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THE APPLICATION OF MISCUÉ ANALYSIS TO THE ORAL READING OF
VOCALIZED AND UNVOCALIZED HEBREW TEXTS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Edith Kroo Allouche, B.A., M.A.

* * * * *

The Ohio State University

1977

Reading Committee:
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Professor Sharon E. Fox
Professor Virginia G. Allen

Approved By
Adviser
Department of Humanities Education
This work is dedicated with love

to my mother, Lilly,

and to the memory of my father,

Paul 194
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And finally, special mention must be made of my sister, Rosemary Mandel, for her unfailing faith and encouragement throughout the years.
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Studies in Foreign Language Education. Professors Edward D. Allen and Gilbert A. Jarvis


Studies in Reading. Professor Sharon E. Fox.
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CHAPTER I

THE PROBLEM

Introduction to the Problem

The reading skill is receiving increased attention and importance in foreign language instruction. Whereas it was once accorded a minor position by the audiolingual approach to language teaching, reading is now emerging as a worthwhile and productive activity that contributes positively to the mastery of a foreign language. In addition to the appreciation of reading as a pleasurable leisure activity, it is valued as a skill that can be pursued independently by language learners and one that is relatively easy to maintain after formal instruction.

How to teach reading in a foreign language is a resulting concern as educators attempt to resolve differing views of what instruction should entail. When the alphabet of the foreign language is similar to that used in English, the ability to read is sometimes assumed, and attention is concentrated instead on vocabulary building or expansion of grammatical knowledge. The ultimate objective, comprehension of the text, is stressed while the mechanics of letter recognition and identification are virtually ignored. When the writing system contains new and different elements, however, methods that stress the initial stages of learning to read may be adapted from native-language reading instruction. Two of the most popular approaches, phonics and whole word reading, emphasize the physical aspects of the reading process—the written
sample as perceived by the reader. Phonics, with its focus on sound-symbol correspondences, emphasizes the importance of accurately identifying individual letters. Whole word reading suggests attention to the configuration of the word as a unit. This concern with the perception and identification of the graphic symbols is evident in classroom reading practice, error correction, and remedial work.

Much of the basic research done in reading also deals with the role of perception (Braine, 1967; Bower, 1970; Kolers, 1970; Levin and Kaplan, 1970). With the aid of the tachistoscope, eye movements across written samples are measured and compared under varying conditions. Letters may be physically distorted or the text may be altered in order to examine the role of the graphic display as it affects perception, identification, and retention. Bower (1970) altered a modern Greek text by substituting orthographically different words of the same auditory-articulatory form and determined that the look of a word is more important than its sound. In another study, Levin and Kaplan (1970) investigated the length of the Eye-Voice Span by artificially obscuring the text at a predetermined point during oral reading and then assessing retention of phrase units. They found that speed and a long E-VS characterized good readers. These studies attempt to explain what happens during reading in terms of the written sample and the visual system.

Reading is, however, more than a process of letter identification or association of appropriate sound values to the letters (Williams, 1970). According to Hochberg (1970), "Normal practiced reading, then, is an active process, involving the continual generation and testing of hypotheses, not an automatic sequential decoding process" (p. 85).
Reading involves the higher order cognitive processes as the reader uses his knowledge of the language and the world in order to make syntactic and semantic decisions in predicting and confirming his hypotheses.

When reading is defined, as it is here, as a process of extracting meaning from written symbols, then psycholinguistic theories become relevant and assume precedence over strictly perceptual definitions. The psycholinguistic view emphasizes the reader's language knowledge and worldly experience more than his precision in identifying written symbols. The graphic display is thought to be just one of several cues available to him in his effort to comprehend the text. When used in conjunction with syntactic and semantic cues, the graphic presentation may even be reduced (Smith, 1971). The reader builds skill through greater control over language structure, broadened experiences, and increased conceptual development (Goodman, 1967).

The role of memory in retaining previously encountered grammatical and contextual information is also emphasized. The reader must overcome the limited capacity of short-term memory by reducing the number of items to be visually processed. He does this by sampling from the graphic display and by "chunking" information into larger units of meaning. In this way, he is able to read more quickly and use syntactic and semantic cues more effectively. Detailed attention to the graphic sample could impede comprehension by slowing down visual processing and overloading the memory channels.

The Hebrew language seems to be particularly well suited to assessing the role of the graphic display in relation to the other cuing systems and to comprehension because its visual sample may be reduced
without artificially impairing the text. Hebrew has a consonantal alphabet to which vowels may be optionally added above, below, or on the line of writing. Because the characters carry primarily semantic information, context and the reader's own linguistic knowledge are necessary for comprehension when overt grammatical cues, the vowels, are removed.

The present study examines the role of the graphic display in facilitating comprehension by analyzing the miscues made during oral reading. The miscue, defined as the actual observed response made in oral reading that does not match the expected response, can be qualitatively analyzed in order to determine the reader's use or non-use of the various cuing systems (Goodman, 1969). In this study, analysis of the miscues generated by reading vocalized and unvocalized Hebrew texts provides a means of comparing the reading strategies used with full and reduced graphic systems.

Theoretical Basis

Descriptions of the reading process as it occurs in the native language have relevance for reading in a second language because the strategies involved in extracting meaning from written symbols are basically the same (Buck, 1974). The difference between native-language reading and foreign language reading stem largely from differences in language competence, memory span, and native-language influence (Yorio, 1971). These factors may affect the reader's ability to sample, predict, and confirm his hypotheses in reading, but do not necessarily cause him to abandon such strategies (Lopez, 1977). The tools used to investigate native-language reading behavior have also been applied to foreign language reading. Miscue analysis has already been successfully
used to determine the reader's use of the graphophonetic, syntactic, and semantic cuing systems in reading French (Allen, 1976).

The psycholinguistic theory of reading, in particular, seems to have relevance for reading in foreign languages. In this theory, the cuing systems available to the reader in his effort to comprehend the text extend beyond visual cues. While the graphic display provides visual information, the reader has additional sources of information to aid him in extracting meaning. These non-physical sources are internal to the reader and consist of his linguistic background, conceptual level, and experiences in the world. Goodman (1969) hypothesizes that comprehension is, in fact, facilitated through the use of three main cuing systems: graphophonetic, syntactic, and semantic. The skillful reader makes optimum use of these cuing systems by reducing the amount of visual information he processes while still deriving meaning from the text.

The psycholinguistic theory of reading provides underlying theoretical support for miscue analysis. The miscues generated during oral reading are qualitatively analyzed in order to assess the reader's strategies in the use of the various cuing systems. Such an approach de-emphasizes quantitative descriptions of reading "errors" and instead concentrates on the reader's use of self-correction and graphic, syntactic, and semantic cues as he attempts to gain meaning from the text.

The Reading Miscue Inventory (RMI) (J. Goodman and Burke, 1972) is a published program of miscue analysis that provides the classroom teacher with a practical tool for evaluating the reader's strengths and weaknesses in the use of the various cuing systems. Through its system of categorizing and interpreting miscues, current reading strategies are

**Statement of the Problem**

It is the purpose of this study to examine the effect of two types of graphophonic cuing systems, full and reduced, on the reading strategies of Hebrew language students at different levels of Hebrew language instruction. Specifically, the study deals with the following theoretical question:

Must readers be provided with the full range of available cuing systems (syntactic, semantic, and graphophonic) in order to make optimum use of efficient and effective reading strategies, or is it desirable to reduce the amount of graphic information in the text so that visual processing is done more rapidly and larger units of meaning may be stored in memory?

The specific research questions are:

1. Do the quality and quantity of miscues made in the reading of vocalized Hebrew texts differ from those made in the reading of unvocalized Hebrew texts?

2. What are the differences in the quality and quantity of miscues made by Hebrew language students at different levels of Hebrew language instruction?

3. Is there an interaction effect between year-of-study and type of text read that affects the quality and
quantity of miscues made? If so, what is the nature of these differences and what are the implications for reading programs in Hebrew language instruction?

**Operational Definition:**

1. **Text:** Text is one of two independent variables in this study. It refers to the story or passage of Hebrew to be read. It is composed of a graphic display and has two levels: with vowels and without vowels.

2. **Sublinear vowels:** Sublinear vowels are written below the line of writing and comprise the majority of vowels written in Hebrew.

3. **Vocalized:** The term vocalized refers to Hebrew written with vowels.

4. **Unvocalized:** In this study, the term unvocalized refers to Hebrew written with sublinear vowels removed.

5. **Miscue:** The miscue is defined here as a deviation from the printed page occurring during oral reading.

6. **Categories of the RMI:** In this study, categories are the dependent variables by which the text and year-of-study groups are compared. Each category describes an aspect of the quality or quantity of the miscues made during oral reading. The following categories are used:
   a. Total number of miscues produced per words in the text
   b. Real word substitutions
c. Graphophonic similarity: the extent to which the
miscue is graphophonically similar to the word
printed in the text
d. Corrections: the attempt made to correct a
miscue
e. Syntactic Acceptability: the extent to which the
miscue was syntactically acceptable
f. Semantic Acceptability: The extent to which the
miscue was semantically acceptable
g. Meaning Change: the extent to which the author's
original meaning is preserved
h. Grammatical Strength: the extent to which the
reader is successful in the use of the syntactic
and semantic cuing systems as revealed in the
patterns of correction, syntactic acceptability,
and semantic acceptability
i. Comprehension: the extent to which there has been
a loss of meaning based on the revealed patterns
of correction, semantic acceptability, and no mean-
ing change

7. Year of Study: This term refers to one of two independent
variables in this study and is composed of two levels:
second year and fourth year of Hebrew language study.

8. Reading strategies: The interactions between written
material and the unassisted reader that are available to
him in his effort to comprehend the text. These
interactions may make use of any or all of the cuing systems. The particular reading strategy employed may vary with text type and may be differentially dependent on sound-symbol correspondences, context strategies, or background information.

9. Efficient and effective readers: Efficient readers are here defined as those who selectively use a minimal number of cues in reading. Effective readers are here defined as those who extract the most meaning from the text.

Value of the Study

In Hebrew language instruction, reading has consistently played a major role in both elementary and secondary school programs. Even when the audiolingual approach was most influential in guiding language instruction, reading was accorded importance beyond that of an aid in reinforcing the oral skills.

Obviously, our major goal in the teaching of Hebrew in our schools in this country is reading. We want to prepare our pupils to understand the classical texts of our tradition.

