u>where</u>	When <u>where</u> is used as a conjunction it is defined as "at what or which place"; "in a place which." <u>Where</u> signals a relationship of qualification.
<u>when</u>	<u>When</u> is defined as "at the time which," or "though," when used as a conjunction. <u>When</u> signals a relationship of qualification.
<u>while</u>	<u>While</u> is defined as "as long as," or "during the time that." <u>While</u> signals a relationship of qualification.
<u>yet</u>	When <u>yet</u> is used as a conjunction it is defined as "though," "still," or "nevertheless." <u>Yet</u> signals a relationship of contrast.

## Second Stage

After conjunctions and definitions were developed, the investigator developed a twenty-five item test, which was piloted with nine

fourth graders in a Columbus public school. Three children in each of three achievement levels, high, average, and low, were screened, using an introspective technique of having subjects verbally discuss their choices. Using these data, the test was re-written to eliminate vague wording.

### Third Stage

After corrections were made on items which were poorly understood by the subjects, an extended test was piloted with sixty fourth grade students in Ashville, Ohio. The data collected were analyzed with the Kuder-Richardson Formula 21, and a reliability coefficient of .88 was established. On the basis of an item analysis, the test was revised by deleting two items with a negative discrimination index and by extending the fifty items to sixty-three items to increase the reliability of the instrument.<sup>19</sup>

### Cloze Comprehension of Conjunctions Test

The third measure used was the other instrument developed by Stoodt to specifically assess comprehension of conjunctions in a different format. This was the Cloze Comprehension of Conjunctions Test, with three levels of difficulty. Cloze 1 contains no conjunctions. Cloze 2 contains half as many conjunctions as Cloze 3, which has a high level of conjunctions.

The cloze procedure had been well validated for measurement of

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<sup>19</sup> Ibid., p. 61.

comprehension.<sup>20</sup> This cloze procedure involved reconstruction of a reading passage by deleting every fifth word. The first and last sentences were left intact. Validation studies had been conducted by Jenkinson,<sup>21</sup> Ruddell,<sup>22</sup> and Bormuth,<sup>23</sup> with correlations between standardized reading tests of comprehension and cloze tests ranging from .70 to .85. "It appears, at least under the conditions of the present study that cloze tests made by deleting every fifth word measure skills closely related or identical to those measured by conventional multiple choice reading comprehension tests."<sup>24</sup>

Passages of the Cloze Comprehension of Conjunctions Test were developed in a similar manner to the multiple choice test. Readability of the passages, as measured by the Lorge Readability Formula, ranged from 2.3 to 2.5. Readability was controlled at this level so that difficulty in reading would not interfere with the central problem of comprehending texts with varying degrees of grammatical conjunction. The passages were developed around topics of interest to children of this age, baseball, kite flying, and spring.

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<sup>20</sup>Ruth Gallant, "Use of Cloze Tests as a Measure of Readability in the Primary Grades," Reading and Inquiry, J.A. Figurel, ed., (Newark, Delaware: International Reading Association, 1965), pp. 286-87.

<sup>21</sup>M.E. Jenkinson, "Selected Processes and Difficulties in Reading Comprehension" (Ph.D. dissertation, University of Chicago, 1957).

<sup>22</sup>R.B. Ruddell, "An Investigation of the Effects of the Similarity of Oral and Written Patterns of Language Structure on Reading Comprehension" (Ph.D. dissertation, Indiana University, 1963).

<sup>23</sup>John R. Bormuth, "Factor Validity of Cloze Tests as Measures of Reading Comprehension Ability," Reading Research Quarterly (Spring, 1969), pp. 358-65.

<sup>24</sup>Ibid.

### Collection of Data

In September, 1979, arrangements were made to conduct the investigation of this study with fourth, fifth, and sixth graders in the Indian Enrichment Program in the Moore Public Schools, returning data to them to be used for further diagnostic work and treatment. In January, 1980, inservice began with twelve teacher-aides in the program to train them in administration of the tests selected. Three inservice sessions were conducted between January, 1980, and March, 1980. Teacher-aides were instructed in administering direction, timing the tests, and in some cases, experiencing the tests to increase their knowledge and proficiency, as examiners.

The instruments were thus administered by trained teacher-aides during the spring of 1980. Data were collected by the Administrator of the Indian Enrichment Program and the investigator's principal advisor from the University of Oklahoma. Upon receipt, the investigator scored the tests with the assistance of two doctoral students in the Reading Department of the College of Education. Data were analyzed at the University of Oklahoma Computer Facilities, with programs selected from the Statistical Package for Social Sciences.<sup>25</sup>

### Variables

The three test measures provided data on the variables of reading comprehension and understanding of grammatical conjunctions for the entire group of subjects and for each grade level as separate variables.

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<sup>25</sup>Norman H. Nie, Statistical Package for the Social Sciences (New York: McGraw-Hill Book Co., 1975)

Because of the versatility of the Cloze Comprehension of Conjunctions Test at three different levels, it was possible to use each level as a variable in statistical analysis and to use this variable for either comprehension or understanding of conjunctions.

In order to further analyze the subjects' understanding of grammatical conjunctions, the data were redefined in sub-variables for specific statistical procedures to reflect several differing linguistic theories on the nature of conjunctions. Traditional analysis of grammatical conjunctions defined specific conjunctions as belonging to one of the following classifications: 1) Addition, 2) Comparison, 3) Qualification, 4) Illation, 5) Incorporation, 6) Alternation, and 7) Contrast. Each conjunction was assigned to one of these categories on the basis of definition by dictionary. Thus, these categories became variables for study of frequency distributions and hierarchies of difficulty by grade level.

In another procedure, the data were analyzed and redefined to reflect psycholinguistic theories of comprehension and the function of conjunctions. From the subjects' responses on the Multiple Choice Conjunction Test, the incorrect answers were analyzed and tabulated to reflect the variables of syntactic acceptability and semantic acceptability, that is, the grammatical fit into the stem sentence and logical and meaningful fit into the stem sentence. The model for this type of analysis was Goodman's Miscue Analysis, in which "miscues made by each reader. . . can then be compared. . . as the percentages of miscues that. . . are syntactically and semantically acceptable."<sup>26</sup>

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<sup>26</sup>Carolyn G. Burke, "Reading Miscue Research: A Theoretical Position," Findings of Research in Miscue Analysis: Classroom Implications, ed. by P. David Allen (Urbana, Ill.: NCTE, 1976), p. 22.

A chi-square analysis of these frequencies by grade level was utilized to ascertain if there were significant developmental changes in the dependence upon syntactic or semantic cueing.

For purposes of establishing a hierarchy of difficulty among the conjunctions, an item analysis was run, wherein each test item became a variable for all subjects as a group, and for each grade level. Table I gives the variables, statistical procedures, use of procedures, and related hypotheses.

