

THE EFFECTS OF SUBSTITUTION
MISCUES ON THE READING
PERFORMANCE OF SELECTED
GRADE FOUR BOYS

CENTRE FOR NEWFOUNDLAND STUDIES

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THE EFFECTS OF SUBSTITUTION MISCUES ON
THE READING PERFORMANCE OF SELECTED
GRADE FOUR BOYS

by



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ABSTRACT

The purpose of this study was to determine to what extent substitution miscues affected the comprehension scores of grade four boys as they orally read a selected passage. The theory presented suggested that such mistakes made during oral reading would generally detract from comprehension, but that not all substitutions would detract equally. Further, it was suggested that if students reread to correct a substitution miscue, the original mistake would not detract from comprehension; rather the correction would add to the reader's comprehension and nothing would have been lost. But if a student did not go back to correct his error, there still may not have been a loss of comprehension, because the substitution may have contained as much meaning as the correct word. That is, if the uncorrected substitution was an acceptable one, both syntactically and semantically, it may have added to, rather than detracted from, the comprehension of the passage. Finally, it was suggested that only those substitutions which were syntactically-semantically unacceptable; that is, those that were grammatically incorrect and that were void of meaning, detracted from comprehension, and, hence, resulted in low comprehension scores.

The sample for testing these hypothesized relationships consisted of 46 grade four boys who individually read the same passage for the investigator. Following the oral

reading, each child "retold" the story in his own words and, based upon this recall and retelling, a comprehension score was established. Each session was tape-recorded; later on, substitution miscues were coded into one of three categories: (1) corrections, (2) syntactically-semantically acceptable miscues, or (3) syntactically-semantically non-acceptable miscues.

Bivariate relationships were established between the three predictor variables and the outcome variable, reading comprehension. All associations were significant in the hypothesized direction. Regression analysis was then conducted on two predictor variables--proportion of corrections and proportion of syntactically-semantically acceptable miscues--to establish their effects on reading comprehension. It was found that corrections and acceptable miscues each independently affected reading performance and that the combined effects accounted for 38% of the variability in that reading performance.

It was, therefore, concluded that not all oral reading errors detracted from comprehension; rather, that corrected errors and acceptable miscues added to the understanding of the passage, and only unacceptable miscues detracted from understanding. The support for the hypotheses of the study and the theory from which they were derived served to enhance and reconfirm the theory underlying the Goodman-Goodman-Burke research.

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TABLE OF CONTENTS

	Page
I INTRODUCTION TO THE STUDY	1
Statement of the Problem	1
Purposes of the Study	4
Significance of the Study	7
Limitations of the Study	13
II REVIEW OF THE LITERATURE	16
III HYPOTHESES, SAMPLE, AND DATA	32
Hypotheses	32
The Sample	35
Variables and Instrumentation	39
Reading Comprehension	42
Substitution Miscues	45
Proportion of Corrected	
Substitution Miscues	49
Proportion of Syntactically-	
Semantically Acceptable Miscues	52
Proportion of Non-Acceptable Miscues	56
IV FINDINGS AND DISCUSSION	59
Basic Zero-Order Relationships	59
Relationships Between Dependent	
and Independent Variables	61
Total substitution miscues and	
reading comprehension	61
Corrections and reading	
comprehension	65
Acceptable miscues and	
reading comprehension	65
Unacceptable miscues and	
reading comprehension	67
Relationships Between Independent	
Variables	69
Total substitution miscues	
and corrections	71
Total substitution miscues	
and acceptable miscues	71
Total substitution miscues	
and non-acceptable miscues	71
Corrections and acceptable	
miscues	72
Corrections and non-acceptable	
miscues	72

	Page
Multivariable Relationships	72
Problem of Obtaining a Unique Solution for Predictor Variables	74
Collinearity Between Corrections and Acceptable Miscues	76
Relative Strengths of the Effects of Predictor Variables on Reading Comprehension	77
The Meaning of Regression Coefficients	79
Standardized Regression Coefficients	82
The Standard Error Beta	84
The Coefficient of Determination	85
Discussion	86
Summary	95
 V PRACTICAL IMPLICATIONS AND CONCLUSIONS	98
Practical Implications	98
Development of Appropriate Reading Strategies	99
Self-Initiated Regressing to Correct	101
Correcting Unacceptable Miscues	102
Importance of Student Experiences for Reading	102
Conclusions	104
Theoretical Conclusions	104
Total substitutions and reading comprehension	104
Correcting and reading comprehension	105
Acceptable miscues and reading comprehension	105
Non-acceptable miscues and reading comprehension	106
Independent effects of corrections and acceptable miscues on reading comprehension	106
Practical Conclusions	107
Suggestions for Further Research	108
 REFERENCES	111
 APPENDIX 1	116
 APPENDIX 2	123
 APPENDIX 3	130
 APPENDIX 4	136

LIST OF TABLES

Table		Page
1	Mean, Standard Deviation, Skewness, and Kurtosis for the Guthrie Pretest (N=62)	38
2	Mean, Standard Deviation, Skewness, and Kurtosis for the Study Sample (N=46)	46
3	Zero-Order Correlations, Means, and Standard Deviations of Variables in the Psycholinguistic Study of Reading Comprehension (N=46)	60
4	Results of the Regression Analysis: The Effects of Corrections and Acceptable Substitution Miscues on the Comprehension Scores of Grade Four Boys (N=46)	83

LIST OF FIGURES

Figure		Page
1	Diagrammatic Representation of the Oral Reading Process	23
2	Histogram Representing Raw Scores of the Pretest Sample	40
3	Histogram Representing Raw Scores of the Study Sample on the Pretest	41
4	Coding Sheet for the Modified Instrument	43
5	Frequency Polygon of Retelling Comprehension Scores	47
6	Frequency Polygon of Total Number of Substitutions	50
7	Frequency Polygon of Proportion of Corrected Miscues	53
8	Frequency Polygon of Proportion of Acceptable Miscues	55
9	Frequency Polygon of Non-Acceptable Miscues	58
10	Scattergram of Relationship Between Total Substitution Miscues and Reading Comprehension	63
11	Scattergram of Relationship Between Proportion of Corrections and Reading Comprehension	66
12	Scattergram of Relationship Between Proportion of Acceptable Miscues and Reading Comprehension	68
13	Scattergram of Relationship Between Proportion of Non-Acceptable Miscues and Reading Comprehension	70

CHAPTER I

INTRODUCTION TO THE STUDY

Statement of the Problem

Reading is a complex process in which a reader, through the continuous selection of appropriate responses, attempts to convert an author's written message into personal meaning. Any reader may err when transforming written material into his personal meaning system. Recent trends in reading research (Goodman, K., 1972; Goodman & Burke, 1972) suggest that the effective reader is not necessarily the one who produces an errorless or near-errorless performance; rather, he is the one who reconstructs a written message in a manner which allows him to gain the greatest amount of information and meaning from that written material. Frank Smith (1975) views this state of making sense of written language (or of any other communication) as comprehending or reducing uncertainty. Goodman (1970a) claims that, "Essentially, the only objective in reading is comprehension (p. 28)". All else, he insists, is one of three things: (1) a skill to be used in achieving comprehension (such as recognizing letter-sound relationships), (2) a subcategory of comprehension (such as critical reading), or (3) a use to be made of comprehension (such as the enjoyment of literature).

If, though, a reader errs when selecting responses that should enable him to understand written discourse, what

effect will such transgressions have upon his comprehension of the passage? Does the number of such deviations from the text result in a change in comprehension? Do all such incorrect responses affect comprehension in the same manner and/or to the same extent?

Recent innovations in reading research now allow investigators, through the use of qualitative analysis of oral reading errors, to answer questions such as those posed above. Goodman (1969), who is the founder of qualitative error analysis, believes that the term "error" is misleading because many so-called errors, nevertheless, represent accurately the meaning of the text. He prefers "miscue", which term implies a different though not necessarily incorrect response. Underlying this change in the way errors are perceived, and hence, the subtle shift in terminology from "incorrect response" to "miscue", is the assumption that both correct and incorrect responses are manifestations of the same cues and mental processes.

The present study was concerned with that category of miscue called "substitution miscue". A substitution miscue occurs when a reader replaces or substitutes one word with another word. For example, a child might read, "The deer ran through the woods." from the printed sentence, "The deer ran through the forest."; again, "Peggy sensed the corner in his voice." rather than, "Peggy sensed the concern in his voice." The fundamental question that this study dealt with was: To what extent do such substitution miscues affect the reader's

comprehension of a passage?

The basic assumption of the study stems from the Goodman-Goodman-Burke work (cited above) which posits that reading involves more than simply the identification of words and letters in a precise and sequential manner. Rather, they claim, reading involves the processing of all information available to the reader as he attempts to extract meaning from printed material. This information includes: (a) the configuration of letters in a line of print, sentence, or paragraph; (b) the syntactic, or grammatical cues inherent in that line, sentence, or paragraph; (c) the semantic, or meaning, cues associated with the reading material; and (d) the interrelationship between (a), (b) and (c) with the reader's language facility and his background of conceptual data. These sources of information allow the reader to react to printed words in numerous ways--making inferences, evaluating, checking validity and drawing conclusions.

Insights into the intricate process of reading may be gained by observing behaviour manifested during oral reading. By utilizing recent research developments in linguistics, cognitive psychology, and psycholinguistics, an objective analysis of oral reading may be made. Miscues, or the unexpected oral responses to the textual stimulus, provide an accessible source of data upon which analysis can be conducted.

In earlier research, no distinction was made between one type of substitution miscue and another; that is, all were regarded as being equally in error. Recently,

however, miscue analysis has shown that not all miscues are of equal importance in their effect upon reading comprehension. Further, these errors constitute a normal part of the reading process. Substitution miscues are "unequal" because some affect the understanding a great deal, while others have virtually no effect upon comprehension. The difference here is due to the quality of the substitution made. A person who regresses to correct those substitutions that distort meaning appears to be performing a "natural" part of the reading process (Goodman, 1969). Researchers now believe that such regressions indicate that a reader, who is involved in a selective process while reading, is concerned with meaning and with reading material that sounds like natural and acceptable language to him. He may, therefore, regress to "correct" anticipatory expressions that are not accurate or that are not acceptable.

Purposes of the Study

It would appear that substitution miscues constitute most of the miscues made by readers (Goodman, 1971; Goodman & Burke, 1968; Weber, 1970; Beebe, 1976). What the reader does about substitution miscues and the extent to which they affect reading comprehension were the two basic concerns of this study. With regard to the first concern, a reader could either correct the substitution miscue or he could continue reading without correcting. Hereafter, those substitution miscues that were corrected are referred to as corrections,

and those that were not corrected as non-corrections. If a reader failed to correct the miscue, two other possibilities were evident. First, the substitution could have been syntactically-semantically acceptable; that is, the substitution was both grammatically (syntactically) equivalent to the correct word, and also an accurate representation of the meaning, or semantic equivalence, of what was written in the text. Hereafter, this type of substitution miscue is referred to as an acceptable miscue. Second, the substitution miscue could have been syntactically-semantically unacceptable for any one of the three following reasons: (i) the substitution was syntactically acceptable but semantically unacceptable; (ii) the substitution was syntactically unacceptable, and in rare instances, semantically acceptable; or (iii) the substitution was both syntactically and semantically unacceptable.¹ Hereafter, these substitution miscues are referred to as non-acceptable miscues.

These alternatives gave rise to three purposes of the study. The first purpose was to examine the effect of two variables on reading comprehension; namely, the total number of substitution miscues, and the proportion of those miscues which were corrected. This part of the study was designed to provide answers to four questions.

1. To what extent was reading comprehension a function of the total number of substitution miscues?

¹It is recognized that syntax and semantics are "concepts" which are logically different in kind. The justification for not treating them as separate entities in this study is taken up below when dealing with the variables.

The third purpose of the study was to examine the combined effects of corrections and acceptable miscues on reading comprehension. In this part of the study, only the positive aspects of substitution miscues were considered; that is, those substitution miscues that had been corrected, and those miscues which had been left uncorrected but which were acceptable within the context of the passage. The decision at this point to examine the effects of acceptable miscues was somewhat arbitrary but was influenced by the investigator's preference -- to look at the effects that, theoretically, would add to rather than detract from comprehension. The questions which this section of the study attempted to answer were as follows:

1. To what extent did corrections and acceptable miscues independently affect reading comprehension?
2. To what extent did corrections affect comprehension over-and-above the effect of acceptable miscues?
3. To what extent did acceptable miscues affect reading comprehension over-and-above the effect of corrections?

Significance of the Study

In the past, reading has been viewed as a precise process that involves exact, detailed and sequential perception and identification of letters, words, spelling patterns, and large language units. Phonic centered approaches have stressed letter identification, and word centered approaches have stressed word identification. These emphases are still

evident in the teaching of reading throughout North America, though recognition is given to the fact that reading also involves comprehension.

In recent years Kenneth and Yetta Goodman, along with Carolyn Burke, have presented an alternative explanation of the reading process. They conceptualize reading as a selective procedure, as one in which the reader uses only part of what is on the printed page, plus what he already knows about the structure of the language, and whatever background knowledge and experience he can marshall in order to "figure out" what is before him. From the composition of these three elements the reader arrives at his rendition of what he thinks the author has intended.

Thus, Kenneth Goodman (1970b) refers to reading as a "psycholinguistic guessing game" involving the simultaneous application of at least three cueing systems which are referred to as the grapho-phonetic, the syntactic and the semantic sources of information. Learning to read requires the application of all three systems. The reader selects as much information from each system as is necessary for him to "guess" or "predict" what is written. If the "guess" does not sound like language, or if it lacks meaning, the reader must discard the "guess" and regress, or go back for more information--especially grapho-phonetic information.

The reader's usage of the three cueing systems reflects those strategies employed in the reading act. We cannot hear what a child reads during silent reading; therefore, we

rely on oral reading to provide insight into these strategies. But we cannot determine what methods are employed if the reader reads correctly; consequently, we must examine the oral reading errors on the assumption that the same cues may trigger both incorrect responses and correct responses.

Since 1964 a series of studies on qualitative miscue analysis has been conducted under the direction of Kenneth Goodman in close association with Yetta Goodman and Carolyn Burke. These researchers have attempted to examine the nature of reading as a psycholinguistic process. Three major studies on oral reading errors were conducted in the late 1960's and early 1970's by these three researchers for the United States Office of Education (Goodman & Burke, 1968; Goodman & Burke, 1969; Goodman, 1971). The studies concentrated on indepth analyses of miscues made by the children who read for the researchers. The reading ability of the subjects ranged from a grade-one level to a grade-six level and the number of subjects used in these studies were 12, 18 and 4 respectively. The analyses were descriptive and the most frequently used statistical tool was the percentage of miscues per hundred running words. These studies represented a major breakthrough in analyzing oral reading errors and in contributing to the formulation of a prototypical psycholinguistic theory of reading. They were, however, qualitative descriptive studies, and no attempt seems to have been made to conduct analyses for the purposes of establishing statistical levels of association and the interdependencies between the types of miscues,

and between the types of miscues and reading comprehension.

At approximately the same time that the Goodman-Goodman-Burke miscue studies were being carried out, several doctoral candidates at Wayne State University, who were also under the direction of Kenneth Goodman, were extending and complementing the qualitative miscue analysis that the originators of the theory had engaged upon. Allen (1969), Carlson (1970), Gutknecht (1971), Menosky (1971), Page (1970), Sims (1972), Romatowski (1972), Thornton (1973), and Watson (1973) analyzed the oral reading miscues of children from a variety of backgrounds, across a range of grades and from a variety of perspectives. All studies, however, continued to limit their investigations to describing, albeit in depth, the nature of the reader's miscues, in order that the researcher could discern what cues and mental processes the reader was utilizing as he read. This type of study was important because it allowed an investigator to assess objectively the interaction between the reader and the printed material in a manner that had not been possible before the introduction of qualitative miscue analysis.

The doctoral dissertation by Allen (1969) was of particular importance to the present study, because it dealt primarily with substitution miscues. Allen's findings clearly supported the theory stemming from the Goodman-Goodman-Burke research: that readers utilize all three cueing systems (grapho-phonetic, syntactic, and semantic) as they read. Allen was also interested in the correction behaviour of his readers.

He found that over 70% of all the substitution miscues made by his fifteen subjects were syntactically acceptable, and that the degree to which a miscue was semantically acceptable seemed to determine whether or not the miscue was corrected. Three other findings also appear to be of importance to the present study.

1. Little relationship was found between the number of miscues a reader made and his comprehension of the story.
2. All children corrected a substantial number of their oral reading miscues.
3. There appeared to be little or no consistent relationship between the number of miscues each reader made and the proportion of his corrected miscues.

These findings were based upon the percentage of miscues per one hundred words as compared to a comprehension score which had been categorized into five levels of performance. The percentage score and the comprehension ratings were presented in tables from which the findings seem to have been deduced. In one instance, a correlation coefficient was presented in a paragraph describing the relationship between the number of miscues and the percentage of corrections. It may be the case that correlation coefficients were calculated for all combinations of variables; if so, such was not reported in the study. Further, that analysis of this kind has been conducted in other studies was not mentioned in the thesis.

It would seem, then, that those studies done to date in the Goodman tradition are basing their findings on trends

which are made evident by the scrutinizing of individual performances of a small number of cases. There is evidence, however, that other researchers are utilizing statistical results more frequently, and employing larger samples. Walker (1975) utilized a two-way analysis of variance design on sixty grade three subjects in order to determine whether the oral reading performance of dialect speaking Newfoundland children was affected by syntactic differences between their dialect and Standard English. Hood and Kendall (1975) used a t test to investigate the differences between twenty-five "reflective" and twenty-five "impulsive" second-graders in the number and category of oral reading errors made, and their subsequent correction.

As yet, the present investigator has not located any study which has attempted to establish net effect (as opposed to gross effect) coefficients between types of miscues made and reading comprehension. It is for this reason that the present study may have theoretical and practical significance. If relationships can be established between the total number of substitutions and reading comprehension, between the proportion of corrections and reading comprehension, and between acceptable or non-acceptable miscues and reading comprehension, a more accurate understanding of the effect of substitution miscues upon reading comprehension will have been established. Further, if a prediction equation which establishes the effect of uncorrected substitution miscues on reading comprehension is formulated, teachers can then begin to judge more accurately

whether it is necessary to insist that all oral reading errors be corrected or just those that distort meaning.

Limitations of the Study

There were three main limitations in this study which are classified as: (1) conceptual limitations, (2) measurement limitations, and (3) data gathering limitations. The first limitation stems from the fact that not all three cueing strategies were considered as variables; that is, the grapho-phonetic or sound-letter relationship has been purposely omitted from the study because the investigator was concerned primarily with syntactic-semantic cueing strategies. While it was recognized that the grapho-phonetic element is an essential and integral aspect of reading (without it, there would be no print to comprehend) the scope of this research did not permit the researcher to include this element as an independent variable. Similarly, factors such as background experiences, verbal proficiency, perseverance, stage of thinking, I.Q., and motivation were not considered.

The second limitation, measurement of variables, has two aspects. First, the combining of the two cueing strategies, syntactic and semantic, into one strategy--namely, syntactically-semantically acceptable or non-acceptable--collapsed two variables into one variable and, therefore, restricted the degree of accuracy of measurement of each potential variable. The combining of these two elements was done for two reasons--one theoretical, and one practical.

The theoretical reason will be discussed when the variables are described in the third chapter. The practical reason was engendered by the need to code the data within reasonable time limits. Gathering and coding miscue data is an arduous and time consuming task (hence, the small numbers of cases used in the Goodman and associates work), which task must be simplified if larger numbers of cases are to be included in miscue studies.

The second aspect of measurement limitation is concerned with assessing the extent to which the subjects understood the reading passage. Comprehension was measured by a retelling score, based upon the subject's recall and interpretation of the story which he "told" to the investigator. Some children may, in fact, have understood, at the time of reading, more than they are able to recall and transmit to the investigator immediately following the reading of the passage. If this was the case, a retelling score did not accurately measure the child's understanding of the passage.

The data gathering limitation has four aspects. First, the sample was not randomly selected. This suggests that the findings cannot be generalized to a wider population. Second, after two schools had been selected all boys within the selected grade level were given a pretest to delimit the range of reading ability within the sample. Only those students scoring 70% or above on the pretest were included in the sample. The case base, then was biased, in that only "good" readers were included. Third, each subject

read only one passage. This procedure may be a limitation, because the scores obtained for each child, on the basis of a single trial, may not be a true reflection of his reading ability. Finally, the students in the study may have been inhibited when reading to a stranger and may have produced more miscues than they would have under usual classroom conditions. Reticence in the retelling of the story was a problem with some children and, hence, their comprehension scores were probably lower than what they would have been in a classroom test situation. Then, too, the need to record the responses of the students on a tape recorder may have compounded the problem.

CHAPTER II

REVIEW OF THE LITERATURE

Before the turn of the century, only scattered reports of children's reading behaviour were available. In 1908, Huey said, "We have surely come to the place where we need to know just what the child normally does when he reads, in order to plan a natural and economic method of learning to read (p. 9)." Huey's insight into the need to understand what a child does when he reads served as a turning point in the way educators began to think about reading. A long history of reading observations has accumulated since then, and a variety of interpretations of the reading process has emerged.

The past decade in reading research has witnessed a notable change in both methodology and theory. The emphasis in methodology has become the construction of models of reading (cf. Davis, 1961), and the emphasis in theory is now clearly on the syntactic and semantic elements of reading comprehension (Carroll, 1970, 1971; Goodman, 1965, 1969, 1972; and Smith, 1971, 1973, 1975). Investigators have shifted emphasis from reading being primarily conceived of as a series of careful visual perceptions, with research focusing on grapho-phonetic skill, to reading being perceived as a highly complex multi-factor and integrated process. Huey (1908) and Thorndike (1917), noted exceptions among early investigators,

generated the interrelated and complex concepts of reading that have formed the basis for much of the research and theorizing that has occurred within the last ten years.

Huey recognized the need to see words as units rather than as a combination of individual letters, but he emphasized that meaning dominates the perception of words and phrases and that stumbling and hesitation in oral reading comes from too much attention to the mechanics of reading (especially phonics) and too little attention to the context of the passage. Furthermore, Huey wrote at length about the "natural" way of learning to read. Just as a child's curiosity is satisfied by answering his questions, his curiosity about print is satisfied by being read aloud to by parents. Children who are read to cannot help but acquire the meaning inherent in printed materials and will surely learn much more readily a large stock of sight words.