(Ehrmann, 1962)

While reading comprehension is an important objective in many Hebrew language programs, efforts in that direction have not been noticeably successful (Fishman, 1976). The difficulties associated with the Hebrew school, such as the number of hours of instruction allotted and the lack of appropriate instructional materials, are often cited as the causes of this failure (Haramati, 1976). More research is needed to
improve reading instruction through materials development and within the parameters of religious school education.

In this study, reduction of textual visual information by elimination of sublinear vowels is not just a laboratory exercise but has practical significance. Although traditionally the fully vocalic text is used in beginning reading instruction for children, comprehension of unvocalized text is an understood long-term objective because adult reading material in Hebrew (with the exception of special kinds of literature such as the Bible, prayerbooks, dictionaries, and poetry) is written without vowels. Early reliance on vocalic texts, furthermore, makes later transition to consonantal texts difficult (Amir-Coffin, 1975). Even where the goal of reading instruction is the reading of Biblical prose, if analysis of reading behavior shows that the reader is more actively and productively using his language knowledge in the reading of texts without vowels, then early reading instruction should include unvocalized Hebrew text as part of the "reading for comprehension" program.
CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Research on native-language reading has shifted away from a strictly perceptual orientation that emphasizes letter identification to one that recognizes the role of higher order cognitive processes (Brown, 1970; Gibson and Levin, 1975; Williams, 1970). Research on the reading of languages that have different alphabets, however, often deals with the perception and identification of graphic symbols rather than with the processes that lead to comprehension (Henning, 1975). The present study is concerned with the comprehension of written material and not with the accurate discrimination of graphic symbols. The problem to be explored is that of the role of the graphic display in the reading process. The review of the literature, then, will focus on the following topics:

1. The role of the graphic display in the psycholinguistic theory of reading
2. Miscue analysis
3. Foreign language reading research
4. Hebrew language reading research
The role of the graphic display in the psycholinguistic theory of reading

In the psycholinguistic theory of reading, the sources of information available to the reader in his effort to extract meaning from the text extend beyond the visual sample. These additional sources, internal to the reader and stored permanently in his long-term memory, consist of the reader's knowledge of the language and the world. Therefore, what the reader brings to the reading task in terms of linguistic background and worldly experiences is just as significant as the graphic display (Smith, 1971).

The psycholinguistic view is based, in large measure, on three radical insights supported by both psychology and linguistics:

1. Only a small part of the information necessary for reading comprehension comes from the printed page
2. Comprehension must precede the identification of individual words
3. Reading is not decoding to spoken language (Smith, 1973)

These assertions underly definitions of reading in which it is viewed as a generation and testing of hypotheses rather than as a sequential decoding process (Hochberg, 1970). The reader actively participates in the reconstruction of meaning (Goodman, 1973b). Within the cognitive framework, several explanations of reading have been offered, each suggesting that the visual sample may actually constitute a relatively small part of the total reading process.
Kolers (1968) sees reading as being "only incidentally visual" (p. 8). He describes it as being a complex form of information processing and hypothesizes three levels of performance:

1. Perception of characters, or visual operations
2. Perception of syntax, or sensitivity to grammar
3. Direct perception of meanings of words (Kolers, 1973)

In a set of experiments using geometrically transformed letters, he demonstrated that it is not the geometry or discriminability of the letters that affects their recognition. Rather, prior judgment of their orientation on the page, a cognitive decision, determines whether accurate letter identification will be made.

In a study with bilingual subjects who read mixed passages of French and English, he found that though subjects were able to tell what a passage was about after the readings, they could rarely tell in which language a particular fact had been read. Kolers concluded that the correspondence between what is written and what the subject says he read is a semantic, not graphic, correspondence.

Chomsky (1970) also claims that the oral identification of the graphic symbols is not the essential task in reading. He asserts that the orthography of a language corresponds to a level of representation that abstracts away from the effects of phonological rules. He argues that reading involves the associations between underlying aspects of the internalized lexicon and the graphic symbols rather than with grapheme-phoneme correspondences. A beginning reader, in his view, may best be taught to read by vocabulary enrichment and not by phonics drills.
Goodman (1967) elaborates on the use of visual and non-visual sources of information. He found evidence that readers of English use three main cuing systems: the graphophonic, syntactic, and semantic. The graphophonic system provides the information needed to make correspondences between the graphic and phonological systems. The syntactic system provides information by grammatical clues such as function words and inflectional suffixes; while the semantic cuing system depends on the experience and conceptual background of the reader to provide a meaning context. These cuing systems are utilized simultaneously and interdependently. Use of syntactic and semantic cues, however, may be so extensive that only minimal use of graphic cues is necessary for comprehension. Effective reading strategies ensure selection of the most productive cues.

Goodman further describes a performance model of reading (Goodman, 1967). The reader scans the text, fixes, and selects graphic cues guided by constraints imposed by prior language knowledge, cognitive style, and strategies he has learned. He searches his memory for related syntactic, semantic, and phonological cues and then predicts. He checks his choices by testing for semantic and grammatical acceptability. If the choice is acceptable, he will decode the extended meaning. If it is unacceptable, he must regress to locate the inconsistency. Because of the sampling, predicting, and testing done by the reader, Goodman refers to the process as a "psycholinguistic guessing game." The meaning that a reader gets from a printed page originates internally and only as much visual information as is necessary to confirm it is used.
The relatively minor role that the graphic display has in the reading process seems to be further verified by consideration of the limitations of the visual and memory systems. Smith (1971) refers to a limited channel capacity—a limit to the speed at which an eye can travel over a passage of text while making information-gathering fixations and a limit to the amount of information that can be acquired in a single fixation. A quarter of a second or more is required to process information that goes into sensory store. Furthermore, short-term memory, where raw information is held for further processing, can hold only about four or five separate items. Skilled readers must be fast readers in order to integrate new information with syntactic and semantic information stored in long-term memory. This is because the processing of visual information is not instantaneous and, furthermore, involves some loss of information (Smith, 1971). Close attention to graphics slows down reading, causes greater information loss, and reduces comprehension.

Smith supports the claim that visual items can be identified from minimal information because graphic clues are supplemented by non-visual sources of information. Redundancy, the repetition of information, is an example of a non-visual information source that is used in conjunction with selected clues from the graphic display. Effective use of redundancy, however, requires knowledge on the part of the reader of sequential constraints in the construction of words. The reader’s own language background is a relevant factor here.

Smith also claims that the load on short-term memory can be reduced by chunking information into larger units—storing words instead of letters. "Chunking" also involves making use of syntactic and semantic
(non-visual) information, and is also related to the reader's linguistic background.

Central to this and other descriptions of the reading process is the role of prediction. Prediction enables the reader to select from the visual sample more efficiently, to speed up his reading, and to overcome the limited capacity of short-term memory by filling it with units as large and as meaningful as possible.

Smith concludes that because of physical limitations, the fluent reader must read with a minimum amount of dependence on visual information. He does this by using grammatical knowledge to associate graphic clues with the developing semantic interpretations.

**Miscue Analysis**

While tachistoscopic measurements of feature and letter identification are possible directly, assessments of cognitive processes in reading must be made indirectly. The analysis of miscues made in oral reading is one way that the wide range of cues used in reading may be observed.

Investigations of the reading process via miscue analysis were first initiated in the early 1960's in order to study closely what children do when they read. It became apparent that oral reading does not imply the accurate rendition of the text because all readers, even good ones, make "errors" (Goodman, 1973c). Miscues were, in fact, thought to make use of the same processes and be generated in response to the same cues as was correct reading (Goodman, 1973c). The quality, rather than the quantity of miscues, was viewed as the central concern.
Early studies of oral-reading miscues were characterized, however, by arbitrary, non-parallel, and overlapping categories of classification (Goodman, 1965). The conviction that miscues could provide positive clues to the process of reading led to the development of the Goodman Taxonomy of Reading Miscues. The Taxonomy organizes miscues according to linguistic and psycholinguistic characteristics—each miscue is classified by its graphic, phonological, syntactic, and semantic aspects in relation to the expected (printed) word. The 28 variables listed provide a systematized classification of miscues that enables comparison among research findings.

The realization that miscue analysis could be a viable tool for instructional purposes led to the development of the Reading Miscue Inventory (RMI). This classroom manual concentrates on nine key variables and on the patterns of miscues produced in order to measure the reader's strategy and success in comprehending written material. The assumptions that underly the RMI reflect the psycholinguistic view of reading as an active language process in which the reader uses syntactic and semantic information, in addition to the graphic display, for extracting meaning from the text.

Miscue analysis has been used to investigate a wide range of variables that affect the reading process. The relationship of miscues to style and difficulty of reading material, portion of passage read, and age, proficiency, or ethnic background of the reader have been assessed in this way (Rupley, 1977). Butler (1972) notes the use of miscue analysis in case and longitudinal studies as well.
Miscue analysis has additionally been applied to languages other than English. Lopez (1977) examined the miscues made by bilingual children reading Spanish. Her findings support the existence of language-determined grammatical and semantic constraints and developmental proficiency in the use of the cuing systems.

Miscue analysis involving non-native language reading, however, has the greatest relevance for the present study. Buck (1973) saw the problem of learning to read in a second language as one that encompasses more than learning an unfamiliar system of graphic shapes or becoming accustomed to a change in directionality. She discusses the difficulties in terms of:

1. The reader's input
2. The author's input
3. The reading process itself

Differences in language control and cultural expectations affect foreign language reading in all three areas and cause miscues. Sampling the input from the text, for instance, may be difficult when the reader does not know which units carry the most information. Predicting structure and meaning may be hampered by lack of knowledge or experience in the language or in the values and norms of the culture. Testing, confirming, and correcting are also functions of the reader's familiarity with the language and/or native language and culture interference. Buck therefore cautions teachers against immediately assuming that a reader's problems must be related to graphophonics.
Of direct relevance to the present study is the work of Allen (1976) in the use of miscue analysis for diagnosing the oral reading proficiency of French language students. He examined the miscues of 39 randomly chosen third-year French students in four high schools and found that their miscues reflected differences in reading strategies. Some students relied heavily on the graphophonic system, making appropriate sound-symbol correspondences without attention to meaning. More proficient readers were able to use syntactic and semantic cues in addition to the graphics in order to predict meaning. He suggests that more research in miscue analysis could enable fuller understanding of the complexities involved in learning to read a second language.

Findings reported from reading research using miscue analysis in the native language may be confirmed for foreign language reading by the present study. Biemiller (1970) analyzed the errors that children made during oral reading in terms of contextual and graphic constraints. Based on his observations, he identified three phases in their reading development:

1. At first, mainly context clues were used
2. Then a greater proportion of graphic information was utilized
3. Finally a balance of context clues and graphic information was reached

He concluded that even young, beginning readers use a wide range of cues when reading.
Weber (1970a), in studying the miscues made by first-grade readers, was able to show that both strong and weak readers used their linguistic knowledge to identify words. She also found some evidence of an inverse relationship in the use of graphic information and grammatical context.