TABLE 1  
STATISTICAL PROCEDURES

Variables	Statistical Procedures	Use of Procedures	Related Hypothesis
<u>Pairs:</u>			
<u>Reading Comp.</u>			
SDRT MC Conj	1. Scattergrams	Appraisal of data for linearity and homoscedasticity.	Hypothesis I
SDRT CLOZE 1			Hypothesis III
SDRT CLOZE 2	2. Spearman Rho Correlation		Hypothesis I
SDRT CLOZE 3			
CLOZE 1 MC Conj			
CLOZE 2 MC Conj			
CLOZE 3 MC Conj			
<u>Each Conjunction:</u>			
MC Conj Grade level	1. Crossbreak	Item analysis for most difficult conjunctions	Hypothesis II
<u>Categories of conjunctions:</u>			
Addition Total Subjects	1. Crosstabulation	Comparison of most difficult items in categories by grade level	Hypothesis II and III
Comparison 4th Grade			
Qualification 5th Grade			
Illation 6th Grade			
Incorporation			
Alternation			
Contrast			
<u>Miscue Variables</u>			
Syntactic Fit 4th Grade	1. Chi-Square	Comparison of subjects' dependence on semantic or syntactic cues.	Hypothesis III
Semantic Fit 5th Grade			
6th Grade			
<u>Understanding of Conjunction:</u>			
MC Conj Test 4th Grade	1. Mann-Whitney U	Analysis of variance of grade levels	Hypothesis III
CLOZE 1 5th Grade			
CLOZE 2 6th Grade		Comparison of rankings of most difficult conj.	Hypothesis II
CLOZE 3			



Data on the variables were first examined through scatter diagrams for linearity and homoscedasticity. Because of the large degree of scatter in many of the diagrams, and because of the nature and size of the sample, the objectives of Hypothesis I were assessed with the Spearman Rho, a nonparametric formula suitable for nonprobability sampling<sup>27</sup>

To establish the hierarchy of difficulty proposed in Hypothesis II, an item analysis was run for the entire group of subjects and for each grade level, using a Crosstabs program of the computer package SPSS. From these crosstabulations, the most difficult conjunctions were identified, those with less than 19% accuracy.

To further extend exploration of Hypotheses II and III, the most difficult conjunctions were redefined into variables matching traditional categories of conjunctions: 1) Addition; 2) Comparison; 3) Qualification; 4) Illation; 5) Incorporation; 6) Alternation; and 7) Contrast. These categories were arranged in hierarchies of difficulty, those having the most difficult conjunctions, by grade level.

Another subsidiary investigation of Hypothesis III involved regrouping data for the conjunctions in the most difficult range for each grade level. For this analysis, the most frequent incorrect answers were judged for syntactic or semantic fit, according to "Miscue Analysis" procedures. Chi-square analyses were utilized to ascertain maturational changes in syntactic or semantic dominance in incorrect answers, and any shifts from one system to the other.

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<sup>27</sup>N.M.Downie and R.W.Heath, Basic Statistical Methods, Fourth Edit. (New York: Harper and Row, Pub., 1974), p. 153.

Finally, in assessing the maturational development in the understanding of conjunctions, the data were examined with the Mann-Whitney U Test. This "is one of the most powerful of the nonparametric tests, and it is a most useful alternative to the parametric t-test when the researcher wishes to avoid the t-test's assumptions."<sup>28</sup> A level of confidence was set at .05, but results were reported at actual levels for clarity of reading.

### Summary

The purpose of this study was to determine the relationship between the understanding of grammatical conjunctions and reading comprehension for Native American children in the fourth, fifth, and sixth grades. The problem was approached through three hypotheses. The first involved the correlation between reading comprehension and understanding conjunctions for the group and for each grade. The second involved the establishment of a hierarchy of difficulty among the most difficult conjunctions. The third problem concerned tracing developmental changes through these grades in the understanding of conjunctions and in the relationship between the two variables.

Three test instruments were used: the Stanford Diagnostic Reading Test, the Multiple Choice Conjunctions Test, and the Cloze Comprehension of Conjunctions Test. Statistical procedures used were the Spearman Rho Correlation, scattergrams, crossbreaks, chi-square, and the Mann-Whitney U.

The next chapter presents the findings of the procedures and analyses implemented.

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<sup>28</sup>Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., 1956), p. 116.

## CHAPTER IV

### FINDINGS AND DISCUSSION

This study was conducted to investigate the relationship of the understanding of grammatical conjunction and reading comprehension in Native American children in an urban setting. Thirty-four Native American subjects from the fourth, fifth, and sixth grades were administered a group of tests measuring reading comprehension and understanding of conjunctions. The data from these tests were analyzed to study three problems: 1) the correlation between reading comprehension and the understanding of conjunctions; 2) a hierarchy of difficulty among the conjunctions selected for the study; and 3) the maturational development in the understanding of conjunctions.

#### Correlation Between Reading Comprehension And Understanding of Grammatical Conjunction

Both of the variables of reading comprehension and the understanding of conjunctions were measured with two test instruments of differing formats: a multiple choice test and a cloze test. For all grades, the correlation between reading comprehension and the understanding of conjunctions on the multiple choice tests (SDRT and MCCT) was .39,  $p = .01$ . However, the correlation between the multiple choice test of reading comprehension (SDRT) and Cloze 3 Understanding of Conjunctions was only .16,  $p = .18$ . Similarly, when reading comprehension was measured by Cloze 3 and understanding of conjunctions was measured

by the MCCT, the correlation was .08,  $p = .31$ . For all grades, when both variables were represented by cloze tests, Cloze 2 and Cloze 3, there was a highly significant level of correlation,  $r = .52$ ,  $p = .001$ . Grade level was a highly significant factor in the understanding of conjunctions through Cloze 3,  $r = .60$ ,  $p = .001$ . It was significant in comprehension through Cloze 2,  $r = .32$ ,  $p = .05$ . Grade was not a significant factor in the correlations with the multiple choice tests. Table 2 gives a summary of correlations for all grades.

TABLE 2  
SUMMARY OF CORRELATIONS: ALL GRADES

N = 34					
	CLOZE 1	CLOZE 2	CLOZE 3	MCCT	SDRT
CLOZE 1		$r = .66$ $p = .001^*$	$r = .49$ $p = .001^*$	$r = .06$ $p = .37$	$r = .06$ $p = .38$
CLOZE 2			$r = .53$ $p = .001^*$	$r = .09$ $p = .31$	$r = -.07$ $p = .36$
CLOZE 3				$r = .09$ $p = .31$	$r = .16$ $p = .18$
MCCT					$r = .40$ $p = .01^*$
GRADE	$r = .11$ $p = .26$	$r = .32$ $p = .03^*$	$r = .60$ $p = .001^*$	$r = .17$ $p = .16$	$r = .06$ $p = .38$

Correlations Within Grade Levels

Fourth Grade

For the fourth grade subjects only, there was a significant correlation between the variables of reading comprehension and the understanding of conjunctions, as measured by multiple choice tests SDRT and MCCT:  $r = .60$ ,  $p = .05$ . When test formats were mixed, there were negative correlations for both sets of variables: SDRT and Cloze 3,  $r = -.05$ ; Cloze 3 and MCCT,  $r = -.09$ . Nor was there a significant correlation between the two variables, when both were measured by Cloze Tests 2 and 3,  $r = .09$ ,  $p = .38$ . Curiously, for these younger subjects, Cloze 1 and Cloze 3 approached significance,  $r = .47$ ,  $p = .06$ . A summary of correlations for Grade Four is given in Table 3.

TABLE 3  
SUMMARY OF CORRELATIONS: FOURTH GRADE

N = 12					
	CLOZE 1	CLOZE 2	CLOZE 3	MCCT	SDRT
CLOZE 1		$r = .26$ $p = .21$	$r = .47$ $p = .06$	$r = .08$ $p = .40$	$r = .009$ $p = .49$
CLOZE 2			$r = .09$ $p = .38$	$r = -.26$ $p = .20$	$r = -.16$ $p = .31$
CLOZE 3				$r = -.09$ $p = .39$	$r = -.05$ $p = .45$
MCCT					$r = .60$ $p = .018^*$

### Fifth Grade Correlations

Spearman Rho correlations for the fifth grade sample produced a different pattern from those of the fourth grade. There was no significant correlation between the variables of reading comprehension and understanding of conjunctions, as measured by multiple choice tests SDRT and MCCT,  $r = .05$ ,  $p = .42$ . However, there were highly significant correlations between the variables, as measured by Cloze Tests 1 and 2,  $r = .76$ ,  $p = .001$ , and by Cloze Tests 1 and 3,  $r = .61$ ,  $p = .01$ . Pairing the variables across a mixed format, Cloze 1 or 2 with SDRT, produced negative correlations, even to a level of significance: Cloze 2 and SDRT,  $r = -.55$ ,  $p = .02$ . When the Multiple Choice Conjunction Test measured understanding of conjunctions and comprehension was assessed through the cloze tests, the correlations were simply weak, the strongest being between Cloze 1 and MCCT,  $r = .37$ ,  $p = .10$ . Therefore, one sees a continued correlation between the variables of reading comprehension and understanding of conjunctions, but only when measured in the format of the cloze tests and not in the multiple choice format. Furthermore, the potential influence of test format appeared to be in different patterns at the fourth and fifth grade levels. A summary of correlations for the fifth grade sample is given in Table 4.

