WORD ACQUISITION AND RETENTION BY KINDERGARTEN CHILDREN: THE EFFECTS OF METHOD OF PRESENTATION

by

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ABSTRACT

Investigates the use of words in isolation and words in sentences for teaching word recognition to beginning readers. The methods chosen are representative of the contrasting theories of Samuels' focal attention hypothesis and Goodman's contextual hypothesis. Method effectiveness was measured by acquisition trials for eight target words, and retention scores on four tests administered twenty-four hours and three weeks after the initial teaching session.

Subjects were seventy-two kindergarten children randomly assigned to three experimental groups: isolated word treatment, sentence treatment, and control group. Preliminary screening of subjects revealed no prior knowledge of the target words. Subjects receiving treatment, twenty-four boys and twenty-four girls, were taught individually by one of the methods. Testing after twenty-four hours and three weeks included recognition tests of target words in taught conditions of isolation and sentences, in new contexts, and in word designation tasks. Control subjects received only preliminary screening tests and posttests of word recognition after three weeks.

Two-way analyses of variance revealed no significant differences in performance of boys and girls on the tasks of acquisition

and retention, and no interaction effect between method of word presentation and sex of subjects.

Results indicated significant differences for methods of word presentation on trials to criterion ($p < .001$) and total long-term retention ($p < .05$); subjects taught by the sentence method required fewer trials and recognized more words after three weeks. No significant differences were found on total short-term retention ($p < .075$). Analyses of variance revealed no significant differences between treatment groups on recognition tests of words in isolation, new contexts, and word designation; however, at twenty-four hours and at three weeks, the sentence group performed significantly better on the sentence test ($p < .001$). Analyses with repeated measures indicated that subjects taught by an isolated word method performed equally well on tests of word recognition under varied contextual conditions. However, children taught by a sentence method performed significantly better on a word recognition test which matched the learning condition ($p < .0001$.)

Performance with specific target words varied ($p < .0001$) but was not significantly related to word meaningfulness ($\bar{m}$) as established in this study using the procedures outlined by Noble (1952) and Mickelson (1967).

No significant gains were made by the control subjects, indicating that instructional method effected gains in word recognition by treatment subjects.

These findings were interpreted as support for Goodman's contextual hypothesis rather than Samuels' focal attention hypothesis. Implications for educational practice are that sentences can be used effectively to teach word recognition to beginning readers.

Examiners: [redacted]

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CHAPTER I

INTRODUCTION TO THE PROBLEM

Purpose of the Study

The purpose of this study is to examine the acquisition and retention of new words by beginning readers in relation to different methods of word presentation. An attempt is made to determine the comparative effectiveness of teaching new words in isolation or in sentence context. Results of the study are of theoretical and practical value.

Statement of the Problem

The question of the cues children use when learning to read, and the related problem of how to effectively present new words to beginning readers, has been the topic of debate among reading authorities for more than three decades. To date, no consensus has been reached. The problem in this study is to determine if there is a significant difference in the effectiveness of teaching new words by the word-alone method and the word-sentence method. To be effective, a method must enable a kindergarten child to acquire new words quickly and to retain them successfully for both short- and long-term periods. This study analyzes the two methods in terms of these criteria.

Background Information

Reading is a complex task. It involves the extraction of meaning from arbitrarily-chosen graphic symbols combined in varying degrees of difficulty. Researchers have long agreed that the recognition of words is essential to the task. However, controversy over the best method of presenting new words to children has been the basis of dispute among reading theorists for many years.

The issue has been addressed from two main perspectives. One school of thought is that words can be mastered through a stimulus-response approach to learning. This involves the graphic presentation of the word in its isolated form, followed by an oral response from the child. The manner in which the appropriate oral response is determined reflects the instructional method in which the child has been schooled: one method stresses whole words; the other emphasizes phonics.

The whole word method is based on the belief that a word can be recognized by its distinctive attributes, and an immediate oral response to the word can be elicited through repeated presentations of its graphic form. The child discovers similarities and differences in the letter order, length, and shape of printed words, and uses these significant characteristics to distinguish one word from another.