In one extensive and comprehensive study directed by Goodman (1973c), data were collected on the reading strategies of readers at different levels of maturity and skill. Students from the second, fourth, sixth, eighth, and tenth grades were classified along dimensions of high, medium, or low reading proficiency levels in order to permit comparison of both developmental and ability differences. Correlations between categories were also computed and are summarized here according to miscue categories.

1. Quantity: The data showed a fairly consistent and negative relationship between miscue quantity and proficiency. Strong negative correlations between this measure and measures of comprehension, semantic acceptability, and syntactic acceptability were found. Goodman did not see this as proof, however, that accuracy is a prerequisite for efficient, effective reading. He hypothesized, instead, that the lower quantity of miscues was a result, not a cause, of the reader's efficiency in processing information. He noted the similarities in quantity of miscues produced among good readers at different grade levels but cautioned that the range of miscues over different age and skill levels tended to overlap, thereby prohibiting determination of any individual's reading proficiency by simply counting his miscues.
2. Comprehending: On a comprehending measure that Goodman defined as the proportion of miscues that produce acceptable meaning either before or after correction, the data supported the assumption that the comprehending score is a good measure of effectiveness in reading. This index had a strong positive relationship with semantic and syntactic acceptability and a consistent, relatively strong, negative relationship with quantity. The weak, negative relationships seen between this index and those of graphic and phonemic proximity in the higher grades were reversed and reflected positive relationships in the younger grades.

The inverse relationship between comprehending and quantity was expected because proficient readers tend to make fewer and better miscues. The negative correlation between the comprehending score and graphic and phonemic proximity scores in the higher grades was not predicted but was interpreted as the tendency to read difficult semantic content with increasing superficial accuracy.

3. Correction: According to Goodman, the correction factor is an important part of the reading process because it shows that the reader:

a. is aware that a miscue has been made
b. feels a need to correct it
c. is able to correct it

It was thought that efficient readers would correct a high percentage of miscues that need correction while ignoring miscues that do not.

The data indicated that no group corrected more than 38% of its miscues, but that some miscues were, in fact, more likely to be corrected than others. There was a strong tendency to correct semantically
unacceptable miscues and miscues that resulted in unacceptable or partially acceptable syntactic structures. Syntactic considerations seemed to trigger correction more consistently.

Percent of corrections seemed to increase as quality increased and quantity decreased. Readers with less correction had higher phonemic and graphic correspondences to the expected responses, but were also characterized by lower comprehending scores. The findings, taken in their entirety, reflect the influence of grammar and meaning on readers' correction strategies.

4. Syntactic and Semantic Acceptability: Goodman found that syntactically and semantically acceptable miscues were produced by all subjects at all grade levels, though the percentage varied with ability. The data showed a tendency for both syntactic and semantic acceptability to increase with reading proficiency.

Semantic acceptability was additionally related to grade level, especially among readers of high proficiency. These readers made fewer semantically unacceptable miscues in successively higher grades. This development of a concern for meaning and the development of the ability to deal with semantic input with increasing maturity was not apparent among less efficient unskilled readers. Goodman suggests, therefore, that semantic acceptability is an important indicator of relative proficiency among readers.

Both syntactic and semantic acceptability were affected by the type of material read. The more difficult the style or language of a given passage, the greater the percent of unacceptable miscues.
Because semantic acceptability is dependent on syntactic acceptability, the high positive correlation observed between the two measures was not unexpected. Their relationships to other variables were also similar: positive with correction and comprehending, negative with quantity and graphic and phonemic proximity in the higher grades. Reversals in the second- and fourth-grade groups result in positive correlations between the measures of semantic and syntactic acceptability and the measures of high graphic and phonemic proximity. From these observations, Goodman asserts that semantic acceptability is the single best predictor of success in comprehending.

5. Graphic and Phonemic Proximity: In the data on graphic and phonemic proximity, means were similar across grade levels and were in contrast to the divergent patterns in evidence on other variables in the study. The higher correspondence of print than sound noted in the findings was interpreted as evidence that readers rely more heavily on the graphic system than on the phonemic one. Furthermore, inefficient readers, overly concerned with word-for-word accuracy, made miscues that had a high degree of graphic correspondence even when meaning was lost. The pattern tended toward inverse relationships between comprehending and graphic and phonemic proximity among older readers. A positive relationship between these variables was observed among younger readers for whom, it was hypothesized, accuracy and meaning go together. Because only the lowest skill group of young readers showed any evidence of inability or lack of confidence in using graphophonic information in reading, Goodman suggests that phonics problems
are not of any great importance in differentiating skill levels among readers.

**Foreign Language Reading Research**

Although research on first-language reading continues rigorously on both the theoretical and applied levels, Frechette (1976) notes that research in foreign language reading seems both limited in scope and too complex for classroom application. Phillips (1974) points out that methodological or linguistic considerations are often emphasized without attention to the reader's behavior. Many of the studies are descriptive or deal with discrete aspects of vocabulary and grammar rather than with the process as a whole.

Although investigations of the reading process as a psycholinguistic phenomenon are few, they generally support the findings from native-language reading research. The need for speed as an aid to comprehension has been shown with non-native readers of English (Ferguson, 1974). The role of contextual background and of extralinguistic factors have been related to comprehension in reading (Yorio, 1971; Oiler, 1974). More recently, Omaggio (1977) explored the effects of selected pictorial contexts on measures of reading comprehension in beginning college French. Findings from research on readability criteria and eye-fixation length indicate both the importance of meaning and context and the need to assist non-native readers in discriminating between significant and insignificant orthographic features (Holley, 1973; Hatch, 1974). The role of vocabulary and syntax in aiding the reader to predict meaning with a minimal number of visual cues has also been noted (King et al.,
Phillips (1974) investigated reading as a problem-solving behavior, focusing on readers' use of cognitive strategies in order to study closely.

Hebrew Language Reading Research

Mann (1969) provides a brief description of printed Hebrew as a necessary preface to discussing the difficulties in teaching Hebrew reading. Research in Hebrew reading must consider these characteristics:

1. Hebrew is read and written right to left.
2. The alphabet consists of 22 basic consonants, but students must recognize 31 symbols because there are, in addition, five final forms, three letters that represent an entirely different consonant when written with a dot, and one letter whose dot movement changes its consonant value.
3. More than one symbol represents a consonant sound in some instances.
4. Many of the letters are similar in shape.
5. There is no capitalization.
6. There are sixteen symbols of vocalization marks.
7. The different vowels are written or represented as various configurations of small dots and lines. These vowel signs are usually supra or sublinear.
8. There are two instances when a consonant has a vowel sound.

Vocalized Hebrew text is viewed as being especially difficult to read because the vowel is "in different places in the letter" (above
it, below it, or inside it), is small and the reader tends to mix them up since there are also similar pairs" (Haramati, 1974, p. 4).

Much of the research in the reading of foreign languages using a non-Roman alphabet has emphasized discrete components of the reading process. Bishop (1964) investigated the role of grapheme-phoneme associations and the superior transfer value of training with individual letters as compared with whole words in Arabic. In Hebrew, the effect of language directionality on perception and retention has been investigated (Braine, 1967; Keenan, 1970) but these studies have dealt primarily with either bilingual or native subjects. Since findings showed that significant cues for letters are at the bottom in Hebrew and at the top in English, supra-linear vowels may be more quickly or accurately perceived and identified by native English readers reading Hebrew than sublinear vowels would be. The finding that perception of English letters results in left primacy while perception of Hebrew letters results in right primacy of the visual field may account for miscues highly influenced by the peripheral field. Such interpretations for non-native language reading remain to be confirmed.

Although investigations of the reading process in Hebrew as a psycholinguistic phenomenon are often descriptive or deal with native-language readers, such investigations generally support the findings reported in English reading research. Working with Israeli children, Venezky (1973) found that decoding abilities (letter-sound) were replaced by syntactic and semantic strategies. This supports Biemiller's findings, reported earlier in this chapter, that even young, beginning readers
depend on more than just graphic cues. Furthermore, Venezky found that reading unvocalized Hebrew results in dependence on context and word shape as dominant cues at the expense of letter-sound generalizations.

Similarly, Amir-Coffin (1975) concluded that a consonantal alphabet requires the support of context in addition to grammatical knowledge and control over vocabulary. Working with non-native readers in an effort to improve reading instruction among college-age second-language students, she found that full use of context requires the ability to scan the text quickly so that the larger structure within which the word occurs can be an aid to comprehension. Observing the use of the syntactic cuing system to derive meaning from Hebrew text, Coffin and Schramm (1971) recommend rigorous exercises in grammar for development of the reading skill.
CHAPTER III

DESIGN AND PROCEDURE

Design

The experimental design selected for this study was a one-between, one-within subjects analysis of variance, which can also be described as a mixture of the one-factor completely randomized and one-factor repeated measurements design (Kennedy, 1975).

A 2x2 factorial analysis of variance was carried out in each of the nine categories in which miscues were classified. The first independent variable was year-of-study and consisted of two levels: second and fourth year of Hebrew language study. It is the between-subjects variable. The second independent variable was Hebrew text type and also consisted of two levels: vocalized and unvocalized. It is a repeated measurements or within-subjects variable. Each of nine dependent variables of the study describes an aspect of the miscues generated during oral reading. The nine categories are:

1. Miscues per Words in Text
2. Real Word Substitutions
3. Graphophonic Similarity
4. Correction
5. Syntactic Acceptability
6. Semantic Acceptability
7. No Meaning Change
8. Grammatical Strength
9. Comprehension

The design of the study is illustrated in Figure 1.

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Vocalized</th>
<th>Unvocalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth year</td>
<td></td>
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</tbody>
</table>

Figure 1. Experimental Design

Population and sampling

The population consisted of the second- and fourth-year Hebrew language students of Tifereth Israel Religious School, Columbus, Ohio, from which a random sample of eight students from each grade level was drawn. The school's afternoon program is available to members of Tifereth Israel Congregation, a conservative Jewish synagogue composed primarily of middle and upper middle class families.