TABLE 4  
SUMMARY OF CORRELATIONS: FIFTH GRADE

N = 13					
	CLOZE 1	CLOZE 2	CLOZE 3	MCCT	SDRT
CLOZE 1		r = .76 p = .001*	r = .61 p = .01*	r = .37 p = .10	r = -.30 p = .16
CLOZE 2			r = .36 p = .11	r = .11 p = .35	r = -.55 p = .02*
CLOZE 3				r = .25 p = .20	r = .04 p = .45
MCCT					r = .05 p = .42

#### Sixth Grade Correlations

For sixth grade subjects, the relationship between reading comprehension and understanding of conjunctions followed a pattern similar to the fifth graders. There was no significant correlation between the two variables, as measured through multiple choice tests SDRT and MCCT. However, cloze tests assessing the two variables had significant correlations: Cloze 2 and Cloze 3,  $r = .60$ ,  $p = .05$ ; Cloze 1 and Cloze 2,  $r = .77$ ,  $p = .007$ . Negative correlations continued between the cloze test for conjunctions and the SDRT; and there were low correlations between the Multiple Choice Conjunctions Test and cloze tests of comprehension. Table 5 gives the correlations for the sixth grade subjects.

TABLE 5  
SUMMARY OF CORRELATIONS: SIXTH GRADE

	CLOZE 1	CLOZE 2	CLOZE 3	MCCT	SDRT
CLOZE 1		$r = .77$ $p = .007$	$r = .30$ $p = .21$	$r = -.32$ $p = .20$	$r = -.04$ $p = .46$
CLOZE 2			$r = .60$ $p = .05$	$r = .11$ $p = .38$	$r = -.004$ $p = .50$
CLOZE 3				$r = .16$ $p = .38$	$r = .27$ $p = .24$
MCCT					$r = .17$ $p = .33$

#### Summary of Findings for Hypothesis I

The alternate hypothesis, which stated that there is a statistically significant correlation between understanding of grammatical conjunction and reading comprehension, was accepted for the entire group, and for the fourth grade sub-sample, on the evidence of significant correlations between the multiple choice tests SDRT and MCCT. The hypothesis was accepted for the fifth and sixth grade samples, on the basis of the correlations between cloze tests measuring these variables. However, findings from the multiple choice did not support this. The nature of the developmental changes causing these contradictory findings was explored in Hypothesis III.

#### Hierarchy of Difficulty in Conjunctions

The objective of Hypothesis II was to determine whether there was a hierarchy of difficulty among the various conjunctions identified as the most frequently used conjunctions in previous research. An



item analysis was done, utilizing the Crossbreak feature of the SPSS program, to identify the conjunctions which had the lowest frequency of correct answers by grade level and for the group as a whole.

After the hierarchy of most difficult conjunctions was established, a second analysis of hierarchy of difficulty was investigated. In this analysis, the most difficult conjunctions were grouped into traditional categories reflecting rational function upon the basis of dictionary definition. The variables thus became the conjunction categories: 1) Addition, 2) Comparison, 3) Qualification, 4) Illation, 5) Incorporation, 6) Alternation, and 7) Contrast, and the frequencies in each group were ranked.

#### Hierarchy of Difficulty of Conjunctions

For all subjects, there were ten items of sufficient difficulty that fewer than 18% of all subjects answered these items correctly. These ten items represented eight conjunctions (in descending order of difficulty): that, if, so, while, how, where, yet, and or. Table 6 presents lists of the conjunctions of most difficulty in rank order for the entire group and for each grade separately, along with the rational category and most frequently chosen incorrect answer.

#### Hierarchy of Difficulty for Fourth Graders

In the item analysis of fourth graders' responses on the sixty-three item Multiple Choice Understanding of Conjunctions Test, eighteen items fell within the frequencies of 18.2% correct. These items contained thirteen conjunctions: if, so, when, or, where, while, how, that, than, but, yet, because, and why. The fact that these

conjunctions corresponded to the same hierarchy of a large scale study by Stoodt with ninety-five fourth graders selected randomly from three socioeconomic levels reinforced the findings of this study.

#### Hierarchy of Difficulty for Fifth Graders

The list of most difficult conjunctions, those with 18.2% or less correct answers, was shorter for the fifth graders. There were only eight conjunctions, compiled from ten test items out of the sixty-three item test: that, where, while, if, so, how, or, and yet. The conjunctions when, but, than, because, and why no longer appeared in the list. The ordering of ranks had changed, in that the most difficult ones, if, so, and or, had dropped to lower ranks, and the incorporative conjunction, that, assumed primacy.

#### Hierarchy of Difficulty for Sixth Graders

Tabulation of sixth graders' responses in the MCCT produced eleven conjunctions with frequencies of less than 18% correct answers: so, while, if, that, yet, how, where, though, because, since, and when. Conjunctions no longer in the most difficult range were or, than, but, and why. The most difficult item was so, with no correct responses. But an examination of the most frequent incorrect responses revealed another view of these simple frequencies. The most frequent incorrect answer for the item so in "He walked slowly, so that he would not fall," was "therefore", an alternative which expressed the relationship correctly, but failed to adhere to the syntactic constraints of the given sentence. An examination of all of the most frequent incorrect choices for the most difficult items provided

additional insights into the understanding of conjunctions in a developmental perspective. This analysis is reported in the later section dealing with developmental maturation. However, it was appropriate to mention it here as bearing upon the findings of a hierarchy of difficulty.

### Summary

There was a significant hierarchy of difficulty of conjunctions for fourth, fifth, and sixth grade Native American children in an urban setting. There were also hierarchies for each grade level, which changed and became shorter in some cases. The most significant changes occurred from the fourth to the fifth grades. The hierarchies of difficulty for the entire group and for each grade are presented in Table 6. The Mann-Whitney U provided statistical analyses indicating significant differences in the ranks and frequencies between the fourth and fifth graders, greater than .01, but not between the fifth and sixth graders.

