

A MULTIVARIATE ANALYSIS OF BEGINNING READERS
RECOGNITION OF TAUGHT WORDS IN
FIVE CONTEXTUAL SETTINGS:
A REPLICATION

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CHAPTER I

INTRODUCTION

Background of the Problem

The theoretical view of what cue or cues to use to teach beginning readers new words has been the basis of a great deal of controversy among authorities of reading (Goodman, 1965; Samuels, 1975; Smith, 1972). In 1976, Wood designed a study which focused on this controversy. She compared the effects of three different methods of teaching new words to beginning readers: presenting the word in isolation; presenting the word along with a picture; and presenting the word in sentence context. Wood employed a multivariate analysis of variance design which studied the transfer of learning words in isolation, with a picture, in sentence context and in a story context. Such a procedure was used to avoid any bias in favor of any one of the teaching methods as well as to provide insight into which method is most effective in a natural reading situation, a story.

As a result of her investigation Wood (1976) consequently made the recommendation that the study be replicated, but that a story be implemented to have high contextual constraints for the target words. The study was to include two stories as dependent variables, one was to be highly

contextual, the other was to be the same story used in the original study.

The purpose of Wood's (1976) study was to answer four specific questions:

1. Does picture and sentence context serve as distracting stimulus that diverts the reader's attention from the critical cue, the word to be learned, as suggested by Samuels' focal attention hypothesis?

Samuels maintains that although pictures and context can help cue a correct response to a printed word, they can also serve to distract the reader's attention. This distraction may prevent the reader from focusing on the critical cue, the word to be learned; furthermore, "he may not acquire appropriate responses to the graphic features of the word itself" (Singer, Samuels, & Spiroff, 1973-74, p. 558).

The results of Wood's (1976) study indicated that the use of picture and sentence context facilitated the initial acquisition of target words. The results revealed that the use of picture and sentence context did not interfere with learning the eight target words.

2. Is teaching words in a sentence context a more effective method, as it provides the beginning reader an opportunity to use the syntactic and semantic cues within the language to narrow the possibilities of what an unknown word may be, as suggested by Goodman's contextual hypothesis?

Goodman (1970) proposes that within sentences there are syntactic and semantic cues which children can use to help them anticipate unknown words. If words are presented out of this context, the child is not able to use all of his language competence in the reading task but is forced to rely only on the visual cues within the word itself.

The results of Wood's (1976) study indicated that subjects taught by the word in sentence context method required significantly fewer trials to learn the eight target words than subjects taught by the word in isolation and the word with picture methods.

3. Do subjects taught by one method of teaching word recognition perform differently on different kinds of tests or do they perform better on a test that is the same as the teaching task?

The contrasts among the three dependent variables that were the same as the three teaching methods significantly favored the group taught by the same method on the word in isolation and word in sentence context tests. No significance was shown for the word with picture test.

Wood's (1976) results indicate that the effectiveness of any of the three methods of instruction may be contingent upon the way the effectiveness is measured. The word in story context variable was the only dependent variable which did

not yield significant differences because of the method of instruction.

4. Does the effectiveness of different methods of teaching word recognition vary between sexes?

The results of Wood's (1976) study indicated no significant difference between girls and boys on the five dependent variables.

In Wood's (1976) study the use of picture and sentence context does not interfere with learning the eight target words. The results on the trials to criterion variable favored sentence context and clearly supported Goodman's contextual hypothesis.

Wood's investigation differed from previous research because the subjects in Wood's study were required to read connected text. The word in story context variable was included to determine how subjects taught by the three different methods would perform while reading connected text. In Wood's study a published basal reader story (Appendix A) was selected because it contained eight words that could be used as target words. As a result, the story context variable produced an interesting phenomenon. Whereas the context of the sentences used in Wood's study apparently provided highly contextual information which assisted the subjects in delimiting the range of possibilities in determining

the target words, examination of the basal story reveals that it lacks such contextual information.

Wood noted that a complete reading of the story (see Appendix A) reveals that five of the seven paragraphs begin with almost the same sentence. Five of the eight target words: bird, kite, balloon, rocket and airplane first appear in the same sentence.

"Little frog saw a _____."

Within this sentence, any one of the target words would be syntactically appropriate. The target word next appeared in one of the following sentences:

"That _____ can fly," said little frog.

"A _____ can go up," said little frog.

"This _____ can fly," said little frog.

From a syntactical point of view, inserting any one of the five target words would achieve syntactically acceptable sentences in these three sentences. Semantically, the story seems to supply even less information for the reader. Five of the eight target words possess the characteristic of being able to go up or to fly. Substitution of one of these five words would yield not only syntactically acceptable but also semantically acceptable sentences with the possible exception of

"He saw a big, big moon rocket."

Therefore, on the sentence level in this story subjects were provided with very little linguistic information on which to base decisions about words.

Statement of the Problem

The present study replicated Wood's (1976) study with the intent of answering Wood's original four questions.

1. Does picture and sentence context serve as distracting stimulus that diverts the reader's attention from the critical cue, the word to be learned, as suggested in Samuels' focal attention hypothesis?

2. Is teaching words in a sentence context a more effective method, as it provides the beginning reader an opportunity to use the syntactic and semantic cues within his language to narrow the possibilities of what an unknown word may be, as suggested by Goodman's contextual hypothesis?

3. Do subjects taught by one method of teaching word recognition perform differently on different kinds of tests or do they perform better on a test that is the same as the teaching task?

4. Does the effectiveness of different methods of teaching word recognition vary between sexes?

In addition the present study added a fifth question.

5. Do subjects identify more target words in a story which is contextually constrained than in the basal story used in the original study?

Null Hypotheses

The five questions were incorporated in the null hypotheses which this research was designed to test at the .05 level of confidence.

1. There is no difference between scores on the six dependent variables; trials to criterion, words in isolation, words matched with picture and pronounced, words in sentence context, words in a basal story context and words in a story containing contextual constraints for subjects taught by: words in isolation, words matched with pictures, and words in sentence context.

2. There is no difference between scores of girls and boys on the six dependent variables, taught by the above three methods.

3. There is no interaction between sex and method of instruction on the six dependent variables.

Significance of the Problem

Word Recognition

There has been much controversy among reading authorities (Samuels, 1975; Singer, Samuels & Spiroff, 1973-74; Goodman, 1965) concerning the use of pictures and sentence context in teaching word recognition.

Goodman's (1970) contextual hypothesis suggests that within sentences are syntactic and semantic cues which can

help children to anticipate unknown words. When words are presented in isolation, the reader is forced to rely only on the visual cues within the word itself. However, if the reader is presented the word in context, he can utilize his language competence to identify unknown words.

The effects of picture versus no-picture on the acquisition of words has been investigated by Christina (1973) in which the results revealed that illustrations do assist in sight vocabulary acquisition. Samuels' (1967) research results favored the no-picture condition especially with less capable students.

Samuels' focal attention hypothesis (Singer, et al., 1973-74) maintains that although pictures and context can help cue a correct response to a printed word, they can also serve to distract the reader's attention. This distraction may prevent the reader from focusing on the word to be learned and "he (the reader) may not acquire an appropriate response to the graphic features of the word itself" (Singer, et al., 1973-74, p. 558).

Research studies examining different methods of teaching new words provide unsubstantial information to resolve the controversy. Wood (1976) cites the existing studies (Braun, 1969; Samuels, 1967; Harris, 1967; Singer, et al., 1973-74) which have used as the dependent variable to

measure quantity of learning, a task (recognition of words in isolation), the same as one of the teaching conditions (teaching words in isolation), which has perhaps biased results in favor of that teaching condition. The above mentioned studies have not included, as a dependent variable, a reading task that would reveal how subjects, after being taught a number of words, would read these words in a natural reading situation.

Utilization of Context in Reading

The object of word identification strategies is that the subject will be able to recognize those same words in connected text. Also it has been demonstrated that context has a significant effect on word identification. There is evidence that young readers can recognize words in running text that they are unable to recognize when the words are presented on word lists (Goodman, 1965; Levitt, 1970).

One aspect of the reading context which has not been sufficiently investigated among beginning readers is the location of effective linguistic cues (Ramanauskas, 1972). They can be found within words (Hochberg, 1968), in co-occurrences of adjacent words, in the psychological reality of sentences and in paragraphs (Koen, Becker, & Young, 1969). A persistent problem in studies investigating utilization of context is the nature of the measuring instrument. Most

experiments that measure context utilization use the cloze procedure assuming that effective use of both semantic and syntactic constraints present in the material operates in the successful completion of cloze blanks (Brown, 1968). Fillenbaum, Jones, and Rapoport (1963) indicate that form class predictability may be more dependent on the close grammatical environment, whereas verbatim predictability (matching original words exactly) may be more dependent on both close and remote topic content or semantic features of discourse. According to Ryan and Semmel (1969), preceding and succeeding sentences can often provide the semantic and syntactic context in which to select a possible cloze completion.

Reading Materials

Hoskinsson (1974) indicates that during the process of beginning reading, children need reading materials that provide enough syntactic and semantic context for them to relate their experience and conceptual knowledge to the material being read. Hoskinsson (1975) further suggests that the syntax is so poor in preprimers that children reading the preprimers are reading lists of words presented horizontally rather than vertically.

A study of children's reading behavior provides useful guidelines for the development of instructional materials.

For instance, reading materials can be prepared which allow the child the maximum opportunity to develop efficient habits of forming and testing hypotheses. Easy reading materials often contain the shortest, most frequently used words with little regard given to controlling syntax and semantic associations within a sentence or passage (Ryan & Semmel, 1969).

Research by Ruddell (1965) suggests the reading materials that utilize basic high frequency patterns of children's oral language structure yield higher comprehension than passages using low-frequency and more elaborated construction. Ruddell interprets these findings to support the importance of contextual associations which provide sufficient delimiting information to enable the reader to determine the semantic role of the word and further to recognize and comprehend it in the sentence.

Pearson and Studt (1975) through their research indicate that contextual richness may be an asset rather than a liability even at the early stages of reading. Certain reading programs (e.g., Rasmussen & Goldberg, 1964) suggest that early emphasis on context confuses the beginning reader as to what the basic task is. Pearson and Studt (1975) assert that the paucity of context in early linguistic and basal readers does not allow subjects the opportunity to use their linguistic competence in recognizing words in text. Informal

testing situations carried out by Pearson and Studdt have shown that older readers who read at very low levels make fewer word recognition errors when reading more advanced first grade reading materials than when reading the simplest of materials (preprimers). Pearson and Studdt reveal through a surface analysis of the contexts used in their research that most often the poor, moderate, and rich contexts differ in terms of the associative strength of key words in the sentence contexts.

Beginning reading materials can be written, as suggested by Ryan and Semmel (1969), to include controlled syntactic patterns, highly associated words, and strong continuity among sentences. In other words, "easy" may be reinterpreted to mean maximally redundant. Many cues leading to correct interpretation of the text can be made available so that the child can easily make the proper guesses. Special materials can be designed which stress the importance of various specific cues in certain situations.

Most recently, in research on reading, the pendulum has swung from decoding to other aspects of reading--notably, comprehension. The emergence of such interests reflects the strong influence of cognitive psychology. Reading now seems to be tied to informational processing and other related concepts. More emphasis is being placed on context, in other

words, the search for cues when units larger than a single word are considered (Williams, 1970).

Goodman (1976) suggests that:

Research is needed on how reading works, how it is learned, how effective various programs for instruction are. The knowledge from such research must be integrated with other practical knowledge to produce more effective instruction and more universal learning. (p. 98)

Helen Robinson (1976) comments on the value of continuing research on the same topic. She states that "one-shot studies just scratch the surface. Indeed most of them open up more problems than they solve" (p. 13). She further denotes the importance of following one study after another on the same topic until some dependable answers are obtained.

Borg and Gall (1971) affirm the importance of replication. The principle of replication holds that if one's research findings represent a true phenomenon, these findings should be obtained in each repetition of the study. A replicated finding is strong evidence against the possibility that a Type I error (rejection of the null hypotheses when it is true) occurred in the original study.

The present study was designed to replicate Wood's (1976) investigation which focused on the effectiveness of three methods of teaching word recognition: words in isolation, words with pictures, and words in a sentence context with no pictures. The effectiveness of each method was

assessed by looking at the number of correct responses made by subjects when the target words were presented (1) in isolation, (2) to be matched with a picture, (3) in a sentence context, and (4) in a story context (Wood, 1976). In addition, the present study added a new story created by the investigator with the intent of providing contextual constraints that support the reader. Wood (1976) states that such a procedure was used to avoid any bias in favor of any one of the teaching methods as well as provide insight into which method is most effective in a natural reading situation, a story. The conclusion supporting "Samuels' focal attention hypothesis for acquiring reading responses for novel words" (Singer, et al., 1973-74, p. 566) was reexamined using a multivariate analysis of variance.

Definitions of Terms

The following terms were defined by Wood (1976) to be used throughout this investigation:

Target Words: The actual nouns selected from a story that were taught by each of the three methods and then read in the two stories.

Beginning Reader: First grade children were randomly selected for the study and pretested to assure that they could not recognize more than four of the target words.

Word in Isolation: Target words selected from a story that stood alone and were not accompanied by any cues that might have been used by the reader to identify that word, other than the letters that comprised the word.

Sentence Context: The surrounding syntactic, semantic and grapho-phonetic information that limits the choice of what a particular word can be when it is being read in a sentence.

Word with Picture: Target words selected from a story that were matched with a picture of each word and then pronounced.

For the purposes of the present investigation the following terms were defined:

Basal Story: The basal story entitled "Up to the Moon" by Mabel O'Donnell was selected from a Harper & Row preprimer entitled Fun for You (Appendix A).

Contextual Constraints: For the purpose of this study contextual constraints are defined operationally as the preceding and succeeding sentences that provide the semantic and syntactic context in which to select an unknown word.

Created Story: For the purposes of this study a new story was created by the investigator to have contextual constraints to support the reader in the reading process (Appendix B).

Procedure

For the purpose of replication, the investigator used Wood's (1976) procedure for selecting subjects, pretesting and teaching procedure. In terms of the testing procedure, an additional story with contextual constraints though not included as a part of the teaching procedure was added as a part of the testing procedure.

Subjects

Two hundred fifty first-grade children were selected at random from seven elementary schools in two school districts within the North Texas area that had been used by Wood (1976).

Pretesting

Before the study began, subjects were pretested on the eight target words. The pretest was constructed by typing in primary type each of the eight target words on a 5" x 8" index card. Each subject was exposed to the target words one at a time, with seven seconds allowed for an oral response. Subjects were then stratified on the basis of the pretest scores and randomly assigned to the three treatment conditions. Any subject who knew five or more of the target words at the time of pretesting was not included in the study.

Teaching Procedure

Word in Isolation. A study procedure was used to teach the target words. The word was typed in primary type on a 5" x 8" index card. Three sets of randomly ordered words were used. The card was presented to the subject who was asked to look at the word, to put his finger under the word and to tell the examiner what the word was. If the subject did not respond in seven seconds, he was told the word by the examiner. If the subject gave an incorrect response, he was given the correct word by the examiner. This procedure was continued, alternating the three sets of randomly ordered words, until the subject pronounced all the target words correctly on two successive trials or through a maximum of twelve trials.