E.L. Thorndike in 1917 viewed reading in the following way:

Reading is a very elaborate procedure, involving a weighing of each of many elements in a sentence, their organization in the proper relations one to another, the selection of certain of their connotations and the rejection of others, and the cooperation of many forces to determine final responses. In fact ... the act of answering simple questions about a simple paragraph ... includes all the features characteristic of typical reasoning. (1917:323)

Goodman, Carroll and Smith have all, in recent years, supported the ideas of Huey and Thorndike.

Robert L. Thorndike (1973-1974) has pursued the concept of "reading as reasoning" and posits that once basic decoding

skills are mastered, performance in reading indicates the thinking and reasoning level of the reader and may, therefore, be a potentially powerful predictor of academic performance. Reading, then, becomes a process that must involve some depth of understanding beyond word meaning. A transformation of visual input by way of interaction with the reader's existing knowledge occurs and is generated as comprehension (Goodman, 1965). It has long been recognized that every reader brings with him to a reading situation a variety of experiences, background, and language knowledge which enables him to react to printed material in logical and well-informed ways. These ways constitute "thinking" and "reasoning" (Carroll, 1970). As a reader encounters printed materials in this manner, he performs a highly complex and integrated skill.

Psychologists have attempted to analyze what readers do when they read, and they have clarified the mental processes involved in the initial stages of reading, i.e. the sensory impressions, perception and conceptualization. Carroll (1964) suggested that a fruitful theoretical analysis of reading must rely on something other than just a psychological understanding of the perception of sequential letters and words. Knowledge and principles from other relevant disciplines must add to and complement psychological studies in this area.

One such relevant discipline is linguistics and in its application to reading several distinct positions have emerged. Leonard Bloomfield (1961), a leading pioneer in American linguistics, based his approach on letter-sound

relationships. He believed there is a great deal of consistency between the phonemes (sounds) of the English speech and the graphemes (letters) of English orthography and that the early emphasis in reading instruction should be in teaching these relationships rather than on acquiring meaning from the text. Bloomfield's approach was to construct reading materials in which each sound was represented by the letter which most commonly represented it in actual spelling. Early reading materials would then have complete one-to-one letter-sound relationships, which, he concluded, would eliminate "sounding out", a practice that Bloomfield thought distorted phonemes and should be avoided. As children progressed, less-common correspondences would be introduced. Once the child learned to translate graphemes into phonemes, he would simply use his mastery of oral language to complete the reading task.

Charles Fries (1962), another leading American linguist, was also concerned with the code-breaking process, but he emphasized the relationship of spelling patterns and sound patterns. He believed that in learning to read, children must acquire the ability to discriminate between spelling patterns that are very similar and which represent only minor speech contrasts. For example, the words RAT, HAT, FAT and MAT have only one letter that is different. The sound pattern also represents a minimal change. Fries constructed a linguistic series of readers based upon such spelling patterns and, like Bloomfield, assumed that children would have no problem beyond

this initial stage of familiarizing themselves with a host of spelling patterns. The term "linguistic method" soon developed in reference to both Bloomfield's and Fries' work, and was characterized by letter-sound relationships--probably at the expense of meaning.

Other structural linguists attempted to broaden this narrow view of the reading process and the work of Lefevre (1964) is indicative of their approach. He emphasizes that reading is a language-related process that involves a simultaneous taking-in of patterns and structures of meaning beyond a mere word level. The sentence, Lefevre claims, is the minimal unit of instruction for reading, because a child cannot understand as he reads if he is asked to atomize reading into words, letters, or non-sense syllables. Readers must be able to grasp the syntax of lines of print if they are to make sense of what they read. Phoneme-grapheme correspondences are important but only within full sentence patterns.

Ronald Wardhaugh (1969), a transformational linguist, has extended the Lefevre approach. A reader, he believes, must reach the deep structure of the sentence, because it is at that level that understanding takes place. Deep structure is the meaning which lies deeper than the surface structure of sounds and written symbols. In fact "meaning does not lie in the realm of language at all, but in the underlying thought processes of the language user (Smith, 1975:84)". It is these thought processes that surface structure represents

as written language. Wardhaugh believes, therefore, that a reader must use a variety of abilities simultaneously; that is, he must respond to print and associate it with speech, and at the same time engage in grammatical and meaning processing.

Paul Kolars (1969, 1970), a psychologist, has also concluded that reading is not simply a visual process. When analyzing the errors of adult readers who read experimental materials involving, (i) geometrically reoriented print and (ii) mixed languages in which the subjects were fluent, he found that subjects relied heavily on grammatical information and that they seemed to store meaning (not words) in their memories as they read. Kolars, therefore, stated that the visual components of reading have consistently been overstressed at the expense of syntactic and semantic considerations. Supporting Kolars' findings are Hochberg (1970) and Hochberg and Brooks (1970), who suggest that by utilizing syntactic and semantic knowledge and peripheral vision, a skilled reader fixates only on those parts of the visual array that he anticipates will enable him to check his guesses about what is being said. This in turn will help him formulate further anticipations. The better the reader, the larger the fixation unit from which he samples the text, and the more likely that a word will be decoded by the rapid and easily apprehended features of that word.

K. Goodman (1970b) has attempted to synthesize the theories of psychologists and linguists into a psycholinguistic

theory of the reading process in which he introduces the concepts of sampling and predicting and which he has labelled "the psycholinguistic guessing game". The Goodman-Goodman-Burke group regard oral reading as a viable means of investigating the complexity of the reading process, which they believe involves decoding surface structure writing (graphic input) into meaning or deep structure which is then encoded to surface structure as spoken language (oral output). These relationships are presented in the conceptual diagram (Figure 1).

 Figure 1 about here

Researchers and practitioners agree that errors made by readers are indicators of reading performance. Thus, for the past few years, oral reading errors have been subjected to analysis. Rosemary Weber (1968) has reviewed more than thirty studies based on such data and has classified the research into two groups with distinct concerns. The investigators in one group were concerned with establishing norms for diagnosing reading weaknesses in order to provide starting points for remedial instruction. They generally viewed errors as signs of imperfect learning in problem readers. The other group of investigators analyzed errors in an attempt to provide insight into the nature of the reading process. Rather than prejudging errors as "undesirable", they used them as (mis)cues for diagnosing and delineating those decoding strategies used

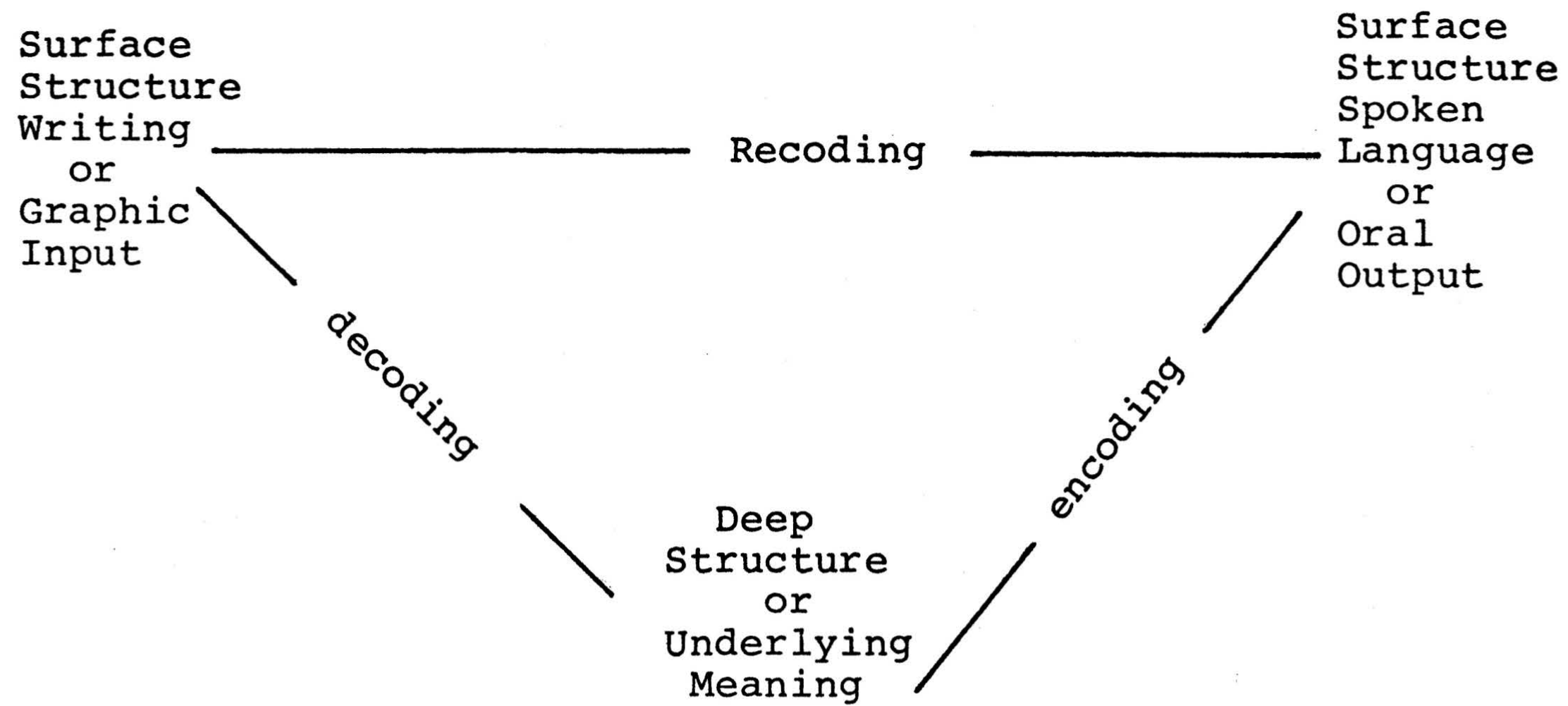


FIGURE 1. Diagrammatic Representation of the Oral Reading Process^a

^aAdapted from K. Goodman, 1970:19, and Smith, 1973:82.

by successful readers when deriving meaning from print. Most of these studies, however, focused on words or letters or both, and exhibited a notable lack of concern for how closely an unexpected response resembled an expected response.

Since 1964 a series of studies involving qualitative analysis of oral reading errors has been conducted at Wayne State University under the direction of Kenneth Goodman, and in close association with Yetta Goodman and Carolyn Burke. The insights gained from their research have culminated in a taxonomy of reading cues and miscues (Goodman, 1969) for indepth analysis and study of oral reading strategies and techniques. Since reading involves the interaction of thought and language, in the taxonomy miscues are organized according to linguistic and psychological characteristics. The taxonomy was then used to classify the miscues of children who read stories which were moderately difficult for them and which they had never seen before. The resultant miscue analysis provided insight into the degree of interplay of grapho-phonetic, syntactic, and semantic information exhibited by the child in decoding graphic display into meaning, followed by its subsequent encoding into spoken language. A Reading Miscue Inventory (RMI), based on the taxonomy, was then developed by Yetta Goodman and Carolyn Burke (1972) to provide classroom teachers with a workable approach to understanding the reading process as it operates for individual readers.

Following Kenneth Goodman's introduction of qualitative miscue analysis, the influence of his work on the reading

research community grew rapidly. The support and publication of his numerous papers by the International Reading Association and the National Council of Teachers of English (two of the most prestigious organizations in reading research) has resulted in the rapid and widespread dissemination of Goodman's psycholinguistic research tradition. It seems, that after half a century of diversified reading research, Goodman has united the two disciplines of psychology and linguistics, applied them to reading, and been successful in redirecting the conceptualization of reading as the complex and integrated process that Huey and E.L. Thorndike talked of in the early 1900's. His contribution to reading research has recently been recognized through his receipt of the National Council of Teachers of English David H. Russell Award for Distinguished Research in 1976.

The research tradition that Goodman has established may be thought of as constituting three phases, namely: the formative phase, the consolidation and testing phase, and the extension phase. The first phase, that of formulating the underlying theory and establishing empirical support for it, occurred as the Goodman-Goodman-Burke team undertook the three previously mentioned studies for the United States Office of Education. At that point, it seems, the researchers intuitively believed that reading is a complex and integrated process rather than a simple precise process. They sought confirmation of their beliefs by carefully observing the behaviour of children as they read orally, followed by the

meticulous scrutinizing of each miscue that had occurred in order that they might understand the process that the readers used as they converted graphic print into oral language and meaning. Out of this phase came the taxonomy and the Reading Miscue Inventory (RMI).

Once they had confirmed the interplay of letter-sound relationships, grammatical structure and contextual meaning, by the observing of a limited number of cases, the team attempted to have their theory tested more rigorously. Several doctoral candidates were working with the Goodman group at that point, and each student, in his own doctoral thesis, attempted to reconfirm the Goodman thesis from a variety of perspectives. For example, Carlson (1970) used the Goodman-Burke taxonomy to conduct a study that focused on analyzing the process that readers use as they read various subject matter passages. Kolczynski (1973) completed a similar study, using the RMI, in which he analyzed the reader's use of syntactic and semantic cueing systems in his effort to gain meaning from literature, science, social studies and mathematics. Both Kolczynski and Carlson found that a subject's ability to read content area material could not be easily predicted from his performance on basal reader material. They also, surprisingly, claimed to have found that there was little relationship between the subject's miscues per hundred words and his comprehension of the selection. Further, they found that while all subjects did use grapho-phonetic cues to aid them with all types of material, they made extensive

use of syntactic and semantic cues to gain meaning, regardless of content area.

Gutknecht (1971), in a study of the oral reading behaviour of perceptually handicapped children, found that the children used the same processes in reading as normal children but that they took more time in acquiring the process. Similarly, Page (1970) found that as the grade level of material varied a child's ability to process the material varied. Rousch (1972) found a variation in ability to process material by readers with different "conceptual backgrounds". Both Page and Rousch observed, however, that a similar integration of strategies was employed by all readers, and that it was the degree of competence in handling the strategies that varied. A similar finding is evident in the work of Thornton (1973) who examined the effect of different reading backgrounds on oral reading errors and its effect upon comprehension. Finally, the work of Romatowski (1972), who looked at the oral reading errors of bilingual students, and Simms (1972), who studied the miscues of black dialect speakers, found support for the interplay of the three cueing systems during reading.

The present phase of the Goodman tradition of reading research encompasses those studies that are attempting to extend the use of the "psycholinguistic guessing game" theory by using larger data sets and more rigorous analytic techniques, so that both statistical and substantive significance can be established regarding the effect of miscues on com-

prehension, or on the acquisition of literacy skills. The work of Walker (1975) and Hood and Kendall (1975) are examples of this extension phase.

The purpose of Walker's study was to discern which group of Newfoundland dialect speaking students would make more oral reading errors; the group reading a standard English passage or the group reading the dialect version of the passage. The oral reading errors of sixty students (thirty in each group) were analyzed using the procedures described in the Reading Miscue Inventory. A two-way analysis of variance was then conducted to establish levels of significance between the number of miscues made by each group. The findings indicated that the Standard English group read the passage faster, with significantly fewer total miscues and significantly fewer dialect miscues than the students who read the dialect passage. Therefore, there was no evidence in the study to support the prevalent view that dialect interferes with oral reading. A standardized reading test was also administered to all students; scores of both groups were quite similar. Given that the subjects most likely made the same kind and number of miscues on the comprehension test as on the oral reading test, one is led to believe that the quality of the miscue made by the dialect version group was such that these students retained the meaning of the passage, despite their having generated a larger number of miscues.

The study by Hood and Kendall used qualitative error analysis on the oral reading of two groups of grade-two

students to estimate whether "reflective" students made more or fewer miscues than did "impulsive" students. Further, the study categorized these miscues into proportion of graphically similar miscues, proportion of contextually (syntactically-semantically) appropriate miscues, and proportion of corrected miscues. T tests were conducted for total miscues and for each of the sub-categories in order to establish significant differences between the two groups consisting of 25 students each. The findings indicate that "reflective" students tend to make fewer total miscues, but the difference was not statistically significant. No differences were found in the proportions of contextually appropriate errors, but differences were found in the proportion of corrections. "Reflective" students corrected more often and made more errors that were graphically similar to the printed text than did "impulsive" students. The comprehension scores of both groups were not significantly different, which would seem to indicate that even though the proportion of corrections was higher for one group than the other, the increased correcting did not add to the comprehension. Since both groups were similar in proportion of contextually appropriate miscues, it seems that the syntactic-semantic appropriateness of errors was more important to comprehension than corrections.

A final study is referred to here because it extends the use of qualitative miscue analysis in yet another direction. DeLawter (1975) analyzed the oral reading miscues of two

groups of children, each consisting of twenty-five second graders, in order to establish relationships between the type of reading instruction that they had received in grade one and the type of miscue they made. One group had received instruction in a series of linguistic readers which emphasized decoding skills but had no emphasis on meaning. The other group was instructed in a basal reader series that emphasized sight words, sentence patterns and meaning. Chi square tests of independence revealed the following results. First, both groups made real word and nonword miscues, but the pattern of their miscues varied. The decoding group made about twice as many nonwords as words, and the meaning group had a higher percentage of real words than nonwords. Graphic similarity was superior for the decoding group but many of those responses were nonwords. Second, no pattern emerged which differentiated the groups on syntactic acceptability of miscues. Third, for both groups, about half of the miscues that were real words were semantically acceptable or relevant to the meaning of their context. However, since the meaning group had more real words than the decoding group, the actual number of miscues that were semantically acceptable was higher for the meaning group. The data in this study indicate that patterns of miscues are consistent with the different emphases of instruction programs and demonstrates that reading strategies are predictable, given the instructional emphasis. This study also supports the Goodman work in that it shows how an emphasis on precise letter identification, presumably

at the expense of sufficient emphasis on gaining meaning from the material, can lead to the development of reading strategies which result in children producing miscues that are void of meaning more often than when a meaning oriented approach to reading is stressed.

The present study falls into the extension phase category of the Goodman work. As pointed out above, it constitutes an extension of the work of Allen (1969). It is believed that by utilizing a larger data base, facilitative of rigorous statistical analysis, some of the issues raised in the Allen study can either be accepted or refuted with a greater degree of confidence.

CHAPTER III

HYPOTHESES, SAMPLE, AND DATA

The purpose of this chapter is threefold: (1) to present the hypotheses of the study; (2) to describe the sample; and (3) to describe the variables and the instrument used to measure them.

Hypotheses

The hypotheses for the study are outgrowths of the problems posed in Chapter I, and, for the most part, flow from, and are supported by, the related research presented in Chapter II.

Hypothesis 1: The greater the total number of substitution miscues the lower the reading comprehension.

Hypothesis 2: The greater the proportion of corrections the higher the reading comprehension.

Hypothesis 3: The greater the proportion of non-corrections the lower the reading comprehension.

Hypothesis 4: The greater the proportion of acceptable miscues the higher the reading comprehension.

Hypothesis 5: The greater the proportion of non-acceptable miscues the lower the reading comprehension.

Hypothesis 6: The proportion of corrections and the proportion of acceptable miscues will each have positive independent effects on reading comprehension.

Hypothesis 6A: The proportion of corrections will be positively associated with reading comprehension over-and-above the effect of the proportion of acceptable miscues.

Hypothesis 6B: The proportion of acceptable miscues will be positively associated with reading comprehension over-and-above the effect of the proportion of corrections.

The first two hypotheses varied from the findings in other studies, and an explanation is necessary. First, Hypothesis 1, concerning the relationship between total number of substitutions and reading comprehension, did not support the findings of Allen (1969), Carlson (1970), and Kolczynski (1973). All three researchers examined the relationships between substitutions and comprehension, though Carlson and Kolczynski considered the one-to-one relationship of all types of miscue and comprehension. What is important to note is that these researchers were effectively concerned with zero-order relationships and not the matrix of relationships and their possible interdependencies.

The reason that Hypothesis 1 differed from the work of these earlier analysts is as follows. The present study was set up to examine the relationship between total substitutions and reading comprehension and the three sub-categories of total substitutions and comprehension; that is, the relationships between corrections, acceptable miscues, and non-acceptable miscues and reading comprehension. Since there is support in the literature for hypothesizing that acceptable miscues enhance

comprehension and non-acceptable miscues detract from comprehension (Goodman, 1969), it seemed reasonable to hypothesize that the larger, all encompassing category of total substitution miscues would have either a positive or a negative effect upon comprehension. Further, to assume that the more miscues a reader makes the better he understands is at least questionable. Therefore, the solution to the dilemma seemed to be to posit that the more substitutions made the lower the comprehension, while keeping in mind that the total number of substitutions is really a proxy for the underlying categories and in all likelihood is, therefore, a surrogate variable for the effects of the non-acceptable miscues (a subcomponent of total substitutions) on reading comprehension. The justification for such a pronouncement is that the total substitution-count represents the number of substitutions made before any corrections were considered, and those substitutions that were subsequently corrected were most likely to be non-acceptable. Therefore, the total substitution count really represented (1) acceptable miscues, (2) unacceptable miscues which were later corrected, and (3) unacceptable miscues that remained as such. The hypothesized negative effect of total substitutions was grounded, therefore, in the view that the total number of substitutions represented (i.e. act as a surrogate for) the latter two categories; namely, unacceptable miscues that were subsequently corrected and unacceptable miscues that were never corrected.

Second, Hypothesis 2, concerning the proportion of corrections and reading comprehension, did not support the

findings of Hood and Kendall (1975). There are two justifications. First, the Goodman-Goodman-Burke research maintains that readers reread to correct anticipatory selections that prove to be inappropriate in meaning and/or syntax. Presumably, then, when the reader corrects, meaning is restored and the correction adds to comprehension rather than exhibiting no effect as Hood and Kendall claimed. Second, the Hood and Kendall article (1975:280) stated that the possibility exists whereby, their ardent "correctors" were correcting many acceptable errors unnecessarily. This situation is known as "overcorrecting" and would seem to do little for increasing comprehension. Hence, ardent correctors scored no better on comprehension than less ardent correctors. This possibility also existed in the present study, but, given the Goodman theory and research findings (1968), it appeared more plausible to claim that the more corrections made the higher the comprehension scores.

The Sample

Forty-six grade-four boys from two St. John's schools constituted the case base for this study. These boys were selected from the sixty-two available male pupils in the four classes of the two schools. Since it was necessary for all subjects to be able to read the same passage with some degree of fluency but at the same time make enough mistakes to participate in the study, it was decided to select only those boys who were reading at or above a grade 4.0 level. They would

all then be able to read a passage difficult enough to produce reading miscues.

Maze 5 and Maze 6 of the Guthrie-Siefert Maze Task was administered to all boys in each of the four classes. Guthrie, Seifert, Burnham, & Caplan (1974:63) described this procedure for measuring reading comprehension in the following way:

The maze procedure consists of a series of sentences which may be extracted from any story or book. The text is modified by substituting three alternative words for every fifth or tenth word in the story. Here is an example:

	or	
The truck was full of	corn.	The farmer and
	roads	
	some	
his truck swam fast.		
	went	

The child reads the material silently and circles the alternatives which he believes are correct. The number or percentage that the child circles correctly indicates the level of his comprehension for that passage.