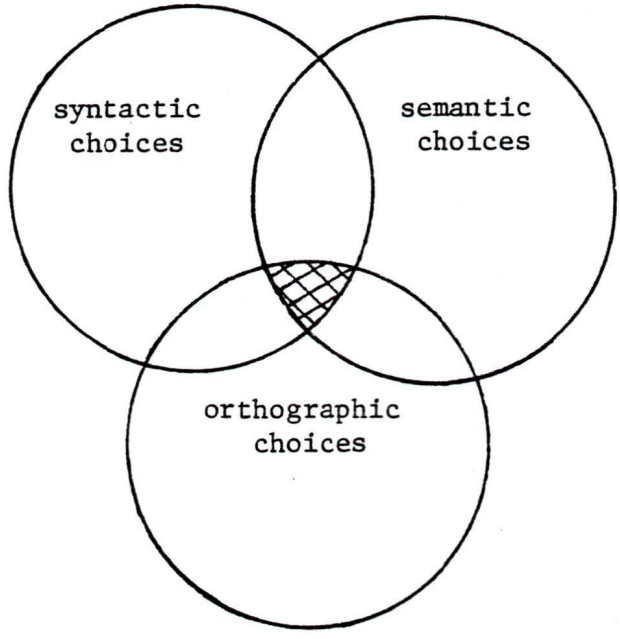
In contrast to this, the phonics method teaches word recognition through grapheme-phoneme correspondences. Like the whole word method, the stimulus is still the graphic form of the word, but the child is

taught to rely on the systematic relationship between letters and sounds. Immediate response is not mandatory because the reader has rules for attacking an unknown word if the need arises. The theory underlying this code-emphasis method is that, given the stimulus and the specific rules to apply to that stimulus, a response is inevitable.

The second school of thought views reading as a whole language task. The recognition of words is important in terms of the meanings they express. Words are presented in sentence context, using language natural to the child. The relationship among words is thought to be as important as the words themselves, for it is through this interaction that the print conveys its message. This meaning-emphasis approach teaches the reader to use all three cue systems to comprehend print; that is, to incorporate the orthographic cues, the syntactic cues, and the semantic cues in an effort to derive the meaning represented by the words. This view is based on the theory that the reader has an understanding of his language system which can be utilized in the reading task. Word recognition, then, is part of a process, and not an end in itself.

It is clear that there is some division on the issue of the best approach to the problem of helping children learn to read. That word recognition is one of the hurdles to be overcome by the beginning reader is one source of agreement among reading authorities. Regardless of favoured method, theorists concur that the purpose of print is to convey meaning, and that the representatives of this meaning are words.

Upon encountering a new word, the reader is faced with innumerable choices. First, every word belongs to the entire set of words which comprises the language. More specifically, the reader can choose from the subset of words that have a particular orthography: perhaps the words in the language that begin or end with the same letter, or have some orthographic feature that the reader identifies as distinctive. Another option is to choose from the subset of words which can satisfy the grammatical position and function of the word in the sentence. A third subset from which the reader can choose is those words which are related in meaning to the unknown word. The following is a visual representation of the choices which face the reader as he encounters an unknown word:



(adapted from
Pearson, 1976)

The intersection of these choices is the precise word which fulfills all the requirements. The reader's task is, indeed, complex, and directly dependent on his/her ability to delimit choices.

Reading authorities are divided in their beliefs concerning the amount of visual input the reader can efficiently process. Two reading theorists who represent the extremes of the controversy are S. J. Samuels and Kenneth Goodman.

Samuels, in his focal attention hypothesis, maintains that, although context and/or pictures can cue or prompt 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 item, the unknown word, and "he may not acquire appropriate responses to the graphic features of the word itself " (Singer, Samuels, & Spiroff, 1974, p.558). Thus, he may appear to recognize the word but, when tested on it in isolation, he cannot produce the word. Samuels, then, recommends that the child learn new words in the absence of other stimuli (i.e. by the word-alone method).