Word-Picture. The teaching procedure for the word-picture condition involved having the subject match the picture of the word with the correct word. Each of the eight pictures were glued on a 5" x 8" card. Three sets of randomly ordered picture cards were used along with a set of eight 5" x 8" index cards on which each of the target words had been typed in primary type. A picture card was placed in front of the subject, and the eight word cards were spread out before the subject. The subject was asked to look at the picture, to say what the picture was, and to find the word that matched the picture. If the correct word was matched,

the subject was asked to pronounce the word. When an incorrect word was matched, the examiner placed the correct word beside the picture and said, "no, this word is (the name of the picture)." The subject was then asked to pronounce the correct word. If the subject did not respond in seven seconds he was told the word by the examiner. That word card was then placed among the other eight cards. This procedure insured that the subject was choosing from eight words throughout the teaching procedure.

Sentence Context. The sentence and target word were typed in primary type on a 5" x 8" card with the target word underlined. The sentence (excluding the target word) was read to the subject. The subject was then asked to look at the word that was underlined and to tell the examiner the word. If no response came after seven seconds the subject was told the target word, and the sentence was read using the target word. This procedure was continued until the subject pronounced all target words correctly on two successive trials or through a maximum of twelve trials.

The number of trials required to learn all the target words was recorded during the teaching procedure. After each subject had pronounced all the target words correctly through two successive trials or a maximum of twelve trials, he was given five different tests; target words presented in isolation, target words matched with pictures, target words

presented in a sentence context, target words presented in a basal story and in a new story containing additional contextual constraints.

Testing Procedure

Word in Isolation. Subjects were shown the eight target words one at a time and asked to pronounce each word. Seven seconds were allowed for the oral response. No feedback was given the subject during the testing procedure.

Word-Picture. Subjects were shown each of the eight pictures and asked to find the word that matched each picture and to pronounce the word. Seven seconds were allowed for the subject to match the correct word with the picture before the next picture was shown. All eight word cards remained on the table before the subject throughout the test. No feedback was given to the subject during the testing procedure.

Word in Sentence Context. Subjects were shown each of the eight sentences with the target word underlined in each. They were asked to read the sentence and were told that help would be given on any of the words except the word that was underlined. Seven seconds were allowed for the subject to make a response to the target word before the next sentence was shown.

Words in a Basal Story. Each subject was asked to read a story selected from a Harper & Row preprimer reader entitled "Up to the Moon" by Mabel O'Donnell (Appendix A).

The target words were underlined and subjects were told that help would be given on any word except those underlined. Seven seconds were allowed for the subject to make a response to the target word. The examiner had a copy of the story on which to record any response that deviated from the expected response.

Words in a New Story. Each student was asked to read the new story containing the underlined target words (Appendix B). Subjects were told that help would be given on any word except those underlined. Seven seconds were allowed for the subject to make a response to the target word. The examiner had a copy of the story on which to record any response that deviated from the expected response.

The new story was created to have specific contextual constraints which would support the reader in the reading process. The new story was contextually constrained in the following ways.

1. High associative words were utilized to cue the reader in identifying the target word. Ruddell's (1968) findings indicate that "contextual associations provide delimiting information to enable the reader to determine the semantic role of the word, and further to recognize and comprehend it in the sentence" (p. 69).

2. Contextual information preceded the onset of the target word when it first appeared in the story. Goodman

(1972) says of the length of a passage: "redundancy and sequential constraint build up as the reader progresses in a passage; short passages are harder to read than longer ones" (p. 153).

3. The story was constructed so that only the underlined target word would fit--the remaining seven target words would not be semantically appropriate. Goodman (1972) states that the readability of a passage has to do with the axiom of predictability: "a given sequence will be easy to read to the extent that what the reader is most likely to predict actually occurs" (p. 153).

4. The story was approximately the same length as the basal story. In addition, each target word appeared at least twice.

The entire teaching, testing procedure was tape recorded. An independent person was able to check the tapes to assure that all procedures were followed as stated.

Analysis of Data

A multivariate analysis of variance was computed on the six dependent variables; number of trials to learn the target words, number of words identified when target words were presented in isolation, number of words correctly matched with picture, number of words identified when target words were presented in a sentence context, and number of

words identified when target words were presented in two stories. If this analysis yields rejection of the null hypotheses, univariate analyses of variance will be conducted to determine which factors contributed to the overall rejection. In addition, certain comparisons were planned, comparing the group receiving a certain treatment with the average of the other two groups.

Limitations of the Study

This investigation was conducted and the results interpreted within the following limitations:

1. The learning environment was not a typical classroom setting because the teaching and testing activities were conducted on an individual basis.

2. The length of time for instruction was brief as compared to the on-going instruction typical of learning to read.

3. The words that were taught were limited to words that could function as nouns in the English language so they could be presented pictorially.

Assumptions of the Study

The following investigation was based on the five following assumptions as stated by Wood (1976). The present investigator added a sixth assumption.

1. Random sampling procedures provide a representative sample of beginning readers.

2. Previous studies which have tested for amount of learning by using only one of the teaching conditions biased the results in favor of that condition.

3. The words to be taught were a representative sample of the words beginning readers are expected to learn to recognize.

4. The sentences used to provide context for the learning condition, words in sentence context, were typical sentences to which beginning readers are exposed.

5. The basal story used to test the number of target words recognized in a story context provided a natural reading situation.

6. The new story devised by the investigator utilized contextual constraints which would give support to the reader for recognizing target words.

CHAPTER II

REVIEW OF RELATED RESEARCH

This study was designed to investigate beginning readers' recognition of taught words in five different contextual settings. The three teaching methods employed were: words in isolation, matching word with pictures, and words in sentence context. The five contextual settings used to measure learning effectiveness were pronouncing the words when presented in isolation, matching the words with a picture, reading sentences containing the words, and reading two stories from which the words had been excerpted.

The following review focused on three types of research: (1) research that has investigated methods of instruction using words in isolation, pictures, and sentence context in teaching word recognition to beginning readers; (2) research that has investigated context utilization; and (3) context as an aid to word identification.

Methods of Instruction

Pictures and Words

The pros and cons of using pictures as an aid in teaching words to beginning readers has long been a debated issue. The following summary of selected research published

since 1965 indicates the supportive use of pictures as an aid in teaching words.

King and Muehl (1965) studied the effect of five different methods of teaching two kinds of word lists to pre-school children. One list contained dissimilar words, the other list contained similar words. The five methods of instruction were: picture, auditory, picture clues, auditory and echoic response, and picture and auditory and echoic response. Results of the investigation revealed that the picture and echoic methods were superior with similar words. With dissimilar words, however, the cue or combination of cues seemed to make little difference with the auditory method tending to be the most effective.

Luyben and Brown (1973) used computerized instruction involving a matching task to study the effects of pictures on learning a sight vocabulary by 27 EMR children. Higher gains were significant between pre- and posttesting favoring the group matching pictures with words rather than the word-word matching group.

Samuels (1967) offers contrasting research to indicate that pictures can distract and interfere with the word learning task. Pre-first-grade children were taught four words. Three different methods were used: no picture, simple-picture, and complex picture. Alternating the acquisition trials and the test trials two dependent measures

were assessed: number of correct responses during the acquisition trials and number of correct responses during the test trials. The test trials involved the recognition of words in isolation. Two separate analyses were computed; one for acquisition trials and one for test trials. The acquisition results favored the simple-picture group whereas the test results significantly favored the no-picture group. Recently this study has been replicated by Montare, Elman, and Cohen (1977) in which they concluded that Samuels' (1967) study was not a test of whether pictures act as distractors due to the extraneous variables that may have had distracting effects upon reading responses to specific words. Their conclusions reflect that there are not significant differences in acquisition of reading responses to printed words between groups that have learned with pictures present and those that have learned in the absence of pictures.

Braun (1969) found similar results to Samuels' (1967) research that indicates that pictures appear to be more distracting. He examined word recognition learning under two conditions: auditory (presenting the word, and having the subject respond with the same word, i.e., an echoic response) and auditory visual (same as auditory except that a picture accompanied the word). Braun's sample consisted of 240 white middle-class kindergarten children. The independent variables were ability level, sex and interest loading. The dependent

variables used were number of words learned, acquisition scores, and the retention measure. The results in regard to the use of pictures seemed to indicate that pictures were more distracting for low ability groups and boys than for high ability groups and girls.

Pictures, Words and Context

The following investigators have noted the effect of context on word recognition.

Wood (1976) designed a study that compared the effects of using words in isolation, words with pictures, and words in sentence context in teaching new words to beginning readers. Learning was assessed on five dependent variables; trials to criterion, a word in isolation test, a word with picture test, a word in sentence context test, and a word in story test.

The results of the study indicated that teaching words in isolation is the most effective method of instruction only when learning was measured using words in isolation. When learning was measured on other dependent variables, results revealed that the use of pictures and sentence context did not distract the reader's attention from the word to be learned as the research of Singer, Samuels, and Spiroff (1973-74) has suggested. Wood's study also denoted that sentence context was the most facilitative teaching method

when compared to teaching words in isolation or with picture.

Although Vorhaus's (1976) research was not concerned with the teaching methodology of word recognition she analyzed the miscue responses of first-grade pupils. Miscue responses to 20 target words were compared and analyzed for four different reading tasks: (1) in isolation, (2) in free-standing sentences, (3) embedded in a complete story, and (4) embedded in an illustrated story. Analysis using the Reading Miscue Inventory indicated a significant gain in correct responses to the target words embedded in a meaningful context as opposed to recognizing the words in isolation.

Contrasting results have been reported by Singer, Samuels, and Spiroff (1973-74) pertaining to the effect of pictures and context on learning responses to printed words. The effect of presenting four printed words in four different ways (in isolation, in association with a picture, embedded in a sentence, or in a combination of a sentence plus a picture) on the acquisition of reading responses of first and second graders was studied. Comparing both on trials to a criterion and on correct responses on test trials (test trials consisted only of words presented in isolation) the subjects scored best on words in isolation with word plus sentence and picture receiving the least score.

The literature indicates that contradictory evidence exists in regard to the use of words in isolation, pictures, and sentence context methods in teaching word recognition to beginning readers.

Context Utilization

Context utilization will be discussed in terms of its applicability to the following four areas.

Using the Cloze Procedure

One of the procedures employed to demonstrate that children are able to utilize context to reduce the amount of visual information needed for word identification is the cloze technique. The cloze technique, introduced by Taylor (1953), consists of presenting single sentences or passages from which words have been systematically deleted and replaced by blanks (for example, every fifth word). Subjects are to fill in all blanks by guessing from the context of remaining words what the missing word should be.

Pearson and Studt (1975) presented a modified cloze task to 36 first-grade and 36 third-grade subjects. The subjects were asked to guess a word that would fit into a blank space in sentences which varied in contextual richness.

Three levels of sentence context were developed for each pair of target words. The following criteria were used to design levels of context.

1. Rich context was highly definitive and specific.

Example: In music class we chose to sing a happy _____.

2. Moderate context level was definitive.

Example: The choir got to choose its own _____.

3. Poor context level was non-definitive, i.e., many words would fit the context. Example: In school today we voted for our favorite _____.
(p. 90)

The first time a subject failed to produce the correct word, the first letter of the missing word was written into the blank. After that, each incorrect response resulted in the addition of another letter. The independent variables were grade level, contextual richness, and frequency of the deleted words. The dependent variable was the proportion of letters required for identification of the target words. A balanced repeated measures design was employed in the study. Grade level, word frequency, and contextual richness were all found to affect the cloze performance with context being significant at the .01 level.

Contextual richness proved to be more facilitating to word identification when the deleted words were of high frequency than when they were of low frequency. High and low frequency words were defined according to the Thorndike-Lorge (1944) count. The performance of third-grade children was helped more than that of first-grade children by being presented high frequency words. The researchers noted that when a word is clearly within the child's oral language repertoire, he or she is able to use contextual constraints with a minimal amount of visual information about the word

in order to achieve identification. However, when the word is less familiar to the child, nearly the entire word is required to achieve identification, even in the richest level of context.

For the purposes of their study, the researchers used the validation technique on adult subjects to establish the levels of poor, moderate and rich contexts. An observation can be made in terms of how context can vary from poor, moderate, and rich context. A surface analysis of the differences among the three levels of contexts across items reveals that most often the poor, moderate and rich contexts differ in terms of the associative strength of key words in the sentence context. Associative key words are higher in richer context although associative key words were not defined by the authors.

In terms of subsequent research, the researchers noted that it would be helpful to examine in more detail the notion of contextual richness. The researchers had hoped to use well formed syntactic and semantic rules to generate the levels of context, but initial attempts to do so did not generate well defined levels of context.

Given adequate syntactic and semantic rules for determining contextual constraints, one could sort out the relative influence of each of these components of linguistic context on word identification. At present, the specific contributions of the components of context remain unresolved;

however, the contribution of the present study is that it strengthens the parameters regarding the relationships between contextual richness, word frequency, and word identification. (Pearson & Studt, 1975, pp. 94-95)

Ramanauskas (1972) assessed context utilization beyond the sentence level. She used the cloze procedure to investigate the effect of rearranging the natural order of the sentences in a paragraph on the cloze responses of 58 junior high school EMR students. Only white EMR children scoring at or above the 2.5 reading grade level on the Wide Range Achievement Test were included in the study. Cloze passages presented to all children were taken from a reading text at the second-grade level. Only exact responses were scored as correct. Ramanauskas found that larger numbers of exact responses were produced for passages in which the sentences were in their natural order (as it would appear in the regular text) rather than for passages in which the sentences were randomly ordered. She concluded that the subjects were not relying exclusively on cues in the immediate vicinity of the blanks, or even within the same sentence, but that subjects availed themselves of semantic and syntactic cues beyond the sentence level. Although Ramanauskas' study did not include nonretarded controls, it is of particular interest because of the way in which it demonstrated the use of context beyond the sentence level.

In the two studies cited, the use of context, as assessed by the cloze procedure, indicates that there are linguistic constraints operating both between and within sentences in written language that enable a reader to supply a missing word by the use of surrounding contextual clues (MacGinitie, 1961; Ramanauskas, 1972).

Used with the Procedure of
In-Context/Out-of-Context Technique

Goodman (1965) used an in-context/out-of-context technique to compare the accuracy with which words are identified in context and in isolation (on a word list). Goodman's procedure involved equating subjects (first through third grade) with respect to the number of errors on a word list presentation. Lists of words at different levels taken from the Betts Reading Series were presented to each child until the child made the predetermined number of errors. Next, each child was asked to read orally the story on which his particular word list had been based. Goodman found that at each level, children were able to read many words in context which they had previously been unable to identify in isolation. However, since Goodman did not control for order, all subjects received the word list first and the text second. The context error scores may have been affected by a practice effect.

Levitt (1970) used Goodman's procedure but modified it by alternating the two tasks with successive subjects. She used non-retarded first-graders and EMR children, to compare the number of target words which were correctly identified in- and out-of-context. Subjects were required to have reading levels between 1.5 and 2.2, as determined by the Wide Range Achievement Test. The effects of type of presentation (word list or story), population (EMR vs. non-retarded) and order of presentation of the two tasks (word list or story) were measured. The only significant difference appeared in error scores between word list and story presentations, with subjects making fewer errors on target words in context as opposed to words presented in isolation.