Guthrie and his research assistant have developed a maze task instrument which contains passages graded from primer to 6.1 in difficulty. The validity and reliability of the instrument is described in an article by Guthrie (1973) where he demonstrates that it correlates at the .82 level with the Gates-MacGinitie Comprehension Subtest.

Maze 5 corresponds approximately to a grade 4.1 level and Maze 6 to a grade 5.1 level. Each test contains 28 items with a resulting total possible score of 56. The cut-off point for inclusion in the sample was a total of 40 points out of the possible 56, which meant that each student selected

was comprehending at least 70% of what he read. It was supposed that he should, therefore, be capable of orally reading the passage contained in the study instrument. The Guthrie maze pretest is presented in Appendix 1 and the report to the schools concerning the results in Appendix 2.

The results of the pretest are presented in Table 1. All calculations in the study were done on a computer using the Statistical Package for the Social Sciences program (SPSS). The SPSS manual is available through the Newfoundland Computer Services terminal at Memorial University.

 Table 1 about here

It should be noted that a variation on the usual formula for calculating the kurtosis is used by SPSS. This is done so that the kurtosis measures are corrected such that a normal distribution will have a kurtosis of zero as does the skewness of a normal distribution. The computing formula employed by Nie, Hull, Jenkins, Steinbrenner, and Bent (1975: 185) in SPSS is:

$$\text{Kurtosis} = \frac{\{ [\sum_{i=1}^N X_i^4 - 4\bar{X}(\sum_{i=1}^N X_i^3) + 6\bar{X}^2(\sum_{i=1}^N X_i^2)] - 4\bar{X}^3(\sum_{i=1}^N X_i)/N \} + \bar{X}^4}{\{ [(\sum_{i=1}^N X_i^2) - N\bar{X}^2] / (N-1) \}^2} - 3 \quad (1)$$

The frequency distribution of the pretest scores is presented in Figure 2. As can be seen, most of the scores clustered above the cut-off point of 40. This meant that the majority of the students in the classes could be included in

TABLE 1

Mean, Standard Deviation, Skewness, and Kurtosis for the Guthrie Pretest (N = 62)

Mean	Standard Deviation	Skewness	Kurtosis
46.34	10.45	-1.225	.378

Note: For the purposes of this study, the normal curve is represented by a skewness of 0 and a kurtosis of 0.

the study sample. From the four classes, a total of 46 boys scored 40 or above on the Guthrie mazes and, therefore, constituted the case base for the present study.

 Figure 2 about here

When the scores of the 46 boys were plotted on a histogram a more accurate picture of the distribution of the case base could be appreciated. Again, clustering occurred near the top of the score range. If Maze 7 of the Guthrie Maze Test had been included in the pretest, it is likely that the distribution of scores among the study sample would have been reasonably close to normal. As it is, the high scorers clustered because the test was not discriminating adequately amongst the high scoring readers. However, for this study, the pretest served its purpose; that is, it successfully eliminated the students who were not reading up to grade level.

 Figure 3 about here

Variables and Instrumentation

The instrument used in this study was based upon the Reading Miscue Inventory (RMI) but was modified so that the present investigator was able to code the reading passages for substitution miscues only; that is, for proportion of

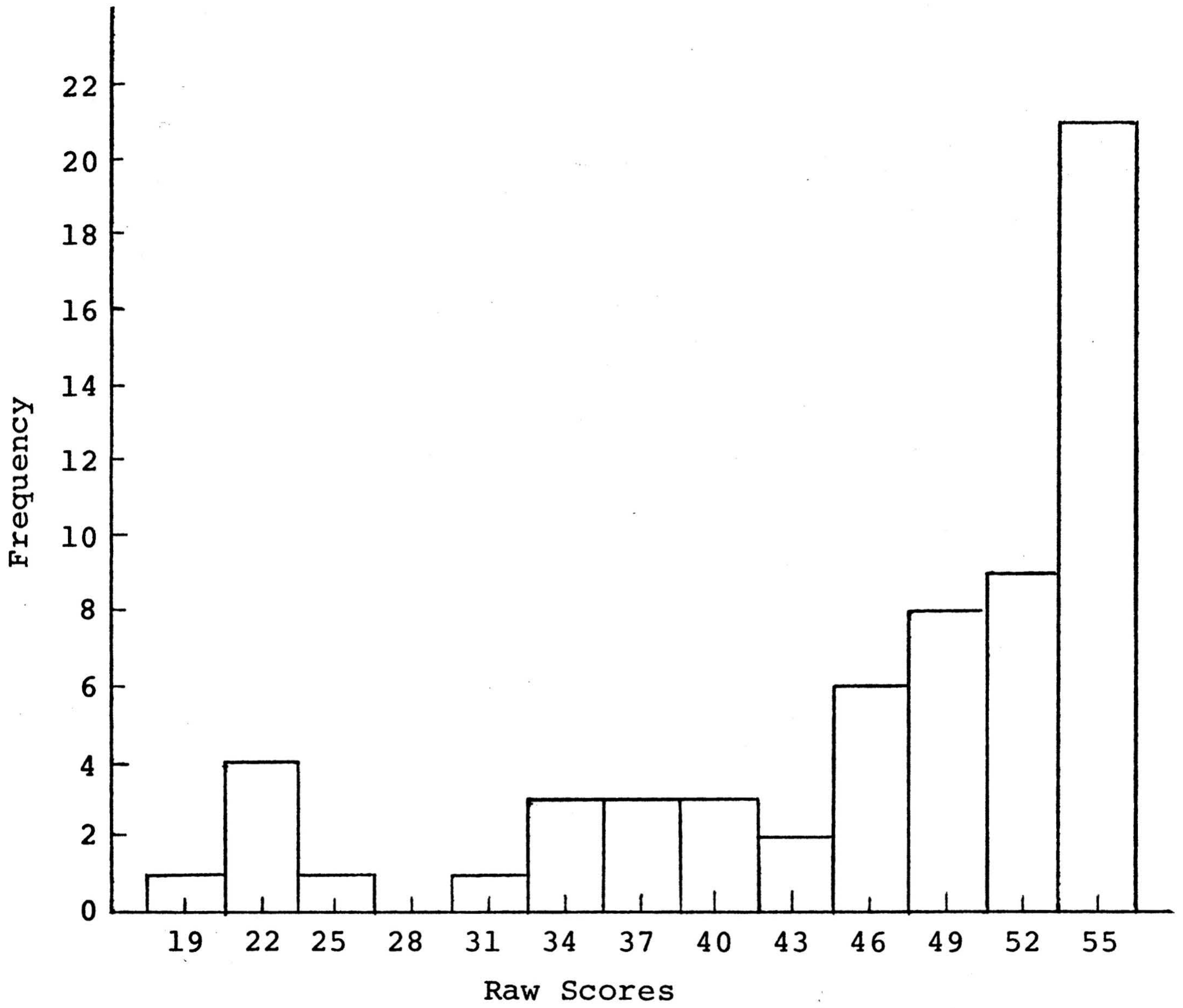


FIGURE 2. Histogram Representing Raw Scores of the Pretest Sample.

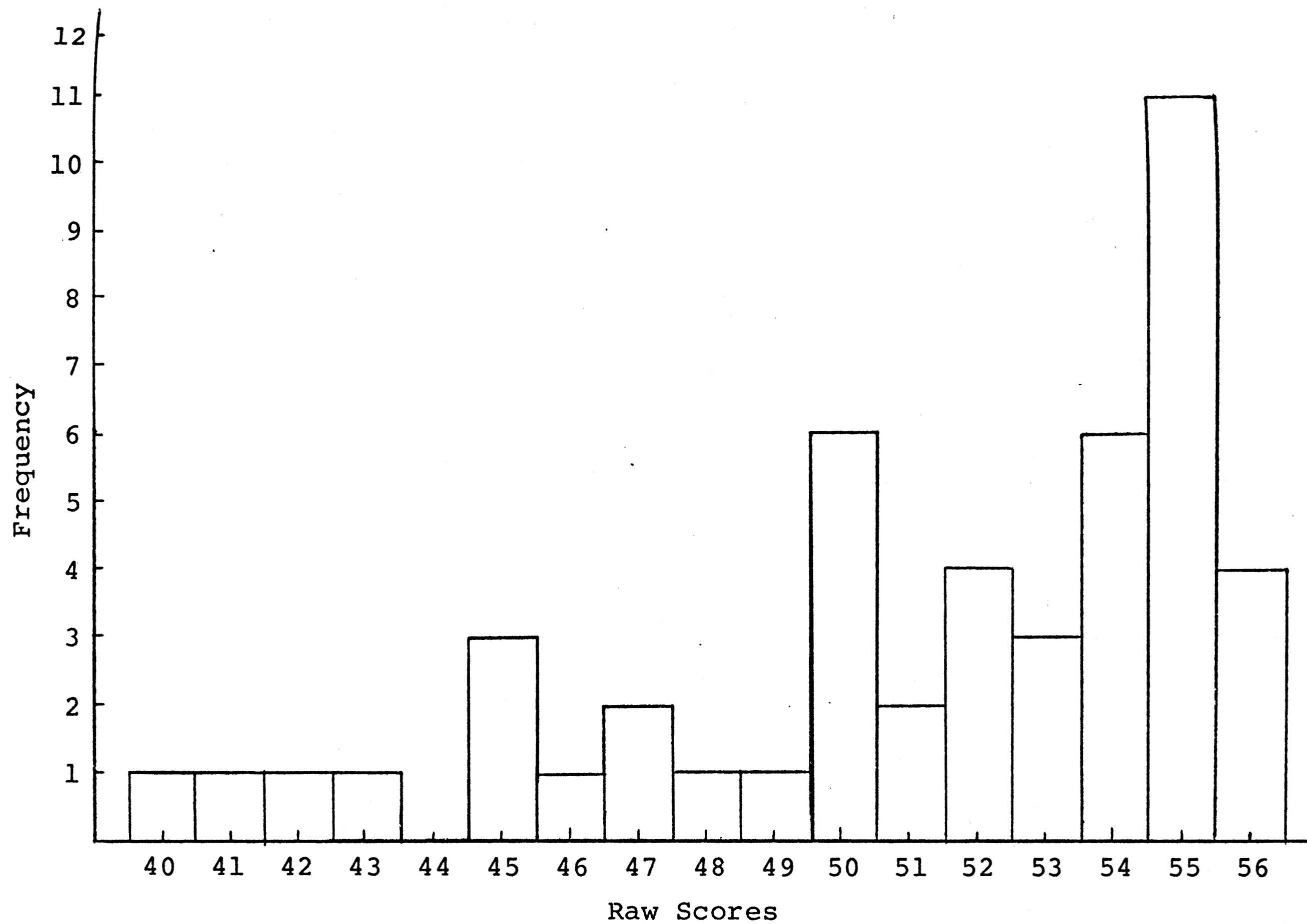


FIGURE 3. Histogram Representing Raw Scores of the Study Sample on the Pretest.

corrections, proportion of acceptable miscues, and proportion of non-acceptable miscues.

The procedure for gathering the data varied from that of the RMI and, therefore, included only three stages. Stage one involved the oral reading, the retelling of the story by the subject, and the audio-taping. The RMI passage which the students read, called "Space Pet", is presented in Appendix 3 and the report to the schools on the oral reading is presented in Appendix 4. During stage two the investigator replayed the tape as often as was necessary to mark each substitution miscue on a typed worksheet and to establish a retelling score according to the guidelines suggested in the RMI. Stage three made use of the modified coding sheet shown in Figure 4. In the present study there was no need to code every kind of miscue, since that was not the concern of the study, just as it was unnecessary to establish graphic-sound relationships in order to arrive at a reader's reading strategy--both of which are a part of the RMI coding process. Once the subject's reading had been coded and totals calculated using the modified instrument, the data analysis could be conducted.

 Figure 4 about here

Reading Comprehension

Reading comprehension of the oral reading passage was measured by a retelling score calculated for each subject.

SPACE PET

As far as I know there has never been a rule against pets in a space station. We had just never had any pets until Sven Olsen decided he wanted one. None of us ever figured out why he chose the pet he did.

Totals

		Non-Corrected	
Substitution	CSM	SSA	NSSA
		Total N.Corr.	

- CSM -- Corrected Substitution Miscus
- SSA -- Syntactically-Semantically Acceptable
- NSSA -- Not Syntactically-Semantically Acceptable

FIGURE 4. Coding Sheet for the Modified Instrument

Immediately following the reading, the child retold as much of the story as he could remember in his own words. A series of questions was then asked by the investigator in an attempt to stimulate further recall and interpretation. Examples of the questions are: "Can you tell me who all of the characters in the story were, and something about them? Where did the story take place? Can you remember anything else about the space station that you may have forgotten to mention? What was it like there? What was going on? Did anything important happen there? What do you think was the most important thing that happened in the story, or the most important thing about the story? Did you learn any lesson from the story?" As often as possible, all children were asked the same questions. However, depending upon the child's initial responses, questions did have to be varied at times. For example, if a child gave the names of all of the characters in the story, it would have been redundant to ask that child to tell who all the characters were; rather, he was only questioned about particular characters if he had omitted to give all of the information about them. Every attempt was made to give each child equal opportunity to retell as much of the story as he apparently understood.

The total score of 100% was made up of four components with varying weights; character analysis - 30% (RETELL 1), events - 45% (RETELL 2), plot - 15% (RETELL 3), and theme - 10% (RETELL 4). By allocating points in this manner, subjects could score above 50% by simply recalling facts from the

story. To obtain a high score, however, they must also have inferred relationships and evaluated the significance of story events.

Since this aspect of the measurement was to some degree dependent upon the researcher's subjective opinion of how completely each subject had described characters, events, plot and theme, five subjects, selected at random, were re-scored and a correlation coefficient established between the two sets of scores for each of the five subjects. A correlation r of .99 revealed that the researcher was consistent in the allocation of points for responses.

The results of the retelling comprehension scores are given in Table 2 and a frequency polygon of the scores is presented in Figure 5.

Table 2 about here

Figure 5 about here

Substitution Miscues

A substitution miscue referred to any incorrect word, partial word or nonword that was given in place of the correct word in the text. In the event that the reader made more than one attempt at decoding a word in the text, two methods for coding the response were used, method two being dependent upon

TABLE 2

Mean, Standard Deviation, Skewness, and Kurtosis for the Study Sample (N = 46)

	Mean	Standard Deviation	Skewness	Kurtosis
TOTALRS (RETELL 1 + RETELL 2 + RETELL 3 + RETELL 4)	50.89	16.67	0.01	-0.80
SUBS	39.85	24.31	1.49	2.51
PCORR	27.97	13.55	0.79	1.15
PACCEPT	46.09	11.67	-0.06	-0.29
PNACCEPT	25.94	15.61	0.71	0.19

Note: TOTALRS = Total retelling comprehension score; RETELL 1 = Retelling comprehension score on character analysis; RETELL 2 = Retelling comprehension score on sequence of events; RETELL 3 = Retelling comprehension score on plot; RETELL 4 = Retelling comprehension score on theme; SUBS = Total number of substitution miscues; PCORR = Proportion of corrections; PACCEPT = proportion of acceptable miscues; PNACCEPT = proportion of non-acceptable miscues.

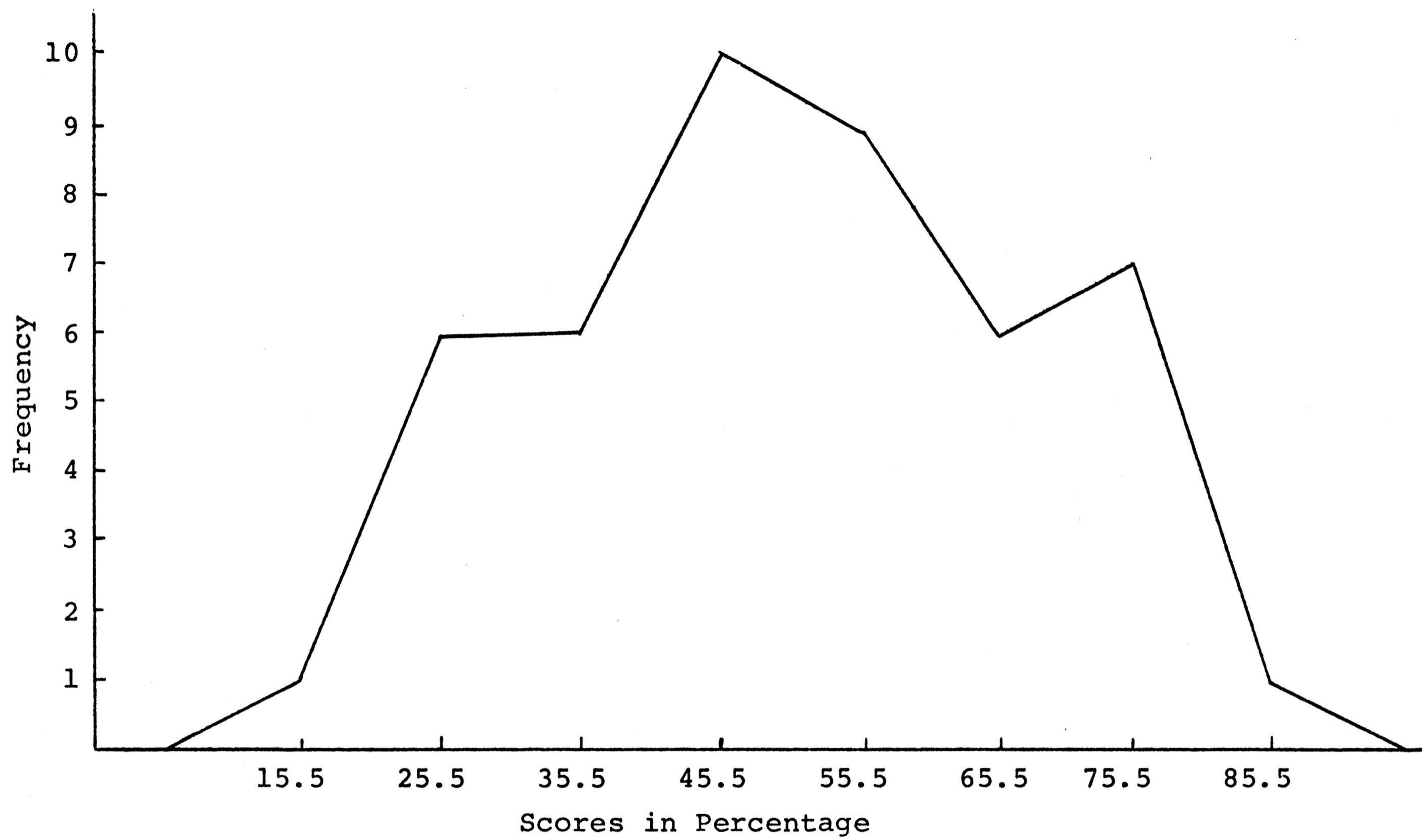


FIGURE 5. Frequency Polygon of Retelling Comprehension Scores

method one. These methods are best described through the use of an example. The word in the text which was being read was "engineer". The reader perceived the word as difficult for him and first said "en", made another attempt and said "energy", and finally said "engine". If the reader stopped after the first attempt, "en", method one was used to code the partial word and the substitution miscue was "en". However, since the reader continued in his attempts to decode the text word and substituted complete words, method two was employed in coding and the first complete word was counted as the substitution miscue. In this case the substitution miscue would have been "energy". Had the student continued in his attempts at decoding and finally arrived at the correct word, "engineer", the substitution miscue remained as "energy" and the correct response "engineer" was counted as a subsequent correction. Corrections are discussed in the following section.

Two further points need to be made regarding the coding or classifying of miscues. First, dialect differences in pronunciation were not counted as substitution miscues and, second, repeated miscues were only counted as one miscue unless they changed function. For example, if a word was consistently miscued and it was consistently used as a noun (as in the instance of proper names), it was counted as one miscue. However, if the word was consistently miscued but its function changed to that of an adjective or a verb, it was counted as a different miscue each time the function changed.

Substitution miscues formed the basic unit of analysis in this study. They were, first of all, examined to find out if the total number of miscues disrupted the comprehension of the passage in question. Later, substitutions were categorized and analyzed to determine what percentage of the miscues were corrected by the reader and how closely they resembled the correct textual word.

The passage selected for this study was 745 words long, and since the child could have theoretically miscued on every word there were 745 possible substitution miscues. Table 2 indicates the number of substitutions. It will be noted that the mean for the total sample is 39.85 with a standard deviation of 24.31 which means that 68% of the sample made between 15.54 and 64.16 substitution miscues. Since the range is from 11 to 120 and the distribution is somewhat skewed to the right and peaked, it seemed to indicate that a number of scores were close to the mean but that there were a few "outliers" with a large number of substitution miscues. The frequency polygon in Figure 6 verifies this observation.