### Hierarchy of difficulty by Categories of Conjunctions

When the conjunctions in the Most Difficult frequencies were regrouped into traditional categories reflecting rational function, upon the basis of dictionary definition, the following analyses were made. Frequencies of most difficult conjunctions in each category were converted to percentages based upon the total number of test items in that category. Thus, the hierarchy reflected the order of conjunctive categories having the highest percentages of most difficult conjunctions. These categories were: 1) Addition, 2) Comparison,

TABLE 6

TOTAL AND RANK ORDER OF MOST DIFFICULT  
CONJUNCTIONS BY GRADE

TABLE 6									
MOST DIFFICULT CONJUNCTIONS TOTAL AND BY GRADE									
Item No.	TOTAL Conjunc. that	Type Incorp.	Rank 1	% Correct 6.9	Rank 2	% Correct 9.1	FOURTH GRADE Most Freq and	Incorrect Ans.	Type Conj. Addition
31-1	if	Qualif.	1	6.9	1	0.	when it		Qualif.
26-1	so	Illatn.	2	13.3	2	9.1	then		Adverb
26-2	while	Qualif.	2	13.3	2	9.1	when		Qualif.
16-2	how	Incorp.	2	13.3	2	9.1	when		Qualif.
15-2	where	Qualif.	2	13.3	2	9.1	because		Qualif.
19-2	how	Incorp.	3	16.7	2	9.1	why		Incorp.
11-2	if	Qualif.	3	16.7	3	18.2	when		Qualif.
11-1	yet	Contrast	4	17.2	3	18.2	also		Addition
23-1	or	Altern.	4	17.2	3	9.1	other than		Alternation
31-2	when	Qualif.	5	20.0	2	9.1	because		Qualif.
27-1	so	Illation	6	18.2	3	18.2	therefore		Illation
22-2	so	Illation	7	24.1	4	27.3	but		Contrast
27-2	when	Qualif.	8	26.7	3	18.2	as		Comparison
18-2	because	Qualif.	8	26.7	3	18.2	when		Qualif.
30-1	how	Incorp.	9	27.6	3	18.2	in addition		Addition
2-1	why	Incorp.	10	30.0	3	18.2	if		Qualif.
29-1	while	Qualif.	11	34.5	5	45.5	therefore where as long as		Illation Qualif. Qualif.
15-1	but	Contrast	11	34.5	3	18.2	then so why		Adverb Illation Adverb
10-2	but	Contrast	10	30.0	3	18.2	which		Relative Pron

TABLE 6 (cont.)

TOTAL AND RANK ORDER OF MOST DIFFICULT  
CONJUNCTIONS BY GRADE

FIFTH GRADE									SIXTH GRADE		
Item No.	Conjunc.	Type	Rank	% Correct	Most Freq Inc.Ans.	Type Conj.	Rank	% Correct	Most Freq.Incorrect Ans.	Type Conj.	
31-1	that	Incorp.	1	0.0%	but and	Contr. Addit.	2	14.3	but and	Contrast Addition	
26-1	if	Qualif.	3	9.1%	when it	Qualif.	3	16.7	then	Adverb	
29-2	so	Illation	4	15.4%	then	Adverb	3	16.7	then also	Adverb Addition	
26-2	while	Qualif.	2	7.7	when	Qualif.	8	33.3	because	Qualif.	
16-2	how	Incorp.	4	15.4	when	Qualif.	3	16.7	how it is done	Clause	
15-2	where	Qualif.	2	7.7	because	Qualif.	8	33.3	because	Qualif.	
19-2	when	Qualif.	6	23.1	when	Qualif.	3	16.7	why	Incorp.	
11-2	if	Qualif.	5	18.2	also	Additn.	5	18.2	also	Addition	
11-1	yet	Contrst.	5	18.2	also	Additn.	2	14.3	also	Addition	
23-1	or	Altern.	5	18.2	other than	Adverb	7	28.6	other than	Adverb	
31-2	when	Qualif.	7	30.8	because	Qualif.	3	16.7	because although	Qualif. Alternation	
27-1	so	Illatn.	10	45.5	so that	Illatn.	1	0.0	therefore	Adverb	
22-2	so	Illatn.	6	23.1	and so	Illatn.	8	33.3	but and so in addition	Contrast Illatn. Prep. phrase	
27-2	when	Qualif.	10	45.5	as	comparis.	8	33.3	when	Qualif.	
18-2	because	Qualif.	9	38.5	the cause of	Phrase	3	16.7	while	Qualif.	
30-1	how	Incorp.	5	18.2	when in addition	Qualif. Prep.Ph	7	28.6	where when	Qualif. Qualif.	
29-1	while	Qualif.	8	36.4	when the reason	Qualif. Noun			the cause of	Prep. Phrase	
					therefore	Adverb	2	14.3	therefore	Adverb	
15-1	but	Contrast	8	36.4	then so	Adverb Illative	8	36.4	then so	Adverb Illation	
2-1	why	Incorp.	9	38.5	if	Qualif.	8	33.3	whether if	Incorp. Qualif.	

3) Qualification, 4) Illation, 5) Incorporation, 6) Alternation, and 7) Contrast.

Of these categories, those which had the most difficult conjunctions were: 1) Incorporation, 2) Illation, 3) Qualification, 4) Contrast, and 5) Alternation. Conjunctions of addition and comparison did not appear in the most difficult ranks. The distribution of most difficult conjunctions in the conjunctive categories, the distribution of total test items in conjunctive categories, and the percentages reflecting this relationship are given in Table 7.

The most difficult category for both fourth and fifth graders was that of incorporation, such as that or how, although the frequency of occurrences dropped from 56% to 33%. The next most difficult category was that of illation, which signified the relationship of result, such as so. The element of reasoning in the illative relationship could be easily recognized. However, the next highest category, qualification, also included conjunctive reasoning in connectives such as because and if. It also included conjunctions with greater variety of meanings, such as the conjunction when, which was defined as signifying both causality and simultaneity. This category presented more difficulty for the sixth grade students, while they had no difficulty with alternation, such as the word or represented, and almost none with contrast, such as but represented. It might have been that the older students did not understand this category less, but that they understood the various meanings for a single conjunction more. This theory was explored in the Miscue Analysis of the most frequent incorrect answers under Hypothesis III. Conjunctions in

TABLE 7

## DISTRIBUTION OF CONJUNCTIONS BY CATEGORIES

Category	Total Test	Grade 4	Grade 5	Grade 6
Addition	7	0	0	0
Comparison	3	0	0	0
Qualification	20	9 46%	5 25%	8 42%
Illation	4	2 50%	1 25%	2 50%
Incorporation	9	5 56%	3 33%	3 33%
Alternation	8	2 25%	2 25%	0 0%
Contrast	12	5 42%	1 8%	1 8%

TABLE 8

## HIERARCHY OF DIFFICULTY BY CATEGORY

Grade 4	Grade 5	Grade 6
1. Incorporation	1. Incorporation	1. Illation
2. Illation	2. Illation Qualification Alternation	2. Qualification
3. Qualification	3. Contrast	3. Incorporation
4. Contrast		4. Contrast
5. Alternation		

the contrast category still were substantially troublesome to the fourth graders, while they presented almost no problems to the fifth and sixth graders. These data are presented in Table 8.

### Summary

There was a hierarchy of difficulty of categories of conjunctions for each of the grade levels. These ranks changed, indicating developmental changes from grade to grade. The actual frequencies of conjunctions in each category decreased from year to year, with the exception of those in the category of qualification.

### Maturational Development in the Understanding of Conjunctions

The problems posed by Hypothesis III were maturational development in understanding conjunctions and the difficulty of conjunctions as understood by Native American children in an urban setting. This objective was explored through several procedures. Descriptive data for each grade level's performance on five measures is given in Table 10. This description includes means, standard deviations, variances, and ranges. The frequencies of performance scores for each grade level were tested for significant differences by grade with the Mann-Whitney U Test. And finally, the incorrect answers for each grade level on the most difficult test items were compared on the basis of syntactic or semantic fit, in a procedure based upon Goodman's Miscue Analysis.

A straightforward examination of the data showed an advance in the means from the fourth to the fifth grades, and a decrease from the fifth to the sixth grades on the two multiple choice tests, the Stanford Diagnostic Reading Test and the Multiple Choice Conjunction



Test. There was also a broadening of the standard deviation and variance from fourth to fifth to sixth grades. These statistics are shown in Table 10. The changed MCCT ranks from the fourth to the fifth grades were significant with a probability of .002 reflected by the Mann-Whitney U Test. The Multiple Choice Conjunctions Test evidenced a decrease in the mean from the fifth to the sixth grades, which was not of significance when tested with the Mann-Whitney.