The following two studies investigated context effectiveness with prereading and reading subjects.

Chester (1972) investigated the learnability of content and function words as cited in Coleman's rank ordering of words as to ease of look-and-say learning taught in treatments of oral context (sentence) and isolation to groups of prereading first-graders in high and low socioeconomic levels. One hundred twelve subjects were tested through a paired associate task (in- or out-of-context, according to treatment) and the data were analyzed in a 2x2x2 analysis of covariance. Of the main effects--word class,

treatment, and socio-economic level were significant. Results indicate that socio-economic level and context may be important factors in initial learning.

Klein, Klein, and Bertino (1974) investigated the use of context with subjects from the fourth- and sixth-grade populations. A word boundary task was used that required subjects to make word-identification decisions both with and without contextual information. A 60 word coherent passage was used for the in-context situation. For the out-of-context passage 60 words were randomly arranged. Results indicated that context was utilized effectively by the sixth-grade students, while fourth-grade students showed small context-use effects.

These four studies indicate that when words are presented in isolation, the reader can only rely on the graphic stimuli to identify the words. But when words are presented in context, readers have the syntactic and semantic constraints available to identify unknown words. Rather than a distractive occurrence context appears to be a facilitative phenomenon.

Analysis of Oral Reading Errors

The procedure of analyzing context utilization through the analysis of oral reading errors involves the analysis of children's word substitutions scored as acceptable

or unacceptable with respect to the context. The proportion of miscues which "fit" the context is regarded as indicative of the effectiveness with which the child utilizes contextual cues (Streib, 1976-77).

An investigation by Weber (1970) conducted with first graders compared the oral reading of high and low ability groups (as identified by the classroom teacher) with respect to the acceptability of their word substitution errors. She found a high percentage of miscues (67.8 per cent) of the 693 errors which fit the preceding context for both good and poor readers. Weber (1970) inferred that there could be little doubt that both strong and weak readers used the constraints of the preceding context to reduce the range of responses.

Biemiller (1970) used the analysis of errors procedure to investigate trends in context utilization from the beginning to end of the first-grade year. He analyzed oral reading errors of 42 first-graders through eight months of instruction in terms of their contextual constraints, i.e., whether or not they made sense with the preceding context and graphic constraints, i.e., how closely they resembled the printed word. Biemiller found that the children in two first-grade classes passed through the three following stages: (1) a reliance on contextual cues, with graphemic cues taking a secondary role; (2) an increase in "no

response" errors, with graphemic and contextual cues secondary; and (3) a drop in "no response" errors, with graphemic and contextual cues predominating.

Biemiller views this study as having two major educational implications. First, it suggests that encouraging early readers to use contextual and picture cues may be ill-advised. Teachers are advised to have children read in situations providing no context at all in order to compel children to use graphic information. As children show evidence of accurate reading out-of-context, then contextual material should be presented.

The second educational implication is the use of oral reading errors as a diagnostic tool. Teachers should be aware of over use of contextual information and implement teaching strategies aimed at increasing the child's use of graphic information.

However, from the evidence presented in the study, it appears that at the beginning level of reading, children bring to the reading situation their ability to use contextual cues to delimit their choices for identifying unknown words.

The Effects of Reading Instruction on Context Utilization

Barr (1974-75) and Cohen (1974-75) were interested in the possible effects of reading instruction method on the

development of context utilization, Cohen (1974-75) noted that children in both Weber's and Biemiller's studies had been instructed by a basal reader approach in which a whole word approach was used in instruction.

Cohen traced the development of context utilization in two classes of first graders who were being instructed by a phonetic approach. The subjects were ranked according to the number of correct words achieved each month on two presentations of contextual material. Those subjects whose monthly number of correct words for both presentations consistently fell within the first quartile were designated "good readers." The last quartile represented the "poor readers."

The first graders did not demonstrate the initial over-reliance on context which had been reported by Biemiller. Instead, the most common type of error at the beginning of first grade was no response. Good readers soon began to make a large proportion of nonsense responses demonstrating that they were scanning words and trying to sound them out. As the year progressed, good readers made a higher percentage of word substitution errors which were congruent with the preceding context.

Barr (1974-75) conducted an exploratory study to determine whether children's strategies for remembering words and identifying new words could be identified prior to

instruction in the first grade, and if so, what effect the method of instruction had on this strategy development. Word learning tasks were administered to 32 first-grade children during the first two weeks of September to assess word recognition skill. The Wide Range Achievement Test was administered in December and May and the Gates-MacGinitie Reading Tests, comprehension sections, were administered in May. Half the subjects were instructed throughout the year in a phonics method while the other half received a sight word method of instruction. The results of the study revealed that regardless of the strategy being used prior to reading instruction, most subjects adopted the method in accord with class instructional emphasis by the end of first grade suggests the power of methods and/or material which influences the individual learning strategy.

Dank (1976) analyzed the oral reading errors made by 20 second-grade pupils during their second year of formal reading instruction. Children were instructed by either Ginn's Reading 360 or McGraw Hill's Programmed Reading. Following the oral reading of the story "King Alfred and the Cakes," and the retelling, oral reading deviations were examined using the Reading Miscue Inventory. Error trends reflected the instructional approach that subjects had received. Subjects taught by the instructional approach which emphasized letter sound correspondences produced more

nonwords, fewer omissions and also produced oral reading errors with high graphic and sound similarity. Subjects taught by integrated reading-language approach generated more semantically acceptable oral reading errors and understood more of what they had read.

Guszek (1972) noted that one reason some children fail to use context in reading is that they focus too much attention on the analysis of individual words and are thus unable to attend to the meaning of the passage. Goodman (1968) cautioned against overemphasis on phonics in reading instruction because he felt that children taught in this manner might come to view word analysis as an end in itself rather than a tool to assist the reader in obtaining meaning from the text.

Basically the search of the literature demonstrated:

- (1) that eventhough children utilize context on cloze tasks, it may not be safe to assume that when the word is actually present in the visual array, the reader will utilize the same cues as he does when he is forced to guess from context;
- (2) children are able to identify more words in context rather than when the same words are presented on word lists;
- (3) through the analysis of reading errors it is indicated that beginning readers are able to make considerable use of context in word identification; and (4) that the approach

used in initial reading instruction has some effect on the development of context utilization--at least during the first-grade year.

Context as an Aid to Word Identification

Context and its Facilitative Effect on Word Identification

Since the effective use of reading context facilitates word identification (Goodman, 1965) it is important to look at some of the properties of context that assist word identification. Redundancy, vertical and horizontal constraints, and irrelevant vs. relevant context will be discussed in the following section.

Redundancy

Redundant sources of information are of two types: syntactic and semantic (Goodman, 1968; Smith, 1971). Words in the context impose constraints upon each other. For example, in the sentence, "The _____ dog ran up to the guest," the words the and dog place definite limitations on the unknown word. Syntactic clues indicate that the target word is of the adjective form class. Semantic information rules out a great many adjectives which could not apply to a dog, for example, delicious, triangular and frequent (Streib, 1976-77).

Redundancy exists "whenever information is duplicated by more than one source . . . or whenever the same alternatives can be eliminated in more than one way" (Smith, 1971, p. 19). Redundancy is available both within individual words and in the context in which the words are embedded.

Smith (1971) feels that comprehension occurs when the reader is able to eliminate some or all of the alternate meanings that a visual configuration might convey. He suggests that the fluent reader is able to identify meaning directly from the visual features by using semantic and syntactic redundancy. Redundancy facilitates comprehension by making far less visual information necessary. Smith indicates that beginning readers must first identify words and then meaning. He sees the fluent reader as using information simultaneously at both the surface and deep structure levels of language, but the beginning reader must deduce meaning from surface structure. The novice is forced, he suggests, to analyze all of the constituents of the surface structure to apply his syntactic knowledge and identify meaning.

Horizontal and Vertical Constraints

Horizontal and vertical constraints appear to be contextual constraints that delimit the choices the reader has available to supply unknown words. Weaver, Kingston, and Dinnan (1970-71) have noted in their study that horizontal

constraints such as word class of a word deleted from a passage and vertical constraints, which operate over the distribution for words that can occur at a particular word class deletion, affect the word a reader will supply from his repertoire. For example, the word class of the deleted word within the sentence, and the amount of context preceding and following the deletion appear to function as constraints which partially act to affect the word a reader supplies from his repertoire. Weaver, et al. refer to these constraints as horizontal constraints.

Aborn, Rubenstein, and Sterling (1959) investigated length, distribution, and structure of context. Their results indicate that preceding and succeeding constraints for context are distributed on each side of the target word and are more facilitative for word identification than the contextual constraints that totally precede or follow the target word. Increasing the length of sentence context beyond 10 words did not increase contextual constraints.

Irrelevant vs. Relevant Context

Two experiments performed by Morton (1964) and Tulving and Gold (1963) document the effects of meaningful context on word perception. An examination of the Tulving and Gold study demonstrates that contextual redundancy is capable of reducing the amount of visual information

required by the adult reader in order for words to be identified. The contextual information was given prior to a tachistoscopic task. As examples, consider the target words COLLISION AND RASPBERRY. Relevant context for COLLISION would be IN A TERRIBLE HIGHWAY (4 word context) or THREE PEOPLE WERE KILLED IN A TERRIBLE HIGHWAY (8 word context). These same two contexts would be considered irrelevant for the target word RASPBERRY. Streib (1976-77) made the observation that when the context was relevant, increasing the number of words in the context resulted in lower recognition thresholds for target words. However, when the context was irrelevant, increasing its length resulted in higher recognition thresholds.

In terms of relevancy of context Morton (1969) presents a logogen model which predicts that context will facilitate to varying degrees the recognition of all words semantically related to it. In his model there is a logogen for each word. A logogen is a device that accepts both sensory and contextual information relevant to the word. In reading, sensory information is in the form of visual attributes. The logogen registers the number of relevant attributes that occur, regardless of the source, on some sort of internal counter. When the counter passes a threshold value, the word represented by the logogen becomes available, i.e., has been recognized.

Kleiman (1977) has interpreted the logogen model. He surmises that context facilitation occurs for a given word when the context provides some relevant semantic features since this would increment the counter and therefore less sensory information would be needed for recognition. The amount of facilitation depends on the number of semantic attributes the word shares with the context. In the logogen model, the counters of all words sharing semantic features with the context would be incremented, thereby facilitating recognition.

One of the interesting features of this model, according to Smith and Spoehr (1974), is the fact that it can predict the effect of context. When a target word is presented alone, the visual features available may not be sufficient to raise the logogen's counter above threshold, but if the same target word has been preceded by relevant context, then the syntactic and semantic features derived from the context contribute to the target word's logogen count.

The literature indicates that the position of the word in the sentence, the grammatical class of a word, preceding and succeeding context, the relevancy of context in terms of the target word, and the redundant sources of information (syntactic and semantic sources) appear to

operate as contextual constraints upon the use of context in reading behavior.

Contextual Constraints

For the purpose of this section contextual constraints are defined as the preceding and succeeding words and sentences that provide the semantic and syntactic context in which to select an unknown word.

Ruddell (1968) suggests that contextual constraints serve to narrow the possible range of appropriate words. He refers to structure words as playing an important role in narrowing possible semantic alternatives in the sequences of a sentence context. For example, the word the not only cues a noun which follows but may also clarify or emphasize the semantic nature of the noun (e.g., The dog was in our yard versus Some dog was in our yard.).

Ryan and Semmel (1969) incorporate the use of contextual constraints in their view of reading as an active process by which the reader uses the syntactic and semantic expectancies within context which lead the reader to form hypotheses which can be confirmed or not confirmed with only a small portion of the cues available in the text. The authors use the illustration of an incomplete text to show how various cues can be utilized to interpret this passage.

It was a w_rm day. A boy and a _____ play_d
 b_ll on th_gr_ss. Birds sang sweet _____.
 _____ swam in the pond. Men sit_ing on
 b_nches read newspapers. (p. 80)

First of all, preceding and succeeding sentences can often provide the semantic and syntactic context in which to select a possible interpretation of a sentence. For example, the pronunciation of "read" in the last sentence (as to whether to use the past or present tense) can be determined by the rest of the passage. Secondly, semantic associations can be activated. The missing word in the second sentence can probably be predicted as girl since this word is so frequently experienced in context: "A boy and a girl."

Thirdly, semantic and syntactic information can interact. For instance in the third sentence, _____ swam in the pond. The filler of that blank must be a noun which does not require an article and which can act as the subject of the verb, swim. Furthermore, this noun denotes an animal which is likely to be found swimming in a pond in the park. Possible guesses included tadpoles, goldfish, ducks, and swans. More information is needed before an alternative can be selected. If the succeeding sentence happened to be "They were difficult to see because they were so deep under water," ducks and swans could be eliminated from the possible pond swimmers. Furthermore, if the word began with the letter 'f', the correct filler would most probably be fish (Ryan and Semmel, 1969, pp. 80-81).

The above information is useful when thinking about the readability of a passage. Goodman (1972) says that the readability of a passage has two important principles:

- (a) the axiom of predictability: a given sequence will be easy to read to the extent that what the reader is most likely to predict actually occurs; uncommon, unusual, or unlikely sequences will be harder to read than common, usual or likely ones;
 - (b) length of passage: since redundancy and sequential constraint build up as the reader progresses in a passage short passages are harder to read than long ones, other things being equal.
- (p. 153)

According to Goodman the first paragraph of a story will be relatively harder to read than the first page of a story.

The literature on contextual constraints can be summarized by Hoskinson (1975) in which he describes reading as the process in which the reader uses whole words and phrases, syntactic and semantic relationships and contextual constraints, the knowledge he has from his experience, and the structured sequence of the text to determine meaning. A reader recreates the meaning intended by the author in terms of his own perceptions and cognitions.

Children's Awareness of Semantic Constraints

There have recently been a number of studies which provide demonstrations of semantic effects on word recognition. Rumelhart (1976) cites a recent series of experiments (Meyer & Schvanveldt, 1971; Meyer, Schvanveldt & Ruddy, 1972;

Ruddy, Meyer & Schvaneveldt, 1973; Schvaneveldt & Meyer, 1973; Meyer, Schvaneveldt & Ruddy, 1974) which have reported convincing evidence of semantic effects on word recognition.

Schvaneveldt, Ackerman, and Semlear (1977) employed a lexical-decision task to determine how much beginning readers benefit from semantic context in word recognition. In the lexical-decision task, subjects judge whether various strings of letters are word or nonwords. By encouraging quick and accurate responses indicating such decisions, the effect of semantic context is assessed from the speed and accuracy of responses to a word when it follows a related or an unrelated word. For example, a word like "nurse" is classified faster following a related word like "doctor" than following an unrelated word like "lamp." In this study, second and fourth-grade children made decisions about words in semantically related or unrelated contexts. By presenting common words and their associates, children's knowledge of the contextual information was assured, and a more accurate assessment of their use of context could be made. The investigators found that younger and poorer readers benefit at least as much from semantic context in word recognition as do older and better readers.