 Figure 6 about here

Proportion of Corrected Substitution Miscues

Corrected substitutions referred to those substitution miscues that were subsequently corrected when the student realized his error and regressed to reread the word exactly

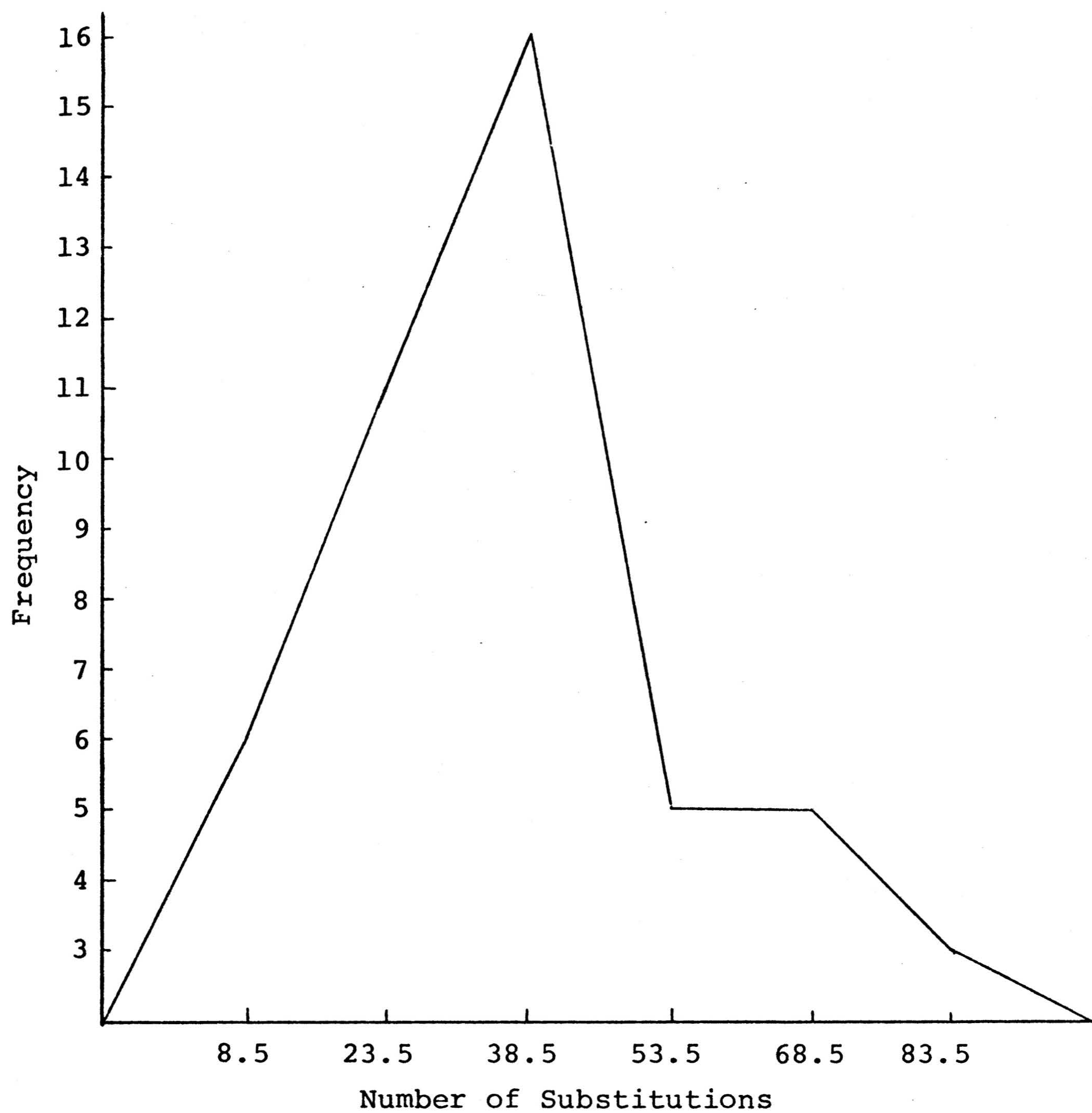


FIGURE 6. Frequency Polygon of Total Number of Substitutions

as it appeared in the text. These corrected substitutions were referred to as corrections. Unsuccessful attempts to correct the miscue rendered the original response a substitution miscue. The obverse of the correction was the non-correction; a situation in which the reader allowed the miscue to remain uncorrected.

The proportion or percentage of the total number of substitution miscues that each child corrected constituted his proportion corrected score (referred to in Table 2 as PCORR). For example, a student who made a total of 30 substitutions and corrected 20 of them would have a proportion correction score of $(20/30) \times 100 = 67$. This is contrasted with a student who made 60 substitutions and corrected 54 of them and whose resultant PCORR score was $(54/60) \times 100 = 90$. By looking at proportions or percentages, all students had an equal opportunity of achieving a score of 100 regardless of the initial number of substitutions made.

The distribution of proportion of corrections for the sample appears in Table 2 and in Figure 7. There was a wide range in correction performance--all the way from virtually no errors being corrected (3.13%) to almost 70%. It seemed that some students were ardent correctors and insisted that what they read should sound like natural and meaningful language, while others either (1) remained oblivious to the sound and sense of their reading and just wished to "get through" it somehow, or (2) had made miscues that were meaningful and sounded like language which did not require

correcting. Given the standard deviation of 13.55 around the mean of 27.97, 68% of all students were correcting less than half of their substitutions, which may indicate that the second explanation for not correcting was more precise.

 Figure 7 about here

Proportion of Syntactically-Semantically Acceptable Miscues

The syntactically-semantically acceptable miscues, referred to as the acceptable miscues, were those miscues that the reader had chosen not to correct and which were both syntactically (or grammatically) and semantically (or meaningfully) congruent with, or parallel to, the expected response and which were, therefore, acceptable within the passage. For example, if a reader said, "Tom was frightened and ran all the way to his home", rather than "Tom was frightened and ran all the way to his house", the non-corrected substitution "home" was counted as acceptable.

While it is realized that syntax and semantics are two distinct concepts that can be measured separately, for the purposes of this study they have been collapsed into a single variable. The reasons for this are as follows.

1. The Allen study, of which the present study was an extension, found that substitution miscues with semantic acceptability also had syntactic acceptability. Hence, syntax preceded meaning and when semantics was measured, syntax was

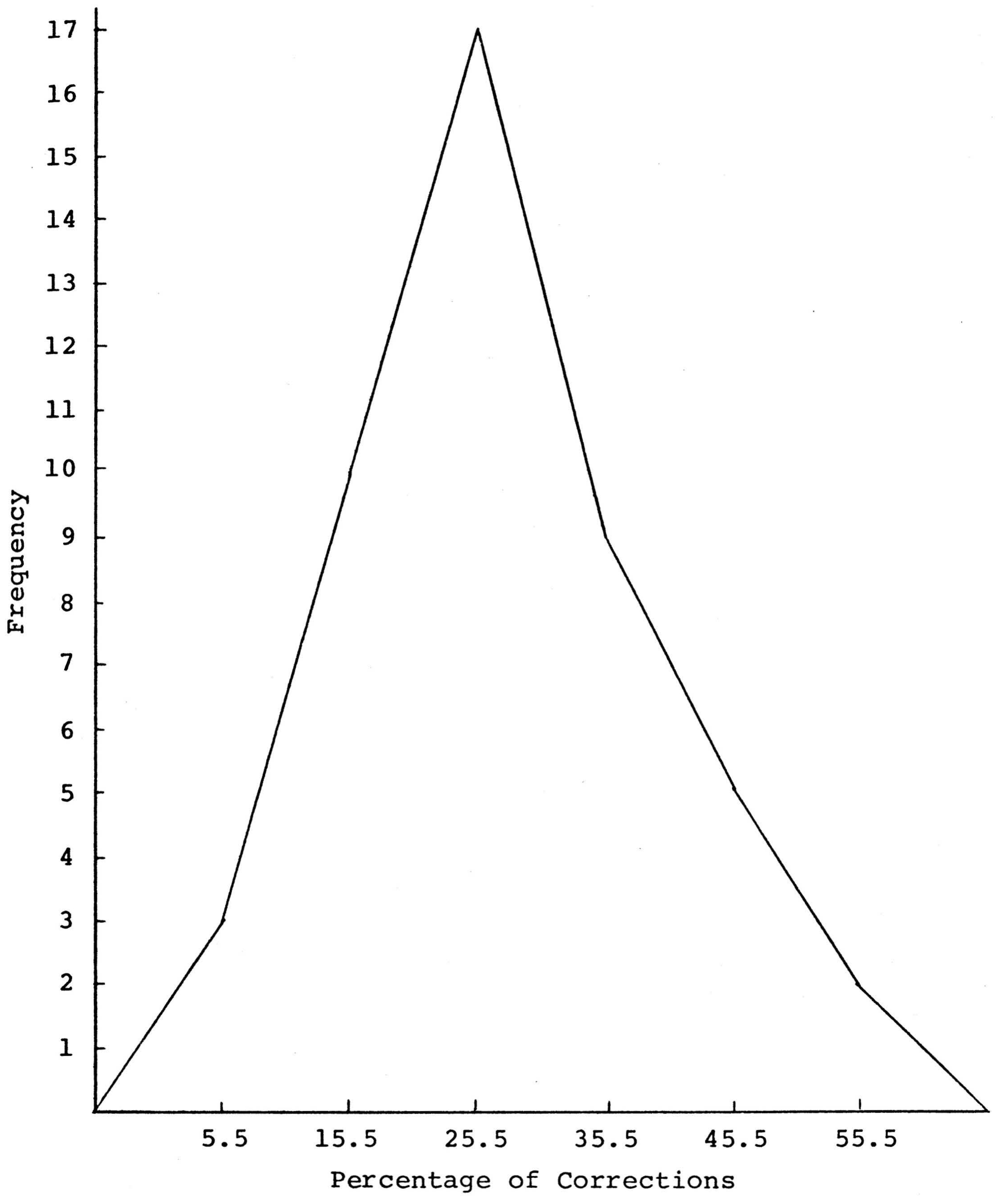


FIGURE 7. Frequency Polygon of Proportion of Corrected Miscues

also included. Since the present study was concerned with both the syntactic and the semantic acceptability of substitution miscues and since syntax precedes semantics, it seemed reasonable to combine the two concepts into one variable.

2. The study by Hood and Kendall (1975:275) combined the two properties of syntax and semantics when categorizing the variables in their research. "An error was considered contextually appropriate only if it was both syntactically and semantically appropriate". Thus, there are precedents to be found in the research literature. Since the present study was primarily concerned with the acceptability of substitutions, it would seem to be legitimate to collapse the two variables into one.

The proportion or percentage of acceptable miscues was used as the unit of measurement in the analysis for the same reasons that percentages were used in calculating correction scores. This proportion was found by using the number of acceptable miscues as the numerator and the total number of substitution miscues as the denominator. The proportion of acceptable miscues is presented under the mnemonics of PACCEPT in Table 2 and the distribution of scores is presented in Figure 8.

Figure 8 about here

It will be noted that the distribution for PACCEPT in the sample was very close to normal but there was not quite

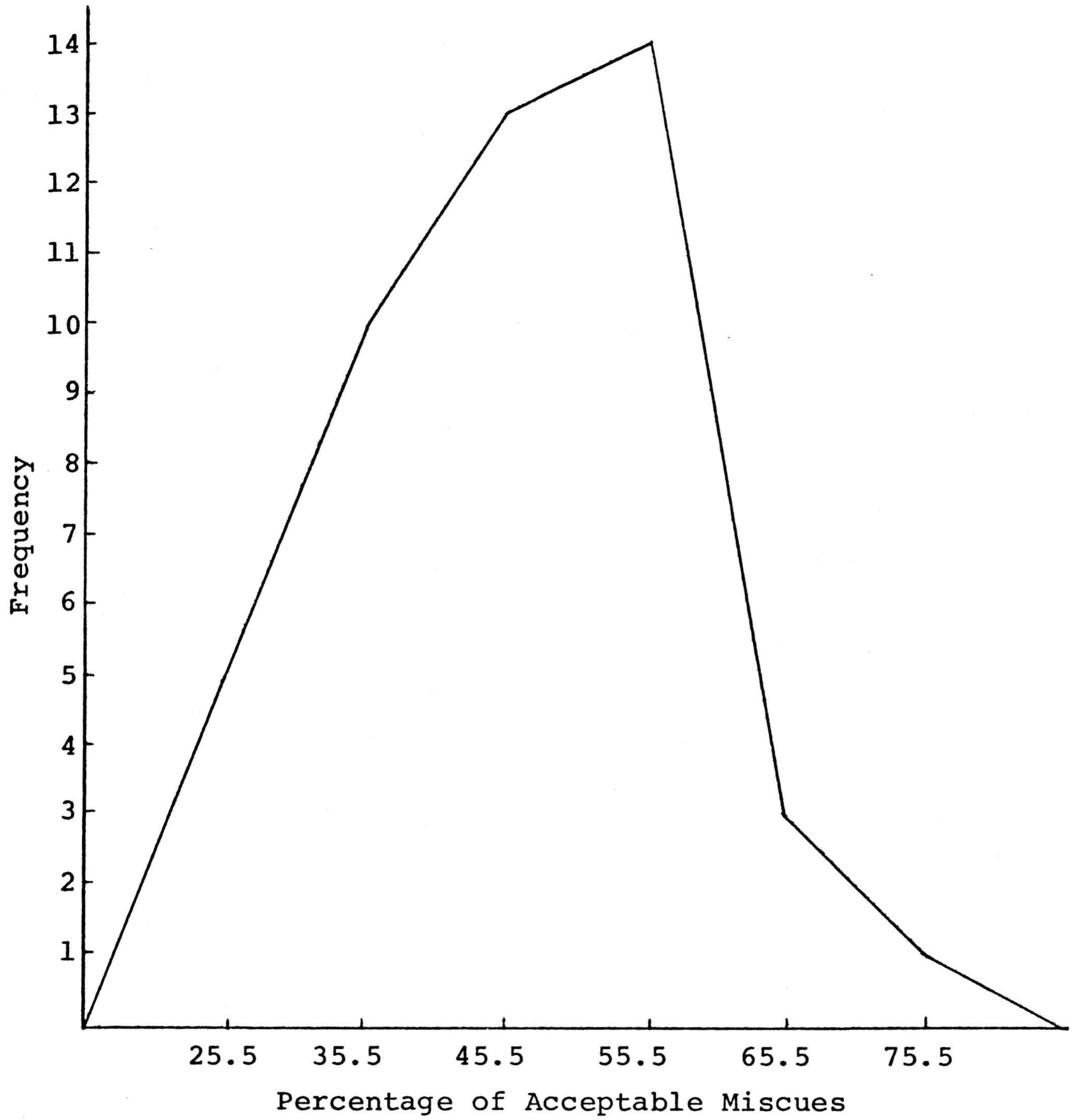


FIGURE 8. Frequency Polygon of Proportion of Acceptable Miscues

the full range of scores allowable; i.e. from 1-100%.

Rather the scores ranged from 20.97% to 75% with a mean of 46.09 (almost the median in a normal distribution) and a standard deviation of 11.67. The curve, therefore, was slightly flat and slightly skewed but for practical purposes it was normal.

Proportion of Non-Acceptable Miscues

The proportion or percentage of miscues that were not syntactically-semantically acceptable; i.e. non-acceptable miscues, constituted the final percentage that, added together with the percentage of corrections and the percentage of acceptable miscues, equalled 100% of each student's total substitutions. This percentage was calculated by using the number of non-acceptable responses for the numerator and the total number of substitution miscues as the denominator. Again, this procedure allowed the investigator to observe what each student had done with his substitution miscues; that is, had he (1) corrected them, (2) left them as acceptable responses, or (3) left them as unacceptable responses?

The third situation constituted the percentage of non-acceptable miscues and, as can be seen, was the obverse of the syntactically-semantically acceptable miscue. The non-acceptable variable is denoted by the mnemonics PNACCEPT in Table 2. Table 2 indicates that the mean for PNACCEPT of the total sample was 25.94 which meant that, on the average, one-quarter of the time the students left their substitutions

stand even though they were not syntactically-semantically congruent with the correct textual words. This was very close to the percentage of miscues that were corrected (27.97) and about half of the percentage that were syntactically- semantically acceptable (46.09). It, therefore, seemed that, in general, the students corrected one-quarter of their substitutions, left one-half of their miscues uncorrected because they were congruent with the expected response, and left the final one-quarter of their miscues even though they were not acceptable within the passage. This was interpreted to mean that there was the distinct possibility that about 75% of the total number of substitutions were not detracting from the comprehension of the passage and that only 25% of the miscues did distort meaning for the reader. The distribution of the scores for non-acceptable miscues is presented in Figure 9.

Figure 9 about here

It appeared, then, that all of the variables in the study were reasonably normal despite some inconsistencies. This is important for the following chapter on statistical analysis, since both correlation and regression are parametric measures and an underlying assumption of parametric statistics is that the variables are normally distributed.

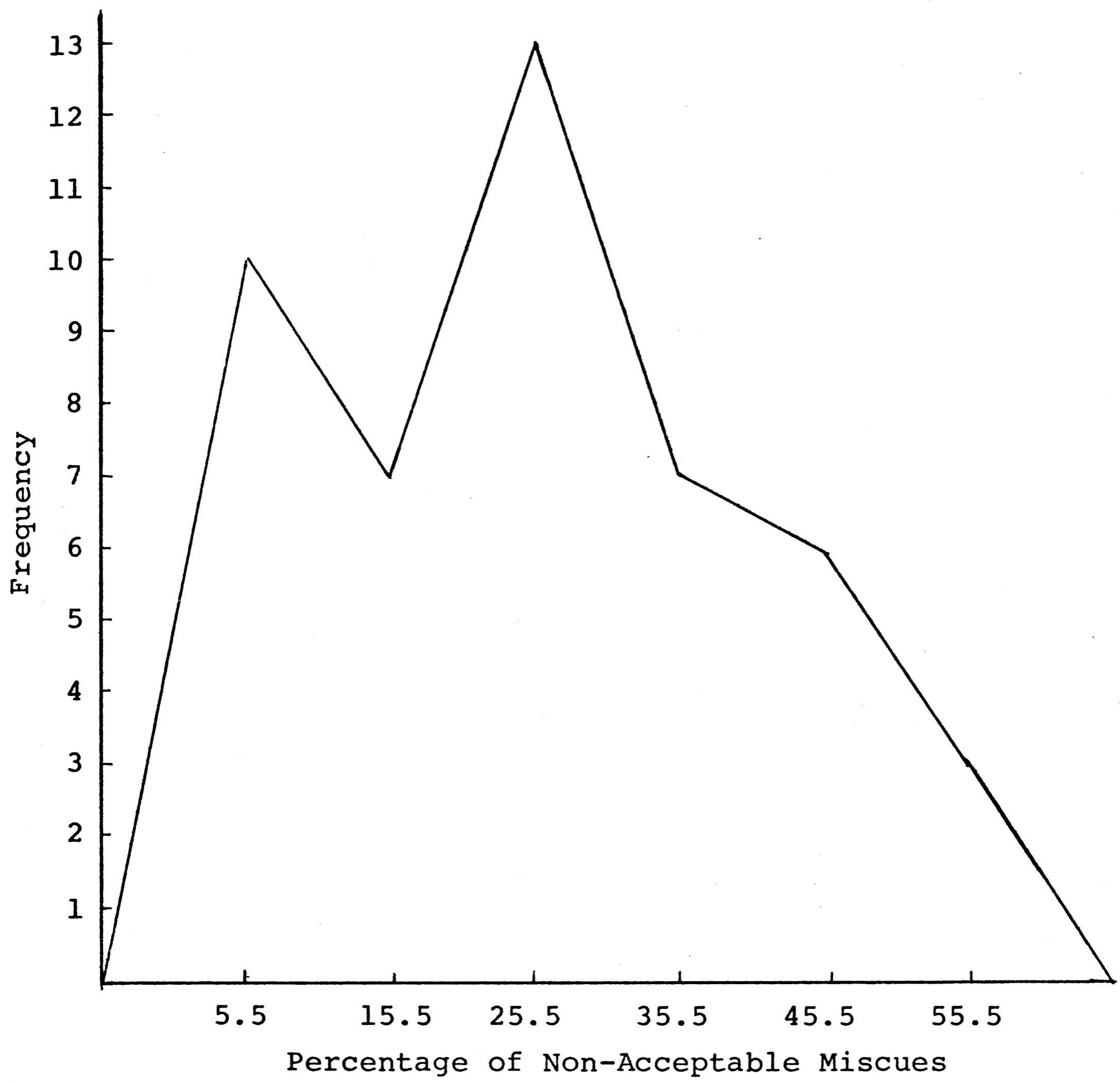


FIGURE 9. Frequency Polygon of Non-Acceptable Miscues

CHAPTER IV

FINDINGS AND DISCUSSION

The purpose of this chapter is threefold: first, to examine the correlations between the independent variables and the dependent variables, and between the set of independent variables; second, to examine the simultaneous effects that the corrected miscues, the acceptable miscues, and the non-acceptable miscues have upon reading comprehension; and third, to discuss the findings in terms of the hypotheses. Pearson product moment correlations are used as the measures of association between variables; and regression analysis is used to identify the relative effects of the corrections and non-corrections on reading comprehension.

Basic Zero-Order Relationships

Basic zero-order relationships (correlation coefficients) provide a single number which summarizes the relationship between two variables. These correlation coefficients indicate the degree to which variation in one variable is related to variation in another. All the intercorrelations used in this study and their associated levels of statistical significance are presented in Table 3.

Table 3 about here

TABLE 3

Zero-Order Correlations, Means, and Standard Deviations of Variables
in the Psycholinguistic Study of Reading Comprehension (N = 46)

VARIABLE	SUBS	PCORR	PACCEPT	PNACCEPT	TOTALRS	MEAN	S.D.
SUBS		-0.483	-0.493	0.788	-0.562	39.85	24.31
PCORR	.001		-0.241	-0.688	0.382	27.97	13.55
PACCEPT	.001	.053		-0.538	0.386	46.09	11.67
PNACCEPT	.001	.001	.001		-0.620	25.94	15.61
TOTALRS	.001	.004	.004	.001		50.89	16.67

Note: Correlation coefficients are above the diagonal; levels of significance are below the diagonal. The key to the mnemonics is as follows: SUBS = Total number of substitution miscues; PCORR = Proportion of corrections; PACCEPT = Proportion of syntactically-semantically acceptable miscues; PNACCEPT = Proportion of non-acceptable miscues; TOTALRS = Retelling comprehension score.

Relationships Between Dependent and Independent Variables

The zero-order correlations that are discussed in this section are those correlations: (1) between reading comprehension and substitutions; (2) between reading comprehension and proportion of corrections; (3) between reading comprehension and proportion of acceptable miscues; and (4) between reading comprehension and proportion of non-acceptable miscues. A matrix of all possible correlations is presented in Table 3.

Total substitution miscues and reading comprehension.

The correlation between the total number of substitution miscues and the reading comprehension score was -0.5623 , which was significant at the .001 level. A significance level of .001 meant that the probability was only 1 in 1000 that this was a chance or accidental finding. Therefore, the greater the number of miscues the lower the comprehension score.

A scatter diagram can be used to give a picture of this bivariate relationship. Scattergrams, however, often suffer from excessive detail. One way to reduce the detail is to draw a straight or curved line through the scattergram in such a manner that it approximates the pattern of points.

The most common statistical procedure for fitting the line to a scattergram is called the "least-squares" procedure. This method is based on the belief that the best-fitting line is one in which the vertical distances of all the points from the line are minimized. The line itself is called the "regression line". That is, if some straight or curved line

were drawn through the scattergram, any point which did not fall exactly on the regression line would be considered "error" in the regression line and is the vertical distance from the point to the line. The distance of point departures from the line are squared and added together to produce a measure of the total error involved when a regression line is used as the prediction of the location of data points. A line which minimizes this sum of squared distances will serve as a better predictor than any other line and is captured by the equation (Nie, et al., 1975:278):

$$\hat{Y} = A + BX \quad (2)$$

The scattergram for reading comprehension (vertical axis) and substitution miscues (horizontal axis) is depicted in Figure 10.