Goodman (1970) proposes that the syntactic and semantic cues available to the child when the word is presented in context are vital components of the reading process. By presenting words in isolation, the child is deprived of the assistance provided by his competence in oral language. Forcing him to rely on only the visual cues within the word is making an easy task difficult. He dismisses the very notion by replying, "There should never be an argument whether to start with code

or with meaning because the code only operates in relationship to meaning." (1971, p.498.) Goodman, then, maintains that the child should learn new words in the context of other words (i.e. by the word-context method).

A re-examination of the visual model of choices facing the reader when he encounters an unknown word demonstrates that, eliminating the semantic and syntactic cues as is suggested by Samuel's focal attention hypothesis does, indeed, narrow the field of responses. The child's attention is free to focus on the orthographic features of words. Some limited syntactic information is still available to the reader, but its reliability is shaken by the fact that words can belong to more than one form class (e.g. cooking: Mom is cooking a turkey. Are these cooking apples?). Limitations, too, are put on how much semantic information is available from a word in its isolated form. Unless the child can already read the word, he has no assistance in determining its meaning. Also, simply being able to pronounce the word does not guarantee an awareness of its meaning.

Goodman's hypothesis is certainly a description of the process engaged in by fluent readers. However, the question concerning the degree of resemblance between the beginning reader and the mature reader is still unanswered by reading authorities. There is a possibility that the processes differ greatly, and depend to some extent on the amount of attention needed by the beginner to learn new words.

Careful consideration of the juxtaposition of the theories of

S. Jay Samuels and Kenneth Goodman invites the following questions about methods of teaching word recognition:

1. Does a sentence context serve to distract the beginning reader, as suggested by Samuels' focal attention hypothesis?

   or Does a sentence context serve as an aid to the beginning reader, as suggested by Goodman's contextual hypothesis?

2. Is one method of word presentation more effective in terms of teaching beginning readers to respond accurately on a test of word recognition administered twenty-four hours after the initial training session?

3. Is one method of word presentation more effective in terms of teaching beginning readers to respond accurately on a test of word recognition administered three weeks after the initial training session?

4. Is there an interaction effect between the sex of the subject and the method of presentation in either the acquisition or the retention of new words?

5. Do subjects taught by one method of presentation perform equally well on a variety of tests of word recognition, or do they perform better on a test that is the same as the teaching task?

Significance of the Study

Word recognition is one of the skills basic to the reading process.

Two conventional methods of teaching word recognition to young children are the word-context method and the word-alone method. The latter method has been widely accepted and practised by classroom teachers for many years. However, recent renewed interest in the language experience approach to reading instruction and the popularization of the cloze procedure for diagnosing progress in comprehension has revived speculation about the success rate of the word-context or whole sentence method of teaching new words.

This study has practical value in that the efficiency of each method is examined in terms of rate of word acquisition, and success in both short- and long-term retention of eight taught words by kindergarten children. The theoretical question concerning Samuels' focal attention hypothesis and Goodman's contextual hypothesis is realistically tested by the learning behaviour of beginning readers in word recognition tasks.

Assumptions of the Study

This investigation is based on the following assumptions:

1. Random sampling procedures provide a representative sample of beginning readers.
2. Non-inclusion of children who recognize any word on the preliminary screening test excludes those children who are beyond the beginner stage in reading.
3. Studies which test taught words in a condition similar to

only one of the teaching methods may bias results toward that method.

4. Eight words are representative of the number of words taught in a classroom reading lesson.

Limitations of the Study

This investigation was conducted and the results were 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 not typical of the on-going nature of reading instruction in the natural classroom setting.
3. The word-sentence situation is atypical of "contextual" studies in that four words within one sentence were all chosen as target words, rather than the usual situation of a single target word within a sentence. However, the use of words comprising a sentence is assumed to be more representative of the whole language or whole sentence approach to beginning reading.
4. The time spent with the control group was not equal to the time spent with the two treatment groups. The removal of

the teaching element from this group eliminated the need for a twenty-four hour retention session, and shortened the testing time in the other two sessions.