Studies of semantic development have dealt mainly with the child's knowledge of words in isolation rather than

words within the context of a sentence. But semantic knowledge consists not only of the properties or features of a lexical item, but also knowledge of the semantic restrictions of the combination of lexical items in a sentence.

James and Miller (1973) however, attempted to investigate the child's developing awareness of the semantic constraints or selection restriction rules that are an integral part of the semantic component. They had two groups of children four to five years and six to seven years of age in this study. The children were asked to identify anomalous and meaningful sentences as either "silly" or "okay." Information about the subjects use of selection restriction rules was acquired by having them convert the anomalous sentences into meaningful ones. Analysis of the subject's responses on the two tasks indicated that both five- and seven-year-old children are capable of distinguishing between anomalous and meaningful sentences although seven-year-olds demonstrate greater awareness of selection restriction rules. Seven-year-old children are more proficient than five-year-olds at using selection restriction rules in sentence production.

Several investigations appear to indicate that children's perception of words depends on the semantic environment in which the words are encountered.

Summary of Review of Related Research

This chapter has presented a review of research dealing with: (1) methods of instruction in teaching word recognition to beginning readers; (2) context utilization as a means to word identification; and (3) context as an aid to word identification.

The following statements summarize the major points of the review:

1. Contradictory evidence was found regarding the use of words in isolation, pictures, and sentence context methods in teaching word recognition.

2. Findings from studies employing the cloze procedure suggested that subjects can use contextual cues to predict missing words accurately, when the context is sufficiently constrained.

3. Children were able to make considerable use of context in word identification.

4. Oral reading miscues gave some indication of the syntactic and semantic strategies used by readers in word identification.

5. Instructional strategies appeared to have some affect on the development of context utilization.

6. Properties of context can serve to influence the decisions readers must make in order to narrow the possible range of appropriate words.

CHAPTER III

DESIGN AND PROCEDURE

The present study replicated Wood's (1976) study which was designed to investigate the comparative effects of three methods of teaching word recognition to beginning readers on these readers' recognition of the same words in four contextual settings. The three teaching methods used were: presenting the word in isolation, matching the word with a picture of the word, and presenting the word in sentence context. This study used five contextual settings to measure learning effectiveness: pronouncing the words when presented in isolation; matching the words with pictures, then pronouncing the word; reading sentences containing the words; reading a basal story and a story designed to have contextual constraints from which the words had been excerpted.

Contradictory evidence from reading research and divergent descriptions of the reading process as postulated by Samuels' focal attention hypothesis and in Goodman's psycholinguistic contextual hypothesis stimulated the following questions:

1. Does picture and sentence context serve as distracting stimulus that diverts the reader's attention from

the critical cue, the word to be learned, as suggested by Samuels' focal attention hypothesis?

2. Is teaching words in a sentence context a more effective method as it provides the beginning reader an opportunity to use the syntactic and semantic cues within the language to narrow the possibilities of what an unknown word may be as suggested by Goodman's contextual hypothesis?

3. Do subjects taught by one method of teaching word recognition perform differently on different kinds of tests or do they perform better on a test that is the same as the teaching task?

4. Does the effectiveness of different methods of teaching word recognition vary between males and females?

5. Do subjects identify more target words in a story which is contextually constrained than in the basal story from which the target words had been excerpted?

This chapter presents information on the subjects used in the study, the selection of words to be taught (target words), the teaching and testing procedures, the statistical analyses and the specific hypotheses tested.

The Sample

The subjects for this study were randomly selected first graders from six randomly identified elementary schools in two school districts in the North Texas Metroplex. Six

schools, three from one district and three from another provided a total of 24 classrooms from which the sample was chosen.

From the total first-grade enrollment, 250 children were randomly selected to be pretested, 125 girls and 125 boys. The pretesting was done during the second week of November of 1976. Any child who knew five or more of the eight target words was not included in the study. Based on the pretest, 14 children, 7 girls and 7 boys, were excluded from the study because they identified five or more words. Ten children were not available for pretesting. The remaining 226 children were categorized according to the number of words identified correctly on the pretest. Table 1 indicates the number of boys and girls who fell into each category. Subjects who identified three or four words were collapsed into one category because the number of children in the two separate categories was so small.

Subjects were randomly selected from each category to be included in the study. The number of subjects randomly selected from each category is presented in Table 2. Permission slips, requesting permission from the parents for their child to participate in the study, were sent to the parents when requested.

After the subjects had been divided by sex and number of words identified on the pretest, a table of random

Table 1

Stratification of Subjects Based on Pretest

Results From Which Sample Was Chosen

No. of Words Identified	Boys	Girls	Total
0	69	75	144
1	19	28	47
2	11	4	15
3 & 4	12	8	20
Total	111	115	226

Table 2

Summary of Subjects Selected According to Number
of Words Identified on the Pretest

No. of Words Identified on Pretest	No. of Boys Selected	No. of Girls Selected	Total
0	30	30	60
1	12	12	24
2	4	4	8
3 & 4	8	8	16
Total	54	54	108

numbers was used to assign each subject to one of the three treatment methods.

The chronological ages of the sample are summarized in Table 3.

Selection of Target Words

The eight target words chosen (frog, kite, bird, balloon, airplane, rocket, man, and moon) had to be nouns so they could be pictorially presented. They also were chosen because Wood (1976) selected the story "Up to the Moon" from the preprimer, Fun for You (O'Donnell, 1972) that contained the eight nouns that could be used as target words in the investigation (Appendix A).

The Story Component

The story "Up to the Moon" used by Wood (1976) in her investigation was also used by this investigator along with a new story. Due to the lack of contextual information supplied in the basal story that would support the reader in identifying the target words, a new story "My Friend Joey" (Appendix B) was designed. The new story was created by the investigator with the purpose of controlling syntactic patterns and semantic associations within a sentence or passage to assist the reader in identifying the eight target words (see Appendix B). Certain contextual constraints were applied to the new story:

Table 3

Summary of Chronological Ages of Sample

Chronological Age	Boys Frequency/Percentage		Girls Frequency/Percentage		Total Frequency/Percentage	
7:10-7:11	1	1.8	3	5.6	4	7.4
7:03-7:04	2	3.7	0	0.0	2	3.7
7:01-7:02	5	9.2	6	11.1	11	20.3
6:11-7:00	16	29.6	4	7.4	20	37.0
6:09-6:10	14	25.9	9	16.6	23	42.5
6:07-6:08	6	11.1	11	20.3	17	31.4
6:05-6:06	1	1.8	11	20.3	12	22.2
6:03-6:04	8	14.8	10	18.5	18	33.3
6:00-6:02	1	1.8	0	0.0	1	1.8
Total	54		54		108	

1. High associative words were utilized to cue the reader in identifying the target word; i.e. On our walk we could look for a nest in a tree to see if a bird is in it. Nest and tree are identified as being words of associative strength that would aid the reader in predicting and identifying the target word bird.

2. Contextual information preceded the onset of the target word when it first appeared in the story.

3. The story was constructed so that only the underlined target word would be semantically appropriate. There is one instance in the story where this constraint is not properly applied; i.e., I will see if we have paper and string to make a kite. It will be fun to see if our kite will fly in the wind. The target words airplane and rocket would be semantically appropriate as well as kite.

4. The story was approximately the same length as the basal story. In addition each target word appeared at least twice.

A panel consisting of members of the investigator's dissertation committee analyzed the story to see if contextual constraints were applied. Readability was not a consideration since all unknown words except the target words could be pronounced for the reader.

Methods of Teaching Word Recognition

The exact steps for presenting a word in each method were as follows:

Word in Isolation (W)

1. Presentation of target word to subject
2. Instruction of subject to pronounce word
3. Pronunciation, or attempt at pronunciation, of target word by subject
4. Approval by examiner if word given was correct or word provided by examiner if attempt was incorrect
5. Correct pronunciation of target word by subject

Word with Picture (W-P)

1. Presentation of one picture and eight words to subject
2. Instruction of subject to find the word that goes with the picture
3. Attempt to match word with picture by the subject, pronunciation of word
4. Approval by examiner if attempt was successful, correct word matched and pronounced by experimenter if attempt was incorrect
5. Correct pronunciation of target word by subject

Word in Sentence Context (W-SC)

1. Presentation of sentence containing target word to subject
2. Reading sentence to the subject leaving out the target word then asking the subject to provide the word left out
3. Attempt at pronunciation of the target word by the subject
4. Approval by examiner if attempt was correct, pronunciation of target word by examiner if attempt was incorrect.
5. Pronunciation of target word by the subject

The exact script followed during the experiment is presented in Appendix I.

Teaching/Testing Procedures

The following description of the investigation will be organized as follows:

- A. Pretesting
- B. Preparation of Materials
 1. Word cards
 2. Picture cards
 3. Sentence cards
 4. Story
 5. Data Collection Sheet

C. The Laboratory Experiment

D. Testing

Pretesting

Prior to the beginning of the experiment, the investigator and two assistants pretested the 250 subjects on the target words to be used in the study. Each child was taken individually from his classroom to a room provided for the study. In the room, the child was seated in a chair at a table and the examiner sat facing the child at the opposite side of the table. The following instructions were given to the subject:

"I have some words here and I want to see how many of the words you know. When I show you a word, if you know what it is you tell me the word, if you don't know the word, don't worry about it, okay?"

The subject was shown the first word, "Look at this word and tell me what it is." Seven seconds were allowed, if the child did not respond the next word was presented. This was continued through all eight target words. No feedback was given during the pretesting. If the subject indicated that he was discouraged by not knowing any of the words, the examiner tried to reassure him by telling him

that maybe he would get to come back to teach him those words.

The number of words correctly pronounced by each subject was recorded by the subject's name.

Preparation of Materials

Word Cards. The eight words (see Appendix C) selected for use in the study were typed in lower case letters using a primary typewriter on white 5" x 8" index cards. A total of ten cards was made for each word. A table of random numbers was used to form four sets of randomly ordered word cards (see Appendix D), three sets to be used during the teaching procedure and one set to be used during the testing procedure. The fifth set was used to match with the picture cards and did not have to be randomly ordered. The cards were then laminated and each randomly ordered. Each set was put on two metal rings.

Picture Cards. Pictures (see Appendix E) were found in reading readiness books and in the pre-primer containing the story from which the eight target words had originally been excerpted. Eight identical pictures were cut out for each of the eight words. These pictures were then pasted in the center of 5" x 8" index cards, and the cards laminated. A table of random numbers was used to form four random orderings of picture cards (see Appendix E), three orderings to

be used during the teaching procedure and one set to be used during the testing procedure. Each set of cards was placed on two metal rings so that each examiner had four sets of the picture cards.

Sentence Cards. A sentence was written by the investigator using each of the eight target words. The sentences were intended to provide relevant context for the target word without using words that would appear in the story from which the words had been excerpted (see Appendix F). The sentences were then typed, using a primary typewriter, on 5" x 8" index cards. A line was drawn under the target word. Eight cards were prepared for each sentence and the cards were laminated. A table of random numbers was used to form four random orderings of the sentences, three orderings to be used during the teaching procedure and one to be used during the testing procedure. Each set of eight cards was placed on two metal rings providing each examiner with four sets of the cards.

Basal Story. As previously noted, the story "Up to the Moon" (O'Donnell, 1972) was selected by Wood (1976) because it contained eight nouns that could be used as target words. One minor change was made in the story. Capital letters on target words were replaced with lower case letters that matched the size of print in the story and then the target words were underlined. The story was duplicated, and

arranged on legal size paper so that a multilith printing procedure could be used to obtain print on both sides of the page. The story, without any pictures, was then put together just as it appeared in the preprimer. Copies were put into two-hole folders that had been cut down to the same size as the story thus making a little book. Twenty-five copies of the story were made so that a new copy could be used when one became soiled.

New Story. The new story "My Friend Joey" created for use in this study contained the eight target words, underlined. Southwestern Typographics, Inc. of Dallas prepared the story so that it would have a similar appearance to the basal story. The story was duplicated, and arranged on legal size paper so that multilith printing procedure could be used to obtain print on both sides of the page. The story, without pictures, was then put together just as it would appear in a preprimer. Copies were put into two-hole folders that had been cut down to the same size as the story thus making a little book. Twenty-five copies of the story were made so that a new copy could be used when one became soiled.

Data Collection Sheet. A data collection sheet (see Appendix G) was prepared to provide a means of recording each subject's responses during the experiment. All possible combinations for the order of administering the five tests

(see Appendix H); words, picture, sentence, basal story, and new story were computed and a list made. Each examiner was supplied with the subject's name that she was assigned to test. The testing order was printed above the subject's name on the data collection sheet to facilitate this procedure.

The Laboratory Experiment

The examiners each worked individually with each subject in order to control as many extraneous variables as possible. In each elementary school, a space was provided that was free from interruptions, that was comfortable and well lighted. The teaching and testing were done by the experimenter and two assistants. Care was taken to insure that any effect due to examiner was distributed across all treatment groups. In addition, examiners followed the same script for the teaching/testing procedures.

The examiners escorted each child from the classroom to the room set aside for the experiment. This walk provided an opportunity to establish rapport with the subject.

Teaching Procedure. Upon arriving in the room provided for the experiment, the subject was asked to sit down at the table in the specified chair and the examiner then sat at the opposite side of the table facing the subject. The script (see Appendix I) describes the procedures utilized

by the examiners. Any deviation from the script was only in terms of encouraging a subject to continue with the task at hand.

Testing Procedure. Immediately following the learning trials, each subject was tested on the five criterion variables; words in isolation, matching words with picture, reading sentences containing the target words, and reading two stories containing the target words. In order to control for the order of testing, the 120 possible combinations for administering the tests were computed and printed for each examiner (see Appendix H).

Each examiner was assigned a combination for the order of testing which appeared above the subject's name on the data collection sheet. Each subject received all five tests. A description of the procedure used for each test can be found in Appendix J. For the statistical analysis, the number of target words pronounced correctly on each test was taken as the subjects' scores and these were written on the data collection sheet after each test.

Null Hypotheses

The following null hypotheses were tested at the .05 level of significance using multivariate analysis of variance procedures:

1. There is no difference between scores on the six dependent variables; trials to criterion, words in isolation,

words matched with pictures and pronounced, words in sentence context, words in a basal story context and words in a story containing contextual constraints for subjects taught by; words in isolation, words matched with pictures, and words in sentence context.

2. There is no difference between the scores of girls and boys on the six dependent variables, taught by the above three methods.