On the other hand, there was a straightforward progression in means from grade to grade in the Cloze Comprehension of Conjunctions Test, which were designed to measure comprehension and also the understanding of conjunctions in the upper two levels. Cloze 1 was a measure of comprehension only, as it contained no conjunctions. There was an advance in the means through each grade level, but the sets of scores did not reach significance with the Mann-Whitney U. Cloze 2, which contained some conjunctions and was, therefore, a measure of understanding of conjunctions, also evidenced advanced means through the three grade levels. These sets of scores showed significant changes, beyond a probability of .01.

But it was the Cloze 3 form, which contained twice as many conjunctions and was, therefore, a more potent assessment of understanding of conjunctions, which proved the most significant advances. The fourth and fifth grade scores displayed changed ranks highly significant, with a probability greater than .001. The sixth grade scores outranked the fifth grade scores significantly, with a probability of .025.

In the presence of such contradictory findings, it was tempting to dismiss some of the data as spurious or reflecting an unidentified variable associated with test format. The sixth grade sample had a higher rate of attrition and might, therefore, have been subject to the influence of a few low scores on the Multiple Choice Conjunction Test. But the steady advance in reading comprehension and the understanding of conjunctions in the Cloze 3 test proved to be the most statistically significant of all of the test forms. And this was within the context of real reading tasks.

Another quantitative way to measure progress from grade to grade was simply to compare the number of most difficult conjunctions from the items of the MCCT which fell within the range of 18.2% frequencies of correct answers. From this point of view, the largest gain was, again, from the fourth to the fifth grades, the number of conjunctions declining from thirteen (fourth grade) to eight (fifth grade), followed by an increase to eleven (sixth grade). Again, this evidence might have indicated a skewing of the data by a sixth grade sample that was small enough to be distorted by extreme scores and which could not provide a true comparison of growth. Yet, the sixth grade scores were significantly higher and had a smaller standard deviation and variance than the fourth and fifth grades on the Cloze 3 test.

#### Miscue Analysis

In this procedure the most frequently chosen incorrect answers were identified as being semantically correct or syntactically correct according to the constraints of the given stem. Analyses of these

responses of fourth, fifth, and sixth graders are shown in Tables 11, 12, and 13 in Appendix B. A summary of these data are as follows:

	Syntactically Correct	Semantically Correct
4th Graders	18	2
5th Graders	13	2
6th Graders	12	8

From these data, it appeared that the younger children, with a higher number of syntactically correct wrong answers, maintained the grammatical or syntactic unity of the sentence at the expense of the semantic or logical sense of the sentence. The older children more readily sacrificed the grammatical unity of the sentence to complete the more logical semantic sense of the original conjunction.

While the syntactic differences appeared to be notable, it was the semantic discrepancies which proved to be more significant statistically. The developmental changes in the use of the semantic cues were significant beyond the .01 level, with the greatest differences occurring from the fourth to the fifth grade. The developmental changes in the use of syntactic cues, which followed a decreasing pattern, reached significant levels only from the fourth to the fifth grades, at the level of .05. It appeared that for these fourth, fifth, and sixth grade Native American subjects, a strong change in the search for logical meaning in conjunctions was taking place. This change was highly significant from the fourth to the fifth grades, and it continued at a significant level from the fifth to the sixth grades. Table 10 presents Chi-square summaries of these data.

TABLE 10  
CHI-SQUARE SUMMARIES  
MISCUE ANALYSIS

<u>Semantic Differences</u>				
GROUPS	df	Chi <sup>2</sup>	Significance	
All subjects	2	16.12	.005	(.005 = 10.60)
4th/5th graders	1	15.72	.005	(.005 = 7.88)
5th/6th graders	1	6.32	.01	(.01 = 6.63)
4th/6th graders	1	10.20	.005	(.005 = 7.88)
<u>Syntactic Differences</u>				
GROUPS	df	Chi <sup>2</sup>	Significance	
All subjects	2	3.19	.10	(.10 = 4.16)
4th/5th graders	1	3.79	.05	(.05 = 3.84)
5th/6th graders	1	1.69	.10	(.10 = 2.71)
4th/6th graders	1	1.9	.10	(.10 = 2.71)

#### Scattergrams

Scattergrams for each grade level representing pairs of tests correlating understanding of conjunctions and reading comprehension, in which at least one measure is an objective test, showed changing patterns of distributions. The fourth grade pairs tended to have a more linear distribution. The fifth grade pairs showed more random scatter. And the sixth grade pairs tended to show a more parabolic pattern, indicating what might have been a curvilinear relationship. For these selected pairs, there was a significant correlation only

for the fourth graders on the two objective measures, the MCCT and the SDRT. The sixth grade showed a distinctively curvilinear shape for Cloze 3 and the SDRT. If this was an accurate representation of behaviors for this sample, then there was another variable, possibly two, influencing the relationship, as a component of the developmental process of maturation. Findings from the Miscue Analysis suggested that an influencing variable might be a growing dominance of the search for logical meaning. The investigation of the most frequently chosen incorrect answers suggested that another factor might be a broadened vocabulary in terms of understanding of more than one meaning for a given word. Scattergrams are presented in Tables 14, 15, and 16 in Appendix B.

#### SUMMARY

This chapter has presented the findings and discussion of the study investigating the relationship of the understanding of conjunctions and reading comprehension. It has shown that there was a statistically significant relationship between the understanding of conjunctions and reading comprehension for the entire sample of Native American children, and for the fourth, fifth, and sixth grades as separate subsamples. A hierarchy of difficulty for the group and for each grade level was found to be significant. When conjunctions were classified by rational category, the categories were found to have rankings of difficulty, which both changed and diminished through maturational development.

Findings on maturational growth and development were mixed. The

objective test measures showed significant growth only from the fourth to the fifth grades. But the Cloze 3 test, which had the largest number of conjunctions provided data to chart maturational growth of significant levels from grade to grade, fourth through sixth. Miscue Analysis showed a shift from syntactic cueing strategies to semantic cueing strategies through the three grades. Scattergrams suggested a growing tendency in the relationship of the understanding of conjunctions to reading comprehension to be curvilinear, suggesting the growing presence of one or more additional variables.

The next chapter presents a summary of the findings, conclusions based upon the findings, and recommendations for further research indicated by this investigation.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Syntactic studies in reading comprehension had been fruitful in the last two decades in charting the relationship of children's comprehension strategies to varying syntactic structures in the written sentence. As research delved more specifically into variations of syntax, function words, such as conjunctions, materialized as important cueing elements. Studies focused on specific grade levels. But a search of the literature revealed a lack of research in a developmental design. This was especially true of minority populations, such as Native American children.

The present study was undertaken to assess Native American children's comprehension as related to their understanding of conjunctions, a pivotal element signaling the complex sentence and complexity of thought. It had been well known and often commented that the fourth grade marked the end of the learning to read period and the beginning of the reading to learn period. This study explored that transition in terms of the relationship of reading comprehension to understanding of conjunctions, the hierarchy of difficulty of the most commonly used conjunctions, and developmental trends and changes in comprehension of conjunctions in fourth, fifth, and sixth grade Native American children in an urban setting.

Subjects for this study were thirty-four Native American children with various tribal and linguistic backgrounds in varying degrees,

in nine elementary schools in Moore, Oklahoma. The variables of reading comprehension and understanding of conjunctions were measured in two different formats. The multiple choice instruments were the Stanford Diagnostic Reading Test and the Multiple Choice Conjunctions Test. Three levels of the Cloze Understanding of Conjunctions Test provided an alternative format for the measurement of the two variables. Cloze 1, having no conjunctions, was a measure of comprehension only. Cloze 2, having some conjunctions, and Cloze 3, having twice as many conjunctions, assessed understanding of conjunctions at varying levels of complexity.