In each grade, an equal number of boys and girls was selected so as to preclude confounding of results by a sex variable. The particular grade levels chosen provide maximum contrast while assuring sufficient linguistic background and availability of subjects for participation. The mean age of the second-year students was ten years; that of the fourth-year students, twelve years. A total of sixteen subjects participated in the study.
Materials

Four Hebrew story passages were selected for each group, providing two vocalized and two unvocalized stories for each individual reading. The average length of each story was 113 words, making a corpus of approximately 226 words in each text type. The stories were taken from a Hebrew book at the instructional level of the particular class; a pilot study, described later in this chapter, confirmed that such text difficulty would elicit a sufficient number of miscues for analysis. Stories were selected and paired by content so as to provide continuity in contextual development. (See Appendix A.)

The stories were prepared by xeroxing the text, removing all picture clues, and mounting on construction paper. Two copies of each story were prepared this way, one of which had sublinear vowels removed by means of typists' white-out correction fluid and was xeroxed again before mounting. (See Appendix B.) In each grade level, four vocalized and four unvocalized passages made a total of eight texts. Additional back-up stories were also prepared to ensure an adequate sample of miscues from proficient readers.

Each subject was taped on a cassette tape recorder which was placed on the table in front of him. The tapes were later replayed by the investigator in order to verify the miscues transcribed during the readings.
**Instrumentation**

Copies of each story passage were made to allow the investigator to read along with the student and to mark his miscues on the spot. These worksheets retained the physical characteristics of the text used by the student and became the permanent record of the student's reading. (See Appendix C.)

**The Reading Miscue Inventory (RMI)**

Selected categories from the RMI were used to code the miscues obtained from the readings. The categories describe aspects of miscues that reflect the use or non-use of the graphophonic, syntactic, and semantic cuing systems. The specific categories and the criteria for rating miscues are as follows:

1. **Graphophonic similarity**: How much does the miscue look or sound like what was expected?
   - **H** A high degree of graphophonic similarity exists between the miscue and the text.
   - **M** Some degree.
   - **L** No graphophonic similarity between the miscue and what was expected.

2. **Correction**: Is the miscue corrected?
   - **Y** Yes
   - **P** There is an unsuccessful attempt at correction or a correct response is abandoned.
   - **N** There has been no attempt at correction.
3. Syntactic acceptability: Does the miscue occur in a structure that is grammatically acceptable?

Y  The miscue occurs in a sentence that is grammatically acceptable and is acceptable in relation to prior and subsequent sentences in the text.

P  The miscue occurs in a sentence that is grammatically acceptable but is not acceptable in relation to prior and subsequent sentences in the text. Or, this miscue is grammatically acceptable only with the sentence portion that comes before or after it.

N  The miscue occurs in a sentence that is not grammatically acceptable.

4. Semantic acceptability: Does the miscue occur in a structure that is semantically acceptable?

Y  The miscue occurs in a sentence that is semantically acceptable and is acceptable in relation to prior and subsequent sentences in the text.

P  The miscue occurs in a sentence that is semantically acceptable but is not acceptable in relation to prior and subsequent sentences in the text. Or, the miscue is semantically acceptable only in the sentence portion that comes before or after it.

N  The miscue occurs in a sentence that is not semantically acceptable.

5. Meaning change: Does the miscue result in a change in meaning?

Y  An extensive change in meaning is involved.
P A minimal change in meaning is involved.
N No change in meaning is involved.

Classifications based on patterns of miscue ratings in particular categories include:

6. Grammatical strength: Specific combinations of Y, P, or N in the categories of Correction, Syntactic Acceptability, and Semantic Acceptability reveal the reader’s use of the syntactic and semantic cuing systems. For example, when a miscue is both syntactically and semantically acceptable, a reader’s attempt to adjust it is considered inefficient and an overcorrection. When correction is selectively applied to miscues that violate the grammar, then the reader is demonstrating strength in the use of syntactic cues. The ratings are as follows:

Strength: In these patterns, the reader uses grammatical and meaning cuing systems effectively and makes appropriate use of correction strategies.

Partial strength: In these patterns, the reader uses the grammatical cuing system to the exclusion of meaning cues and does not make appropriate use of correction strategies.

Weakness: In these patterns, the reader does not use grammatical cues, meaning cues, or appropriate correction strategies.
7. Comprehension: Specific combinations of Y, P, or N in the categories of Correction, Semantic Acceptability and No Meaning Change indicate whether the miscue has resulted in a loss of comprehension. For example, when correction preserves the original meaning or when an uncorrected miscue does not change meaning, it can be inferred that the reader retains the sense of the text. When meaning is only slightly altered by a miscue, comprehension is probably partial. An uncorrected semantically unaccept­able miscue is likely to cause significant loss of compre­hension. The ratings are as follows:

No loss of comprehension: In these patterns, there has been no change in meaning as a result of the miscue.

Partial loss of comprehension: In these patterns, although meaning is changed, it is likely that the reader does gain some meaning from the sentence.

Loss of comprehension: The miscue has produced a structure from which the reader apparently gains no meaning.

Miscue descriptions not formally included in the inventory but based on the original work in miscue analysis (Goodman, 1973c) include:

8. Real word substitutions: Is the miscue a real Hebrew word or a nonsense uttering?

W The word is a Hebrew word and one that would be familiar at this level of instruction.
The word is not a Hebrew word or is one that would not likely be familiar at this level of instruction.

9. Miscues per words in text: a strictly quantitative measure.

The RMI categories are listed on a coding sheet so that each miscue may be rated individually. Each of the inventory questions is asked about each miscue and the response is placed in the appropriate box on the coding sheet. (See Appendix C.)

Pilot study

In the spring of 1976, a pilot study was conducted by the investigator in order to determine:

1. the appropriate length and difficulty of the reading passages
2. the suitability of the RMI categories and coding system for oral reading in the Hebrew language
3. the capability of young Hebrew language students to read unvocalized Hebrew

A sample of four students from the second-year and four students from the fourth-year Hebrew classes of Tifereth Israel Religious School participated in the pilot study, making a total of eight subjects. Because each subject read both a vocalized and an unvocalized text, data were obtained from 16 readings.

In consultation with the classroom teachers the researcher selected stories from two different sources: the book currently used in classroom instruction and a supplementary reader. The story from the regular classroom book came from the next lesson to be introduced in
classroom instruction. In Goodman and Burke's guidelines for using the RMI, selections are taken from one grade level above that at which the student regularly reads as a means of ensuring a sufficient number of miscues.

Four stories at each grade level were xeroxed from the books. Two of the stories had sublinear vowels removed by means of typists' white-out correction fluid and were xeroxed again so as not to give an artificial appearance. Picture clues were removed from all stories and the texts were mounted on construction paper for ease in handling.

Each story was approximately 80 words in length, and, it was hypothesized, would require about 5 minutes to read. Goodman and Burke (1972) suggest that the reading session be of no more than 20-25 minutes in order to avoid subject fatigue. In reading four passages, two vocalized and two unvocalized, each subject would then read within the desired limits.

The readings were conducted in an otherwise empty classroom where subjects read and were taped individually. Each subject was requested to read the Hebrew stories. He was reminded of the options that were available if a difficult word were encountered: he could guess at the word, sound it out, or simply skip it. No correction or assistance would be given during the readings.

The investigator marked the worksheet for miscues during the tapings and later re-played the tapes to confirm the miscues made. Miscues were transcribed onto the coding sheet and were evaluated in each category. In accordance with standard RMI procedures, the first 25 miscues made by each subject in each reading were coded.
As a result of the pilot study, the following adjustments were made in the present study:

1. Test difficulty: Stories in the pilot study contained new and unfamiliar vocabulary that would be introduced orally prior to orthographic presentation in regular classroom instruction. These new words were read correctly by many of the subjects while reading the vocalized text because vowels guide pronunciation. On the unvocalized text, however, these words became nonsense word miscues almost without exception. It was decided, therefore, to select stories of familiar vocabulary from supplementary story readers (not currently in classroom use) at the same level of difficulty as the classroom book. Additionally, each story would appear in vocalized and unvocalized versions and would be read an equal number of times in each to minimize the effects of style or difficulty level of a particular passage.

2. Although a sufficient number of miscues were generated in the study, it was decided to provide additional back-up stories to ensure an adequate sample from proficient readers. Slightly longer passages were also obtained for the present study.

3. Categories and coding: In this investigator's view, the selected categories of the RMI provided, on the whole, linguistically appropriate descriptions of the
miscues generated during the oral reading of Hebrew.

The following adjustments in coding were made:

A "partial" rather than "no" acceptability rating was given for Syntactic Acceptability when the miscue retained the grammatical function of the word in the text despite errors in conjugation or inflection. This was done because the ungrammaticality of a miscue could reflect difficulty with conceptual aspects of the language, such as gender sensitivity, rather than disregard of syntactic cues. Hence, a verb may be read in the singular masculine base form instead of the suffixed feminine form indicating that, at least, the function of the word in the sentence was not ignored by the reader, even when difficulties, conceptual or grammatical, prevented accurate conjugation.

In a similar fashion, a nonsense word was coded "partially syntactically acceptable" when it retained the grammatical function of the word in the text. For example, when the definite marker, which is a prefix in Hebrew, remained separate in pronunciation from the nonsense word to which it was attached, the investigator coded "partial syntactic acceptability." The RMI makes similar adjustments in coding non-words of recognizable form and function.

4. Subjects' capability with regard to unvocalized text: The pilot study revealed
that even younger students were able to read the un-
vocalized text. One change in procedure, however, was
made. A practice sample of unvocalized Hebrew was
added to the present study because initial attempts in
reading without vowels often seemed haphazard or be-
labored and the resulting miscues were not indicative of
later performance. Since only the first 25 miscues made
would be analyzed, results concerning text type could be
affected. Limits on text length and the need to generate
a sufficient and consistent sample of miscues prevented
miscue selection from subsequent portions of the text.
Hence, a practice sample of unvocalized text was pre-
pared.

In summary, the pilot study fulfilled its objectives in indi-
cating appropriate text length and difficulty, in adjustment of the
RMI for oral Hebrew reading, and in determining that even younger stu-
dents were able to read the unvocalized text. Additional outcomes in-
cluded the provision of supplementary back-up stories and a practice
sample of unvocalized text.

Procedure

Readings

The taped readings were conducted by the investigator according
to the standard procedures of the RMI: orally, individually, and with-
out assistance from the investigator. Subjects were told prior to the
readings that they would be asked to retell the story after they had
read in order to direct them toward comprehension rather than sound-symbol accuracy.

Each subject read the practice sample and then the randomly assigned vocalized and unvocalized texts of his group. Random methods were also used to order the presentation of the two text types.