3. There is no interaction between sex of subject and method of instruction on the six dependent variables.

Statistical Treatment

A 3 (teaching method) x 2 (sex) factorial design was used. Subjects were randomly assigned to each of the three experimental treatments. The three teaching methods were: word in isolation, matching the target word with a picture of the word and pronouncing the word, and the word in sentence context. Measurement on the six dependent variables were:

1. number of learning trials to criterion
2. number of words pronounced when target words were presented in isolation
3. number target words correctly matched with a picture of the word pronounced
4. number of words pronounced correctly when read in sentence context

5. number of target words pronounced correctly when reading the basal story from which the target words had been excerpted

6. number of target words pronounced correctly when reading the new story containing the target words

Since more than one dependent variable was measured on each subject, a multivariate analysis of variance (MANOVA) procedure was used. The computer program BMDX69 (Dixon, 1973) was used for the computation. This program provided a test for each source included in the MANOVA summary table. Univariate analysis of variance procedures were computed on each source that yielded rejection of the overall, multivariate null hypothesis. Preplanned Scheffé-type contrasts were conducted comparing the mean of the word in isolation group, on the word in isolation dependent variable, with the average of the other two groups; comparing the mean of the word with picture group, on the word with picture dependent variable, with the average of the other two groups; and comparing the mean of the word in sentence context group, on the word in sentence context dependent variable, with the average of the other two groups. In addition, the more conservative Scheffé critical value was used to test Scheffé-type contrasts on the pairwise differences among the means on each dependent variable for the three experimental groups.

CHAPTER IV

STATISTICAL ANALYSES AND RESULTS

The present study replicated Wood's (1976) study which investigated the comparative effects of three methods of teaching word recognition on beginning readers' recognition of these target words in four contextual settings. This study added a fifth contextual setting to her study. Wood's original four questions and an additional fifth question were sought:

1. Does picture and sentence context serve as a distracting stimulus that diverts the reader's attention from the critical cue, the word to be learned, as suggested by Samuels' focal attention hypothesis?

2. Is teaching words in a sentence context a more effective method, as it provides the beginning reader an opportunity to use the syntactic and semantic cues within his language to narrow the possibilities of what an unknown word may be, as suggested by Goodman's contextual hypothesis?

3. Do subjects taught by one method of teaching word recognition perform differently on different kinds of tests or do they perform better on a test that is the same as the teaching task?

4. Does the effectiveness of different methods of teaching word recognition vary between sexes?

5. Do subjects identify more target words in a story which is contextually constrained than in a basal story from which the target words had been excerpted?

The following null hypotheses were tested at the .05 level of significance:

1. There is no difference between scores on the six dependent variables; trials to criterion, words in isolation, words matched with pictures and pronounced, words in sentence context, words in a basal story context, and words in a story containing contextual constraints for subjects taught by; words in isolation, words matched with pictures, and words in sentence context.

2. There is no difference between the scores of girls and boys on the six dependent variables, taught by the above three methods.

3. There is no interaction between sex of subject and method of instruction on the six dependent variables.

Answers to the preceding questions and tests of the null hypotheses were sought using the following sources of information: (1) the number of trials required to learn the eight target words, (2) the number of target words pronounced correctly when presented in isolation, (3) the number of

target words matched correctly with a picture and then pronounced, (4) the number of target words pronounced correctly when read in a sentence context, and (5) the number of target words pronounced correctly when read in two stories.

The statistical analyses and results will be presented as follows:

1. Multivariate analysis of variance (MANOVA) to test significance of overall null hypotheses.
2. One-way analysis of variance on each of the six dependent variables.
3. Scheffé-type contrasts of experimental group means for each dependent variable.

Testing the Overall Null Hypotheses

A multivariate analysis of variance using the BMDX69 computer program was employed to test the overall null hypotheses of no difference between each of the six dependent variables due to methods of instruction, sex of the subject or interaction between methods and sex. The results of this initial analysis are presented in Table 4.

The overall null hypothesis for treatment methods on the six dependent variables was rejected. The hypotheses of differences due to sex of subject and interaction between sex and methods of instruction were accepted.

Table 4

Multivariate Analysis of Variance Summary Table

Source of Variation	Log (Generalized Variance)	U-Statistic	Degrees of Freedom			Approximate F-Statistic	Degrees of Freedom	
Sex	31.01289	0.968479	5	1,	102	0.6379	5	98.00
Methods of Instruction	31.98718	0.365563	5	2,	102	12.8172*	10	196.00
Sex by Methods Interaction	31.01730	0.964218						
Error	30.98087							

*Significant at .05 and .01 levels

Sources Contributing to Rejection
of Overall Null Hypothesis

Univariate analyses of variance were computed for each of the six dependent variables in order to determine specific variables contributing to the rejection of the null hypothesis for treatment effects. The ANOVA summary tables are presented in Tables 5, 6, 7, 8, 9, and 10.

As indicated in Tables 5, 6, 7, 8, 9, and 10, performance on the two variables: trials to criterion and word in sentence context led to the rejection of the overall hypothesis for treatment effects. The word in isolation, words with picture, and the two story variables did not yield significant results.

Table 5

ANOVA Summary Table for Dependent Variable,
Trials to Criterion (1)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Methods of Instruction	2	211.7224	105.8612	16.6829*
Error	105	666.2756	6.3455	
Total	107	877.9980		

*Significant at .05.

Table 6

ANOVA Summary Table for Dependent Variable,
Word in Isolation Test (2)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Methods of Instruction	2	29.5555	14.7777	2.9326
Error	105	529.1099	5.0391	
Total	107	558.6653		

Table 7

ANOVA Summary Table for Dependent Variable,
Matching Word with Picture Test (3)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Methods of Instruction	2	9.6852	4.8426	1.3250
Error	105	383.7490	3.6548	
Total	107	393.4341		

Table 8

ANOVA Summary Table for Dependent Variable,
Word in Sentence Context (4)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Methods of Instruction	2	104.2407	52.1203	10.5406*
Error	105	519.1936	4.9447	
Total	107	623.4341		

*Significant at .05.

Table 9

ANOVA Summary Table for Dependent Variable,
Word in Basal Story Test (5)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Methods of Instruction	2	742.1252	371.0625	1.6198
Error	105	24053.3555	229.0796	
Total	107	24795.4805		

Table 10

ANOVA Summary Table for Dependent Variable,
Word in New Story (6)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Method of Instruction	2	49.1295	24.5648	1.3527
Error	105	1906.8252	18.1602	
Total	107	1955.9546		

Scheffé-Type Contrasts

Questions One and Two

Scheffé-type contrasts on the differences among the means of the three treatment groups were computed in order to answer two of the three major research questions regarding the use of words, pictures, and sentence context in teaching word recognition. Table 11 includes the means for each experimental group on the six dependent variables.

Computed F's comparing the group receiving a certain treatment with the average of the other two groups on dependent variables 2, 3, 4, and 5 were compared to the critical F for Scheffé-type contrasts which equalled 3.94. Computed F's for all other Scheffé-type contrasts were compared to the more conservative F of 6.16 (Harris, 1975,

Table 11
Summary of Experimental Group Means*
on the Six Dependent Variables

Experimental Groups	Trials to Criterion	Word in Isolation	Word With Picture	Word in Sentence Context	Word in Basal Story	Word in New Story
W	6.9722	6.8889	6.8056	6.3889	39.8611	15.4444
W-P	4.1667	5.6111	7.2778	4.8056	33.4722	14.0278
W-SC	3.8611	6.1667	6.5556	7.1667	37.2222	15.4722
Total	5.0000	6.2222	6.8797	6.1204	36.8518	14.9815

*n = 36

p. 104). Table 12 contains the contrasts and computed F's on the dependent variable, trials to criterion.

Table 12
Scheffé-Type Contrasts Between Means for
the Three Experimental Groups on the
Trials to Criterion Variable (1)

Comparison	Computed Scheffé F Value
(1) W vs. W-P	22.3268*
(2) W vs. W-SC	27.4558*
(3) W-P vs. W-SC	.2649
(4) W vs. Average of W-P & W-SC	33.1001*
(5) W-P vs. Average of W & W-SC	5.9092
(6) W-SC vs. Average of W & W-P	11.0382*

Critical F = 6.16

*Significant at .05 level

As revealed by comparison 1 and 2 in Table 12, subjects in the picture and sentence context groups required significantly fewer trials to learn the eight target words than subjects in the word in isolation group. The contrast between subjects in the word with picture and sentence context groups, however, was not significant. Subjects in the word group required significantly more trials to learn the

eight words than subjects in the word with picture and word in sentence context groups combined. On the other hand, subjects in the word with sentence context group required significantly fewer trials to learn the eight target words than subjects in the word in isolation and word with picture groups combined. For the trials to criterion variable, subjects using pictures and sentence context learned the eight target words with fewer trials than subjects using the word in isolation treatment. The result does not support the theory that words and sentence context distract the subject's attention. In fact, the sentence context method was consistently the most effective method as measured by the number of trials required to learn the eight target words.

The Scheffé-type contrasts between group means on variable two, word in isolation, are presented in Table 13.

When target words were tested in isolation, the comparison between the word in isolation group and the average of the word with picture and word in sentence context groups was significant and will be discussed later in this chapter.

Table 13

Scheffé-Type Contrasts Between Means for
the Three Experimental Groups on the
Word in Isolation Variable (2)

Comparison	Computed Scheffé F Value
(1) W vs. W-P	5.8323
(2) W vs. W-SC	1.8630
(3) W-P vs. W-SC	1.1026
(4) W vs. Average of W-P & W-SC	4.7627*

Critical F = 6.16 for comparisons (1), (2), (3)

Critical F = 3.94 for comparison (4)

*Significant at .05 level

Table 14 presents the Scheffé-type comparisons on variable three, word with picture test.

On the dependent variable, word with picture, there was no difference between the number of words recognized by subjects taught using word in isolation, word with picture, or word in sentence context. The contrast between the method that matches the dependent variable, word with picture and the combination of the other two treatment groups was not significant.

Table 14

Scheffé-Type Contrasts Between Means for
the Three Experimental Groups on the
Word with Picture Variable (3)

Comparison	Computed Scheffé F Value
(1) W vs. W-P	1.098
(2) W vs. W-SC	.3078
(3) W-P vs. W-SC	2.5687
(4) W-P vs. Average of W & W-SC	2.3420

Critical F = 6.16 for comparisons (1), (2), (3)

Critical F = 3.94 for comparison (4)

The results of the Scheffé-type contrasts for the means of the three experimental groups on the word in sentence context variable are presented in Table 15.

Table 15 shows that students taught by the word method did significantly better on the word in sentence context test than the subjects taught by the word with picture method. The students taught by the word in sentence context method recognized significantly more words than those subjects taught by the word with picture method. There were no significant differences between the number of words recognized by the word in isolation and word in sentence context methods. When measuring number of words learned by having

subjects read the words in a sentence context, the use of sentence context did not interfere with the learning. On the sentence context variable, the use of sentence context appeared to be facilitative rather than a distracting stimulus. This statement cannot be made for the word with picture treatment. Subjects in this group recognized fewer words than subjects in the other two groups. The contrast between the word in sentence context and the average of the word and word with picture methods will be discussed in a later section of this chapter.

Table 15
Scheffé-Type Contrasts Between Means for the
Three Experimental Groups on the Word
in Sentence Context Variable (4)

Comparison	Computed Scheffé F Value
(1) W vs. W-P	9.1255*
(2) W vs. W-SC	2.2022
(3) W-P vs. W-SC	20.2937*
(4) W-SC vs. Average	11.9554*

Critical F = 6.16 for comparisons (1), (2), (3)

Critical F = 3.94 for comparison (4)

*Significant at .05 level

Tables 16 and 17 contain the Scheffé-type contrasts between each experimental group and between each group and the average of the other two on the story context variable. As both tables reveal, the method of instruction was independent of performance on the story context variable. In terms of questions one and two stated at the beginning of this chapter, subjects taught by the word in isolation method did not recognize significantly more words when reading the story than subjects taught by the word with picture or word with sentence context methods.

Table 16
Scheffé-Type Contrasts Between Means for the
Three Experimental Groups on the Word in
Basal Story Context Variable (5)

Comparison	Computed Scheffé F Value
(1) W vs. W-P	3.2073
(2) W vs. W-SC	.5471
(3) W-P vs. W-SC	1.1049
(4) W vs. Average of W-P & W-SC	2.1346
(5) W-P vs. Average of W & W-SC	2.6924
(6) W-SC vs. Average of W & W-P	.0323

Critical F = 6.16

Table 17

Scheffé-Type Contrasts Between Means for the
Three Experimental Groups on the Word in
New Story Context Variable (6)

Comparison	Computed Scheffé F Value
(1) W vs. W-P	1.9890
(2) W vs. W-SC	.0007
(3) W-P vs. W-SC	2.0678
(4) W vs. Average of W-P & W-SC	.6372
(5) W-P vs. Average of W & W-SC	2.7043
(6) W-SC vs. Average of W & W-P	.7160

Critical F = 6.16

These results do not support the focal attention hypothesis that sentence and picture context serve to distract the reader's attention from the word to be learned. Neither do these results support the contextual hypothesis that sentence context is a more effective method of teaching word recognition.

Summary of Questions One and Two

Scheffé-type contrasts were computed in order to answer the following two questions that Wood (1976) proposed in the original study:

1. Does picture and sentence context serve as a distracting stimulus that diverts the reader's attention from the critical cue, the word to be learned, as suggested by Samuels' focal attention hypothesis?

2. Is teaching words in a sentence context a more effective method, as it provides the beginning reader an opportunity to use the syntactic and semantic cues within his language system to narrow the possibilities of what an unknown word may be, as suggested by Goodman's contextual hypothesis?

The answers to these two questions will be summarized for each dependent variable.

Trials to Criterion. Samuels' focal attention hypothesis that pictures and sentence context distract the reader's attention was not supported. Subjects in both the word with picture and word in sentence context groups required significantly fewer trials to learn the eight target words than subjects in the word in isolation group.

The significant differences in favor of the word in sentence context method on the trials to criterion variable indicated that this method was the most effective in initial learning and therefore reinforces the contextual hypothesis.

Word in Isolation. When measuring learning by testing with words in isolation, subjects in the word in isolation group did not recognize significantly more words than

subjects in the word with picture group or the word in sentence group; therefore, pictures and sentence context did not seem to distract the subject's attention.

Word with Picture. The results of the word with picture test do not support either the focal attention hypothesis or the contextual hypothesis in terms of the use of pictures and sentence context in teaching word recognition.

Word in Sentence Context. The word in sentence context group indicates that when learning is measured by reading words in sentence context, the focal attention hypothesis is not supported. The sentence context method appears to be the most effective method of teaching word recognition when measuring by the dependent variable word in sentence context.

Word in Story Content. When learning was measured by reading the target words in a story context, results revealed that the three methods of teaching word recognition were equally effective. The theory that pictures and sentence context divert the readers' attention and result in inferior learning as suggested by the focal attention hypothesis was not reinforced. Neither did the results on the story context variable support the sentence context method as a more effective method as suggested by the contextual hypothesis.

Question Three: Teach/Test Bias

A third major research question this study was designed to investigate was whether or not subjects taught by

one method of teaching word recognition perform differently on different kinds of tests or whether they perform better on a test that is the same as the teaching task. In order to answer this question, three comparisons had to be made:

(1) Between subjects taught by the word in isolation method and the average of subjects taught by the word with picture and word in sentence context methods as measured on the word in isolation test. (2) Between subjects taught by the word with picture method and the average of subjects taught by the word in isolation and word in sentence context methods as measured on the word with picture test. (3) Between subjects taught by the word in sentence context method and the average of subjects taught by the word in isolation and word with picture methods as measured on the word in sentence context test.