Definition of Terms

The following terms have been formulated for use throughout the study.

word-alone method or isolated-word method: The teaching method which involves presenting target words singly, unaccompanied by any pictorial or graphic cues other than the letters comprising the word.

word-sentence method: the teaching method which involves presenting a sentence composed completely of target words; every target word within the sentence is semantically and syntactically linked to every other target word.

word-context method: the teaching method which involves presenting one target word within a printed sentence, such that the surrounding semantic and syntactic information limits the choice of what a particular word or words may be.

beginning readers: kindergarten children randomly selected for the study, and who knew none of the eight target words.

target words: the specific eight words taught to the subjects.

criterion: two consecutive correct responses for a target word.

trials to criterion: the number of teach/test trials required by a subject to attain criterion on a word.

total trials to criterion: the total number of teach/test trials for eight target words.

word acquisition: the point at which a subject achieved two consecutive correct responses for a word.

word recognition or word identification: the act of identifying a target word by saying its name when it was graphically presented. For example, when the experimenter asked, "What is this word?", the subject replied, "_____."

short-term retention: recognition of target words twenty-four hours after the teaching session.

long-term retention: recognition of target words three weeks after the teaching session.

isolation test: the retention test in which target words were presented in isolation, the condition that matched the word-alone method of presentation.

sentence test: the retention test in which the target words were presented in the sentence condition that matched the word-sentence method of presentation.

new context test: the retention test in which the target words were presented in a context which was different from both treatment conditions.

word designation test: the retention test which involved finding,

pointing to, and naming an unspecified target word (or extraneous word) in a new sentence context. For example, when the experimenter asked, "Are there any words here that you know?", the subject replied, pointing to a specific word, "This word is _____."

stimulus-response: the act of eliciting a response by presenting a stimulus.

phonics: the code-emphasis system of phoneme-grapheme correspondences.

psycholinguistics: the scientific discipline which applied knowledge and basic principles from both psychology and linguistics.

word meaningfulness ($\bar{m}$) : the mean frequency of continued written associations made by subjects within a 60-second time interval; $\bar{m} = \frac{\Sigma R}{N}$ (Noble, 1952).

Summary

The purpose of this study is to investigate the effectiveness of teaching word recognition to beginning readers by presenting words in isolation or words in sentences. These two methods are representative of different theories concerning word recognition and its relationship to the reading process. The theory underlying the isolated-word method is based on a stimulus-response approach to learning; repeated presentations of the graphic form produces an automatic oral response. The whole language approach, in contrast to this, regards word recognition as an

integrated part of the reading process; words are recognized in the context of other words in order to preserve meaning. With respect to these contrasting theories, this chapter discusses the purpose and significance of the study, the background to the problem, and questions arising from previous theories of word recognition in relation to the reading process. Assumptions and limitations of the research study are delineated, and definitions of pertinent terminology are given.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

The review of literature presented in this chapter centers around three interrelated fields of research: word recognition as it relates to the reading process; studies which investigate methods of instruction in word recognition; and the cues or conditions that assist readers in the identification of words.

Word Recognition and the Reading Process

One of the important capabilities in learning to read involves the recognition of words. Meaning, the ultimate goal of reading, is symbolically encoded, and without the recognition of words, the reader cannot tap the intended message. For this reason, word recognition has been a central subject of debate for many decades. The acquisition of the ability to read printed words by beginning and mature readers has been a primary concern for theorists and practitioners alike because, encompassed within this topic is the issue of which skills and experiences are most important in beginning reading.

The components of skills necessary to the reading process have been summarized by John B. Carroll (1976). Though there is little agreement among reading authorities on the order of their significance, the following list encompasses the majority of opinions in the field.

Carroll states it thus:

1. The child must learn the language he is going to learn to read.

2. The child must learn to dissect spoken words into component sounds.

3. The child must learn the left-to-right principle by which words are spelled and put in order in continuous text.

5. The child must learn patterns of correspondence between letters and sounds,...that will help him recognize words.

6. The child must learn to recognize printed words from whatever cues he can use--total configuration, letters, sounds, meanings.

7. The child must learn that printed words are signals for spoken words and that meanings can be apprehended from these printed words.