Because of the size and nature of the sample, nonparametric statistics were used for analysis of the data. Correlation of variables was analyzed with the Spearman's Rho formula. An item analysis, Cross breaks, and the Mann-Whitney U were used to explore the hierarchy of difficulty of conjunctions. The Mann-Whitney U test was used to examine developmental growth and trends in the understanding of conjunctions through the three grade levels.

#### Summary

The analysis of the data resulted in the following findings:

1. There was a significant correlation between the understanding of conjunctions and reading comprehension for the entire sample of fourth, fifth, and sixth graders ( $r = .40$ ;  $p = .01$ ).
2. There was a significant correlation between reading comprehension and the understanding of conjunctions for the fourth grade sample ( $r = .60$ ;  $p = .01$ ).



3. There was no statistical correlation between reading comprehension and the understanding of conjunctions for the fifth grade sample, when measured by multiple choice objective tests.

4. There was a significant correlation between reading comprehension and the understanding of conjunctions for the fifth grade sample, when measured by cloze tests ( $r = .61$ ;  $p = .01$ ).

5. There was no statistical correlation between reading comprehension and the understanding of conjunctions for the sixth grade sample, when measured by multiple choice tests.

6. There was a significant correlation between reading comprehension and understanding of conjunctions for the sixth grade sample, when measured by cloze tests ( $r = .77$ ;  $p = .007$ ).

7. There was a hierarchy of difficulty of conjunctions for the group as a whole and for each grade level.

8. There was a hierarchy of difficulty in conjunctive categories, the order of which changed for each grade level.

9. There was an increase in the understanding of conjunctions from the fourth to the fifth grades, as measured by the multiple choice test ( $p = .002$ ).

10. There was a decrease in the understanding of conjunctions from the fifth to the sixth grades, as measured by the multiple choice test.

11. There was an increase in the understanding of conjunctions from the fourth to the fifth grades, as measured by Cloze 3 tests ( $p = .001$ ).

12. There was an increase in understanding of conjunctions from the fifth to the sixth grades, measured by Cloze 3 ( $p = .025$ ).

13. There was a significant increase in semantically accurate incorrect answers on the objective measure of understanding of conjunctions from grade to grade ( $p = >.01$ ).

14. There was a decrease of syntactically accurate incorrect answers from grade to grade, significant only from fourth to fifth grades ( $p = >.05$ ).

### Conclusions

The following conclusions were made as a result of the analysis of the data obtained in this study:

1. There was a significant relationship between reading comprehension and the understanding of conjunctions for these Native American subjects in the fourth, fifth, and sixth grades. The nature of that relationship appeared to change through maturational development. These developmental changes indicated by the statistical analyses provided some of the more interesting insights from this study. For the youngest subjects, the fourth graders, the relationship was strong and linear when measured by the Multiple Choice Conjunctions Test, which targeted the most common definitions of the most frequently used conjunctions. This relationship did not hold up for the fifth and sixth grade subjects on the multiple choice tests. However, it did continue for both grades, when measured by cloze tests, which allowed for a broader range of vocabulary choices.

While the multiple choice tests failed to produce significant correlations, scattergrams suggested alternative interpretations for this apparent contradiction in findings. Fifth grade plottings

showed a large degree of scatter. But with sixth grade scores, the relationship became increasingly curvilinear, indicating the presence of one or more additional variables. The scatter present in fifth grade correlations might have reflected Holmes' and Singer's observations that "total variance attributed to vocabulary abilities increases significantly after the fifth grade and then remains approximately the same from the sixth grade. . . ."

2. A hierarchy of difficulty of conjunctions was established for each of the grade levels. The rankings for the fourth grade sample were approximately the same as those reported in a large scale study of a random stratified sample of fourth graders in an industrial city in Ohio by Stoodt. This measure, therefore, established a degree of comparability between the Native American sample and a larger random sample in a different geographic location. The list of most difficult conjunctions decreased from the fourth to the fifth grades and increased slightly from the fifth to the sixth grades.

When the most difficult conjunctions were regrouped by traditional categories reflecting rational function, rankings were established for each grade level. The most difficult category for both fourth and fifth graders was incorporation, such as that and how. There was no previous research with which this finding corroborated. The next most difficult categories for fourth and fifth graders, and the most difficult first and second ranks for sixth graders, were illation and qualification. This finding concurred with Loban's study that showed that fifth, sixth, and seventh graders were beginning to frame clauses of hypotheses and consequences in written and oral language.

3. A significant increase in the understanding of conjunctions through maturation occurred, most highly evidenced from the Cloze 3 data. The contradictory evidence from the multiple choice conjunctions test suggested that this objective test was overly simplistic in relying on the most common definition. The curvilinear relationship indicated by sixth grade scattergrams corroborated this assumption, indicating that with maturation the relationship became more complex and represented the growing presence of one or more unidentified variables. The hierarchy of difficulty of conjunctive categories suggested that the unidentified variable might be related to cognitive or reasoning factors. The Miscue Analysis indicated that there was a shift in dominance from syntactic factors to semantic factors: a search for meaning and a depth of vocabulary. This indicated a vocabulary related variable, or a factor compounded of both vocabulary and reasoning. These findings corroborated and enlarged upon Holmes' and Singer's observation that there was a "developmental shift from a predominance of visual perceptual abilities at the third grade to a more equitable organization of visual perceptual and word meaning factors at the sixth grade level." It enlarged considerably upon their conclusion that there was a "gradient shift. . .a reorganization of substrata factors that occurred during a child's growth".

#### Recommendations

The following recommendations were offered on the basis of this study:

1. The indications of a developmental trend towards a curvilinear

relationship in the understanding of conjunctions and reading comprehension showed a need for further research with larger samples of both minority groups and randomly selected urban subjects for the three grade levels.

2. The dissimilarity of findings from the objective Multiple Choice Conjunctions Test and the Cloze Comprehension of Conjunctions Test indicated the need for a replication with a redesigned Multiple Choice Conjunctions Test for subjects beyond the fourth grade level. The design of this instrument should reflect research of frequencies of both specific conjunctions and the meanings of these conjunctions found in higher levels of reading material.

3. The developmental trends suggested by the findings of the Miscue Analysis should be investigated with an instrument specifically designed to force a choice of semantically correct or syntactically correct alternatives to a correct answer.

4. The findings of the analysis of the hierarchy of difficulty in categories of conjunctions indicated a need for further research related to cognitive growth. Previous research, which derived from disparate disciplines, did not provide a consistent framework of reference for categorizing the function of conjunctions. A cross-disciplinary research effort from the fields of language development, linguistics, and cognitive psychology could provide a framework which would accommodate the findings from these various fields more aptly.

5. The uniqueness of the findings of the hierarchy of difficulty of conjunctive categories that showed conjunctions of inclusion, such as how and that, to be most difficult for fourth and fifth grade

Native American indicated a need for further research in this area. Because of the varying degrees of cultural influences and the variety of tribes represented in any one sample of Native Americans in an urban setting, several replications may be necessary.