On the word in isolation test, comparison number four in Table 13 reveals that this contrast was significant. Subjects taught by the word in isolation method performed significantly better on the word in isolation test than subjects taught by the word with picture and word in sentence context methods. The contrast between word with picture and the average of the word in isolation and word in sentence context methods on the word with picture test was not significant (Table 14, comparison four). A significant contrast was found for the difference between the sentence context group

and the word in isolation and word with picture groups on the word in sentence context test (Table 15, comparison four).

Subjects with superior performance were those taught by the same method as the variable used for testing learning effectiveness except on the word with picture variables. A teach/test bias, therefore, was found for words in isolation and words in sentence context.

Question Four: Sex and Method
of Teaching Word Recognition

Does effectiveness of different methods of teaching word recognition vary between sexes? No significant differences were found for differential effects due to sex and interaction between sex and methods of instruction.

Question Five: Basal Story vs.
Story with Contextual Constraints

Do subjects identify more target words in a story which is contextually constrained than in a basal story from which the words had been excerpted? No significant differences were found between the two stories.

An "ex post facto" investigation was initiated in order to explore an added question of whether readers vs. nonreaders identify more target words on the story variable. An univariate analysis of variance was computed for each

story. Scheffé contrasts were computed for the three levels of subjects. The three levels were identified as:

Readers - This group comprised of 19 subjects was identified as fluent readers. Fluent readers were defined as subjects receiving no more than twenty words pronounced by the investigator on each story.

Middle Readers - This group comprised of 22 subjects was identified as subjects that were making an attempt at reading the two stories, but received a considerable amount of prompting.

Nonreaders - This group consisted of 67 subjects all of whom needed almost all words pronounced.

There was no assistance given to any of the three groups on the target words.

Tables 18 and 19 indicate there is a significant difference on both stories. As indicated in Tables 20 and 21 the significant difference appears between readers and non-readers and middle readers and nonreaders. In Table 22 the means on both stories for readers and middle readers are higher than the means for the nonreaders. The readers and the middle readers recognized significantly more target words on both stories than nonreaders. The difference between the number of words recognized by the nonreaders on the basal story and the new story was noted. On the new story non-readers recognized 13.40 target words of the possible 18

Table 18

ANOVA Summary Table for Basal Story

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F	p
Three Groups of Readers	2	6945.9268	3472.9634	20.4295*	.0000
Error	105	178949.7028	169.99972		
Total	107	24795.6296			

*Significant at .05

Table 19

ANOVA Summary Table for New Story

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F	p
Three Groups of Readers	2	440.8412	220.4206	15.2754*	.0000
Error	105	1515.1218	14.4297		
Total	107	1955.9630			

*Significant at .05

whereas on the basal story nonreaders recognized 30.58 target words of the possible 50.

Table 20
Scheffé F's Converted to
 T^2 's for Basal Story

Levels of Readers	1	2	3
1	0.0	0.1552	3.546*
2	0.1552	0.0	3.553*
3	3.546*	3.553*	0.0

Critical $T^2 = 84$

*Significant at .05

Table 21
Scheffé F's Converted to
 T^2 's for New Story

Levels of Readers	1	2	3
1	0.0	.1947	3.104*
2	.1947	0.0	3.035*
3	3.104*	3.035*	0.0

Critical $T^2 = 84$

*Significant at .05

Table 22

Group Means for Target Words

Basal Story		New Story	
Groups		Groups	
1	47.57895	1	17.73684
2	46.68182	2	17.40909
3	30.58209	3	13.40299

Group 1 - Readers

Group 2 - Middle Group of Readers

Group 3 - Nonreaders

Summary of Results

The statistical analysis for this investigation included a multivariate analysis of variance, univariate analyses of variance on each of the six dependent variables, and Scheffé-type contrasts. The results were as follows:

1. The null hypothesis for treatment effects was rejected at the .05 level of significance.

2. The null hypotheses for differential effects due to sex and interaction between sex and methods of instruction were accepted.

3. Significant differences between the experimental groups on the number of trials required to learn the eight target words support the use of pictures and sentence context.

a. Subjects receiving the word with picture method and the word in sentence context method learned the eight target words with fewer trials to criterion than subjects in the word in isolation method.

b. Subjects receiving the word in sentence context method learned the eight target words in fewer trials than subjects receiving the word in isolation and word with picture methods combined.

4. On the word in isolation test subjects taught by the word in isolation method recognized significantly more words than subjects taught by the word in sentence context method and the word with picture method combined.

5. No significant differences were found for the word with picture dependent variable.

6. Significant differences were found on the word in sentence context test.

a. Subjects receiving the word in sentence context method and the word in isolation method recognized significantly more words than subjects receiving the word with picture method.

b. No differences were found between the word in isolation and word with sentence context groups.

7. No significant differences were found between the three experimental groups on the two stories, basal and new story.

8. Tests to determine teach/test bias revealed significant results on the word in isolation and word in sentence context tests, but not on the word with picture test.

9. Readers and the middle readers recognized significantly more target words than nonreaders on both stories. Nonreaders recognized more target words in the new story than on the basal story.

CHAPTER V

SUMMARY AND DISCUSSION

Summary

This study replicated Wood's (1976) study which investigated the use of words in isolation, pictures, and sentence context in teaching word recognition to beginning readers. Learning was assessed on five dependent variables with this study adding a sixth variable; trials to criterion, word in isolation test, word with picture test, word in sentence context test, word in a basal story used in the original study, and word in a new story created to have certain contextual constraints. Multivariate analysis of variance techniques were employed to determine significant differences between these six variables.

The eight target words were used to pretest the randomly selected 250 first graders in order to eliminate children who knew five or more of the words. The final sample consisted of 54 boys and 54 girls who were stratified on the basis of the number of words they correctly pronounced on the pretest. These 108 subjects were randomly assigned to the three treatment groups: word in isolation, word with picture, and word in sentence context.

Each subject was taught individually by one of three methods, during November and December, 1976. The teaching materials were 5" x 8" index cards on which the words and sentences had been typed in primary type and on which the pictures had been pasted. Three sets of randomly ordered cards were used for each teaching method. Throughout the experiment 7 seconds were allowed for a response from the subject and the procedure was terminated when all words were pronounced correctly on two consecutive trials or through a maximum of 12 trials. After the teaching procedure, each subject was given five tests. The order of testing was randomized to avoid practice effects. Subjects were asked to pronounce the words when presented in isolation, to match the words with pictures of the words and pronounce the words, to read the target words in sentence context, to read the target words in the basal story and to read the target words in a new story designed to have contextual constraints. Data utilized in the statistical analyses included the number of trials required to learn the words, and the number of target words correctly pronounced on each of the five tests.

Null Hypotheses

The null hypotheses this study was designed to test at the .05 level of confidence were:

1. There is no difference between scores on the six dependent variables; trials to criterion, words in isolation, words matched with picture and pronounced, words in sentence, words in a basal story context and words in a story containing contextual constraints for subjects taught by: words in isolation, words matched with pictures, and words in sentence context. The null hypothesis for treatment effects was rejected at the .05 level of significance.

2. There is no difference between scores of girls and boys on the six dependent variables, taught by the above three methods. The null hypothesis for sex and differences between the scores on the dependent variables was accepted.

3. There is no interaction between sex and method of instruction on the six dependent variables. The null hypothesis for sex and interaction due to method of instruction on the six dependent variables was accepted.

Summary of Research Questions

The present study replicated Wood's (1976) study with the intent of answering Wood's original four questions in addition to a fifth question posed by the present investigator.

1. Does picture and sentence context serve as distracting stimulus that diverts the reader's attention from the critical cue, the word to be learned, as suggested by Samuels' focal attention hypothesis?

The results of the present study supported Wood's (1976) finding that pictures and sentence context facilitated the initial acquisition of target words as measured by the number of trials to criterion variable. The evidence from this study revealed that the use of pictures and sentence context did not interfere with learning the eight target words.

2. Is teaching words in a sentence context a more effective method, as it provides the beginning reader an opportunity to use the syntactic and semantic cues within the language to narrow the possibilities of what an unknown word may be, as suggested by Goodman's contextual hypothesis?

The results of the present study supported Wood's (1976) finding that subjects taught by the word in sentence context method required significantly fewer trials to learn the eight target words than subjects taught by the word in isolation and the word with picture methods. In the present study subjects in the sentence context group required the fewest number of trials while subjects in the word in isolation group required the greatest number.

3. Do subjects taught by one method of teaching word recognition perform differently on different kinds of tests or do they perform better on a test that is the same as the teaching task?

The results of this study supported Wood's (1976) finding that groups taught by the word in isolation and sentence context method performed significantly better on the word in isolation and word in sentence context tests. The word with picture contrast was not significant. The results of this study and Wood's study indicate that the effectiveness of any of the three methods of instruction may be contingent upon how that effectiveness is measured.

4. Does the effectiveness of different methods of teaching word recognition vary between sexes?

The results of this study were the same as Wood's finding of no significant difference between girls and boys on the six dependent variables.

5. Do subjects indentify more target words in a story which is contextually constrained than in the basal story used in the original study.

The results of this study indicated no significant differences were found between the basal story and the story designed to have contextual constraints.

Conclusions

Within the limitations of this study, the following conclusions seem justified.

1. Data gathered in Wood's (1976) study and the present study did not support the focal attention hypothesis

that pictures and sentence context interfere with teaching word recognition. Evidence is given to support the use of sentence context as the most facilitative approach of the three methods of teaching word recognition to beginning readers.

2. Results indicated that when the test used to measure learning was the same as the teaching task performance was biased in favor of that teaching method on two of the three tests.

3. The method of teaching word recognition was independent of the sex of the learner.

4. The method of instruction was independent of performance on the story context variable.

Discussion

In Wood's (1976) study a published basal story (Appendix A) was selected because it contained eight words that could be used as target words. Wood reported that the story context variable produced an interesting phenomenon. Her examination of the basal story revealed that the story provided very little linguistic information on which to base decisions about words. The paucity of linguistic information may have been a contributing factor as to why the story dependent variable was not significant. Therefore, she recommended that her study be replicated utilizing a story written to have high contextual constraints for the target words.

In the present study a new story was created to have constraints to support the reader in the reading process.

The new story was constrained in the following ways:

1. High associative words were utilized to cue the reader in identifying the target words.
2. Contextual information preceded the onset of the target word when it first appeared in the story.
3. The story was constructed so that only the underlined target word would fit--the remaining seven target words would not be semantically appropriate.
4. The story was approximately the same length as the basal story with each target word being mentioned at least twice.

Univariate analyses on the dependent story variables revealed that the method of instruction was independent of performance on the story variables. As result an "ex post facto" investigation was performed and will be discussed.

Readers vs. Nonreaders

The subjects were divided into three levels:

1. Readers. This group, comprised of 19 subjects with an average age of six years six months, was identified as fluent readers. Fluent readers were defined as subjects receiving no more than twenty words pronounced by the investigator on each story.

2. Middle Readers. This group, comprised of 22 subjects with an average age of six years three months, was

identified as subjects that were making an attempt at reading the two stories, but received a considerable amount of prompting.

3. Nonreaders. This group with average age of six years three months consisted of 67 subjects, all of whom needed almost all words pronounced.

Contrasts among the three groups of subjects on both stories indicated that as expected readers and middle readers identified significantly more target words on both stories than nonreaders. The difference between the number of words recognized by the nonreaders on the basal and the new story was a most interesting finding. On the new story nonreaders recognized a mean of 13.40 target words of the possible 18 whereas on the basal story nonreaders recognized a mean of 30.58 target words of the possible 50. The comparison of target words recognized by the three groups of readers on both stories revealed that perhaps nonreaders benefit more by contextual constraints than more proficient readers who recognized the target words in either story. Yetta Goodman (1977) cautions against the interpretation that readers are more proficient at utilizing context than nonreaders. Children who are struggling at the beginning stages of reading seem to be able to profit more by having stories that are linguistically and conceptually supportive for the reader.

Substitutions for Target
Words in "My Friend Joey"

In the analysis of oral reading errors procedure, the subject's word substitutions are scored as acceptable or unacceptable with respect to the context. The proportion of substitutions which "fit" the context is regarded as indicative of the effectiveness with which the child is utilizing contextual cues (Streib, 1976-77).

The subject's utilization of context with regard to syntactic and semantic acceptability will be analyzed only at the sentence level for the substitutions for the target words embedded in "My Friend Joey" (Appendix B). The substitution responses made by all the subjects to the target words are classified according to the following categories which have been taken from Reading Misuse Inventory (Goodman & Burke, 1972).

graphic similarity - Some degree of graphic similarity exists between the substitution and the target words.

Inspection of the data indicates that 28% of the 100 substitutions had a degree of graphic similarity (Appendix K).

syntactic acceptability - The substitution response to the target word contained within context of the original text produced a grammatically acceptable structure.

Inspection of the data indicates that 85% of the 100 substitutions were syntactically acceptable (Appendix L).

semantic acceptability - The substitution response to the target word contained within context of the original text produced a sematically acceptable structure.

Inspection of the data indicates that 36% of the 100 substitutions were semantically acceptable (Appendix L).

A very low percentage of No Response behavior was recorded for subjects in the story "My Friend Joey." Of the 1944 possible responses for the target words by the 108 subjects 11% were categorized as No Response as opposed to offering a substitution or a correct response.

Target Words Identified
in "My Friend Joey"

An observation was made concerning the number of subjects correctly identifying the target words each time the word appeared. The information is presented as follows:

<u>Target Words</u>	<u>Number of Subjects</u>
kite	80
frog	75
moon	73
bird	67
man	66
airplane	61
balloon	59
rocket	58

Placement of the target words either at the beginning, middle or end of the story with regard to target words most often identified opposed to words least often identified was not a factor. Kite and balloon were two words at the beginning of the story and moon which was the third most identifiable word appeared at the end of the story. It appears that subjects had more difficulty with words of two syllables.

The target words in the story "My Friend Joey" (see Appendix B) appeared twice except for the target word moon which appeared four times in the text. Twenty-one of the 108 subjects correctly identified the target word the first time it appeared, but missed the word the second time. Forty of the 108 subjects missed the target word the first time the word appeared, but correctly pronounced the word the second time. More subjects identifying the target word the second time the word appeared in context may suggest that subjects avail themselves of preceding context to make a correct response to the target word.

Questions to be Resolved

The word in story context variable was included in the study in order to determine how subjects taught by the three different methods would perform while reading connected text. Certain aspects of the procedures need to be identified that may be interfering with the story context variable.

Prompting. Two authorities in the field of reading, Yetta Goodman (1977) and Carolyn Burke (1976), have made comments in regard to the investigator supplying all unknown words except the target word. Kenneth Goodman (1973) views reading as an active process in which the reader samples, predicts, confirms or tests, and incorporates information in order to obtain meaning from the graphic, syntactic and semantic cues provided by the author. Pronouncing all

unknown words could have created a dependency factor which may have inhibited the child from responding to the contextual cues. Although it appears from this study that nonreaders availed themselves of the contextual cues in the new story "My Friend Joey" and pronounced the target words whereas nonreaders reading the basal story did not do as well.