 Figure 10 about here

This scattergram was done by computer, using the SPSS program which also calculated the Y intercept (A) as 66.25546 and the slope (B) as -0.3855. The equation for predicting reading scores, given the number of substitution miscues was then:

$$\hat{Y} = 66.25546 - 0.3855 (X)$$

For example, if a student made 32 substitution miscues, his predicted reading comprehension score on this passage would be 54.

$$\begin{aligned} \hat{Y} &= 66.25546 - 0.3855 \times 32 \\ \hat{Y} &= 66.25546 - 12.336 \\ \hat{Y} &= 54 \end{aligned}$$

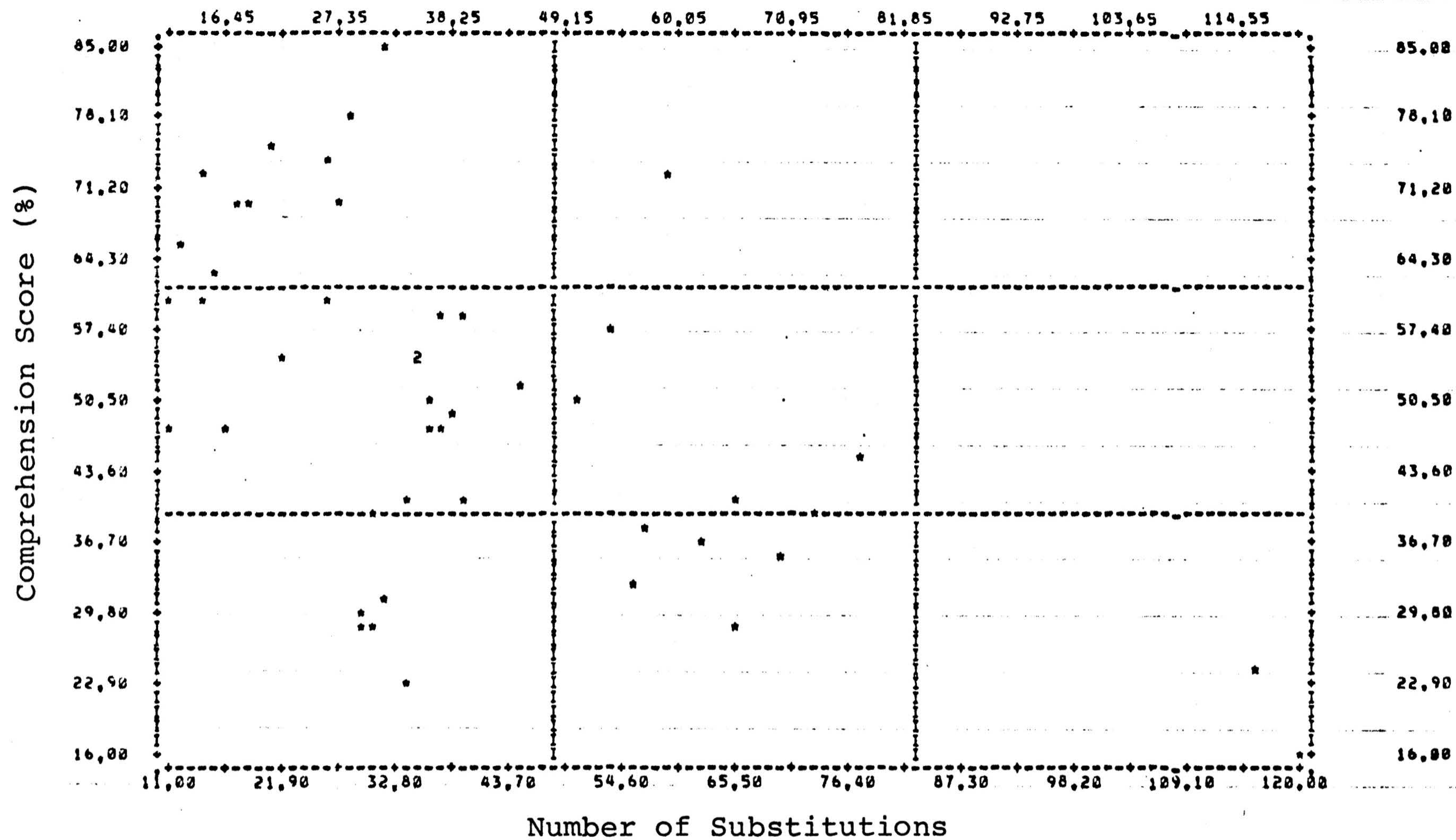


FIGURE 10. Scattergram of Relationship Between Total Substitution Miscues and Reading Comprehension

As can be seen in the scattergram, though, there was considerable variation around the regression line. This suggested that the predicted Y scores, in many instances, were far from accurate; and, hence, using the number of substitutions to predict reading comprehension for these students was not a particularly reliable method. For this reason, then, it was necessary to look beyond the total number of substitution miscues to establish more reliable regression coefficients for predicting reading comprehension scores. The sub-categories of substitutions provided this opportunity.

When students failed to reread to correct substitution miscues, detailed analysis was conducted on the miscues to determine whether the miscues were syntactically-semantically acceptable or, conversely syntactically-semantically unacceptable. Each miscue, then, was coded as either: (1) corrected, (2) acceptable, or (3) unacceptable. Once the total number of substitution miscues was decomposed into these three categories, a more accurate picture of their relationships to reading comprehension was obtained. When one looked beyond total numbers and when each substitution was considered in the light of what the reader did about the miscues--for example, whether or not he corrected, and whether those that were not corrected were syntactically-semantically acceptable or unacceptable--more detailed appreciation was gained about the predicted value of the types of substitution miscues as determinants of reading comprehension. These three decomposed

elements of substitutions related to reading comprehension in the following three ways.

Corrections and reading comprehension. Despite the total number of substitution miscues, the greater proportion of times the student reread to correct miscues, the higher was his comprehension. This correlation was 0.3822 and was significant at the .004 level. The scattergram depicting this relationship is presented in Figure 11. There was a definite positive relationship but with a few "outliers" far to the right. The intercept (A) was 37.75029 and the slope (B) was 0.46992 so that a prediction equation using the proportion of corrections as the X variable was:

$$\hat{Y} = 37.75029 + 0.46992 (X)$$

With less variance from the regression line, the proportion of corrections served as a more accurate predictor of reading comprehension scores.

Figure 11 about here

Acceptable miscues and reading comprehension. The correlation between proportion of acceptable miscues and reading comprehension was almost identical to the correlation between corrections and reading comprehension; that is, 0.3859 as compared to 0.3822. Both were significant at the .004 level. It was evident that the higher the percentage of acceptable miscues, the higher the reading comprehension score, which was also the case with proportion of corrections

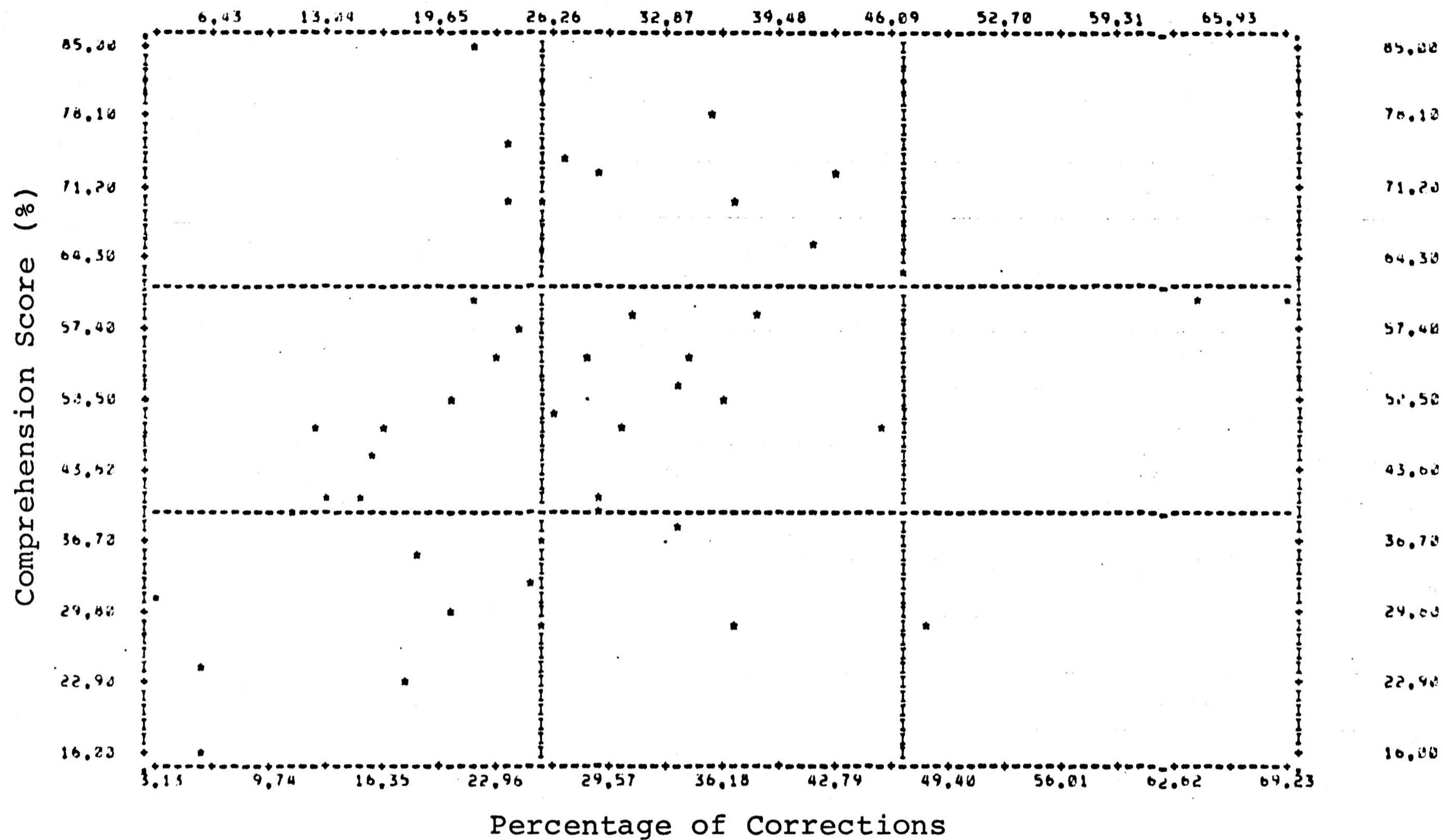


FIGURE 11. Scattergram of Relationship Between Proportion of Corrections and Reading Comprehension

and reading comprehension.

The scattergram for proportion of acceptable miscues and reading comprehension is given in Figure 12. Again, there was a clear, positive relationship but with some "outliers" in both directions. The intercept (A) was 25.4985 and the slope (B) was 0.55095 so that the prediction equation for proportion of acceptable miscues and reading comprehension was:

$$\hat{Y} = 25.49585 + 0.55095(X)$$

Figure 12 about here

Unacceptable miscues and reading comprehension. The obverse of the acceptable miscue was the unacceptable miscue. The correlation between the proportion of non-acceptable miscues and reading comprehension was -0.6204 and was significant at the .001 level. This suggested that the higher the percentage of unacceptable miscues the higher the loss of comprehension while reading. It was noteworthy that this correlation was stronger than the negative correlation between total number of substitutions and reading comprehension of which it was a sub-category.

The scattergram for proportion of non-acceptable miscues and reading comprehension (Figure 13) showed a strong negative relationship with "outliers" in both directions. The relationship was not as erratic as the first relationship between total substitutions and reading comprehension, which

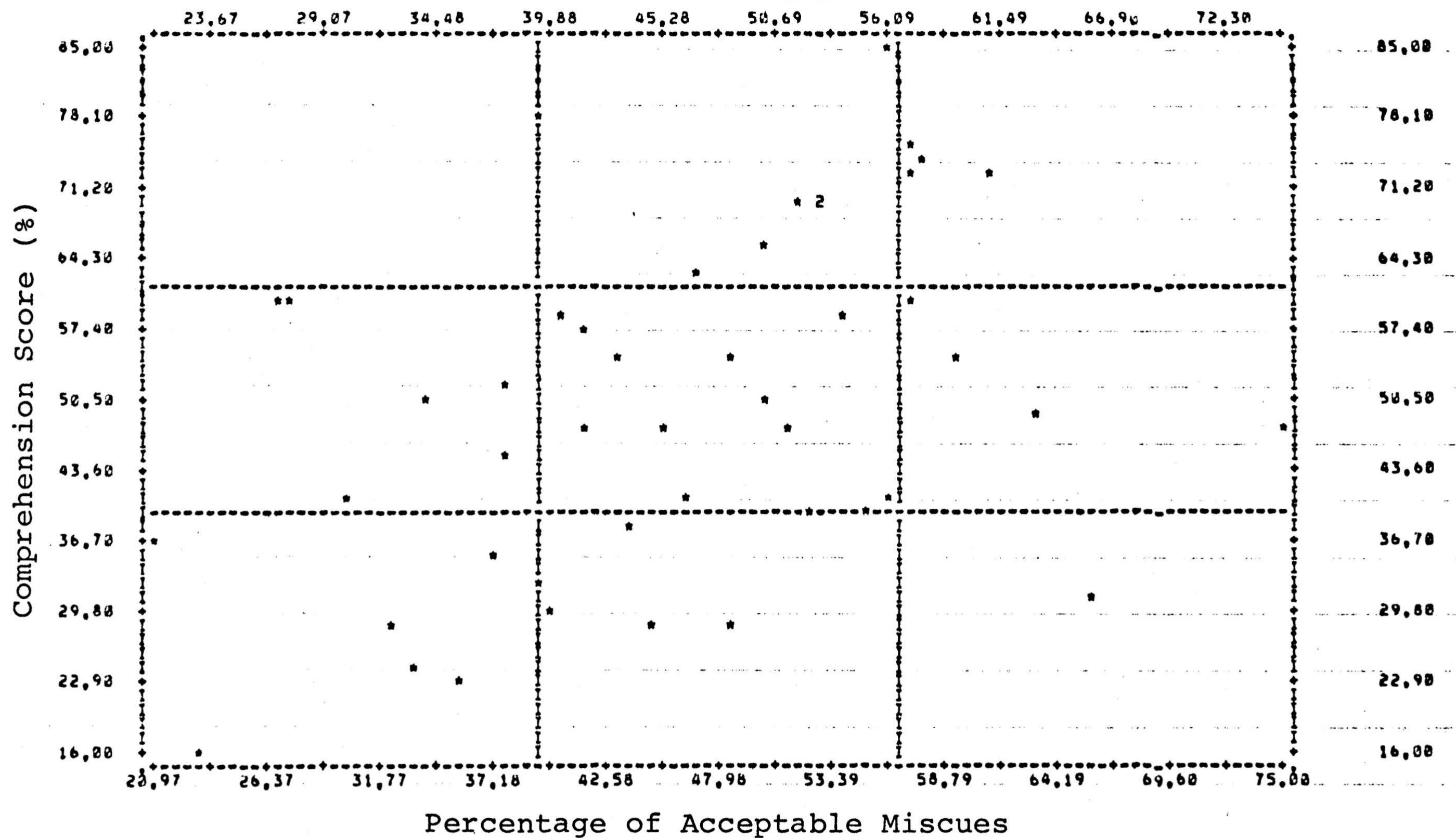


FIGURE 12. Scattergram of Relationship Between Proportion of Acceptable Miscues and Reading Comprehension

tended to support the claim that total substitutions were actually a proxy for unacceptable miscues, plus something else that was causing this erratic behaviour; that is, the influence of acceptable miscues.

 Figure 13 about here

The Y intercept (A) was 68.0754 and the slope (B) was -0.66243 which meant that the prediction equation for this variable was:

$$\hat{Y} = 68.0754 - 0.66243(X)$$

The proportion of non-acceptable miscues was also a better predictor of reading comprehension than total substitutions, because there was less variance around the regression line. Hence, all three sub-categories individually provided more accurate prediction equations than did the overriding variable, total substitutions. However, neither correlation coefficient techniques, nor simple regression, provided for the possibility of using more than one of these variables in the regression equation.

Relationships Between Independent Variables

The relationships between the independent variables of total number of substitutions (referred to as SUBS) and its three sub-categories, corrections, acceptable miscues, and non-acceptable miscues, are also presented in Table 3.

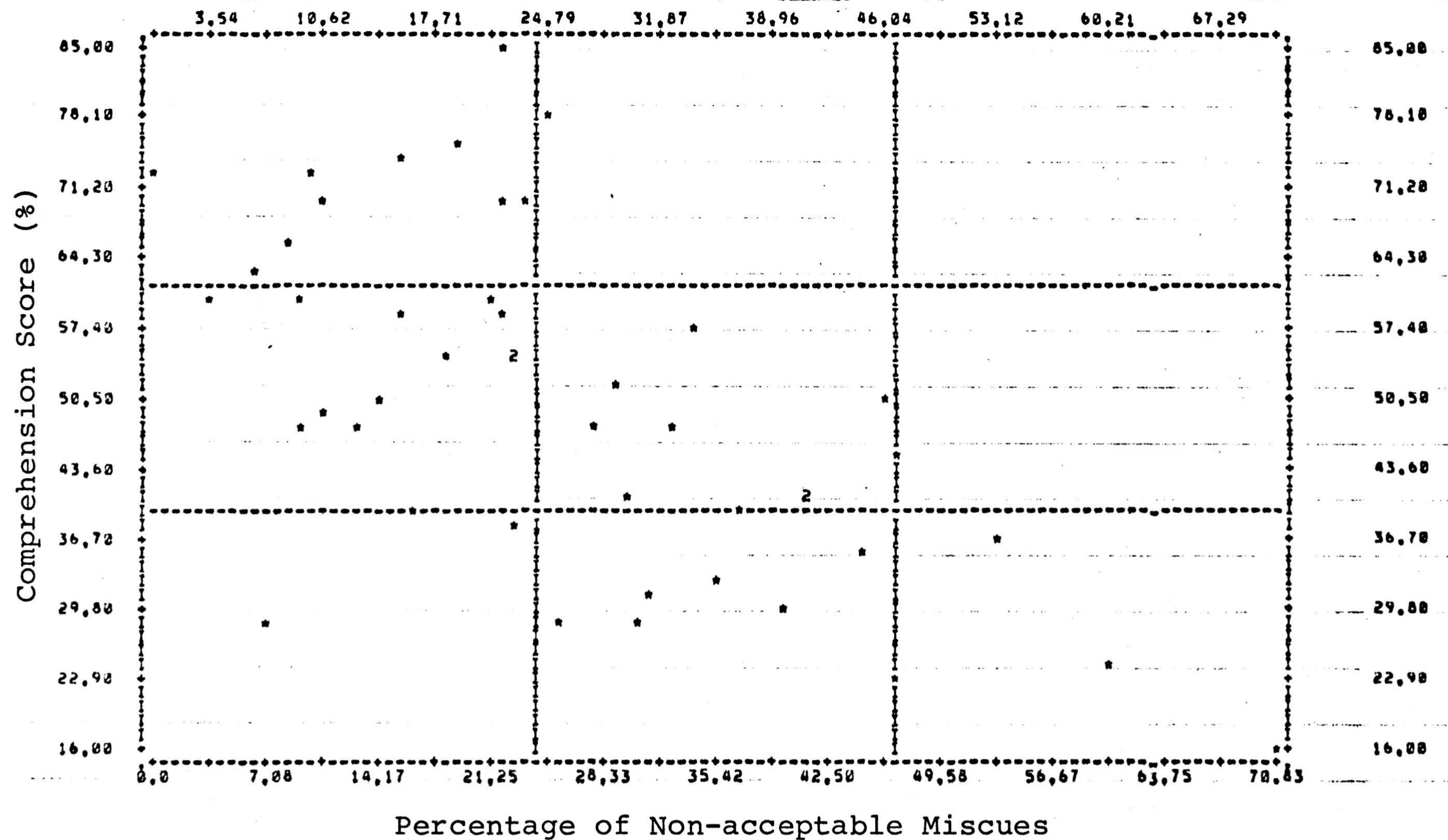


FIGURE 13. Scattergram of Relationship Between Proportion of Non-Acceptable Miscues and Reading Comprehension

Total substitution miscues and corrections. The correlation between total substitutions and the proportion corrected was -0.4829 , which was significant at the .001 level. This was interpreted to mean that the greater the total number of substitutions, the less likely they were to be corrected.

Total substitution miscues and acceptable miscues. The correlation between total substitutions and the proportion of acceptable miscues was also a reasonably strong negative correlation (-0.4927), significant at the .001 level. That is, the greater the number of total substitutions, the less likely that the uncorrected substitutions were syntactically-
semantically acceptable.

Total substitution miscues and non-acceptable miscues. The correlation between total substitutions and the percentage of non-acceptable responses was the obverse of the above relationship, in that there was a very high positive relationship. The correlation of 0.7877 , significant at the .001 level, indicated that the greater the number of total substitutions, the more likely that the uncorrected substitutions were unacceptable which explained the strong negative correlations between both total substitutions and reading comprehension and the proportion of unacceptable substitutions and reading comprehension.

The relationships between the proportion of corrected miscues and the proportion of uncorrected miscues are also included in Table 3 and are as follows.

Corrections and acceptable miscues. The correlation between the proportion of corrections and the proportion of acceptable miscues was -0.2412 which was not significant beyond the .053 level. This meant that the probability of this finding being a chance occurrence was 53 out of 1000. Since an acceptable probability level had been previously set at 50 or less out of 1000 a probability of 53 was not acceptable. Therefore, the correlation could have occurred by chance. Such a non-significant relationship was evidence that the two variables were relatively independent of one another. In other words, just because a miscue was not corrected did not mean that it was an acceptable miscue.

Corrections and non-acceptable miscues. The correlation between the proportion of corrections and the non-acceptable responses was -0.6879 and was significant at the .001 level. The more corrections made the less likely uncorrected substitutions were to be unacceptable. That is, those students who corrected a high proportion of their miscues also made only a few unacceptable responses.

Multivariable Relationships

It must be recognized that when correlation coefficients are used to establish patterns of relationship between variables, the degree of association is in fact a rather crude measure. In educational research, it is generally accepted that independent variables interact with one another, which in turn correlate with the dependent variables. Therefore,

it is seldom that a direct one-to-one relationship exists between an independent variable and a dependent variable; rather, the relationship is usually influenced by extraneous variables or other outside "noise". The single correlation coefficient number, then, can be misleading and in all likelihood denotes the relationship in question plus other things. For this reason a second, but related, mode of analysis was conducted in an attempt to isolate the effect that each of two predictor variables--corrected miscues and acceptable miscues--had on the outcome variable, reading comprehension. This procedure requires that the analyst obtain an accurate estimate of the effect of one independent variable on the criterion while taking into account or controlling for the effect of the other independent variable.