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## APPENDIX A

PLEASE NOTE:

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These consist of pages:

UNDERSTANDING CONJUNCTIONS WORKSHEET #1 AND #2

(APPENDIX A PAGES 111-114)

CLOZE EXERCISE #1-#3 (APPENDIX A PAGES 115-117)

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## APPENDIX B

TABLE 10

TABLE OF MEANS, STANDARD DEVIATIONS, VARIANCE, AND RANGES

Instrument	N	Mean	St. Dev.	Variance	Range
Stanford Diagnostic Reading Test					
Grade 4	9	41.9	8.16	59.20	24-50
Grade 5	13	50.15	5.41	29.30	41-57
Grade 6	5	46.4	8.56	81.33	38-57
Multiple Choice Conjunction Test					
Grade 4	11	22.45	5.24	27.47	18-31
Grade 5	13	30.07	6.73	45.24	19-42
Grade 6	6	26.17	11.4	129.96	15-42
Cloze 1					
Grade 4	13	33.00	3.96	15.67	27-39
Grade 5	13	35.00	3.44	11.83	27-41
Grade 6	7	36.29	3.45	11.90	30-41
Cloze 2					
Grade 4	13	30.00	8.12	66.00	08-37
Grade 5	13	33.23	5.34	28.53	19-38
Grade 6	8	35.63	2.56	6.55	32-38
Cloze 3					
Grade 4	10	24.50	4.03	16.28	17-30
Grade 5	12	29.59	2.99	8.99	26-35
Grade 6	8	31.88	2.17	4.64	28-35

TABLE 11

MISCUE ANALYSIS OF MOST FREQUENT ERRORS  
BY SEMANTIC / SYNTACTIC ACCEPTABILITY

## FOURTH GRADE

ITEM #	CONJUNCTION	MEANING	FREQ. CORRECT	RANK ORDER	HIGHEST INCORRECT CHOICE	SYNT. OR SEMANT CORRECT
26-1	if	on condition that	0.	1	when it (45.5)	no no
15-2	where	at which place	9.1	2	because (63.6%)	yes no
16-2	how	way in which	9.1	2	when (36.4%)	yes no
19-2	how	in what way	9.1	2	why (45.5%)	yes no
26-2	while	at the same time	9.1	2	when(72.7%)	yes no
29-2	so	for that reason	9.1	2	then(45.5%)	yes no
30-2	where	at which place	9.1	2	when(63.6%)	yes no
31-2	when	during the time that	9.1	2	because(54.5%)	yes no
23-1	or	equally possible	9.1	2	other than(45.5%)	yes no
24-1	than	compare things not equal	9.1	2	as tall as(36.4) less than(36.4)	no no no no
31-1	that	for the purpose	9.1	2	and(54.5)	yes no
10-2	but	do other than	18.2	3	which (36.4)	no no
11-1	yet	still	18.2	3	also(72.7)	yes no
15-1	but	yet	18.2	3	then (27.3) so (27.3) why (27.3)	yes no yes no no no
19-1	but	yet	18.2	3	in addition(45.5)	yes no
20-1	but	except	18.2	3	than (54.5)	no no
27-1	so	in order that	18.2	3	therefore (45.5)	no yes
30-1	how	way in which	18.2	3	in addition (36.4)	no no
27-2	when	at the same time	18.2	3	as (45.5)	yes yes
18-2	because	for the reason that	18.2	3	when (72.7)	yes no
2-2	why	for what reason	18.2	3	if (45.5)	yes no
3-2	because	for the reason that	18.2	3	therefore (54.5)	no no
11-2	if	whether	18.2	3	when (36.4)	yes no
22-2	so	for that reason	27.3	4	but (45.5)	yes no

Total Number of Conjunctions with less than 18% correct answers 24

Highest Frequencies Incorrect Answers 27

Syntactically Correct 18  
Semantically Correct 2

Total of Highest Frequencies of Incorrect Answers 27

TABLE 12

MISCUE ANALYSIS OF MOST FREQUENT ERRORS  
BY SEMANTIC / SYNTACTIC ACCEPTABILITY

## FIFTH GRADE

Item#	CONJUNCTION	MEANING	FREQ. CORRECT	RANK ORDER	HIGHEST INCORRECT CHOICE	SYNT. OR SEMANT CORRECT	
31-1	that	for the purpose	0.0	1	but (36.4) and (36.4)	yes yes	no no
30-2	where	at which place	7.7	2	when (46.2)	yes	no
15-2	where	at which place	7.7	2	because (63.6)	yes	no
26-2	while	at the same time	7.7	2	when (76.9)	yes	no
26-1	if	on condition that	9.1	3	when it (36.4)	no	yes
29-2	so	for that reason	15.4	4	then (61.5)	yes	no
16-2	how	way in which	15.4	4	when (46.2)	yes	no
11-1	yet	still	18.2	5	also (54.5)	yes	no
22-1	or	the same as	18.2	5	and (63.6)	yes	no
23-1	or	equally possible	18.2	5	other than (27.3)	no	no
30-1	how	way in which	18.2	5	in addition (18.2) when (18.2) the reason (18.2)	no yes no	no no no
11-2	if	whether	18.2	5	for (30.8) when (30.8)	no yes	no no
19-2	how	in what way	23.1	6	when (46.2)	yes	no
6-2	since	because	23.1	6	therefore (53.8)	no	no
22-2	so	for that reason	23.1	6	and so (30.0)	yes	yes
Total number of conjunctions with less than 28% correct answers				15			
Highest Frequencies of Incorrect Answers Syntactically Correct				13			
Highest Frequencies of Incorrect Answers Semantically Correct				2			
Total of Highest Frequencies of Incorrect Answers				19			

TABLE 13

MISCUE ANALYSIS OF MOST FREQUENT ERRORS  
BY SEMANTIC / SYNTACTIC ACCEPTABILITY

SIXTH GRADE

ITEM #	CONJUNCTION	MEANING	FREQ. CORRECT	RANK ORDER	HIGHEST INCORRECT CHOICE	SYNT. OR SEMAN CORRECT	
27-1	so	in order that	0.0	1	therefore (42.9)	no	yes
11-1	yet	still	14.3	2	also (71.4)	yes	no
26-1	if	on condition that	14.3	2	because (57.1)	no	yes
29-1	while	at the same time	14.3	2	therefore (28.6) where (28.6)	no no	no yes
31-1	that	for the purpose	14.3	2	but (28.6) and (28.6)	no no	no yes
11-2	if	whether	16.7	3	for (33.3) when (33.3)	no yes	no no
13-2	though	however	16.7	3	and will (50.0)	no	no
16-2	how	way in which	16.7	3	how it is done(33.0) while (33.0)	no yes	yes no
18-2	because	for the reason that	16.7	3	while (33.0) the cause of (33.3)	no no	no yes
19-2	how	in what way	16.7	3	why (33.3)	yes	no
28-2	since	because	16.7	3	when (50.0)	yes	no
29-2	so	for that reason	16.7	3	then (33.3)	yes	no
30-2	where	at which place	16.7	3	because (50.0)	yes	no
31-2	when	during the time that	16.7	3	because (33.3) although (33.3)	yes yes	no no
14-1	or	choice	28.6	4	and (42.9)	yes	no
22-1	or	the same as	28.6	4	in addition (42.9)	no	yes
23-1	or	equally possible	28.6	4	other than (28.6)	no	no
24-1	than	compare things not equal	28.6	4	as tall as (28.6) less than (28.6)	no no	no no
28-1	though	although	28.6	4	and (42.9)	yes	no
32-1	when	though	28.6	4	and (28.6)	yes	yes
TOTAL CONJUNCTIONS WITH FREQUENCIES OF CORRECT ANSWERS OF 28.6% or less				20			
Highest Frequencies of Incorrect Answers Syntactically Correct				12			
Highest Frequencies of Incorrect Answers Semantically Correct				8			
Total of Highest Frequencies of Incorrect Answers				27			