Target Words Underlined. Goodman (1977) commented that the lines under the target words may have caused an interesting occurrence. If the reader views the process as only identifying the underlined words the subjects may not be paying enough attention to the meaning of the passage in order to use the context to predict. The readers may think the process only involves identifying the underlined words.

Building a Conceptual Base. It was the intent of this investigator to build in "contextual associations which provide sufficient delimiting information to enable a reader to determine the semantic role of a word and further to recognize and comprehend it in the text" (Ruddell, 1968, p. 69). However, what may be contextually constraining to an adult may not be suited for a child reading the text.

The whole field of schema theory and its relatedness to the reading of stories is currently being researched. Frederiksen (1977) makes the observation that very little is known about how children use high-level schemas in comprehension. He cites studies to indicate that while we do have

suggestive evidence that high-level story structure does affect comprehension and recall of text (Mandler & Johnson, 1976; Stein & Glenn, 1977; Thorndike, 1976; Kintsch, 1977), we know very little about how the process operates.

One proposal is that comprehension is schema-based, a child expects a story to have conventionalized structure and selects propositions from a story which fit or "instantiate" the expected structure. Since story schemas may offer possibilities for their realization, text based information is important in generating an instantiated schema for a story. (p. 17)

Hoskinson (1977) has made the observation that children need to have reading materials within their conceptual understanding otherwise the reading activity can become meaningless word calling. The meaning which a word has for a first-grade child is a factor which will greatly influence the difficulty he may have in learning to recognize the word in discourse.

The Task of Reading a Story. Two factors that may have some bearing on the task of reading a story are:

- (1) prior reading instruction and (2) time of year the data were collected.

Barr (1974-75) concluded from her research, that in the early grades, instructional methods do influence the "strategies" used by children in reading connected text. Guszak (1972) noted that some children focus too much attention on the analysis of individual words and are thus unable to attend to the meaning of the passage. Goodman (1968)

cautioned against overemphasis on decoding in early reading instruction because he felt that children taught in this manner might come to view word analysis as an end in itself rather than as a tool to assist the reader in obtaining meaning from the text.

The time of year November/December of 1976 may be premature in terms of expectations for first graders handling of connected text. It appears from some of the statements excerpted from the tapes that children at this time of year are not used to sustained reading.

Children's Comments. "Do I have to read all of this?" and "This is a long story" indicate that the task of reading connected discourse at this time of year appears to be a difficult task for some children. One additional comment can be made in terms of asking first-graders to read two stories at one sitting which may have produced a factor of fatigue.

Implications

Every first-grade teacher is faced with the problem of teaching pupils to recognize printed words as one of the steps in the reading process. This study confirms Wood's (1976) finding that sentence context can be used effectively in teaching word recognition.

In almost all cases words should be embedded in context. In context means that words rarely should be isolated on flash cards or in a list of words, nor even picked out of

a sentence to be read alone. Words should most always be read in at least the minimum of meaningful context--a phrase or a clause.

In terms of the design of instructional materials it appears that nonreaders profit more from contextually rich connected text than readers. Readers apparently bring to the printed page their own contextual associations that support them in the reading task. Teachers need to have alternate sources of materials available for the nonreaders that will assist them with the reading of connected discourse. These materials can vary from the language experience activities to stories designed especially with the linguistic and conceptual competence of the child in mind.

Recommendations for Further Study

Further research needs to be conducted in regard to what contextual constraints are needed to support the reader in connected discourse. In terms of writing materials for beginning readers more information is needed concerning the notion of contextual richness.

In terms of the replication of this study several variations dealing with the story variable could be recommended:

1. The first-graders to be included in the study should be identified as subjects knowing five or less of the

target words and are willing to read connected text with a minimum of prompting.

2. A story could be initiated as one of the treatments for teaching word recognition.

3. An illustrated story could be included and compared to a story that is not illustrated.

4. The target words should appear in discourse without being underlined.

5. The pilot testing of stories, as was done with this study, could use the modified cloze procedure as a way of finding out the utility of certain contextual associations implemented in the text. Interviewing children is another way of identifying contextual cues that might have conceptual meaning for the beginning reader.

Peroration

In Frank Smith's (1977) commentary on comprehension he emphasizes that comprehension should be regarded as a condition always to be fostered, by ensuring that activities and materials always make sense to children and by helping children to develop conceptual frameworks and strategies of enquiry relevant to the skills we expect them to master.

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APPENDIXES

APPENDIX A

Story

Up to the Moon

"I want to do something,"
said little frog.

"I want to fly to the moon.

But I can not fly.

A frog can not fly.

What can I do?

I will see."

Little frog saw a bird.

"You can fly," said the frog.

"Can you fly to the moon?

May I go with you?"

"I can fly," said the bird.

"But I can not fly to the moon.

You can not go with me."

Little frog saw a kite.

"That kite can fly,"
said little frog.

"Can it fly up to the moon?
I will see."

Little frog saw the kite fly.
He saw the kite fly up, up, up.
But the kite did not fly up
to the moon.

Little frog saw a balloon.

"A balloon can go up,"
said little frog.

"That balloon may go up
to the moon."

I will see."

Did the balloon go up
to the moon?

It did not.

Little frog saw a big airplane.

"This airplane can fly,"
said little frog.

"Can this airplane fly up
to the moon?
I will see."

Did the airplane fly up
to the moon?
It did not.

Now what did little frog see?

He saw a rocket.

He saw a big, big moon rocket.

"A rocket can fly to the moon,"
said little frog.

"This rocket is going to the moon.

I will get in.

I will go, too."

And he did.

"Look up, Mother, look up,"
said little owl.

"Do you see the man in the moon?

I see the man in the moon.

He is looking down at me.

But I see little frog, too.

Can you see little frog?

I can. Yes, I can."

"Up To the Moon"

101 "I want to do something,"
102 said Little Frog.
103 "I want to fly to the moon.
104 But I can not fly.
105 A frog can not fly.
106 What can I do?
107 I will see."

201 Little Frog saw a bird.
202 "You can fly," said the frog.
203 "Can you fly to the moon?
204 May I go with you?"
205 "I can fly," said the bird.
206 "But I can not fly to the moon.
207 You can not go with me."

301 Little Frog saw a kite.
302 "That kite can fly,"
303 said Little Frog.
304 "Can it fly up to the moon?
305 I will see."
306 Little Frog saw the kite fly.
307 He saw the kite fly up, up, up.
308 But the kite did not fly up
309 to the moon.

401 Little Frog saw a balloon.

402 "A balloon can go up,"

403 said Little Frog.

404 "That balloon may go up

405 to the moon.

406 I will see."

407 Did the balloon go up

408 to the moon?

409 It did not.

501 Little Frog saw a big airplane.

502 "This airplane can fly,"

503 said Little Frog.

504 "Can this airplane fly up

505 to the moon?

506 I will see."

507 Did the airplane fly up

508 to the moon?

509 It did not.

601 Now what did Little Frog see?
602 He saw a rocket.
603 He saw a big, big moon rocket.
604 "A rocket can fly to the moon,"
605 said Little Frog.
606 "This rocket is going to the moon.
607 I will get in.
608 I will go, too."
609 And he did.

701 "Look up, Mother, look up,"
702 said Little Owl.
703 "Do you see the man in the moon?
704 I see the man in the moon.
705 He is looking down at me.
706 But I see Little Frog, too.
707 Can you see Little Frog?
708 I can. Yes, I can."

The investigator used this form to code all information offered by the subject as he/she was reading the story. All words pronounced by the investigator were recorded on this form.

APPENDIX B

Story

My Friend Joey

I have a friend named Joey.
We are going to play together today.
I am trying to think
of all the things we can do.

If there is enough wind
we could make something
that flies up high.
I will see if we have paper and string
to make a kite.
It will be fun to see if our kite
will fly in the wind.

Joey said that he would
bring something to play with.
He said that he would bring
something rubber
that you blow air into.
It must be a balloon.
I hope it pops.
I like to hear a balloon pop.

On our walk
we could look for a nest in a tree
to see if a bird is in it.
I like the chirping sound a bird makes.

Joey and I like things that fly.
Maybe we could walk to the airport.
At the airport
we could watch an airplane fly.
My dad is a man who flies an airplane.
He is called a pilot.
An astronaut can fly a rocket
to the moon.
Someday when I grow up to be a man
like my dad I will fly to the moon
in a rocket.

When it gets dark
and the moon begins to shine
we will have to walk back home.
At night Joey and I like to pretend
we are walking on the moon.
I can't wait till Joey gets here
so we can play.

My Friend Joey

101 I have a friend named Joey. We are going
102 to play together today. I am trying to think
103 of all the things we can do.

104 If there is enough wind we could make
105 something that flies up high. I will see
106 if we have paper and string to make a
107 kite. It will be fun to see if our kite
108 will fly in the wind.

201 Joey said that he would bring something
202 to play with. He said that he would bring
203 something rubber that you blow air into.
204 It must be a balloon. I hope it pops.
205 I like to hear a balloon pop.

301 Joey and I could take a walk. We
302 could walk by a pond and watch a green
303 frog jump into the water. Joey likes
304 to hear the croaking noise a frog makes.

401 On our walk we could look for a nest
402 in a tree to see if a bird is in it.
403 I like the chirping sound a bird makes.

501 Joey and I like things that fly.

502 Maybe we could walk to the airport.

503 At the airport we could watch an

504 airplane fly. My dad is a man who

505 flies an airplane. He is called

506 a pilot. An astronaut can fly a

507 rocket to the moon. Someday when

508 I grow up to be a man like my dad

509 I will fly to the moon in a rocket.

601 When it gets dark and the moon begins to

602 shine we will have to walk back home.

603 At night Joey and I like to pretend

604 we are walking on the moon.

605 I can't wait till Joey gets here so we can

606 play.

The investigator used this form to code all information offered by the subject as he/she was reading the story. All words pronounced by the investigator were recorded on this form.

APPENDIX .C

Word Cards

balloon

airplane

140

rocket

kite

141

frog

moon

142

man

bird

APPENDIX D

Order of Words for Teaching - Testing

Words in Isolation

<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>
balloon	bird	kite	bird
airplane	balloon	balloon	frog
moon	kite	bird	man
frog	rocket	rocket	kite
rocket	airplane	airplane	rocket
bird	frog	frog	moon
kite	man	man	airplane
man	moon	moon	balloon

Matching Pictures with Words (Order of Pictures)

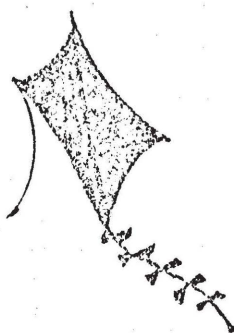
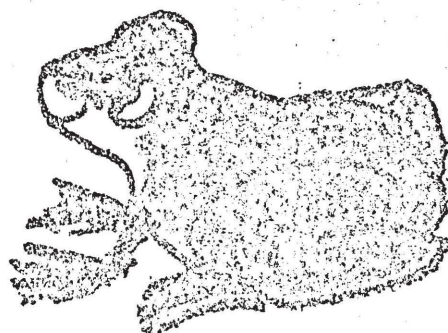
<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>
frog	rocket	airplane	balloon
airplane	airplane	rocket	kite
bird	balloon	moon	man
man	man	bird	rocket
moon	bird	balloon	frog
rocket	frog	frog	bird
balloon	kite	man	moon
kite	moon	kite	airplane

Sentence Context

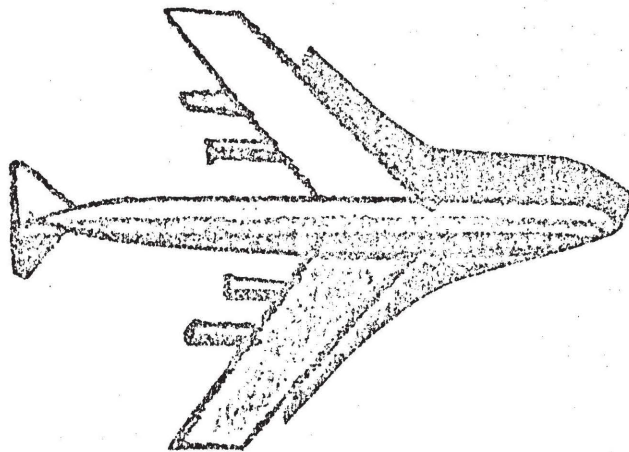
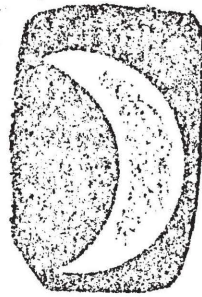
<u>1st</u>	<u>2nd</u>	<u>3rd</u>	<u>4th</u>
frog	bird	balloon	man
airplane	airplane	kite	bird
bird	kite	moon	rocket
rocket	frog	bird	balloon
moon	moon	man	kite
balloon	rocket	frog	airplane
kite	balloon	rocket	moon
man	man	airplane	frog

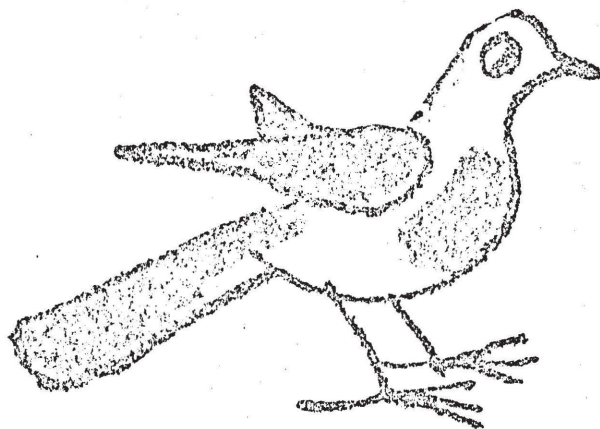
APPENDIX E

Picture Cards

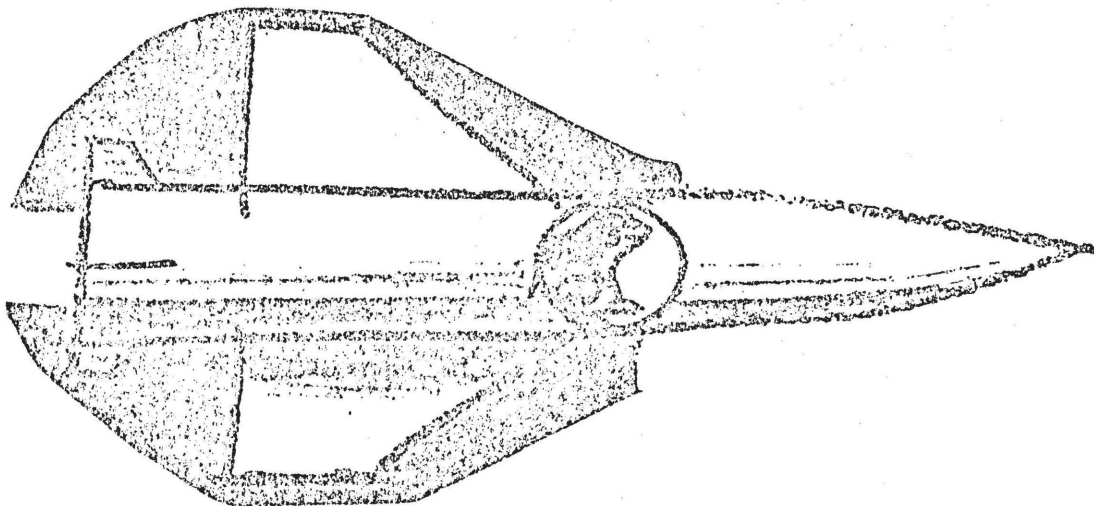
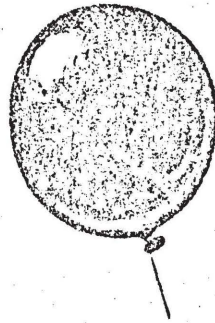


145





147



APPENDIX F
Sentence Cards

I can blow up the balloon.