8. The child must learn to reason and think about what he reads.

(adapted from Carroll, 1976, p.13-15)

The long-continued debate over the superiority of a code-emphasis approach or a meaning-emphasis approach to reading is actually a debate over the best order for teaching these skills. The task of the beginning reader is to acquire eight separate component skills which the mature reader incorporates simultaneously.

For beginning reading, some authorities stress the importance of mastering letter-sound mapping skills followed by exposure to translating speech from print, or the more difficult task of converting print to speech (Liberman & Shankweiler, 1976). Jeanette Chall, in

her 1967 survey of research literature and programs of instruction entitled Learning to Read: The Great Debate, concluded that code-emphasis approaches produced better results, at least up to the end of the third grade. Dykstra (1968) came to the same conclusion in his comparison of code- and meaning-emphasis beginning reading programs. In testing children on six reading variables, he discovered that children on code-emphasis programs performed better on virtually all scores.

Recognition of words quickly and automatically is seen as the key to successful reading by some theorists. This need for a rapid response is the foundation of the sight-word approach to reading: the reader must acquire an automatic response to the graphic stimuli comprising the word. The visual information in a word is processed in varying stages of speed and accuracy until finally the point of automaticity is reached (LaBerge & Samuels, 1974). Not until then is the attention mechanism free to focus on other sources of information in the reading task. Support for this theory of automatic information processing comes from studies that compare good and poor readers, revealing that skilled comprehenders are more rapid at oral word processing, regardless of word frequency or type (Perfetti & Hogaboam, 1975).

Singer (1978) proposes that words should be presented for learning with no other external cues to allow the beginner to focus his attention on the printed words themselves. Pictures and context assist the child in making rapid initial progress; however, they only serve to distract when similar words are introduced, when synonyms occur, or when students

are asked to transfer their word recognition abilities to novel words. Samuels' focal attention hypothesis is given as an explanation of these results.

Another view of the most important experiences in reading is that of the psycholinguists who suggest the practice of learning the meanings of printed words as they appear in larger sentence and story contexts. Goodman (1972) states that children come to the reading experience with a well-developed understanding of the language system. He has already mastered the oral code and can use his knowledge of syntax and semantics to aid his progress in reading. He warns, "Language cannot be broken into pieces without changing it to a set of abstractions: sounds, letters, words....Broken into bite-sized pieces,...language has to be learned abstract piece by abstract piece; the learner then needs to relearn how to use the pieces in the reading task." (1972, p.507). Instead, Goodman suggests using a whole language approach in which the reading tasks resemble the reading process, rather than a set of subskills which become an end in themselves.

> Beginning cues in reading are graphic, obviously. But there has been an exaggeration of the importance of these cues. They are misused when taught out of language context, because they are of value only in language context.
> (K. S. Goodman, 1971, p.460)

Frank Smith (1971), a proponent of learn-to-read-by-reading, supports most of Goodman's concepts. He vehemently opposes those who suggest a code-emphasis approach to reading. Instead he proclaims that letter identification and the comprehension of meaning interefere with one

another's progress. He uses a feature analytic model to explain the reader develops his own means of eliminating alternatives in print by forming critical sets of features, and the sequential redundancy aids in his identification of words and letters. Two main assumptions about fluent reading are rejected by Smith (1971): that the identification of letters is necessarily a preliminary to word identification, and that identification of words is a prerequisite to comprehension. Rather, it is possible to recognize a word without actually identifying its letters because it is exactly the word that was anticipated from the contextual flow; in the same manner, often a sentence is read without attention to specific words, and yet comprehension is not lost. The explanation for these occurrences is that there is a reduction of uncertainty on the part of the reader due to the redundancy in orthographic, syntactic, and semantic cues.

Miller (1965), in his description of the principles underlying psycholinguistics, refers to the redundancy in spoken language. He explains that processing meaning is less difficult if the reader heeds the constraint made by syntactic structure as it imposes groupings that govern the interactions between the meanings of words within sentences, and warns against teaching the meanings of words in isolation. Miller advises that the meaning of an utterance is not the linear sum of the meanings of words that comprise it. Language and reading are clearly not situations in which the sum of the parts is equal to the whole.