Multiple regression, the second mode of analysis used in the present study, is a statistical technique through which one can more precisely analyze the relationship between a dependent or criterion variable and a set of independent or predictor variables. In this study, multiple regression was used as a descriptive tool by which the linear dependence of reading comprehension on corrected and acceptable miscues was determined. This was done (1) by finding the best linear prediction equation and evaluating its prediction accuracy, and (2) by controlling for other possibly confounding factors in order to evaluate the relative contribution of the correction miscue variable and the relative contribution of the acceptable miscue variable. That is, through multiple

regression techniques, the researcher was able to obtain a prediction equation that indicated how scores on independent variables (corrections and acceptable miscues) could be weighted and summed in order to obtain the best possible prediction of reading comprehension for the sample in question. The researcher was also able to obtain statistics that indicated how accurate the equation was and how much of the variation in reading comprehension was accounted for by the joint linear influences of corrections and acceptable miscues.²

Problem of Obtaining a Unique Solution for Predictor Variables

When the present study was originally conceived, the intention of the investigator was to include the total number of substitutions as an independent variable in the regression analysis. This meant that four variables (SUBS, PCORR, PACCEPT, and PNACCEPT) were to have been used in obtaining a prediction equation whereby scores could be estimated for the dependent variable. The analytical steps in obtaining the solution to the prediction equation were outlined in Chapter I and included entering total substitutions into the regression analysis first in order to obtain the effect that this variable had upon comprehension. Once this regression coefficient was obtained, the proportion of corrections was to have been entered into the analysis on step II (while holding constant the effect of total substitutions through a stepwise regression

²For a more detailed account of multiple regression see Kerlinger, F.N., & Pedhazur, E.J. Multiple Regression in Behavioural Research. New York: Holt, Rinehart and Winston, 1973.

procedure) in order to obtain the unique effect of the correction variable on reading comprehension over-and-above the effect of total substitutions. Once the effect of corrections was estimated, the proportion of uncorrected miscues was to have been entered in the analyses to establish the effect of uncorrected substitution miscues. Finally, the proportion of uncorrected miscues that were syntactically- semantically acceptable was to have been entered in the analysis to establish their effect while controlling for all other effects.

This solution to the problem, however, proved to be untenable for reasons which were not foreseen during the planning stages of the study. When the total number of substitutions was entered into the analysis it naturally subsumed all the explained variance, since the other three variables were merely disaggregated elements of the total. That is, total substitutions was a general category variable which could be decomposed into corrected and uncorrected substitutions. The uncorrected substitutions could then be further decomposed into acceptable and non-acceptable. This meant that the sub-elements of a global variable were being entered into the regression analysis as independent variables even though they were definitively and empirically redundant.

Before a solution to the problem could be obtained, it was necessary to select those variables which would theoretically enable one to predict scores on the dependent variable and which were not redundant in the practical realm

of data analysis. The first decision was to exclude the total number of substitution miscues from the analysis since they subsumed all other independent variables. Total substitutions was decomposed into corrected and uncorrected. The corrected miscue was selected as the first independent variable to enter into the analysis and then the uncorrected miscues were considered. As mentioned earlier, the variable uncorrected miscues can be decomposed into acceptable and non-acceptable miscues. To use both sub-categories of uncorrected miscues would also have been redundant, since one was the obverse of the other; that is, if a miscue was not acceptable it must have been unacceptable. Theoretically, then, either could have been used in the analysis, but because the correlation coefficient between proportion of corrections and proportion of acceptable miscues was only -0.241 as compared to the correlation coefficient of -0.688 between proportion of corrections and proportion of non-acceptable miscues, the former was selected to minimize a problem of collinearity.

Using proportion of corrections and proportion of acceptable miscues as the independent variables, another regression analysis was conducted, the results of which will be presented following a discussion of collinearity.

Collinearity Between Corrections and Acceptable Miscues

Collinearity refers to the situation in which some or all of the independent variables are highly intercorrelated.

This situation can cause problems in regression analysis because (1) regression coefficients cannot be uniquely determined--that is, there is too much overlap, and (2) if extreme collinearity exists (for example, zero-order relationships in the 0.8 to 0.99 range) it may not be possible to invert the correlation matrix for the independent variables--the procedure upon which unique solutions to regression equations depends. This, in effect, means that the greater the intercorrelation of independent variables, the less the reliability of the relative importance indicated by the partial regression coefficients.

The correlation coefficient between corrected miscues and acceptable miscues was -0.241 (Table 3), which was rather low in comparison to all other correlation coefficients between independent variables. This suggested that these two independent variables were only modestly interrelated; hence, they were relatively independent of one another. The problem of collinearity, then, for the following analysis appeared to be minimal given the collinear nature of psychological variables.

Relative Strengths of the Effects of Predictor Variables on Reading Comprehension

Recall that in simple regression analysis, the values of the dependent variables are predicted from a linear function of the form:

$$\hat{Y} = A + BX.$$

The difference between the actual and the estimated value of Y for each case is called the residual or error term in prediction and is represented by the expression (Nie, et al., 1975:323)

$$\text{Residuals} = Y - \hat{Y}. \quad (3)$$

The regression strategy involves the selection of A and B in such a way that the sum of the squared residuals is smaller than any possible alternative values or:

$$\Sigma(Y - \hat{Y})^2 = \text{SS residuals} = \text{minimum}.$$

The optimum values for B and A are obtained from the formulas (Nie, et al., 1975:323)

$$B = \frac{\Sigma(X - \bar{X})(Y - \bar{Y})}{\Sigma(X - \bar{X})^2} \quad (4)$$

$$A = \bar{Y} - B\bar{X} \quad (5)$$

where \bar{X} is the mean of independent variable scores and \bar{Y} is the mean of the actual dependent variable scores.

The constant A (referred to as the Y intercept) is the point at which the regression line crosses the Y axis and represents the predicted value of Y when $X = 0$. The constant B, usually referred to as the (nonstandardized) regression coefficient, is the slope of the regression line which indicates the expected change in Y with a change of one unit in X. The predicted \hat{Y} values fall along the regression line, and the vertical distances $(Y - \hat{Y})$ of the points from the line represent residuals or errors in prediction. Since the sum of squared residuals is minimized, the regression line is called the least-squares line or line of best fit,

which means that no other line is "closer" to the points.

The basic principles of regression analysis used in the bivariate case described above may be extended to situations involving two or more independent variables. The general form of the unstandardized regression then becomes (Nie, et al., 1975:328):

$$\hat{Y} = A + B_1X_1 + B_2X_2 + \dots + B_nX_n \quad (6)$$

where \hat{Y} represents the estimated value of Y , A is the intercept, and B_1 are regression, or beta, coefficients.

The calculation of the B 's of the regression equation is done rather mechanically with formulas for two X variables (Kerlinger & Pedhazur, 1973:34). They are:

$$B_1 = \frac{(\sum X_2^2) (\sum X_1 Y) - (\sum X_1 X_2) (\sum X_2 Y)}{(\sum X_1^2) (\sum X_2^2) - (\sum X_1 X_2)^2} \quad (7)$$

$$B_2 = \frac{(\sum X_1^2) (\sum X_2 Y) - (\sum X_1 X_2) (\sum X_1 Y)}{(\sum X_1^2) (\sum X_2^2) - (\sum X_1 X_2)^2} \quad (8)$$

Substituting these values into the first equation gives (Nie, et al., 1975:329):

$$A = \bar{Y} - B_1\bar{X}_1 - B_2\bar{X}_2. \quad (9)$$

The Meaning of Regression Coefficients

A regression coefficient, say B_1 , in the equation

$$\hat{Y} = A + B_1X_1 + B_2X_2$$

stands for the expected change in Y with a change of one unit in X_1 , when X_2 is held constant or otherwise controlled.

Likewise, B_2 stands for the expected change in Y with a unit

change in X_2 when X_1 is held constant. Therefore, B_1 and B_2 may be called partial regression coefficients because the effects of the other variable is partialled out. Further, the combined "effects" are additive. That is, if there is a one unit change on each of X_1 and X_2 , the expected change in Y would be $(B_1 + B_2)$.

The results of the analysis for this study are presented in Table 4. The regression coefficient is referred to as the unstandardized BETA COEFFICIENT (B). Note that the B indicates that it has not been standardized. The B for the proportion of corrected miscues was 0.6205 and for the proportion of acceptable miscues was 0.7247. Both were significant at the .001 level.³ This meant that for every unit change in the proportion-of-corrected-miscues variable there was a predicted increase in the reading comprehension score (Y) of .6205, when the effects of the proportion of acceptable miscues were held constant. Similarly, a one unit change in the proportion of acceptable miscues produced a predicted increase of 0.7247 in the reading comprehension score, when the effects of corrections were held constant. When the combined effects were taken into account a one unit increase in each independent variable produced a 1.3452

³The significance of the regression coefficient (as well as the standardized beta and standard error beta which follow) was tested by evaluating the F ratio using the following formula (Nie, et al., 1975:326):

$$F = \frac{\sum (\hat{Y} - \bar{Y})^2 / 1}{\sum (Y - \hat{Y})^2 / N - 2} \quad \begin{array}{l} \text{with one and } N - 2 = 44 \\ \text{degrees of freedom.} \end{array} \quad (10)$$

(.6295 + .724) predicted change in the reading comprehension score. Because each of the three variables in the regression equation was expressed in proportions or percentages, unstandardized beta coefficients assumed a substantive meaning that is uncommon in most studies which are composed of a set of variables, each possessing a different metric. Thus, a one unit change in the proportion of corrections referred to a single percentage unit; and the predicted increase of .6205 referred to a .6205 increase in percentage points of reading comprehension. This was interpreted to mean that if the effects of the proportion of acceptable miscues were somehow held constant and if, at the same time, the performance of a student in terms of his proportion of corrections was improved ten percent, then one might reasonably expect a 6.205% improvement in reading comprehension.

Similarly, if a student's proportion of corrected substitution miscues remained the same, but his performance in terms of the proportion of acceptable miscues improved by ten percent, then a gain of 7.247% in reading comprehension could reasonably be expected. Since improvements are likely to operate simultaneously, and if it were hypothesized that as a result of instruction and student perseverance both PCORR and PACCEPT effects improved by ten percent, then a resultant gain of 13.452% in reading comprehension could be expected. It would seem that efforts to improve performances in terms of encouraging students to reread to correct, and in terms of developing the students' syntactic structures and

semantic code, may be expected to have considerable pay-offs in terms of improved reading comprehension performances.

The prediction equation for this study was then represented by:

$$\hat{Y} = 0.1364 + 0.6205(X_1) + 0.7247(X_2)$$

where \hat{Y} = estimated reading comprehension score

X_1 = proportion of corrected miscues, and

X_2 = proportion of acceptable miscues.

Table 4 about here

Standardized Regression Coefficients

Scores on independent and dependent variables can be standardized so that the relative effects of each independent variable on the dependent variable can be calculated. Regression coefficients are also then standardized and are referred to as BETA WEIGHTS. While these beta weights do not allow one to estimate Y values from the original raw value units, they are essential when one considers the relative weight that each independent variable contributes to the dependent variable.

In the present study, the beta weights for the two predictor variables, proportion of corrections and proportion of acceptable miscues, were 0.5046 and 0.5076 respectively. This means that each was contributing the same amount in the prediction of the dependent variable score, reading com-

TABLE 4

Results of the Regression Analysis: The Effects of Corrections and Acceptable Substitution Miscues on the Comprehension Scores of Grade Four Boys (N = 46)

Independent Variables	Dependent Variable - Reading Comprehension				
	1. Unstandardized Beta Coefficient (B)	2. Standardized Beta (β)	3. Standard Error Beta	4. F	5. ρ
Proportion of Corrected Miscues	0.6205	0.5046	0.1511	16.867	.001
Proportion of Acceptable Miscues	0.7247	0.5076	0.1754	17.069	.001
(Constant)	0.1364				
R^2	0.3887				

prehension, and that a one standard-deviation-unit change in either independent variable produced a .5 standard-deviation-unit change in the dependent variable. When the effects of the two independent variables were added together, a one unit change in each variable produced a one standard-deviation-unit change in the dependent variable.

The Standard Error Beta

To evaluate the accuracy of the prediction equation or, equivalently, to determine the amount of prediction error, it was necessary to examine the statistics that reflected the average size of the residuals or error term. A widely used statistic for this purpose is the standard error of estimate, which is the standard deviation of actual Y values from the predicted \hat{Y} values. Another procedure, and the one used in this study, is to estimate the standard deviation of the sampling variability of the unstandardized regression coefficient (beta coefficients). This standard error of beta was calculated by the following formula and was provided in the SPSS program package (Nie, et al., 1975:326):

$$\sqrt{B} = \sqrt{\frac{\sum (Y - \hat{Y})^2 / (N-2)}{\sum (X - \bar{X})^2}} \quad (11)$$

In the present study the standard error of beta for the first predictor variable (corrected miscues) was 0.1511 and for the second predictor variable (acceptable miscues) was 0.1754. This indicated the amount of variance of the regression coefficients around the regression line which can

be more easily understood in terms of standard deviations of the error terms around the regression line. A generally acceptable significance level for the standard error of beta is that it should be less than one-half of the regression or beta coefficient (Spady & Greenwood, 1971:5). The standard errors of the two betas in the present study were well below this level (cf. Table 4) which indicated that prediction error was minimal and the accuracy of the measurement of the prediction equation was high.

The Coefficient of Determination

No matter what variable is used as X in the prediction equation, the square of the correlation (r) between the predictor variable and the criterion variable is referred to as the coefficient of determination. This indicates the proportion of variance among the criterion scores that can be explained by differences in the predictor variable or that a given percentage of Y variance is predictable on the basis of the set of predictor variables.

The total sum of squares in Y (which is the variability of the dependent variable Y) can be partitioned into components that are (1) explained or accounted for by the regression line, denoted by SSreg $[\sum (\hat{Y} - \bar{Y})^2]$, and (2) unexplained (namely, the sum of squared residuals), denoted by SSres $[\sum (Y - \hat{Y})^2]$ (Nie, et al., 1975:330). That is,

$$\begin{aligned} SS_Y &= SS_{reg} + SS_{res}, \text{ or} \\ \sum (Y - \bar{Y})^2 &= \sum (\hat{Y} - \bar{Y})^2 + \sum (Y - \hat{Y})^2. \end{aligned} \quad (12)$$

Because of this partitioning, the strength of the linear association is the ratio of explained variation around the regression line in the dependent variable Y to the total variation in Y. That is (Nie, et al., 1975:330)

$$\begin{aligned} R_{XY}^2 &= \frac{SS_{reg}}{SS_Y} \\ &= \frac{SS_Y - SS_{res}}{SS_Y} \end{aligned} \quad (13)$$

and this coefficient represents the amount of variance explained. In the present study the coefficient of determination (R^2) was .3887 which meant that for this sample, the proportion of corrections and the proportion of acceptable miscues accounted for 38 percent of the variance in the reading comprehension scores, or that 38 percent of the variance in the dependent variable was predictable by the two independent variables.

Discussion

The purpose of this section is to discuss the findings in terms of the extent to which they support or fail to support the hypotheses. The format of the section will include discussion of the acceptance or rejection of the first five hypotheses which were tested using zero-order correlations, followed by the acceptance or rejection of hypotheses 6, 6a, and 6b which were tested using regression procedures.

Hypothesis 1: the greater the number of substitutions the lower the reading comprehension.

The correlation between the total number of substitutions and reading comprehension was -0.5623 , which was significant at the $.001$ level. On the basis of this evidence Hypothesis 1 was accepted. Thus, when considering only the total number of substitutions, the evidence from this study supported the view that was prevalent up to the mid-1960's; that oral reading errors are signs of reading disabilities (Weber, 1968).

If this hypothesis is accepted at face value, it suggests that if teachers want to improve the reading comprehension of their students, they need only eliminate reading errors by teaching children to identify each word precisely and accurately. That is, if the grapho-phonetic elements of reading are carefully and adequately taught, reading comprehension would improve. In practice, however, this does not seem to be the case. There are still students who can say each word accurately as they attempt to read but who have little understanding of what sentences or passages mean.

The present study, which is based upon the work of Kenneth & Yetta Goodman and Carolyn Burke, suggested that reading comprehension involved more than simply processing letters and words. Readers must also use the syntactic and semantic elements inherent in reading material if they are to be successful readers. When children do utilize these additional elements while reading, they will often realize that they have made an error, because the utterance does not

sound correct to them or because it does not make sense. If this is the case, readers will often go back to correct the mistake so that it fits into the framework of the sentence or the paragraph, and then continue reading. This situation leads to the second hypothesis.

Hypothesis 2: the greater the proportion of corrections the higher the reading comprehension.

The correlation between proportion of corrections and reading comprehension was 0.3822 and was significant at the .004 level. Since the level of acceptance or rejection had been set at .05, Hypothesis 2 was accepted. Therefore, those students who were self-motivated to reread to correct substitutions that did not sound like real language to them, or that were void of meaning, were the students whose comprehension scores were the highest. Further, the more they corrected the higher were their comprehension scores. Readers seldom corrected all of their substitutions; in fact many students corrected very few. This leads to the third hypothesis, which was the obverse of Hypothesis 2.

Hypothesis 3: the greater the proportion of non-corrections the lower the reading comprehension.

Since this hypothesis was the obverse of Hypothesis 2, the correlation was the same except for the change in sign; therefore, the correlation between the proportion of non-corrections and reading comprehension was -0.3822, which was also significant at the .004 level. Hypothesis 3 was accepted and simply reconfirmed the suggestions that the

greater the proportion of corrections made, the higher the comprehension; and the greater the proportion of non-corrections the lower the comprehension.

Perhaps the most practical proposition presented in this study held that not all uncorrected substitution miscues detracted from reading comprehension. Some, and perhaps many, non-corrections resembled the text word so closely, both syntactically and semantically, that little or no meaning was lost when the reader failed to correct the word. This proposition was formulated as Hypothesis 4.

Hypothesis 4: the greater the proportion of acceptable miscues the higher the reading comprehension.

The correlation between acceptable miscues and reading comprehension was 0.3859, which was significant at the .004 level. Therefore, Hypothesis 4 was accepted. It signified that even though the proportion of non-corrections had a depressing effect on comprehension, those non-corrections which were acceptable within the sentence or passage had an inflationary effect upon comprehension. In other words, acceptable miscues were indicators of "good" reading comprehension.

It was suggested in the theoretical section of the study that because of the reader's language facility and background experience, he may substitute words in a sentence that are syntactically-semantically equivalent to the actual printed words. If a reader did this, he would be unlikely to correct the mistake; and, further, little if any meaning

would have been lost during reading. The acceptance of Hypothesis 4 indicated that this was precisely the case. Readers refused to correct acceptable miscues, and those miscues--because they were acceptable--enhanced comprehension rather than detracted from it.

There still remains, however, the problem of the non-corrections that were non-acceptable miscues. Such miscues did not resemble syntactically and semantically the actual words on the page. Since these miscues were the obverse of acceptable miscues, it was postulated that they would detract from comprehension.

Hypothesis 5: the greater the proportion of non-acceptable miscues, the lower the reading comprehension.

The correlation between proportion of non-acceptable miscues and reading comprehension was -0.6204 , which was significant at the $.001$ level. Therefore, Hypothesis 5 was accepted. That is, those students who were not self-motivated to correct their miscues, even though these were not grammatically correct and were meaningless within the context, scored the lowest on comprehension.

The correlation between proportion of non-acceptable miscues and reading comprehension (-0.6204) was stronger than the correlation between total substitutions and reading comprehension (-0.5623) of which it was a sub-category. This was probably due to the fact that correlation coefficients are not precise, in that they do not provide just a direct one-to-one correspondence between variables. Psychological-

type variables within a zero-order correlation matrix interact with one another or with extraneous variables, such that the correlation coefficient calculated also has interface with other variables in the set. It is, therefore, likely that the negative correlation (-0.5623) between total substitutions and reading comprehension was influenced by the correlation (0.788) between total substitutions and non-acceptable miscues. In fact, because the correlation between total substitutions and non-acceptable miscues was so high, one may assert with some confidence that the negative correlation between total substitutions and reading comprehension (-0.5623) was simply a reflection of the depressing effect that non-acceptable miscues had upon comprehension rather than the negative effect that substitutions in general appeared to have on comprehension.

This deduction lends further support to the theoretical claim in this study that not all substitutions have the same effect upon comprehension. Rather, the effect is dependent upon what the reader does about the substitution, and upon the quality of that substitution.

Hypotheses 6, 6a, and 6b were presented in an attempt to test whether the two most logically delineated subcategories of substitutions; namely, proportion of corrections and proportion of acceptable miscues, were each independently contributing to the prediction of a reading comprehension score. Hypothesis 6: the proportion of corrections and the proportion of acceptable miscues will each have positive independent

effects on reading comprehension.

This hypothesis was tested by establishing unstandardized beta coefficients, 0.6205 for proportion of corrections and 0.7247 for proportion of acceptable miscues, both of which were significant at the .001 level. On the basis of these coefficients, Hypothesis 6 was accepted. This meant that when the effect of the proportion of acceptable miscues was removed, a 1% change in the proportion of corrections produced a 0.6% change in reading comprehension. Similarly, when the effect of proportion of correction was removed, a 1% change in proportion of acceptable miscues produced a 0.7% change in reading comprehension.

It was then possible to establish an accurate prediction equation which ensured that the coefficients between the predictor variables and the criterion variable in the present study were precise and direct one-to-one relationships, which were not influenced by outside "noise". The prediction equation then became:

$$\hat{Y} = 0.1364 + 0.6205(X_1) + 0.7247(X_2)$$

where \hat{Y} = estimated reading comprehension score,

X_1 = proportion of corrected miscues, and

X_2 = proportion of acceptable miscues.

The accuracy of this prediction equation was determined by establishing a standard error of beta for each predictor variable (Table 4). Both beta's were below the acceptable level of one-half the regression coefficient value for ensuring that the prediction equation was accurate.

Hypothesis 6a: the proportion of corrections will be positively associated with reading comprehension over-and-above the effects of the proportion of acceptable miscues.

Hypothesis 6a was tested by using standardized regression coefficients (standardized betas). The utility of this procedure lies in the fact that the effect of proportions of corrections may be calculated relative to the effect of the proportion of acceptable miscues. The standardized beta for proportion of corrections was 0.5040 which was significant at the .001 level. Hypothesis 6a was accepted, which indicated that after standardizing all variables, then controlling the effect of the proportion of acceptable miscues, the predictor "proportion of corrections" had a strong effect on reading comprehension.

Hypothesis 6b: the proportion of acceptable miscues will be positively associated with reading comprehension over-and-above the effects of proportion of corrections.

The same procedures were used for testing Hypothesis 6b as were used for testing 6a. The standardized beta for proportion of acceptable miscues was 0.5076 which was also significant at the .001 level. Hypothesis 6b was accepted indicating that the proportion of acceptable miscues effected the comprehension scores just as much as did the proportion of corrections. It was, therefore, evident that, for this sample of students, the quality of the miscue had as much influence upon the reading comprehension score as did the degree to which the student was willing to reread to correct

his mistakes.