We took a trip in an airplane.

A rocket can go very fast.

I like to play with my kite.

The frog jumped into the water.

The moon is in the sky at night.

That man is my dad.

That nest has a bird in it.

APPENDIX G

DATA COLLECTION SHEET

Date _____

Name	School	B'Date	Sex	a. Treatment	Trials to Criterion	1 Words	2 Pictures	3 Sentences	4 * Story
				b. <u>frog</u> <u>kite</u>	<u>balloon</u>	<u>bird</u>	<u>airplane</u>	<u>rocket</u> <u>man</u>	<u>moon</u>
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				a.					
				b.					
				Totals for b.					

*the number of correct words pronounced for the basal story appeared on the left while the correct number of words pronounced for the new story appeared on the right and was penciled in red with a circle around the number

APPENDIX H

Order for Testing

- | | |
|-----------------------|----------------------------------|
| (1) Word in Isolation | (4) Basal story (Up to the Moon) |
| (2) Picture | (5) New story (My Friend Joey) |
| (3) Sentence | |

1.	12345	41.	24513	81.	42315
2.	12354	42.	24531	82.	42351
3.	12535	43.	25134	83.	42513
4.	12453	44.	25143	84.	42531
5.	12543	45.	25314	85.	43125
6.	12534	46.	25341	86.	43152
7.	13245	47.	25413	87.	43215
8.	13254	48.	25431	88.	43251
9.	13425	49.	31245	89.	43512
10.	13452	50.	31254	90.	43521
11.	13534	51.	31425	91.	45123
12.	13543	52.	31452	92.	45132
13.	14235	53.	31542	93.	45213
14.	14253	54.	31524	94.	45231
15.	14325	55.	32145	95.	45321
16.	14352	56.	32154	96.	45312
17.	14523	57.	32415	97.	51234
18.	14532	58.	32451	98.	51243
19.	15234	59.	32541	99.	51342
20.	15243	60.	32514	100.	51324
21.	15342	61.	34125	101.	51432
22.	15324	62.	34152	102.	51423
23.	15423	63.	34215	103.	52134
24.	15432	64.	34251	104.	52143
25.	21345	65.	34512	105.	52314
26.	21354	66.	34521	106.	52341
27.	21435	67.	35124	107.	52413
28.	21453	68.	35142	108.	52431
29.	21534	69.	35214	109.	53124
30.	21543	70.	35241	110.	53142
31.	23154	71.	35412	111.	53214
32.	23154	72.	35421	112.	53241
33.	23451	73.	41235	113.	53412
34.	23415	74.	41253	114.	53421
35.	23514	75.	41325	115.	54123
36.	23541	76.	41352	116.	54132
37.	24135	77.	41523	117.	54213
38.	24153	78.	41532	118.	54231
39.	24315	79.	42135	119.	54312
40.	24351	80.	42153	120.	54321

APPENDIX I

Script for Teaching Procedures

All Three Methods - "Do you remember when I (other examiner's name if pretesting done by that person) showed you those words the other day?" (Wait for reaction.)
"And I told you that maybe I would get to come back and teach you those words you didn't know?" (Wait for reaction.) "Well, that's what we're going to do today. I am going to teach you those words."

Word Method - "And this is the way we are going to do it."
Place first set of randomly ordered words in front of the child. "Place your finger under this word and tell me what it is." Wait seven seconds for response. If child gives the correct response:
"That's right, this word is ____." If subject gives incorrect response: "No, this word is _____, say ____." If subject gives no response: "This word is _____, say ____."
Turn to next word card and repeat. Proceed through all eight words in this way. Place the second set of randomly ordered words in front of the subject. Follow the same directions through all eight words. Place the third set of randomly ordered words in

front of the subject and follow the same directions through the eight words. Repeat above beginning with the first set of randomly ordered cards and continue until the subject pronounces all eight words on two consecutive trials or through a maximum of 12 runs through the eight words. Record the number of learning trials on the Data Collection Sheet.

Testing - Subject is then given the five tests in the order which comes next in the list of all possible combinations of the five tests.

Word Picture Method - "And this is the way we are going to do it." Place the first set of randomly ordered pictures in front of the subject, and spread the eight word cards around the pictures so that all the words are visible and within easy reach of the subject. "Look at the picture, tell me what it is a picture of, then find the word that goes with the picture, and tell me the word." The subject was allowed to either point to the word card or pick up the word card. Seven seconds were allowed for a response. If subject gives the correct response: "That's right, this word is _____. " If subject gives an incorrect response: "No, this is the word _____."

Point to the correct word. "Say _____. " If subject gave no response: Point to correct word. "This word is _____, say _____. " Turn to the next picture card and repeat. Proceed through all eight picture cards in the same way. Place second set of randomly ordered picture cards in front of the subject and rearrange word cards to prevent subject from memorizing their placement. Follow the same directions through all eight words. Place the third set of randomly ordered picture cards in front of the subject and rearrange word cards. Follow the same instructions through the eight cards. Repeat beginning with the first set of randomly ordered picture cards and continue until the subject matches all eight pictures with the correct words on two consecutive trials or through a maximum of 12 runs through all eight pictures. Record the number of trials on the Data Collection Sheet.

Testing - The subject is given the five tests in the order which came up next in the list of all possible combinations of the five tests.

Word Sentence Context - "And this is the way we are going to do it." Place first set of randomly ordered

sentence cards in front of the subject. "I am going to read this sentence and leave out the word that has a line under it. When I finish reading the sentence, you point to the word with the line under it and tell me what it is." Read the sentence leaving out the underlined word. Remind subject to point to the word left out if he does not. "What is that word?" Wait seven seconds for a response. If subject gives the correct response: "That's right, that word is ____." If subject gives an incorrect response: "No, that word is _____, say ____." If subject gives no response: "That word is _____, say ____." Turn to the next sentence and repeat. Proceed through all eight sentences in this way. Place second set of randomly ordered sentences in front of subject. Follow same procedure through the eight sentences. Place the third set of randomly ordered sentences in front of the subject and continue with the same procedure. Repeat with the first set of randomly ordered sentence cards and continue until the subject pronounces all eight words correctly on two consecutive trials or through a maximum of 12 runs through each randomly ordered set. Record the

number of learning trials on the Data Collection Sheet.

Testing - Subject is given the five tests in the order which comes next on the list of all possible combinations of the five tests.

APPENDIX J

Script for Testing Procedure

Word in Isolation - Place the randomly ordered set of words that was designated test set in front of the subject. "Place your finger under the word and tell me what it is." Wait seven seconds for a response and then proceed to the next word. No feedback was given on the tests. If subject gave an incorrect answer, the examiner turned to the next card.

Word Picture - Place the randomly ordered set of picture cards (designated as test set) in front of the subject and place the eight word cards around the pictures so that they are all clearly visible and within reach of the subject. "Look at each picture--find the word that goes with the picture and say the word." Seven seconds were allowed for a response. No feedback was given on the test. If the subject gave an incorrect answer, the examiner turned to the next picture and went on.

Word-Sentence Context - The randomly ordered set of sentence cards (designated test set) was placed in front of the subject. "I want you to read each sentence. I

can help you with any of the words in the sentences except the words that have a line under them."

When the subject came to the underlined word, seven seconds were allowed for a response. If the subject had not responded in seven seconds, he was asked to continue. No feedback was given during the testing procedure.

Stories - The story booklet was placed in front of the subject. "You are going to read a story that has those words in it. I can help you with any of the words in the story except the words that have a line under them." Open booklet to first page of story. "Would you start reading, please?" When the subject came to an underlined word, seven seconds were allowed for a response. If the subject made no response, he was to go on reading. No feedback was given on target words during the story reading. When the subject came to a word that was not a target word and did not respond in seven seconds, the word was provided and the subject continued reading.

APPENDIX K

Substitutions for the Target Words in "My Friend Joey" Graphic Similarity

kite	balloon	frog	bird	airplane	man	rocket	moon
picture	dish	grass	*beard	*airport	bird	tub	*motel
dish	song	bird	*beard	*airport	moon	motel	*motel
dish	play	turtle	tree	and	astronaut	plane	*mug
cake	play	jug	noise	pot	pilot	*rote	airplane
plane	*brown	pot	egg	they	pilot	*rote	airport
make	*brown	fish	egg	*airport	pilot	airplane	sidewalk
	*boy	*fish	*beard	*airport	pilot	*rote	bird
	*boy	*fish	dad	*apple		jet	bird
	plane	*fite	dad	jet		away	airport
	plane	*fite	*bug	jet		jet	airport
	gun		dish	rocket		jet	plane
	frog			pilot		*airplane	plane
	sky			sky		plane	plane
	air					*airplane	plane
						*airplane	ground
						*airplane	ground
						rabbit	ground
							ground
							sky
							sky
							sky

*Graphic similarity

Substitutions for all subjects were analyzed.

APPENDIX L

Substitutions for Target Words in "My Friend Joey" Semantic and Syntactic Acceptability

Target Word	Lines in the Story												
kite	107 ¹ 107 ²	NR picture	dish dish	NR cake	plane make								
balloon	204 205	dish song	play play	brown brown	boy boy	plane plane	NR gun	C frog	C sky	air C			
frog	303 304	grass C	bird NR	NR turtle	jug pot	fish fish	fish C	fite fite					
bird	402 403	tree NR	NR noise	egg egg	beard beard	dad dad	bug dish	beard beard					
airplane	504 505	and pot	they NR	airport airport	apple C	jet jet	rocket NR	airport airport	pilot sky				
man	504 508	bird C	moon NR	NR astronaut	NR astronaut	pilot pilot	C pilot	pilot C					
rocket	507 509	tub motel	NR plane	rote rote	rabbit NR	NR airplane	rote C	NR jet	away NR	jet jet	C airplane	plane airplane	C airplane NR airplane
moon	507 509 601 604	motel motel mug NR	C C C airplane	airport NR NR NR	NR NR N\$ sidewalk	C C bird bird	C airport C airport	plane plane plane plane	ground ground C ground	C C sky sky	NR sky C C		

NR - No Response

C - Correct Response

Substitutions for all subjects were analyzed.

APPENDIX M

Raw Data

Dependent Variables:

- | | |
|--|--|
| 1. Trials to Criterion
2. Word in Isolation Test
3. Word with Picture Test
4. Word in Sentence Context Test | 5. Word in Basal Story Context Test
6. Word in New Story Context Test |
|--|--|

Boys (Word Method)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1.	11	8	7	7	29	13
2.	12	4	4	4	35	16
3.	12	1	2	1	1	5
4.	8	5	8	3	40	18
5.	12	0	0	1	1	2
6.	9	6	6	7	47	17
7.	6	8	8	8	49	18
8.	6	5	5	3	14	13
9.	6	8	8	8	50	18
10.	6	8	8	8	47	18
11.	3	8	7	8	50	18
12.	7	8	8	8	46	16
13.	4	8	8	8	37	16
14.	6	8	6	8	50	18
15.	8	8	4	7	36	14
16.	7	8	8	8	50	18
17.	3	8	8	8	50	18
18.	5	7	8	8	50	18

Girls (Word Method)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1.	9	5	8	4	17	11
2.	4	8	8	8	49	18
3.	8	8	8	7	49	18
4.	12	7	5	5	34	11
5.	6	8	8	8	50	17
6.	12	7	7	0	18	9
7.	12	7	4	6	28	10
8.	6	8	8	7	46	16
9.	10	8	7	6	33	16
10.	6	8	8	8	50	18
11.	3	8	8	8	50	18
12.	5	8	8	8	50	18
13.	4	7	8	7	43	18
14.	6	8	7	6	49	15
15.	9	4	6	4	42	15
16.	2	7	8	8	45	18
17.	3	8	8	8	50	18
18.	3	8	8	8	50	18

Boys (Picture Method)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1.	4	7	6	4	16	11
2.	7	4	4	2	16	14
3.	4	5	5	8	31	12
4.	6	3	7	5	33	16
5.	4	0	7	0	5	7
6.	6	8	7	4	46	15
7.	5	0	7	1	14	12
8.	2	7	8	4	28	13
9.	5	7	8	4	32	12
10.	5	6	7	2	21	11
11.	3	7	8	6	46	18
12.	4	5	8	5	36	14
13.	2	8	8	6	46	17
14.	3	5	7	6	26	16
15.	2	8	8	8	50	18
16.	4	6	8	7	41	18
17.	3	6	8	6	50	16
18.	2	8	8	8	50	18

Girls (Picture Method)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1.	4	5	8	2	20	13
2.	12	2	4	0	0	12
3.	3	5	8	6	40	14
4.	8	6	7	1	15	1
5.	11	1	2	0	1	0
6.	2	8	8	7	50	16
7.	5	2	8	2	14	14
8.	3	6	8	5	37	14
9.	6	3	8	0	21	12
10.	3	8	8	7	48	18
11.	4	7	8	6	33	12
12.	2	6	8	7	42	16
13.	2	4	8	6	41	15
14.	2	8	8	6	50	18
15.	2	8	8	8	50	18
16.	5	7	8	8	48	18
17.	2	8	8	8	50	18
18.	3	8	8	8	50	18

Boys (Sentence Method)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1.	3	1	5	4	5	11
2.	7	2	4	3	0	3
3.	4	8	6	8	40	16
4.	6	2	2	8	3	2
5.	4	7	8	7	44	17
6.	4	8	8	8	50	18
7.	4	1	1	4	14	10
8.	4	8	8	8	28	18
9.	4	5	5	8	27	16
10.	3	8	8	8	48	14
11.	4	7	6	8	50	18
12.	3	7	8	8	45	18
13.	2	8	8	8	50	18
14.	2	8	8	8	50	18
15.	2	8	8	8	50	18
16.	3	6	8	7	49	18
17.	6	5	8	7	36	17
18.	3	8	8	8	50	18

Girls (Sentence Method)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
1.	3	8	6	8	50	18
2.	3	7	8	6	25	16
3.	3	5	7	7	39	17
4.	8	6	6	7	42	15
5.	12	0	0	3	0	2
6.	4	7	8	8	50	18
7.	3	3	1	6	21	11
8.	3	7	6	8	34	18
9.	3	7	8	8	46	18
10.	3	7	8	8	31	16
11.	4	7	8	8	48	17
12.	3	8	8	8	45	18
13.	4	8	8	8	50	18
14.	3	7	7	8	45	18
15.	3	6	8	7	42	16
16.	3	6	6	6	33	17
17.	3	8	8	8	50	18
18.	3	8	8	8	50	18