Scoring

The investigator marked the worksheets for miscues during the readings and confirmed them later by means of the tapes. The first 25 miscues in each reading were transcribed onto the coding sheet and coded in each of the categories. Three readings were randomly selected for comparative scoring by another trained Hebrew teacher, and interrater agreement of 85% on miscue occurrence and 80% on coding was reached.

The number of miscues in each rating (high, medium, low, yes, partial, no) was tallied in each category and this number converted to a percentage figure. Percentages are used in the RMI because not all miscues are coded in all categories. Omissions and insertions, for example, are not coded for graphophonic similarity. Additionally, though the "partial" rating was retained in the coding for assessment of patterns of grammatical strength and comprehension, it was collapsed with the "high" rating for statistical analysis. Goodman and Burke (1972) consider partial attempts and partial success as indications of positive interaction between reader and text. In the category of Graphophonic Similarity, the "medium" rating was collapsed into the "low" rating to provide the dichotomy. These percentages comprised the data
from which the group means for year-of-study and text type were computed.

Statistical Analysis

A 2x2 factorial analysis of variance was replicated in each of the nine categories. The between-subjects variable, A, consisted of two levels: second and fourth year of Hebrew language study. The within-subjects variable, B, also had two levels: vocalized and unvocalized Hebrew. The four treatment conditions were: second year with vowels and without; and fourth year with vowels and without. The dependent variables were the nine categorical descriptions of miscues produced during oral reading. There were eight subjects in each level of A, 16 human subjects, and 32 observations.

In a one-between, one-within subjects design, as was used here, the subject's mean performance over repeated measures may vary because of:

1. Exposure to different levels of variable A ($\alpha_j$).
2. Stable individual differences ($S_{ij}$).

Scores obtained over the repeated measures component may vary because:

3. Scores are obtained under different levels of B ($\beta_k$).
4. Scores are obtained under different combinations of levels of A and B ($\alpha\beta_{jk}$) (Kennedy, 1975).

Since the design may be considered a series of separate one-factor repeated measurements designs (a separate design at each level of A), an additional source of variance, ($S_{jk}$) reflects the fact that scores are obtained under different combinations of S and B. And,
finally, \( (\epsilon_{ijk}) \), sampling error, contributes to data variability. The abbreviated mathematical model used then is:

\[
X_{ijk} = \mu + \alpha_j + S_{i/j} + \beta_k + (\alpha\beta)_{ik/j} + \epsilon_{ijk}
\]

The sources of variance and degrees of freedom for this design are:

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of Freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between SS</td>
<td>an-1</td>
</tr>
<tr>
<td>A</td>
<td>a-1</td>
</tr>
<tr>
<td>S/A</td>
<td>a(n-1)</td>
</tr>
<tr>
<td>Within</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>an(b-1)</td>
</tr>
<tr>
<td>AB</td>
<td>b-1</td>
</tr>
<tr>
<td>SB/A(res)</td>
<td>(a-1)(b-1)</td>
</tr>
<tr>
<td>Total</td>
<td>a(n-1)(b-1)</td>
</tr>
</tbody>
</table>

The data were analyzed on the SOUPAC program of the Instruction and Research Computer Center at The Ohio State University. An EXEC SBSS was used to compute the Pearson Product-Moment correlations.

The null hypotheses tested were:

1. \( H_0 \) There will be no significant difference attributable to variation in year of study on the quality or quantity of miscues described by the category.

2. \( H_0 \) There will be no significant difference attributable to variation in text type on the quality or quantity of miscues described by the category.

3. \( H_0 \) There will be no significant interaction between year of study and text type on the quality or quantity of miscues described by the category.
CHAPTER IV

RESULTS AND DISCUSSION

Introduction

This study examined the miscues made during the oral reading of vocalized and unpocalized Hebrew in order to compare the use of the graphophonic, syntactic, and semantic cuing systems with full and reduced graphic systems. A 2x2 factorial design was replicated for each of nine dependent variables. The between-subjects variable, year-of-study, consisted of two levels: second and fourth year of Hebrew language instruction. The within-subjects variable, text type, also had two levels: vocalized and unpocalized Hebrew. The dependent variables were the categorical descriptions of miscues produced during oral reading. They are:

1. Miscues per Words in Text
2. Real Word Substitutions
3. Graphophonic Similarity
4. Correction
5. Syntactic Acceptability
6. Semantic Acceptability
7. No Meaning Change
8. Grammatical Strength
9. Comprehension
Subjects in each year-of-study group read vocalized and unvocalized Hebrew texts. The miscues made during the oral readings were coded according to selected categories of the RMI. The ratings obtained in each category were summed and converted into a percentage figure. Statistical findings and discussion are reported separately for each of the categories that constitute the nine dependent variables in the study.

Category 1: Miscues per words in text

The total number of miscues produced in each reading was tallied as the only strictly quantitative measure in this study. Previous research has shown a positive correlation between this index and a reader's level of proficiency in reading (Goodman, 1973c). Table 1 gives the means and standard deviations for percentage of miscues per words in text in each treatment-group.

TABLE 1

MEAN PERCENTAGES OF MISCUES AND STANDARD DEVIATIONS IN CATEGORY 1: MISCUES PER WORDS IN TEXT

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized n=8</th>
<th>Unvocalized n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean S.D.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second Year</td>
<td>20.7 9.8</td>
<td>42.4 17.5</td>
<td>31.6 17.7</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>16.5 13.5</td>
<td>32.7 10.9</td>
<td>24.6 14.5</td>
</tr>
</tbody>
</table>

18.6 11.6
37.6 14.9
The data indicate that twice as many miscues were made in both grade levels when vowels were removed from the text. Second-year subjects miscued more frequently than the fourth-year group on both text types, but the difference between the groups was smaller on the vocalized text. The results of the analysis of variance are presented in Table 2.

**TABLE 2**

SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 1: MISCUES PER WORDS IN TEXT

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.038</td>
<td>.038</td>
<td>1.686</td>
<td>.215</td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.032</td>
<td>.023</td>
<td>2.186</td>
<td>.155</td>
</tr>
<tr>
<td><strong>Within Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>.287</td>
<td>.287</td>
<td>23.276</td>
<td>.0002</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.006</td>
<td>.006</td>
<td>.469</td>
<td>.505</td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.017</td>
<td>.012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As these data show, the text variable was statistically significant. The greater percentage of miscues made in the reading of unvocalized Hebrew was not totally unexpected because reading without vowels was a new experience for these subjects.

The main effect means for year-of-study showed fewer miscues made by the fourth year group, but the difference was not statistically significant. This observation does conform, however, with previous
research findings that older, more proficient readers tend to miscue less frequently. There were no significant interaction effects.

Category 2: Real word substitutions

The percentage of words that were meaningful Hebrew words rather than nonsense utterances was tallied in this category. This index contributes data on the extent to which a reader attempts to make reading make sense. Means and standard deviations are presented in Table 3.

### TABLE 3

**MEAN PERCENTAGES OF MISCUES AND STANDARD DEVIATIONS IN CATEGORY 2: REAL WORD SUBSTITUTIONS**

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized n=8</th>
<th>Unvocalized n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S.D.</td>
<td>S.D.</td>
</tr>
<tr>
<td>Second Year</td>
<td>Mean</td>
<td>46.0</td>
<td>48.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>14.0</td>
<td>13.8</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>Mean</td>
<td>27.5</td>
<td>29.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>15.0</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36.7</td>
<td>39.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.0</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Although both grade levels made the preferred substitutions more often in reading the unvocalized texts, the differences in performance between text types are small. Larger differences are observed between grade levels. Table 4 provides the results of the analysis of variance for this category.
TABLE 4
SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 2:
REAL WORD SUBSTITUTIONS

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.281</td>
<td>.281</td>
<td>16.331</td>
<td>.001</td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.024</td>
<td>.017</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>.004</td>
<td>.004</td>
<td>.229</td>
<td>.639</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.0005</td>
<td>.00005</td>
<td>.003</td>
<td>.958</td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.025</td>
<td>.018</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The data show that the second-year students produced a significantly higher percentage of real Hebrew words when they miscued than did the fourth-year group. This finding supports previous observations that even young, beginning readers read for sense and meaning and tend to rely on context at first (Biemiller, 1970). The fact that the fourth-year group produced fewer meaningful miscues may result from the emphasis on smooth phonic reading that occurs with Bar and Bat Mitzvah training at this age. Comprehension is not a prime objective in this instruction. Because both the direction and percentage of change in performance between text types were the same for the two groups, no statistically significant interactions were observed.
Category 3: Graphophonic Similarity

The degree to which the miscue resembles the word printed in the text reveals the reader's use of the graphophonic cuing system. Those miscues having a "high" rating in graphophonic similarity provided the data here. The means and standard deviations are given in Table 5.

**TABLE 5**

**MEAN PERCENTAGES OF MISCUES AND STANDARD DEVIATIONS IN CATEGORY 3: GRAPHOPHONIC SIMILARITY**

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized n=8</th>
<th>Unvocalized n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Year</td>
<td>Mean</td>
<td>72.0</td>
<td>79.0</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>13.4</td>
<td>13.0</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>Mean</td>
<td>49.7</td>
<td>84.0</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>25.9</td>
<td>11.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60.9</td>
<td>81.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23.0</td>
<td>12.3</td>
</tr>
</tbody>
</table>

The table shows that in reading unvocalized text, the second-year group produced more miscues with a high degree of graphophonic similarity to the printed word than did the older group. In the reading of unvocalized text, however, the miscues of the fourth-year group reflected greater use of the graphophonic cuing system than did those of the younger group. The results of the analysis of variance are presented in Table 6.
TABLE 6

SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 3:
GRAPHOPHONIC SIMILARITY

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.059</td>
<td>.059</td>
<td>1.833</td>
<td>.197</td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.045</td>
<td>.032</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.148</td>
<td>.148</td>
<td>5.624</td>
<td>.030</td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.036</td>
<td>.025</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The interaction between text type and year of study is statistically significant. The data show that the use of the graphophonic cuing system depends on both text and grade level. Although the mis-cues of the younger children did reflect greater attention to the visual sample when reading unvocalized text, the difference between text types was small in comparison to the greater difference evidenced between readings by the older group. Figure 2 shows the graph of this interaction.

Caution must be used in the interpretation of these results, however, because it is not the strengthening of the graphophonic cuing system that necessarily promotes effective and efficient reading strategies, but rather its use in conjunction with the syntactic and semantic cuing systems.
Figure 2. Interaction between Year of Study and Text in Category 3: Graphophonics Similarity
Although high ratings on this index indicate, primarily, attention to the graphic display, greater accuracy in making sound-symbol correspondences may also be associated. Removing the complex vowel system may have facilitated accurate identification of the remaining graphic sample.