Standardized partial regression coefficients indicate the average increase in the dependent variable for a unit or standard deviation increase in the predictor variable. Standardization of variables constitutes a mathematical transformation of the variable scales such that all units are given a common metric with a mean of zero and identical distribution of one standard deviation. In terms of the present psycholinguistic study of reading comprehension, the average direct effect on the dependent variables TOTALRS for the grade four boys one standard deviation above the mean on PCORR and who had identical scores on PACCEPT was .50. In other words, a positive unit shift in PCORR had the probable effect of increasing a standard deviation unit of TOTALRS by 50%, over-and-above the effects of PACCEPT. It is noted that the impact of PACCEPT had about equal force to that of PCORR (standardized beta equals .51).

During the analysis of the data an attempt was made to enter the proportion of non-acceptable miscues into the regression analysis. Because this variable was the complement of the proportion of acceptable miscues and because the correlation coefficient between proportion of non-acceptable miscues and reading comprehension (-0.620) was considerably larger than the correlation coefficient between proportion of acceptable miscues and reading comprehension (0.386), the variable, proportion of non-acceptable miscues, overrode proportions of acceptable miscues and predicted most of the

variance leaving proportion of acceptable miscues with virtually no effect on the criterion variable. In other words, because the variable proportion of non-acceptable miscues was the complement of the proportion of acceptable miscues, and because it was a more powerful predictor, it subsumed the effects of proportion of acceptable miscues. This happened because these two variables were not independent of one another, and hence, one of the basic assumptions of regression had been violated.

It can be seen then, that it was not only logically but practically necessary to delimit the predictor variables in the regression to those that precisely, accurately, and independently allowed one to estimate regression coefficients for use in a prediction equation.

Summary

The findings in this study clearly supported the hypotheses which were, for the most part, deduced from the theory. The study set out to determine to what extent substitution miscues affected the comprehension scores of students in the sample. The theory suggested that such mistakes made during oral reading do generally detract from comprehension, but that not all substitutions detract equally. That is, when a student reread and corrected a substitution, the original mistake did not detract from comprehension; rather the correction added to the reader's comprehension and nothing was lost. But, if a student did not go back to

correct his error, there still might not have been a loss of comprehension, because the substitution may have contained as much meaning as the corrected word. That is, if the uncorrected substitution was an acceptable one, both syntactically and semantically, it might have added to rather than detracted from comprehension of the passage. Finally, it was suggested that only those substitutions which were syntactically-semantically unacceptable--that is, those that were grammatically incorrect and that were void of meaning--detracted from comprehension; and, hence, resulted in low comprehension scores.

The support for these hypotheses and the theory from which they were derived serve to enhance and reconfirm the theory underlying the Goodman-Goodman-Burke research. Only a segment of their work was utilized in this study; namely substitution miscues, and the procedures for coding data were greatly simplified, yet all of the relationships emerged with strong correlations and were significant at a high level. Furthermore, the regression analysis indicated that in this study 38 percent of the variance in reading comprehension could be related to the degree to which students corrected their substitutions, and the degree to which the uncorrected substitutions were acceptable alternatives to the correct word. Only two predictor variables were used, yet a relatively large amount of variance is accounted for. This would seem to indicate that the theory presented in this study is contributing substantially to explaining why

some children understand what they read more readily than other children.

CHAPTER V

PRACTICAL IMPLICATIONS AND CONCLUSIONS

The purpose of this chapter is twofold: first, to suggest some practical implications for education that arise as a result of the findings in this study; and second, to draw conclusions regarding both the theoretical and practical implications of the study and suggest extensions to the research.

Practical Implications

The question arises; What should be done about oral reading errors? The usual procedure is to treat all miscues in the same way: namely, the reader is asked to stop and reread. This procedure is based upon the assumption that when a student reads orally he must reproduce exactly what is on the printed page, and that if he fails to do so he must be encouraged to correct all deviations from the text regardless of their effect on the meaning. This view of reading treats the reader as a passive machine who simply records and reproduces the author's words. As was noted, however, the reader is not passive. Reading is a meaningful interaction between the language of the reader and the language of the author. Reading is not an exact process. All readers do deviate from the text, and these deviations should be evaluated on the degree to which the meaning of the text is disrupted.

The present study found that when the substitution miscues of the 46 participating boys were sub-divided into three categories; (1) corrections, (2) acceptable miscues, and (3) non-acceptable miscues, the only substitutions that detracted from comprehension of the passage were the non-acceptable miscues. Further, if the substitution was subsequently corrected or if it was syntactically-semantically acceptable, it added to the students' understanding of the story rather than detracted from it. It is on the basis of these findings that the following practical implications of the study are suggested.

Development of Appropriate Reading Strategies

One of the most powerful uses of miscue analysis is in teacher education. In the process of analyzing the miscues of a reader, the teacher must ask questions and consider issues that had hitherto been neglected or avoided. Is the meaning acceptable when the miscue occurs? Does the reader correct the miscue if its meaning is not acceptable? If a word is substituted for another word, is it the same part of speech? Is the reader's dialect involved? Through such questions, instead of counting the total number of errors, the teacher focuses her attention on the quality of the miscue and its effect upon meaning. In so doing, the teacher can then direct the emphasis in reading instruction to a comprehension-centered approach.

Kenneth Goodman (1973), after a decade of research on oral reading miscues, makes the following claim.

When a reader's miscues are analyzed, the most important single indication of the reader's proficiency is the semantic acceptability of his miscues before correction. The reader's preoccupation with meaning will show in his miscues, because they will tend to result in language which still makes sense. ...

Effective readers also tend to correct miscues which result in a loss of meaning. They do this selectively. They will often not even be aware they have made mistakes if meaning is not changed. (1973:9)

If these suppositions are true--and from the findings in this study, they appear to be--gaining meaning during reading must be the main concern of teachers from the initial stages of beginning reading instruction. Beginning readers, as well as more advanced readers, need to be assisted in developing reading strategies that enable them to become independent readers as they use grammatical and semantic cues as well as grapho-phonetic cues in their reading.

For too many years, skills such as "sounding out", "reading carefully" and "word attack" have been diligently taught, often at the expense of teaching children how to use context clues within the reading setting, how to build concepts and ideas through reading, how to integrate meaning during reading, and how to use prior experience and language facility to comprehend what is before them on the printed page. It is now time to redirect the emphasis in teaching reading. To do this, teachers must know as much as possible about the reading process--first, a teacher should develop a

sound understanding of the language development process in children; and second, she should familiarize herself with psycholinguistic principles. Once these tasks are accomplished, the teacher is in a position to make the necessary judgments about materials and methods which will allow her to devise reading strategy lessons that enable students to learn to utilize all three cueing systems rather than just the grapho-phonetic aspect of reading. Examples of such lessons are available in Goodman, Burke and Sherman (1975).

Stemming from this major implication of the findings are three other supporting suggestions.

Self-Initiated Regressing to Correct

Too much emphasis is probably placed on prompting or correcting children as they read orally. Rather, they should be encouraged to detect and correct their own miscues by realizing that the error is not grammatically or semantically sound. When children come to understand that reading must sound like natural language and must make sense to them, they will draw upon their existing spoken language system and upon related experiences to establish the validity of what they have just uttered. If the reader is bewildered or confused by what he is reading, encouraging the child to reread the section in the way that he thinks it should be is more likely to assist him in grasping the syntax and meaning of the passage than if the teacher corrects it for him. That is, the child will be learning how to use what he already knows

when he reads and will, therefore, be employing all three cueing strategies rather than relying almost exclusively on letter-sound relationships.

Correcting Unacceptable Miscues

Related to the second implication is the third suggestion. Teachers probably need only correct or assist children with those unacceptable miscues that cause serious distortion to the meaning of the passage in question. If the syntactic and semantic strategies mentioned above fail, it is probably wise to correct the word for the student so that he may continue reading with as little further disruption to the passage as is possible. It may then be beneficial to the student to teach the vowel, the blend, the prefix, suffix, compound word or whatever that is appropriate as a key to unlocking the meaning of the problem word. Teaching skills as isolated procedures is no assurance that the reader can, or will, use that skill during the reading process.

Importance of Student Experiences for Reading

The material that children read should be meaningful to them within the language and the actual and vicarious experiences that they bring to the reading situation, or that are developed just prior to the reading lesson. The child who brings to the task of learning to read a host of experiences and a familiarity with the grammatical construction used in books has a decided advantage over those

children who have seen and done very little or who have not been read to a great deal. The child who is well prepared for reading has little trouble anticipating and predicting the syntax and meaning because he has something to relate the printed words to. He can categorize and integrate what he sees in print with what he already knows. However, the child who has not had the advantage of numerous experiences and adequate exposure to books and reading, must receive some form of compensation if he is to succeed in learning to read efficiently.

An efficient form of compensation is to read to the children so that they become familiar with the syntax of books and with the redundant nature of our language. Most children enjoy being read to and the "good" reader--indeed, any reader--can benefit from such experiences. Readers can always profit from encounters with new experiences in print and from the complex grammatical construction of the more sophisticated books, which can be interspersed with the less sophisticated, so that each reader's predictive ability in reading will be extended.

Supporting the idea of reading to children to develop vicarious experiences and written language facility is the suggestion that any concepts of unfamiliar language patterns which are likely to emerge in a reading lesson, should be discussed before any reading takes place. The more experienced children in the class can be encouraged to share their knowledge and concrete objects that may stimulate discussion.

In this way all of the children who will be participating in the lesson will be able to predict what the words are, because they are able to relate words to what they already know about the concepts involved and about the written language that describes appropriately such concepts.

Conclusions

The conclusions of this study are drawn from the findings in Chapter IV and the theoretical and practical implications that arose from those findings. The conclusions are summarized as: (1) theoretical conclusions, (2) practical conclusions, and (3) suggestions for extending the research.

Theoretical Conclusions

The fundamental question that this study has attempted to answer is: To what extent do substitution miscues affect the reader's comprehension of a passage? Out of this basic question emerged two distinct concerns: first, whether the reader was willing to self-correct his mistakes, and if so, whether correcting miscues affects comprehension; and second, if the reader allows the mistakes to stand, whether failure to correct the miscues affects comprehension. In the findings, strong trends emerge which lead the investigator to conclude as follows:

Total substitutions and reading comprehension. It was found that the greater the number of substitutions, the lower the reading comprehension. When one considers only

the total number of substitutions, the evidence in this study supports the view that oral reading errors are always detrimental to comprehension and are, therefore, signs of reading disabilities.

However, when substitution miscues are scrutinized more carefully to determine the effects of different kinds of substitutions on reading comprehension, a more accurate picture of the relationship can be obtained. To this end, the substitutions were divided into the following three categories: (1) corrections; (2) acceptable miscues; and (3) non-acceptable miscues. That is, the study looked beyond total numbers to see what the reader did about the miscue; for example, (1) Did he correct it? (2) Did he leave it as a syntactically-semantically acceptable miscue? or (3) Did he leave it as a syntactically-semantically unacceptable miscue? Further, in each situation the effects of each type of miscue on comprehension were examined.

Corrections and reading comprehension. For this sample, the greater the proportion of corrections, the higher the comprehension score. That is, the more that the students were self-motivated to regress to correct substitutions that did not sound like real language to them or that were void of meaning, the higher were their comprehension scores.

Acceptable miscues and reading comprehension. Of those substitutions that were not corrected, the greater the proportion that were acceptable miscues, the higher the comprehension score. That is, when readers substitute words

that are syntactically-semantically acceptable or equivalent to the printed words, no meaning is lost and comprehension has been enhanced by such miscues rather than hampered.

Non-acceptable miscues and reading comprehension. If the non-corrections are syntactically-semantically unacceptable within the text, comprehension of the passage is decreased. Those students who were unwilling to correct such miscues scored the lowest on comprehension such that the greater the proportion of non-acceptable miscues, the lower the reading comprehension.

Further, it is concluded that the negative effect of total substitutions on reading comprehension is simply a reflection of the depressing effect of the non-acceptable miscues on comprehension rather than the negative effect that substitutions in general would appear to have on comprehension scores.

These four conclusions lead to a summary conclusion: namely, that not all substitution miscues have the same effect upon comprehension. In fact, it is only the syntactically-semantically unacceptable miscue that detracts from understanding. The corrected miscue and the acceptable miscue actually enhance reading comprehension, because the meaning within the passage is retained.

Independent effects of corrections and acceptable miscues on reading comprehension. The final theoretical conclusion in this study is that corrections and acceptable miscues independently and positively affect a reader's

comprehension of a passage. When the effects of either variable are controlled in the presence of the other, each variable (corrections and acceptable miscues) has a powerful effect upon comprehension, such that 38 percent of the variance in the reading comprehension of this sample was determined by the degree to which the readers corrected miscues and the degree to which their uncorrected miscues were syntactically-semantically acceptable.

Practical Conclusions

Given the theoretical conclusions of this study it seems obvious that teachers must be guided toward two ends. First, they must be assisted in shifting their view of reading from that of conceiving reading as a precise process to that of conceiving reading as a selective process and one in which three cueing systems are utilized rather than just one. As a consequence, teachers will begin to view oral reading errors in a different light; that is, the mistakes the children make will not be thought of negatively but will be used to permit teachers to observe the strategies (1) that the children are employing, (2) that they are not employing, and (3) that they are overstressing at the expense of others, as they read. At that point, lessons can be devised whereby strengths in particular reading strategies can be built upon and weaknesses in other strategies can be overcome. If the correction miscue variable and the acceptable miscue variable have such powerful influences upon comprehension during

reading, surely teachers should be teaching toward developing syntactic and semantic strategies as well as grapho-phonic strategies, rather than insisting upon exact renditions of passages, in the hope that accurate and precise word pronouncing alone will achieve understanding.

The second goal that teachers must be directed toward is that of considering whether it is worthwhile to correct a student's oral reading errors for him or insist that he correct them. The evidence in this study leads the investigator to conclude that correcting every error is not only unnecessary but probably disrupts a reader such that it may distract from comprehension. Since it is only non-acceptable miscues that distort meaning, it is suggested that children be asked to correct, or have the error corrected for them, only when it is obvious to the teacher that by allowing the miscue to stand, comprehension of the passage will be seriously jeopardized.

Suggestions for Further Research

Two of the three following suggestions for further research are attempts to overcome the limitations of the present study. The first suggestion is related to the data gathering limitation; namely, that the sample size was restricted to selected grade four boys from only two schools. By using random sampling techniques on a larger population, the findings would be more generalizable.

The second suggestion relates to both the measurement and the conceptual limitations. That is, it would be desirable

to conduct further research on what may be called elaborated and extended versions of the study. The elaborated version would resolve the measurement limitation and the extended version would overcome the conceptual limitation. An elaborated study would be one in which the syntactic-semantic variable could be disaggregated into its two constituent elements, and the dependent variable, reading comprehension, measured in two ways; namely, (1) as a decoding score, as measured, say, on a standardized reading achievement test; and (2) as an encoding score; for example, the present retelling measure. A double outcome study would provide solutions to two issues. First, it would provide an answer to the question: To what extent are both decoding and encoding skills dependent on basic cueing strategies? Second, it would resolve the question: To what extent do the cueing strategies account for the covariation between decoding and encoding abilities?

The study could be extended in two directions--backward and forward. The backward extension would involve adding the grapho-phonetic (and possibly the graphic and the phonetic) variable to the other independent variables. The forward extension could take the form of estimating the extent to which the decoding and encoding measures of reading comprehension mediate the effects of the independent variables on school subject-matter performances in literature, mathematics, and science.

The third suggestion is to design a longitudinal study in which repeated measures on a set of individuals

are obtained for all of the above variables over a period of time. For example, measures at the beginning and conclusion of a grade would be taken and then at regular intervals in subsequent grades, thus permitting a repeated measures multivariate design.

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Test Reference

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APPENDIX 1

MEMORIAL UNIVERSITY OF NEWFOUNDLAND

SUBSTITUTION MISCUE
RESEARCH STUDY

Test Booklet

Guthrie-Seifert Reading Comprehension Test

School Number: _____

Student Name: _____

Birthdate: _____

SUMMARY SCORES	
Maze V	_____
Maze VI	_____

MAZE COMPREHENSION TEST

Directions:

Every fifth word in the story has a choice of three words for you to read. Choose the word that fits into the story and circle it. You may need to read past the group of three words before you can choose the correct answer.

Example:

Once there was a poor man and his wife. Tree
cow Had
many They

were so poor that and they had was just wife
all down cow.
sky one

IN THE FOREST

Blackie was saddled. He ^{from} did ready for a trip
was

both ^{beside}
as the forest. Prince stood possibly Blackie.
through horses

Prince was a pack ^{horse} turtle . He was loaded with blankets,
into

a ^{noisy} like bag, and other supplies.
sleeping

Both ^{flowers} horses lifted their ears. They ^{heard} trails the
talk sailed

forest ranger's loud ^{blanket} kept . They are ready to go
voice

on ^{blankets}
before a trip. They will spend a few days in
turned silk

the forest ^{stood} together . There are many things to ^{swim} on .
less do

Blackie turned his head. ^{Will} He seemed to be asking
Flag

just what ^{did} had to be done. ^{In} Then man laughed.
forest The

They will see how trip the roads and trails are.
easy

This travels is July. There are many people houses camping in
many laughed

the forest. The paths and asking roads must be kept open
that many head

for them.

They will guess trails some of the lookouts. Things
visit The Which

lookouts are men who watch pack yet forest from their towers.
the

Got Trees like to talk things over sure with the forest ranger.
They paths

Heard fence
Though man got into the saddle . The ranger
The ready

and horses there could off on their trip.
were

WILD PONY

The pampas is an enormous suit
little , and there
land

are some mighty man
his cowboys there . But there never
fine

had with
as a man more skillful this the rope than Juan. The
was into

usual back
way to catch wild ponies fine
fruit was to herd
should

them into the gallon
enormous . But Juan looked down upon
corral

that slept
yellow kind of sport. He liked to swing the lasso,
eye some

which he always
down prepared himself out in the looked
whistle open
tight

field. This was considered a
this risky chance, but
end

not of
herd Juan. His eagle eye measured
with ate the distance
mighty

to the inch
skillful . His timing was as horse
train exact as a fine
most

clock.

There later was a little whistle as hay the lasso
did yet

spun through the air, and seconds open later Juan gently
members

pulled in not the rope. There stood a little own horse in
but rope

front of him, from his a bunch of hay hanging from as his
with sport

mouth. His frightened eyes were cowboys wide open and wild.
had

The hood gently reared back and made one last mouth
horse sand

effort to escape. But Juan intended held the end of the
risky

journey
pulled tight.
rope

APPENDIX 2

PRELIMINARY RESULTS OF READING MISCUE STUDY

Introduction

The preliminary results of the Reading Miscue Study will be presented under the following headings.

1. Description of the Test
2. Results of the Test--Student Performances
3. Results of the Test--Descriptive Statistics
4. Interpretation

Description of the Test

Guthrie-Seifert Reading Comprehension Test¹

John T. Guthrie, the Director of Research for the International Reading Association, and his research assistant, Mary Seifert, have devised the maze technique as a practical procedure for measuring reading comprehension. The maze instrument contains seven (7) passages (or mazes) graded from primer to grade 6.1 in difficulty. The reliabilities (K-R21)² for the two mazes used in the present study (Maze 5 and Maze 6) were .92 and .90 respectively. Guthrie (1973: 296) reports that the correlation between the Maze instrument and the Gates-MacGinitie Comprehension Test was .82.

¹Test Reference: Maze Task: Experimental Version. John T. Guthrie and Mary Seifert (no date). See also Guthrie, J.T., Seifert, M., Burnham, N.A., & Caplan, R.I. The Maze Technique to Assess, Monitor Reading Comprehension. The Reading Teacher, 1974, 28, 161-168.

²Kuder-Richardson formula no. 21.

The maze 5 test was designed to meet a four point one (4.1) grade level for U.S. children. The maze 6 was designed to be appropriate for children at the grade five point one level; that is, to discriminate between children just beginning grade five.

Guthrie et al. (1974:163) note that the maze technique is easily utilized by teachers, who can, with little difficulty, construct their own mazes. Series of sentences from any story or book at the appropriate grade level are modified by substituting three alternative words for every fifth or tenth word in the story. The child reads the words silently, circling the alternatives which he believes to be correct. The percentage of correct selections indicates the degree of comprehension for that passage.

Test Results--Student Performances

The performance of the students on the Maze 5 and Maze 6 Tests are presented below in Table 1.

TABLE 1
STUDENT PERFORMANCE ON MAZE TESTS

Student Name		Maze 5		Maze 6		Maze 5 + Maze 6	
		score	%	score	%	score	%
Class I	S ₁	28	100	28	100	56	100
	2	27	96	28	100	55	98
	3	28	100	27	96	55	98
	4	28	100	27	96	55	98
	5	28	100	23	82	51	91
	6	26	93	25	89	51	91
	7	25	89	23	82	48	86
	8	25	89	22	79	47	84
	9	25	89	21	75	46	82
	10	19	68	17	61	36	64
	11	17	61	15	54	32	57
	12	15	54	10	36	25	45
	13	15	54	8	29	23	41
	14	15	54	6	21	21	37
	15	10	36	11	39	21	37
	16	9	32	11	39	20	36
Class II	S ₁₇	28	100	27	96	55	98
	18	27	96	28	100	55	98
	19	28	100	27	96	55	98
	20	27	96	27	96	54	96
	21	28	100	26	93	54	96
	22	28	100	24	86	52	93
	23	28	100	22	79	50	89
	24	25	89	25	89	50	89
	25	24	86	21	75	45	80
	26	25	89	18	64	43	77
	27	23	82	18	64	41	73
	28	20	71	17	61	37	66
	29	20	71	11	39	33	59
	30	12	43	11	39	23	41

(cont'd.)

Table 1 (cont'd.)