TABLE 14

SCATTERGRAMS: MCCT AND SDRT

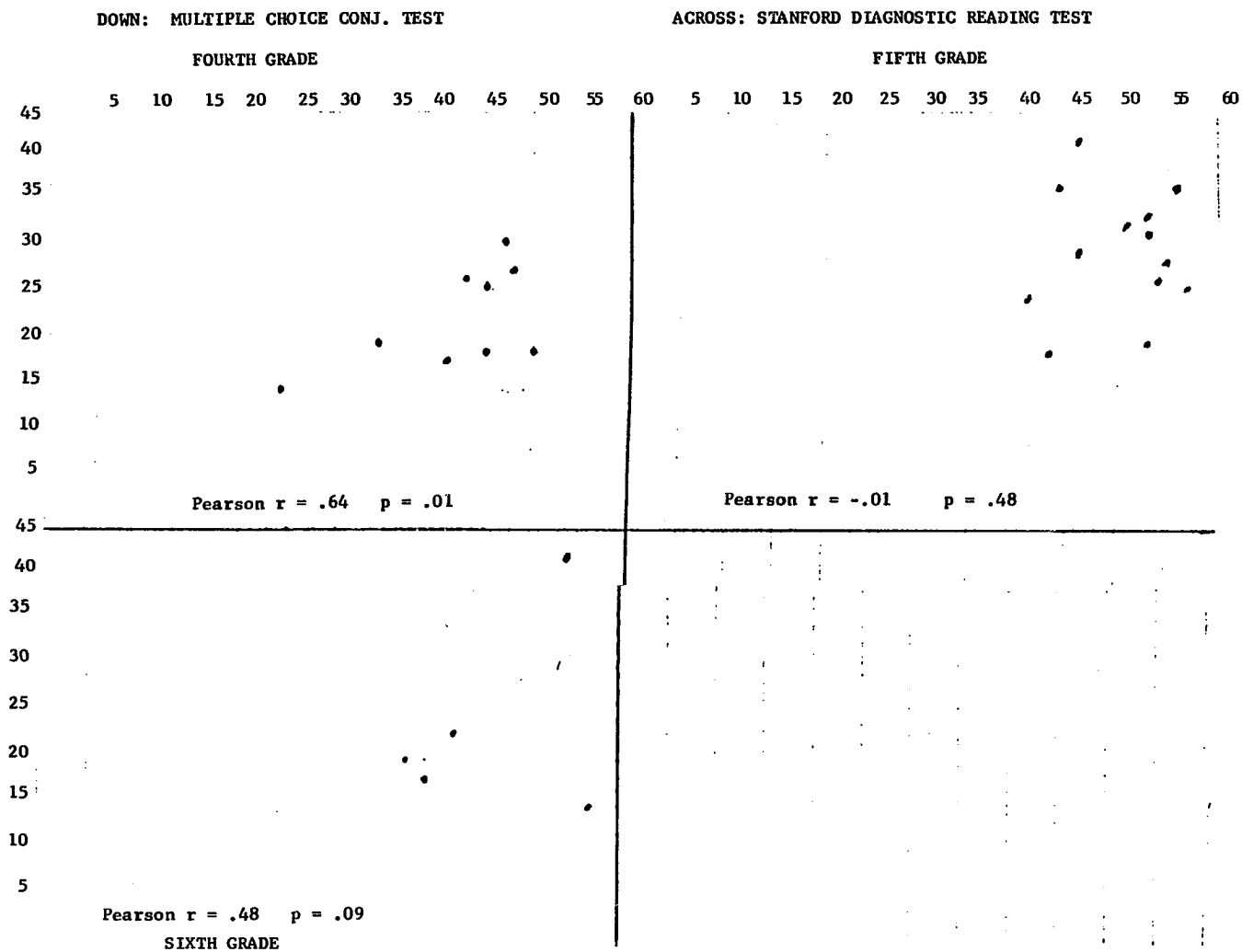


TABLE 15

SCATTERGRAMS: CLOZE 3 AND SDRT

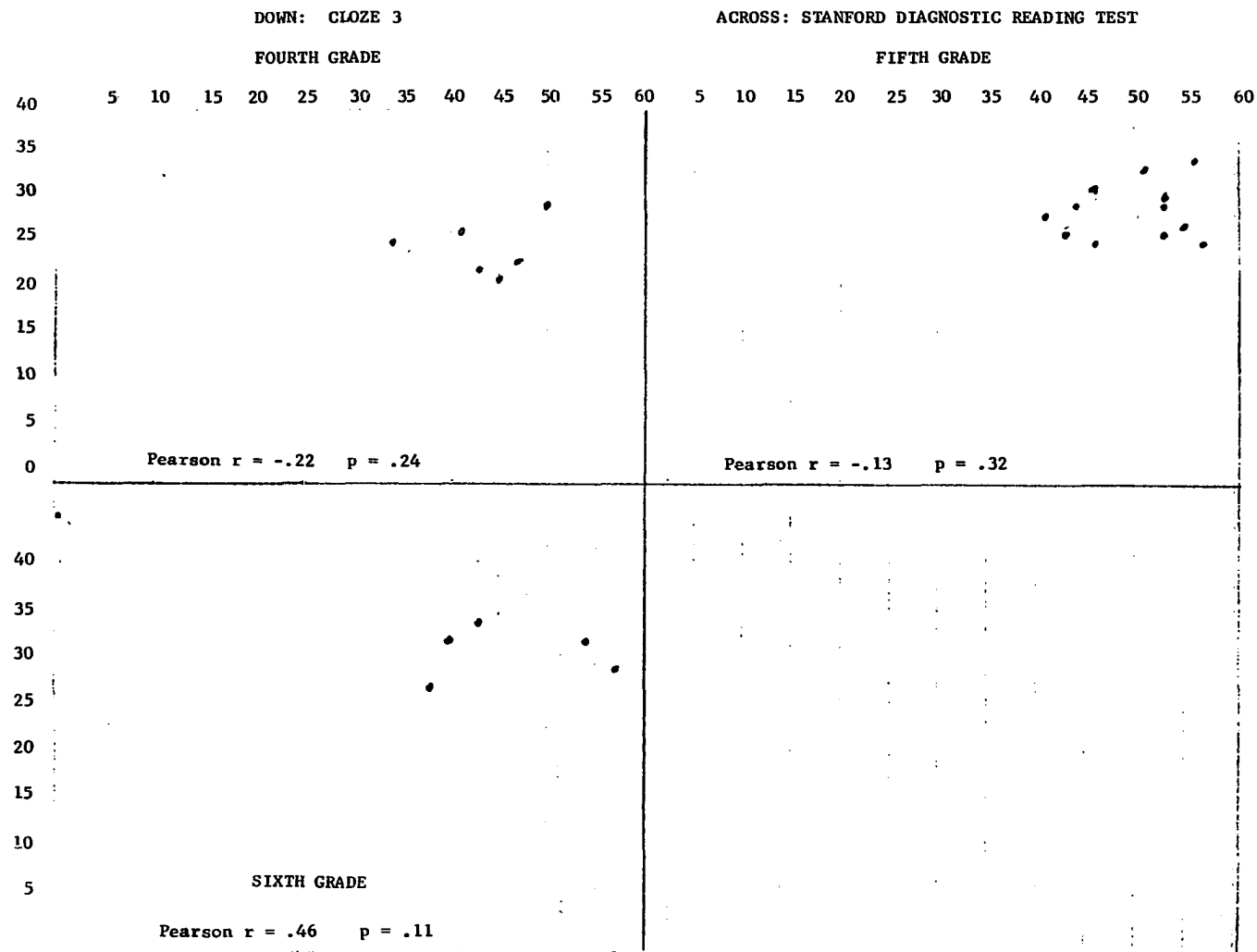


TABLE 16

SCATTERGRAMS: CLOZE 3 AND MCCT