Category 4: Correction

Correction may be taken as one measure of a reader's sensitivity to syntactic and semantic acceptability (Goodman, 1973c). The reader's attempts at correction, both successful and unsuccessful, comprise the data in this category. Treatment-group means and standard deviations are presented in Table 7.

TABLE 7

MEAN PERCENTAGES OF MISCUES AND STANDARD DEVIATIONS IN CATEGORY 4: CORRECTION

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized n=8</th>
<th>Unvocalized n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
</tr>
<tr>
<td>Second Year</td>
<td>33.5</td>
<td>20.8</td>
<td>22.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fourth Year</td>
<td>33.5</td>
<td>18.6</td>
<td>19.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The figures indicate that fewer attempts at correction were made while reading unvocalized text. Differences between grade levels are small. A significant difference with regard to text type is reported in the results of the analysis of variance found in Table 8.

TABLE 8

SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 4: CORRECTION

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.002</td>
<td>.002</td>
<td>.038</td>
<td></td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.066</td>
<td>.047</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>.135</td>
<td>.135</td>
<td>10.718</td>
<td></td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.000</td>
<td>.002</td>
<td>.143</td>
<td></td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.018</td>
<td>.013</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The difference between text types was statistically significant in the direction of vocalized text. It had been thought that unvocalized text would promote greater use of correction in order to make an alternative choice when an ambiguous consonant combination was read unacceptably. The data did not confirm such a strategy. Perhaps without vowels to facilitate correction, readers were unwilling to regress and correct.

Category 5: Syntactic Acceptability

The grammatical organization of a sentence provides the framework for the meaning—there can be acceptable grammar without acceptable
meaning though the reverse is not true. This category not only evaluates the reader's control of sentence structure, but also sets limits on the semantic acceptability of the miscue made. A miscue cannot be rated semantically acceptable if it is syntactically unacceptable.

The percentage of miscues rated as having partial or full syntactic acceptability provides the data here. Means and standard deviations appear in Table 9.

**TABLE 9**

**MEAN PERCENTAGES OF MISCUES AND STANDARD DEVIATIONS IN CATEGORY 5: SYNTACTIC ACCEPTABILITY**

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized n=8</th>
<th>Unvocalized n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Year</td>
<td>Mean</td>
<td>69.5</td>
<td>64.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>13.7</td>
<td>12.9</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>Mean</td>
<td>57.0</td>
<td>60.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>16.1</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63.2</td>
<td>62.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.8</td>
<td>12.5</td>
</tr>
</tbody>
</table>

The table indicates that the second-year group made more syntactically acceptable miscues while reading vocalized text than they did while reading unvocalized text. The fourth-year group, in contrast, used the syntactic cuing system more effectively when vowels were eliminated. In both text types, however, the second-year group made more syntactically acceptable miscues. The results of the analysis are given in Table 10.
TABLE 10
SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 5:
SYNTACTIC ACCEPTABILITY

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.054</td>
<td>.054</td>
<td>2.147</td>
<td>.165</td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.036</td>
<td>.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>.0004</td>
<td>.0004</td>
<td>.034</td>
<td>.856</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.014</td>
<td>.014</td>
<td>1.098</td>
<td>.312</td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.18</td>
<td>.13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The observed differences between text types and between years of study are not statistically significant. The difference in performance in the direction of the second-year group strengthens the claim that emphasis on meaning and sense seems to guide the younger reader. The very small difference noted between text types suggests that even with increased occurrence of miscues in reading unvocalized text, the syntactic cuing system was still employed.

Category 6: Semantic Acceptability

Goodman (1973c) suggests that semantic acceptability is a more accurate indicator of reading proficiency than is syntactic acceptability because the ability to produce acceptable meaning varies more between readers but is positively correlated to effectiveness and
grade level. Text is also believed to influence the semantic acceptability of miscues made—difficult content or style produces more non-word substitutions.

The percentage of miscues that showed full or partial semantic acceptability was tallied as a measure of the ability to produce acceptable meaning. Means and standard deviations are given in Table 11.

**TABLE 11**

**MEAN PERCENTAGES OF MISCUES AND STANDARD DEVIATIONS IN CATEGORY 6: SEMANTIC ACCEPTABILITY**

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized n=8</th>
<th>Unvocalized n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>Second Year</td>
<td>41.0</td>
<td>42.0</td>
<td>41.5</td>
</tr>
<tr>
<td></td>
<td>10.8</td>
<td>17.8</td>
<td>14.2</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>29.0</td>
<td>33.0</td>
<td>31.0</td>
</tr>
<tr>
<td></td>
<td>12.0</td>
<td>10.2</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>35.0</td>
<td>37.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12.7</td>
<td>14.7</td>
<td></td>
</tr>
</tbody>
</table>

Although both grade levels produced more semantically acceptable miscues when reading unvocalized text, the differences between text types are small. A larger difference in performance is observed between years of study. Table 12 presents the results of the analysis of variance.
A statistically significant difference between grade levels was observed in the direction of the second year of study. The text variable was not statistically significant in producing semantically acceptable mistakes and no significant interactions between text and year of study occurred.

The data are consistent with previous findings in this study where the younger group demonstrated significantly greater concern for meaning than did the older group. This observation may reflect the curricular objectives discussed earlier. At progressively higher levels of instruction in the elementary Hebrew program at this school, increased attention is given to Bar and Bat Mitzvah training which emphasizes phonics and rote memory rather than comprehension. A learning set for quick and fluent pronunciation, not meaning, would be reflected in the scores on this category.
Category 7: No Meaning Change

A reader is considered successful with written material to the extent that he is able to grasp the author's intent in writing. When a miscue alters a sentence, the resulting passage may or may not affect the semantic sense. Semantic change has been shown to be related to proficiency—an obvious movement toward less semantic change occurs among successively higher grade levels (Goodman, 1973c). Text material also affects this variable as shown by the inverse relationship of miscues per words in text and semantic change. A difficult text will elicit more uncorrected miscues (Goodman, 1973c).

This measure of the ability to preserve the original meaning of the text contains the percentage of miscues with codings of partial or no meaning change. Table 13 shows the means and standard deviations for this category.

### Table 13

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized</th>
<th>Unvocalized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n=8</td>
<td>n=8</td>
</tr>
<tr>
<td>Second Year</td>
<td>Mean</td>
<td>31.5</td>
<td>32.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>10.4</td>
<td>13.1</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>Mean</td>
<td>19.0</td>
<td>20.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>9.3</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td><strong>25.2</strong></td>
<td><strong>26.5</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>11.5</strong></td>
<td><strong>11.1</strong></td>
<td></td>
</tr>
</tbody>
</table>
Vocalized and unvocalized texts elicited nearly identical results in each group. The miscues of the second-year group, however, reflected the author's original meaning more than did those of the fourth-year group. The ANOVA table is presented in Table 14.

**TABLE 14**

SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 7: NO MEANING CHANGE

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.120</td>
<td>.120</td>
<td>11.615</td>
<td>.004</td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.014</td>
<td>.010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Within Subjects</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>1</td>
<td>.001</td>
<td>.001</td>
<td>.148</td>
<td>.706</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.00005</td>
<td>.00005</td>
<td>.006</td>
<td>.939</td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.001</td>
<td>.008</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The data show that the difference in performance between year-of-study groups was statistically significant; the slight advantage shown in reading unvocalized text was not statistically significant. No significant interactions were observed.

The results presented here do not support previous findings that relate semantic change with level of reader's proficiency or with frequency of miscue occurrence. The younger children, who made more miscues, still preserved the original meaning more than did the older group. This was true on both vocalized and unvocalized text.
Category 8: Grammatical Strength

The interrelationship between correction, syntactic acceptability, and semantic acceptability indicating strength or weakness in the use of the grammatical cuing system was evaluated in this category. The percentage of miscues that were coded in patterns revealing strength or partial strength in the use of the grammatical cuing system was tallied for each subject reading each text type. Table 15 gives the means and standard deviations of treatment groups.

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized</th>
<th>Unvocalized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=8</td>
<td>n=8</td>
<td></td>
</tr>
<tr>
<td>Second Year</td>
<td>Mean</td>
<td>46.5</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>13.8</td>
<td>11.8</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>Mean</td>
<td>42.5</td>
<td>36.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>10.0</td>
<td>8.4</td>
</tr>
</tbody>
</table>

Table 15 shows that grammatical strength is facilitated in the reading of vocalized text for both grade levels. The data also show that while the second-year subjects demonstrated greater use of the grammatical cuing system than the fourth-year group while reading Hebrew.
with vowels, a reversal occurred in the reading of unvocalized text.

In reading without vowels, the older group demonstrated greater grammatical strength than the younger group. Table 16 reports the results of the analysis of variance.

TABLE 16

SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 8: GRAMMATICAL STRENGTH

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.016</td>
<td>.016</td>
<td>1.101</td>
<td>.312</td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.021</td>
<td>.015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>.168</td>
<td>.168</td>
<td>16.218</td>
<td>.001</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.058</td>
<td>.058</td>
<td>5.573</td>
<td>.033</td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.014</td>
<td>.010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The data show that text type was statistically significant. A significant interaction, however, indicates differential treatment-group effects. The performance of the second-year group declined more than that of the fourth-year group when reading unvocalized text. This interaction is graphed in Figure 3.
Figure 3. Interaction between Year of Study and Text in Category 8: Grammatical Strength
The graph shows that both groups used the grammatical cuing system more effectively when vowels were provided. The older group was relatively more effective than the younger group in the use of syntactic information when reading unvocalized text.

Category 9: Comprehension

The interrelationship between correction, semantic acceptability, and meaning change indicates whether comprehension has likely been affected. The percentage of miscues that were coded in patterns revealing no loss or only partial loss of comprehension was tallied for each subject and text type. Table 17 gives the means and standard deviations of treatment-groups.

**Table 17**

**Mean Percentages of Miscues and Standard Deviations in Category 9: Comprehension**

<table>
<thead>
<tr>
<th>Year of Study</th>
<th>Treatment</th>
<th>Vocalized</th>
<th>Unvocalized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=8</td>
<td>n=8</td>
<td></td>
</tr>
<tr>
<td>Second Year</td>
<td>Mean</td>
<td>54.0</td>
<td>39.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>20.1</td>
<td>14.4</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>Mean</td>
<td>46.5</td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>13.8</td>
<td>6.2</td>
</tr>
</tbody>
</table>

50.2 37.5
17.1 10.9
In reading the Hebrew texts, the subject's ability to correct miscues was influenced both by his foreign language vocabulary and by his confidence in it. Any misinformation or uncertainty about the meaning of a word would likely have prevented correction even when meaning was altered. Furthermore, a non-word miscue may not have been corrected simply because it was not perceived as such—arbitrary sound combinations of the relatively unfamiliar phonological system may sound equally probable of being a foreign language word to Hebrew students.