Student Name		Maze 5 score	%	Maze 6 score	%	Maze 5 + Maze 6 score	%
Class III	S ₃₁	28	100	28	100	56	100
	32	28	100	28	100	56	100
	33	28	100	27	96	55	98
	34	28	100	27	96	55	98
	35	28	100	26	93	54	96
	36	27	96	26	93	53	95
	37	27	96	26	93	53	95
	38	27	96	25	89	52	93
	39	28	100	24	86	52	93
	40	28	100	22	79	50	89
	41	26	93	24	86	50	89
	42	25	89	25	89	50	89
	43	25	89	25	89	50	89
	44	28	100	19	68	47	84
	45	28	100	17	61	45	80
	46	24	86	18	64	42	75
	47	23	82	15	54	38	68
	48	21	75	13	46	34	61
	49	27	96	6	21	33	59
Class IV	S ₅₀	28	100	28	100	56	100
	51	28	100	27	96	55	98
	52	28	100	27	96	55	98
	53	28	100	27	96	55	98
	54	28	100	26	93	54	96
	55	27	96	27	96	54	96
	56	27	96	27	96	54	96
	57	28	100	25	89	53	95
	58	26	93	26	93	52	93
	59	27	96	22	79	49	87
	60	25	89	20	71	45	80
	61	22	79	18	64	40	71
	62	21	75	18	64	39	70

Test Results--Descriptive StatisticsMaze 5 Statistics

	Score	%
Mean for Class I	21.3	76
Mean for Class II	24.5	88
Mean for Class III	26.5	95
Mean for Class IV	26.4	94
Overall Mean	24.7	88

Maze 6 Statistics

Mean for Class I	18.9	68
Mean for Class II	21.6	77
Mean for Class III	22.2	79
Mean for Class IV	24.5	87
Overall Mean	21.8	78

Reading Comprehension Statistics

(Maze 5 + Maze 6)

Mean for Class I	40.1	72
Mean for Class II	46.1	82
Mean for Class III	48.7	87
Mean for Class IV	50.8	91
Overall Mean	46.4	83

Interpretation

Student performances on the Maze 5 test of Reading Comprehension were very high. This indicates that the majority of the children tested are reading at or above a grade four level. The Maze 6 Reading Comprehension results were, likewise, encouraging. Since this test was designed for grade 5.1 students, a high proportion (about 3/4) of the grade 4's are comprehending 70% or more at a beginning grade 5 level. The age of the student affected reading comprehension--the higher the age the lower the reading comprehension (less than .05 level of significance).

The investigator wishes to thank the teachers, and through them, the students who so graciously and patiently cooperated in this research.

APPENDIX 3

Space Pet

As far as I know there has never been a rule against pets in a space station. We had just never had any pets until Sven Olsen decided he wanted one. None of us ever figured out why he chose the pet he did.

I first saw Claribel when I was working in my office. I heard a musical whistle near my ear and thought it had come over the radio. I waited for the news to follow. Instead, there was a lovely song. I looked up and had my first view of Claribel.

She was a small yellow canary, hanging very still in the air. Her wings were folded quietly at her sides. She could stay that way because nothing has any weight in space. Before I recovered from the surprise of seeing a canary in our space station, she did

a kind of backward loop. No earthbound canary could have done it.

In no time at all, Sven's pet was everybody's pet. We had a little trouble hiding her when important guests came to visit the space station. We couldn't be sure if we were breaking any rule having her there. But we liked her too much to take a chance on losing her.

Claribel always got noisy when we hid her. Sometimes we had to think fast to explain the peeps and whistles that came from the oddest places. There were a few narrow escapes, but then who would ever dream of looking for a canary in a space station?

All of us at the station were on duty for twelve hours at a time. This was not as hard as it sounds, since you need little sleep in space. Of course there is no "day" and "night" when you are always floating in sunlight. But we found it easier to think of time as being divided into day and night.

One "morning" when I woke up, I could scarcely drag myself out of bed. I was still only half awake when I joined the other men at breakfast. I noticed they seemed unusually sleepy, too. Then I saw that one seat at the table was empty.

"Where's Sven?" I asked.

"He's looking for Claribel," someone answered. "He can't find her. She usually wakes him up."

Just then Sven appeared at the door. In his hand lay a tiny bunch of yellow feathers, with claws sticking up in the air.

"What happened?" we asked.

"I don't know," said Sven sadly. "I just found her like this."

"Let's have a look at her," said Jock Duncan, our cook and doctor. We waited in silence while he held Claribel against his ear, trying to hear a heartbeat.

Presently he shook his head. "I can't hear her heart. But that does not prove she's dead. Let's try giving Claribel some oxygen."

Claribel was put into a face mask. It was as large as an oxygen tent for her. To our delighted surprise, she came back to life at once. Beaming broadly, Sven removed the mask and she hopped onto his finger. She sang her song, then fell over again in his hand.

“I don’t understand what’s wrong with her,” said Sven.
“She’s never done this before.”

For the last few minutes I had been trying to remember something. My mind seemed to be working very slowly, as if I were still sleepy.

Suddenly I understood. “There’s something wrong with the air!” I yelled. “That’s why Claribel passed out. I just remembered that coal miners often take canaries down into mines to warn the men when the air is bad.”

“Oh no!” said Jim, our engineer. “The alarm would have gone off. We have two good warning systems.”

“The second alarm isn’t connected yet,” another man re-

minded him. That really upset Jim. He left without a word. The rest of us passed around the oxygen bottle like an Indian peace pipe. We gave Claribel more oxygen, and she came back to life.

Ten minutes later Jim came back and explained what had happened. During the night, part of an air line had frozen and the alarm had failed to go off. Half a million dollars worth of engineering instruments had let us down. Without Claribel, all of us might have died.

Today, if you should visit a space station, don't be surprised if you hear a canary singing. It means you have a double safeguard at the cost of some birdseed.

APPENDIX 4



MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St. John's, Newfoundland, Canada A1C 5S7

Department of Curriculum and Instruction

Telex: 016-4101
Telephone: (709) 753-1200

February 9, 1976

Mr. _____
_____ Elementary School
St. John's, Newfoundland

Dear Principal:

In October I gathered research data from the grade four classes in your school. At that time both teachers of the classes concerned indicated that they would appreciate having the results from the oral reading sessions. The enclosed report presents these results along with an explanation of the theoretical background to the study and an interpretation of the findings.

I would like to take this opportunity to express my appreciation for the kind cooperation of both teachers and students in this research project.

Yours sincerely,

Mona J. Beebe
Graduate Student

RESULTS OF READING MISCUE STUDY

Introduction

The results of the reading miscue study will be presented under the following headings.

1. Theoretical Background to the Study
2. Description of the Reading Miscue Inventory Instrument
3. Results of the Oral Reading--Student Performances
4. Results of the Oral Reading--Descriptive Statistics
5. Interpretation
6. Implications

Theoretical Background to the Study

In the past, reading has been viewed as a precise process which involves the exact, detailed, and sequential perception and identification of letters, words, spelling patterns and large language units. Phonic centered approaches stressed precise letter identification and word centered approaches stressed word identification. And although it is realized that reading must also involve comprehension, this stress is still very much at the forefront of reading throughout North America.

Kenneth Goodman and his wife Yetta, both from the University of Arizona, along with Carolyn Burke, have for a number of years been conducting research on oral reading errors. They offer an alternative suggestion to this prevalent view of reading as a precise process. They suggest

that reading is a selective process in which the reader uses only part of what is on the printed page, plus what he already knows about the structure of our language, plus his background knowledge and experiences as he figures out what is before him. The reader puts all of these things together and comes up with his rendition of what he thinks the author has intended. Kenneth Goodman refers to the reading process as a "psycholinguistic guessing game" in which the reader, by using "thinking" and "reasoning" processes, draws upon his familiarity with the language and upon what he already knows, and combines these two things with the letter-sound relationships that he learns in school, and that appear before him on the page, to produce something that is meaningful to him.

The Goodmans are saying, then, that readers use not one thing; that is, the letters on the page, but three things in order to understand what a sentence, a paragraph, or a story is about. They refer to these three aspects of reading as cueing systems or strategies and call them grapho-phonic, syntactic, and semantic sources of information.

Grapho-phonic information includes information from the sounds of speech, the printed symbols of letters, and the relationship of the sounds to the letters.

Syntactic information comes from the patterns of the language, the inflectional system, the function words, and intonation.

Semantic information is supplied by the reader himself and is a function of his prior experience and conceptual development.

All three kinds of information are continually used by the reader as he selects as much information from each cueing system as is necessary for him to "guess" or "predict" what is written on the page. If the "guess" or "prediction" of what is written does not sound like language to the reader or if it has no meaning, the reader must then discard the "guess" and regress or go back for more information (particularly grapho-phonetic) so that he can try again. This sampling-guessing-confirming process can take place only when the reader is reading complete language which is meaningful to him. It does not occur when reciting lists of words in isolation because then the child has only one source of information, namely, grapho-phonetic. This would seem to explain why many children can read words in context but have no idea what they are in isolation.

The way in which readers use these three cueing systems reveals what strategies or methods that a reader is employing as he reads. Since we cannot hear what a child reads as he reads silently, we must rely upon his oral reading to give us any insight into the strategies used. But, if we look at oral reading only in terms of the words that are read correctly, we still cannot tell what methods are being employed; all we can tell is that he said the words correctly. Therefore, the Goodmans suggest that we look at oral reading

errors because they believe that it is the same cues and mental processes that trigger an incorrect response as a correct response.

For example, if a sentence read: Where are you? and a child in Newfoundland read: Where ya to?, why has he done this?; because it is part of the language pattern that he is familiar with and that is meaningful to him. The reader has relied heavily upon syntactic and semantic cues and enough on grapho-phonetic that his utterance is rather similar to the actual text. Therefore, that reader is relying on the same cues and mental processes that he would use in "correctly" reading a sentence such as: I see a cat.

All of this is to point out that oral reading errors are just (mis)cues and can tell us which cues the reader is relying most heavily upon. Many children are overly dependent upon grapho-phonetic cues at the expense of syntactic and semantic cues. This may be due to the stress placed upon phonics, structural analysis, and word list practices in the early grades. The example below is an illustration of how teachers can tell which cues the reader is utilizing to the greatest degree.

Text: The boys ran through the dark forest.

Student A: The boys went through the dark woods.

Student B: The boys ran though the dark frest.

Student A has used quite dissimilar words in the sentence, yet the meaning is the same. Student B has relied upon letter-sound relationships to figure out the words which

make little sense in the sentence but which look more like the original text. Here is a clear example of one student (A) using syntactic and semantic cues to assist him in reading and another student (B) relying exclusively upon grapho-phonetic cues with little thought being given to understanding what is read. By looking at oral reading errors in this way a better understanding can be gained about which areas need to be stressed in individual classroom settings. That is, has there been too much emphasis upon phonics and not enough upon "guessing"? Maybe a child needs only to look at the first two letters of the word, and then, given the context and grammatical structure of the sentence, he knows what that word must be.

This approach can also help one understand why some readers gain more information or meaning from printed text than others. If one student relies too heavily upon grapho-phonetic cues and doesn't worry about the passage sounding like language or being meaningful, it is doubtful that his comprehension will be very great. On the other hand, a different student may rely more on syntactic and semantic cues and, even though his errors seem to be quite unlike the words on the page, his comprehension may be very high.

Description of the Reading Miscue Inventory Instrument

In 1972 Yetta Goodman and Carolyn Burke produced a diagnostic reading kit, called the Reading Miscue Inventory (RMI), in an attempt to provide classroom teachers with a

workable approach to understanding how these reading strategies work for individual readers. It allows the user to evaluate the oral reading errors of students in a systematic and objective way and to understand how these errors have influenced the comprehension of a passage.

The RMI supplies the investigator with a series of questions which enables him to determine the quality and variety of the reader's miscues. These questions focus on the meaning of the text being read and allow the investigator to analyze how effectively the reader uses language cues and experiential information. The data provided by the inter-relationship of these factors (print, language, and experience) is then used to construct a Reader Profile chart which indicates, in bar graph, form, the reader's reading strategies as indicated by his strengths and weaknesses in each of the three areas; that is, grapho-phonetic, syntactic, and semantic.

Although there are several kinds of miscues; namely, substitutions, omissions, insertions, reversals, repetitions, partial-words, non-words, dialect differences and intonation-shifts, it has been found by other investigators that more than one-half of all miscues made are substitution miscues. Substitutions occur when one word is substituted or exchanged for another. For the purposes of this study, the scope has been limited to this kind of miscue. An attempt was made to identify the effect that these substitutions had upon the student's comprehension of a reading passage. Because only one kind of miscue was analyzed, it was necessary to modify

the Goodman-Burke RMI to suit the purposes of the study. The underlying principles, of course, were retained and coding techniques were adjusted to allow the investigator to consider the following questions.

1. What effect does the total number of substitutions have upon comprehension?
2. What effect does correcting some of these substitutions have upon comprehension?
3. What effect do substitutions, which have not been corrected but which have retained their syntactic and semantic acceptability, have upon reading comprehension?
4. Conversely, what effect do uncorrected substitutions, which do not retain syntactic and semantic acceptability, have upon reading comprehension?

In other words, even though it may appear that the quantity of substitutions is detracting from the comprehension of the passage, it is necessary to look more closely at whether the substitution is subsequently corrected by the reader or, if not corrected, what the quality of the substitution is, in order to determine whether the substitution is inhibiting the understanding of the passage.

TABLE 1

RESULTS OF THE ORAL READING--STUDENT PERFORMANCES

Student Name		Retelling Score %	Number of Substitutions	Percentage of Substitutions Corrected	Percentage of Acceptable Substitutions	Percentage of Unacceptable Substitutions
Class I	S 1	63	15	47	47	6
	*2	29	29	48	45	7
	3	70	17	24	53	23
	*4	40	31	29	55	16
	6	58	53	25	41	34
	7	42	66	29	30	41
	8	73	59	29	61	10
	9	70	27	26	52	22
Class II	S 17	61	26	69	27	4
	18	67	12	42	50	8
	19	61	11	64	27	9
	20	75	26	27	58	15
	21	51	50	20	34	46
	22	60	39	31	54	15
	23	49	37	16	51	33
	24	40	73	11	52	37
	25	38	62	26	21	53
	26	36	70	19	37	44
	27	46	77	16	37	47

(cont'd.)

Table 1 (cont'd.)

Student Name	Retelling Score %	Number of Substitutions	Percentage of Substitutions Corrected	Percentage of Acceptable Substitutions	Percentage of Unacceptable Substitutions
Class III S					
31	71	19	37	53	10
32	50	38	26	63	11
33	56	35	34	43	23
34	73	14	43	57	0
*35	29	31	26	48	26
36	49	36	30	42	28
37	76	21	24	57	19
38	56	35	28	49	23
39	42	34	15	56	29
40	29	65	37	32	31
41	59	37	38	41	21
42	24	34	18	35	47
43	39	57	33	44	23
44	41	39	13	46	41
45	25	116	6	34	60
Class IV S					
*50	32	32	3	66	31
51	56	22	23	59	18
52	30	30	20	40	40
53	61	14	22	57	21
54	79	28	36	39	25
55	85	32	22	56	22
56	49	11	45	46	9
57	48	16	13	75	12
58	51	36	36	50	14
59	53	45	33	38	29
60	33	56	25	39	36
61	16	120	6	23	71

*These students obtained scores that were significantly below the predicted scores on the basis of the number of substitutions, the percentage of corrected substitutions and the percentage of acceptable substitutions. It is believed that this may be due to reticence in the retelling phase of the test situation. It is, therefore, likely that they understood more of the story than they were able to retell.

Results of the Oral Reading-Descriptive Statistics

<u>Retelling Score (Comprehension)</u>	%
Mean for Class I	56
Mean for Class II	53
Mean for Class III	48
Mean for Class IV	49
Overall Mean	51.5

<u>Number of Substitution Miscues</u>	Number
Mean for Class I	37
Mean for Class II	44
Mean for Class III	41
Mean for Class IV	37
Overall Mean	40

<u>Percentage of Substitutions Corrected</u>	%
Mean for Class I	32
Mean for Class II	31
Mean for Class III	27
Mean for Class IV	24
Overall Mean	28.5

<u>Percentage of Acceptable Substitutions</u>	%
Mean for Class I	48
Mean for Class II	41
Mean for Class III	47
Mean for Class IV	49
Overall Mean	46

Percentage of Unacceptable Substitutions

	%
Mean for Class I	20
Mean for Class II	28
Mean for Class III	26
Mean for Class IV	27
Overall Mean	26

Correlations or Levels of Association Between Total Substitutions, Percentage of Corrections, Percentage of Acceptable Substitutions, Percentage of Unacceptable Substitutions and the Retelling Score (Comprehension) for the Total Sample (N=46)

Variable	Retelling Score or Comprehension of Passage
Total Number of Substitutions	-0.562
Percentage of Substitutions Corrected	+0.382
Percentage of Acceptable Substitutions	+0.386
Percentage of Unacceptable Substitutions	-0.620

A perfect or 100% association would be represented by 1.0.

A negative value signifies that comprehension is detracted from and, conversely, a positive value signifies that comprehension is enhanced.

Interpretation

It is quite clear from the table on the previous page that substitution miscues should not be taken at their face value. Just because a child makes errors while reading does not necessarily mean that comprehension of the passage will be low. If one regards the effect of just the total number of substitutions on comprehension, it can be seen that a -0.562 correlation exists which means that the more substitutions made the lower the comprehension score. However, if one is also willing to look beyond pure numbers and note what the student does about the substitution or to note the quality of the substitution, a better understanding can be gained of the effect of the substitution upon comprehension of the passage. In this study, the correlations in the previous table may be interpreted in the following manner:

1. The students with the greatest number of substitutions obtained the lowest comprehension scores.
2. Those students who were self-motivated to regress to correct substitutions that did not sound like real language to them or that were void of meaning were the students whose comprehension scores were the highest. (correlation 0.382)
3. Those students who were not motivated to correct their substitution miscues, but whose miscues were both grammatically acceptable and meaningful were also among the highest scorers on comprehension. (correlation 0.386)
4. Those students who were not motivated to correct their miscues and whose miscues were not grammatically (or syntact-

ically) acceptable and were meaningless within the context, scored the lowest on comprehension. (correlation -0.620)

These students would utter substitutions that did not sound like natural language and that made no sense. In all likelihood, they are overly dependent upon phonics and structural analysis to decode words and have not as yet learned to use the patterns of language that they are familiar with to assist them in reading; nor have they learned that the purpose of reading is to gain meaning or that what they read must make sense and be meaningful within the context.

Perhaps a few examples of student scores on this project can illustrate these four points.

Student	Retelling Score	No. of Subs.	% Corrected	% Accept.	% Unaccept.
1	25	116	6	34	60
2	46	77	16	37	47
3	73	59	29	61	10
4	42	66	29	30	41
5	85	32	22	56	22
6	24	34	18	35	47

Look at the scores of students 1 and 2. These boys were among those students who had the highest total number of substitution miscues. Their retelling scores are also quite low. If one looks beyond these two scores, it is also noted that these students correct only 6 and 16% of their miscues, that only 34 and 35% of the uncorrected miscues were grammatically acceptable and meaningful, and that 60

and 47% of the uncorrected miscues were very "poor" miscues in the sense that they neither sounded like language nor made sense. It is little wonder then, that comprehension was low.

Let us compare that with the scores of students 3 and 4. Both of these students also made a large number of miscues and corrected 29% of those errors. However, 61% of student 3's miscues were acceptable or "good" miscues and only 10% were "poor" miscues. Student 4, by comparison, had only 30% "good" miscues and 41% "poor" miscues. Hence, one begins to appreciate that perhaps only looking at the total number of miscues gives a deceptive picture of the effect of such miscues upon reading comprehension.

Finally, let us consider the scores of students 5 and 6. Both students made relatively few miscues, yet their comprehension scores vary widely. Closer inspection reveals that both boys corrected about the same percentage of their miscues but student 5 had 56% of his miscues acceptable and 22% unacceptable, while student 6 had only 35% acceptable and 47% (more than twice as many as student 5) unacceptable. Hence, it seems that it is the unacceptable miscues that are distorting meaning and not necessarily the total number of miscues made. It should also be pointed out that the students who make a high percentage of miscues which are unacceptable both grammatically (or syntactically) and in meaning (or semantically) may be relying too heavily upon sound-letter relationships (grapho-phonics) and worrying more about exact

renditions of the passage than about reading which sounds like meaningful, natural language.

Implications

The question now arises; What should be done about oral reading errors? The usual procedure is to treat all miscues in the same way: namely, the reader is asked to stop and reread. This procedure is based upon the assumption that when a student reads orally he must reproduce exactly what is on the printed page. If he fails to do so, he must be encouraged to correct all deviations from the text regardless of their effect on the meaning. This view of reading treats the reader as a passive machine simply recording and reproducing the author's words. As was noted, however, the reader is not passive. Reading is a meaningful interaction between the language of the reader and the language of the author. Reading is not an exact process. All readers do deviate from the text, and these deviations should be evaluated on the degree to which the meaning of the text is disrupted.

Perhaps, then, it is on this basis that teachers should be deciding whether or not a child should correct every error and whether or not his errors should be corrected for him. The investigator believes that there are four major implications for classroom teachers stemming from this research.

1. Too much emphasis is probably placed on prompting or

correcting children as they read orally. Rather, they should be encouraged to detect and correct their own miscues by realizing that they are not grammatically or semantically sound. Regressing to reread or to correct should be encouraged rather than discouraged. In regressing to correct, the student is, in effect, eliminating some of the total number of miscues that may detract from comprehension.

2. Such comments as, "Stop guessing and look at the word!" are out of order since reading is, in fact, a "psycholinguistic guessing game" (Goodman, 1967). "Guess again!" may be a more appropriate response.

3. Children need to be assisted in developing reading strategies that enable them to become unaided readers as they use grammatical and semantic cues as well as grapho-phonetic cues in their reading. Language arts programs offer limitless possibilities in this respect. If syntactic and semantic strategies fail, it may be timely to teach vowels, blends, prefixes, suffixes, compound words or new vocabulary as keys to unlocking meaning from print. Teaching skills as isolated procedures is no assurance that the reader can, or will, use that skill during the reading process. It may be wiser to teach skills as children require them.

4. The material that children read must be meaningful, or make sense, to them within the language and the concrete and vicarious experiences that they bring to the reading situation. Recently, many educators have suggested that reading materials be made available which are more in tune with children's

backgrounds and language experiences. Another approach is to develop children's listening and speaking abilities through a developmental listening and speech program particularly at the primary level. Central to this idea is the necessity that many hours be spent reading to the children so that they become familiar with the grammatical construction used in books and with the redundant nature of our language, which assists a reader in anticipating and predicting the subsequent syntax and meaning within the story.

It is rather ironic that, after more than half a century of research on reading, the practical implications stemming from this study are reminiscent of practical suggestions made by Huey in the early 1900's.

The school should cease to make primary reading the fetish that it has long been, and should construct a primary course in which reading ... (is) always for meanings. ... Word pronouncing will therefore always be secondary to getting whole sentence meanings. ... Until the speech habits are well formed, the school should have much more oral work other than reading... . School readers, especially primers, should largely disappear, except for the real literature of mother tongue, presented in literary wholes, or as they may be records of the children's own experiences and thoughts, or as they may be books needed for information in the everyday life of the school. (Huey, 1908:380-381)

SUGGESTED READINGS

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