The data show a decline in comprehension when reading unvocalized texts. The second-year group, however, showed greater use of the semantic cuing system than did the fourth-year group on both vocalized and unvocalized texts. Table 18 provides the results of the analysis of variance.

**TABLE 18**

**SUMMARY OF ANALYSIS OF VARIANCE FOR CATEGORY 9: COMPREHENSION**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F Ratio</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>.026</td>
<td>.026</td>
<td>1.378</td>
<td>.260</td>
</tr>
<tr>
<td>S/A</td>
<td>14</td>
<td>.027</td>
<td>.019</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>.130</td>
<td>.130</td>
<td>5.698</td>
<td>.032</td>
</tr>
<tr>
<td>AB</td>
<td>1</td>
<td>.002</td>
<td>.002</td>
<td>.107</td>
<td>.748</td>
</tr>
<tr>
<td>SB/A (res)</td>
<td>14</td>
<td>.032</td>
<td>.023</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The difference in the text variable was statistically significant—the vocalized text elicited greater use of appropriate reading strategies to promote comprehension than did the unvocalized text. The ability of both groups to apply correction more successfully to semantically unacceptable or disruptive miscues while reading vocalized Hebrew may be because the graphic presentation of the vowels themselves provides the information needed for correct pronunciation.

The difference in performance between grade levels was not statistically significant. The fact that the younger children out-performed the older group on this measure is, however, consonant with performance on other semantic ratings where similar attention to meaning was observed.

Correlation

A Pearson Product-Moment correlation was computed to show the relationship between categories. Table 19 presents the correlations obtained from the readings of both grade levels on vocalized text. Table 20 presents the correlations obtained from the readings of both grade levels on unvocalized text. Each correlation is followed by its significance level. Positive correlations were expected between measures of syntactic and semantic acceptability, grammatical strength, and comprehension. Such findings would be consistent with those reported in native-language reading research. Results from both vocalized and unvocalized texts confirmed such correlations.
### Table 19

Pearson product moment correlations between categories in the reading of vocalized Hebrew indicating relationships on a scale from -1, perfect negative correlation, to +1, perfect positive correlation.

<table>
<thead>
<tr>
<th>Category</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.000</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-.409</td>
<td>1.000</td>
<td>.058</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.040</td>
<td>.514*</td>
<td>1.000</td>
<td>.441</td>
<td>.02</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-.549*</td>
<td>.105</td>
<td>.109</td>
<td>1.000</td>
<td>.014</td>
<td>.350</td>
<td>.343</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>-.128</td>
<td>.534*</td>
<td>-.149</td>
<td>.029</td>
<td>1.000</td>
<td>.318</td>
<td>.016</td>
<td>.291</td>
<td>.458</td>
</tr>
<tr>
<td>6</td>
<td>-.438*</td>
<td>.869**</td>
<td>.413</td>
<td>.064</td>
<td>.580**</td>
<td>1.000</td>
<td>.045</td>
<td>.001</td>
<td>.056</td>
</tr>
<tr>
<td>7</td>
<td>-.183</td>
<td>.684**</td>
<td>.374</td>
<td>.0006</td>
<td>.564*</td>
<td>.829**</td>
<td>1.000</td>
<td>.249</td>
<td>.002</td>
</tr>
<tr>
<td>8</td>
<td>-.466*</td>
<td>.332</td>
<td>.061</td>
<td>.788**</td>
<td>.258</td>
<td>.273</td>
<td>.246</td>
<td>1.000</td>
<td>.034</td>
</tr>
<tr>
<td>9</td>
<td>-.523*</td>
<td>.464*</td>
<td>.342</td>
<td>.750**</td>
<td>.263</td>
<td>.518*</td>
<td>.479*</td>
<td>.789*</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01
TABLE 20

PEARSON PRODUCT MOMENT CORRELATIONS BETWEEN CATEGORIES IN THE READING OF UNVOCALIZED HEBREW INDICATING RELATIONSHIPS ON A SCALE FROM -1, PERFECT NEGATIVE CORRELATION, TO +1, PERFECT POSITIVE CORRELATION

<table>
<thead>
<tr>
<th>Category</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.000</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-.194</td>
<td>1.000</td>
<td>.236</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>-.228</td>
<td>-.101</td>
<td>1.000</td>
<td>.197</td>
<td>.355</td>
<td>.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>-.014</td>
<td>.053</td>
<td>.199</td>
<td>1.000</td>
<td>.479</td>
<td>.423</td>
<td>.230</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.129</td>
<td>.288</td>
<td>.099</td>
<td>-.427*</td>
<td>1.000</td>
<td>.316</td>
<td>.140</td>
<td>.357</td>
<td>.050</td>
</tr>
<tr>
<td>6</td>
<td>.268</td>
<td>.586</td>
<td>.104</td>
<td>-.261</td>
<td>.553*</td>
<td>1.000</td>
<td>.157</td>
<td>.009</td>
<td>.350</td>
</tr>
<tr>
<td>7</td>
<td>.108</td>
<td>.803**</td>
<td>-.084</td>
<td>-.254</td>
<td>.637**</td>
<td>.705**</td>
<td>1.000</td>
<td>.345</td>
<td>.001</td>
</tr>
<tr>
<td>8</td>
<td>-.125</td>
<td>-.363</td>
<td>.290</td>
<td>-.032</td>
<td>.322</td>
<td>.054</td>
<td>-.153</td>
<td>1.000</td>
<td>.323</td>
</tr>
<tr>
<td>9</td>
<td>.112</td>
<td>.602**</td>
<td>.141</td>
<td>-.116</td>
<td>.496*</td>
<td>.753**</td>
<td>.723**</td>
<td>.082</td>
<td>1.000</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01
Summary

Findings in each of the nine categories have been presented separately in this chapter. The results of the analyses of variance with respect to the null hypotheses are as follows:

1. $H_0$: There will be no significant difference attributable to variation in year-of-study on the quality or quantity of miscues described by the category.

This hypothesis remains tenable for measures of quantity, graphophonetic similarity, correction, syntactic acceptability, grammatical strength, and comprehension.

This hypothesis is rejected for measures of real word substitutions, semantic acceptability, and no meaning change.

2. $H_0$: There will be no significant difference attributable to variation in text type on the quality or quantity of miscues described by the category.

This hypothesis remains tenable for measures of real word substitutions, syntactic acceptability, semantic acceptability, and no meaning change.

This hypothesis is rejected for measures of quantity, graphophonetic similarity, correction, grammatical strength, and comprehension.

3. $H_0$: There will be no significant interaction between year-of-study and text type on the quality or quantity of miscues described by the category.

This hypothesis remains tenable for measures of quantity, real word substitutions, correction, syntactic acceptability, semantic acceptability, no meaning change, and comprehension.
This hypothesis is rejected for measures of graphophonic similarity and grammatical strength.

A synthesis of the results and their implications will be presented in Chapter V.
CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The major interest of this study was the role of the graphic display in facilitating reading comprehension. The effects of full and reduced graphic systems on the reading strategies of Hebrew language students were assessed by analysis of the miscues made during oral reading. It was thought that by eliminating the vowels from a Hebrew text and thereby reducing graphophonic information, reading strategies that emphasize the syntactic and semantic cuing systems would be strengthened. The comparison between vocalized and unvocalized Hebrew texts was made at two different levels of Hebrew language instruction and the four treatment conditions were:

1. Second year with vowels
2. Second year without vowels
3. Fourth year with vowels
4. Fourth year without vowels

A 2x2 factorial design was replicated for each of nine dependent variables that describe the quality or quantity of miscues made. The nine categories taken from the RMI are as follows:
1. Miscues per Words in Text
2. Real Word Substitutions
3. Graphophonic Similarity
4. Correction
5. Syntactic Acceptability
6. Semantic Acceptability
7. No Meaning Change
8. Grammatical Strength
9. Comprehension

Differences significant beyond the .05 level were found between vocalized and unvocalized Hebrew texts in the direction of vocalized text in the following three categories:

   Correction
   Grammatical Strength
   Comprehension

Differences significant beyond the .05 level between text types in the direction of unvocalized text were found in the following two categories:

   Miscues per Words in Text
   Graphophonic Similarity

Differences significant beyond the .05 level between year-of-study groups were all in the direction of the second-year group and were found in the following three categories:
Real Word Substitutions

Semantic Acceptability

No Meaning Change

Interaction effects significant beyond the .05 level were observed in two categories:

Graphophonic Similarity

Grammatical Strength

Discussion

The results of these findings may be discussed in terms of the three research questions investigated in this study and the theoretical question from which they were derived.

Question 1: Do the quality and quantity of miscues made in the reading of vocalized Hebrew texts differ from those made in the reading of unvocalized Hebrew texts? If so, which text type is more conducive to promoting reading strategies that make efficient and effective use of the graphophonic, syntactic, and semantic cuing systems?

Significant differences between text types were found in the direction of vocalized text in the categories of correction, grammatical strength, and comprehension. Differences in miscues per words in text and graphophonic similarity were significant in the direction of unvocalized text. The unvocalized text elicited a greater number of miscues per words in text than did the vocalized text. This finding, however, does not necessarily imply rejection of unvocalized text in reading instruction. As has been noted previously, errorless oral performances are not necessarily indicative of effective reading.
Only one measure, graphophonic similarity, may be interpreted in favor of unvocalized text, and that result was primarily for the older group. A favorable interpretation would suggest that greater accuracy in identifying characters was promoted by the reduced graphic display. Exaggerated attention to the visual sample, however, might be an alternate, though less favorable, interpretation of these findings.

In this investigator's view, a more powerful index of effective reading strategy in this study was that of correction. A significantly higher percentage of correction attempts was found in reading with vowels despite the greater frequency of miscues made in reading without vowels. As noted earlier, the lack of vowels to guide pronunciation may have discouraged efforts to change unacceptable miscues or may have prevented successful correction. The quality of correction attempts, is, in turn, reflected in the scores on grammatical strength and comprehension patterns. The results in this study indicated that both grammatical strength and comprehension were facilitated by the inclusion of vowels in the text. Both of these patterns are compilation measures that include the correction index to evaluate the reader's success in correcting unacceptable miscues. The fact that other measures pertaining to the use of the syntactic and semantic cuing systems, such as syntactic acceptability, semantic acceptability, and no meaning change, were not significantly affected by the lack of vowels, seems to support the claim that facility in correcting vocalized text contributed strongly to the results on the compilation measures. The ability to correct unacceptable miscues, however, is essential to the promotion of effective reading strategies. This ability seemingly was lost in the reading of unvocalized text.
Question 2: What are the differences in the quality and quantity of miscues made by Hebrew language students at different levels of Hebrew language instruction?

Significant differences between year-of-study groups were found in the categories of real word substitutions, semantic acceptability, and no meaning change. All of these measures favored the second-year group and all are interpreted to be indications of the reader's attention to meaning. Older readers who receive religious instruction geared toward perfect and fluent oral reading may have put a smaller emphasis on reading for comprehension. Such a learning set is suggested as the explanation for the finding that the older readers paid less attention to meaning than did the younger readers.

Statistically significant differences between year-of-study groups had been expected in those areas that native-language reading research had shown to be related to reader age, maturity, or proficiency level. The literature has generally reported differences favoring the older, more proficient reader. In this study, however, such differences were not consistently observed. The lack of significant differences between grade levels in categories involving the syntactic cuing system was not expected. It was thought that the older group's greater knowledge of the language and its structure would enable more effective use of grammatical cues. The sample size used in the study (eight subjects in each group) may have been too small to allow significant differences to be detected.
Question 3: Is there an interaction effect between year-of-study and type of text read that affects the quality and quantity of miscues made? If so, what is the nature of these differences and what are the implications for reading programs in Hebrew language instruction?

Significant interaction effects were observed in the categories of graphophonic similarity and grammatical strength. A dramatic shift in strategy was noted in the performance of the older group, indicating greater use of graphophonic information while reading unvocalized Hebrew. In the category of grammatical strength, the younger group declined dramatically in performance when confronted with unvocalized Hebrew. In both instances, the differences suggested that the older group was better able to handle unvocalized Hebrew than was the younger group. Such findings imply that if unvocalized text is included in Hebrew language programs, it would be most appropriate at more advanced levels of instruction. Such interactions between text and level of study, however, were not repeated in other measures of reading strategy examined in this study and only cautious recommendations may be made.

Conclusions

This study attempted to provide information for resolution of the following theoretical question:

Must readers be provided with the full range of cuing systems (syntactic, semantic, and graphophonic) in order to make optimum use of efficient and effective reading strategies, or is it desirable to reduce the amount of graphic information in the text so that visual processing is done more rapidly and larger units of meaning may be stored in memory?
It is believed that statistically significant main effects for the text variable that favor unvocalized Hebrew orthography tend to support the desirability of reducing the amount of graphic information. In the same way, results showing optimal reading strategies associated with vocalized text would strengthen the claim that readers should be provided with full access to all cuing systems.

Analysis of the miscues made during oral reading in this study seems to indicate that artificial reduction of the graphic display does not promote more efficient or effective use of the various cuing systems. It was hoped that reduction of the visual sample would result in less dependence on the graphophonic cuing system. A significant interaction effect in the use of the graphophonic cuing system showed, however, that greater attention was given to the visual display by older readers when reading without vowels. In addition, there was no evidence of increased use of syntactic or semantic cuing systems in reading unvocalized text. Where differences between full and reduced graphic systems were significant, it was the vocalized text that drew upon these other systems.

Limitations of the Study

The reader is reminded of the following limitations of the study:

1. Hebrew program: The afternoon religious school program at Tifereth Israel Religious School consists of a one-year optional introductory class that meets twice a week for a total of eight hours; and five grade levels (Alef through Hay) that meet three times a week for a total of eleven hours. Hebrew language instruction is an integral part of the instructional program with at least 65% of class time spent
on language-related activities at all grade levels. Emphasis is placed on reading as a skill for participation in congregational services, for Bar and Bat Mitzvah in the upper grades, and, most importantly, as a means of comprehending Hebrew texts. Results may be generalized only to congregational afternoon schools with similar programs that emphasize reading comprehension.

2. Sample size: The sample size used, eight students in each year-of-study group, represents approximately one-third of the population under study. The relatively small number of subjects reflects the availability and suitability of students at these grade levels, though a larger n would have enabled a more powerful test for significance. The grade levels selected provided maximum contrast while ensuring sufficient linguistic background and suitability of subjects. A larger contrast, however, might have revealed developmental differences in reading strategies.

3. Texts: Text passages were not randomly selected and therefore, performance results may not be generalizable to other types of reading material.

4. Instruments: As in any study, the validity and reliability of the testing instruments in evaluating student performance are limiting factors. The results reported in this study are valid to the extent that the Reading Miscue Inventory provides linguistically accurate descriptions of miscues made in Hebrew.

5. Novelty of experience: The effects of a new reading experience in this first encounter with unvocalized Hebrew is viewed as a limiting factor. The children did not have practice in reading unvocalized Hebrew prior to the study. Therefore they did not have the opportunity to develop new and appropriate strategies for reading without vowels.
Recommendations for further research

The limitations of this study may have prevented statistical verification of differences between text types in the reading strategies employed. The suggestion is made that this study be replicated with a larger sample size and one that includes a wider range of proficiency levels. Regular classroom practice in reading unvocalized Hebrew prior to the taped readings is also recommended in order to minimize the effects of a novel experience and to allow development of appropriate changes in reading strategies.
APPENDIX A

Hebrew Texts Used
Hebrew Texts Used

SECOND YEAR

Milton Teichman

עבֵרִית א
שבֵת 58 - 60
יָוֵם רֶפֶנָה 61
בּכֵי-הַסְּפֹר 28-29
לֶרֶם תִּבְרֵי 43

B. Sheinson

שֵׁעיָל וָעְרַאלוּ ב
הָרוּר הָא 26

FOURTH YEAR

Aharon Rosen and Yosef Ben-Shefer
Tel Aviv, Israel: Achiasaf
Publishing House, LTD, 1973

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לְשׁוֹנָּה עַמְגָּה

Shlomo Kodesh
New York: Ktav Publishing House, 1965

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APPENDIX B

Vocalized Hebrew and Unvocalized Hebrew
APPENDIX C

Sample Worksheet

Code for Marking Miscues

Coding Sheet
Sample Worksheet

1. המשה Showing על_hand BALL המ personnes

2. שבת שלום' אומר אנא

3. שבת שלום' אומר Dudley

4. שבת שלום' אומרים מהר

5. שבת שלום' אומרים נברך

6. שבת שלום' אומרים יאמ

7. המשה Showing על_hand BALL המ personnes

8. על Hand BALL המennes יאמ של BALL

9. משה מברך על מת

10. המה אומר את נברך

11. עם א IDisposableי שה הקדיש

12. עם Hands מברך על מות

13. עם HANDS שה הקדיש

14. עם Hands על מת

Code for Marking Miscues

Miscue type and occurrence in sample:

1. Substitution: sentence 1
2. Insertion: sentence 10
3. Omission: sentences 4 and 7
4. Correction: sentence 12
5. Repetition: sentence 7
6. Syllable/syllable reading: sentence 9
7. Pronunciation: sentence 5
<table>
<thead>
<tr>
<th>LINE</th>
<th>TEXT</th>
<th>W</th>
<th>N</th>
<th>PHON</th>
<th>COR</th>
<th>GRAM Accept</th>
<th>Sem Accept</th>
<th>Meaning Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ha'asfer 7200</td>
<td></td>
<td></td>
<td>hakonset 7010</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>omer 1916</td>
<td></td>
<td></td>
<td>omeret 17116</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>sultan 1938</td>
<td></td>
<td></td>
<td>kasultan 7350</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>al 5810</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>hag'an 7211</td>
<td></td>
<td></td>
<td>hagayin 7213</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
APPENDIX D

Treatment-Group Means and Standard Deviations for Percentages of Miscues: Categories 1 through 9
<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Treatment Groups</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vocalized</td>
<td>Unvocalized</td>
<td>Vocalized</td>
<td>Unvocalized</td>
</tr>
<tr>
<td></td>
<td>Second Year</td>
<td>Fourth Year</td>
<td>Second Year</td>
<td>Fourth Year</td>
</tr>
<tr>
<td></td>
<td>n=8</td>
<td>n=8</td>
<td>n=8</td>
<td>n=8</td>
</tr>
<tr>
<td>Miscues per words in text</td>
<td>Mean</td>
<td>20.7</td>
<td>42.5</td>
<td>32.7</td>
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<tr>
<td></td>
<td>S.D.</td>
<td>9.8</td>
<td>17.5</td>
<td>10.9</td>
</tr>
<tr>
<td>Real word substitutions</td>
<td>Mean</td>
<td>46.0</td>
<td>48.5</td>
<td>29.5</td>
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<td></td>
<td>S.D.</td>
<td>14.0</td>
<td>13.8</td>
<td>9.3</td>
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<tr>
<td>Graphophonic similarity</td>
<td>Mean</td>
<td>72.0</td>
<td>79.0</td>
<td>84.0</td>
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<tr>
<td></td>
<td>S.D.</td>
<td>13.4</td>
<td>13.0</td>
<td>11.9</td>
</tr>
</tbody>
</table>
TABLE 22

TREATMENT GROUP MEANS AND STANDARD DEVIATIONS FOR PERCENTAGES OF MISCEUES IN CATEGORIES 4, 5, 6, AND 7: CORRECTION, SYNTACTIC ACCEPTABILITY, SEMANTIC ACCEPTABILITY, NO MEANING CHANGE

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Treatment Groups</th>
<th>Vocalized</th>
<th>Unvocalized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Second Year n=8</td>
<td>Fourth Year n=8</td>
<td>Second Year n=8</td>
</tr>
<tr>
<td>Correction</td>
<td>Mean</td>
<td>33.50</td>
<td>22.00</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>10.8</td>
<td>14.0</td>
</tr>
<tr>
<td>Syntactic</td>
<td>Mean</td>
<td>69.5</td>
<td>64.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>13.7</td>
<td>12.9</td>
</tr>
<tr>
<td>Semantic Acceptability</td>
<td>Mean</td>
<td>41.0</td>
<td>42.0</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>10.8</td>
<td>17.8</td>
</tr>
<tr>
<td>No Meaning Change</td>
<td>Mean</td>
<td>31.5</td>
<td>32.5</td>
</tr>
<tr>
<td></td>
<td>S.D.</td>
<td>10.4</td>
<td>13.1</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY


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