Thorndike (1917) made this same observation in his examination of

errors on comprehension questions by sixth graders. His proposition that reading requires reasoning grew from an insight that mistakes in comprehension were often made when students did not attend to the total meaning of a sentence, but rather tried to interpret its parts. He states,

> ...reading is a very elaborate procedure, involving a weighing of each of many elements in a sentence, their organization in the proper relations one to another, the selection of certain of their connotations and the rejection of others, and the cooperation of many forces to determine final response. (1917, p.323)

Much of the controversy over the whole language, whole word, or phonics approaches, according to Barron (1978) is based on differing conceptions of how fluent and beginning readers obtain access to the meanings of printed words. The research literature in this area spans single-word meanings as well as meanings of phrases and sentences. Barron concludes that auditory (phonetic) processing and visual (graphemic) processing can both provide access to lexical meaning. Fluency in reading, however, means knowing when to use the most appropriate cue.

To summarize, Carroll's statement concerning the disagreement by reading authorities on the issue of the best order of presentation of the eight reading skills is demonstrated by their differences in emphasis on word recognition.

Studies of Methodology

Studies investigating methods of instruction and word identification

are plentiful, and involve presenting words in isolation, with pictures, with objects, with oral context, in printed context of sentences or stories, in fixed or random order, or any combination of these conditions. Lists of target words have included nonsense words or syllables that are similar and dissimilar in configuration, of high and low frequency, with regular and irregular spellings, from different word classes, and of varying degrees of concreteness, imagery, and meaningfulness. Analyses have involved trials to criterion, error rates, error types, transfer performance, rate of retention, and the probability of correct responses.

For the purposes of this study, the review in this section is limited to research involving instruction with words in isolation or words in context. Some mention is made of word-picture studies as they relate to Samuels' focal attention hypothesis. Cues and conditions of learning are examined in the next section.

Word and Picture Studies

One of the prominent figures in research involving comparison between methods of word presentation is S. Jay Samuels. Concerned with the functioning of pictures and other stimuli as distracting rather than facilitating word learning, he has conducted extensive experiments to test this hypothesis. His first experiment (1967) involved 30 pre-first grade children who were trained to recognize four words. The three conditions were no picture, simple picture, and complex picture. Ten acquisition trials were alternated with ten test trials. Analyzing

the number of correct responses indicated that on the acquisition trials, results favoured the simple-picture group, whereas on the testing trials, results favoured the no-picture group.

Samuel's second experiment (1967) was closer to a natural classroom reading situation. Using 26 pairs of matched first graders, whom he had pretested on 50 words in isolation, he again investigated the effect of pictures and no-pictures on reading improvement. Following the pretest, both groups read a story containing all the target words, the only difference being the presence or absence of pictures in the mimeographed story book. The posttest was identical to the pretest and showed that, with good readers, there was no significant difference between the two treatment groups in increased word recognition; with the poor readers, however, the no-picture group learned significantly more words.

The results of both experiments led to Samuels' explanation and acceptance of the focal attention hypothesis. Any stimuli other than the target word itself interrupts the learning of the word and "less capable students (were) more distracted by the stimuli than the more capable students" (1967, p. 341).

In an effort to test Samuels' theory, Dollinger & Walker (1978) tested kindergarten children from two different socio-economic backgrounds on their retention of eight low-frequency words taught by word-alone, word-picture, or word-object methods of presentation. Children in upper-middle and lower-class schools performed best when taught by word-alone method. No significant difference in retention

by the 144 children was found for the 24-hour period or the 7-day rest period.

Contrary evidence on the word-alone/word-picture issue has recently appeared in the literature. Montare, Elman, & Cohen (1977) replicated Samuels' (1967) experiment I. After describing major difficulties with his study, they analyzed their data with different statistical treatments and concluded that pictures did not distract children from learning sight words, and were facilitative in teaching words with the same initial consonant.

Arlin, Scott, & Webster (1979) agreed with some of the objections raised by Montare et al., and further discussed the confounding of results in previous studies, including Samuels', by the medium of presentation and voice feedback. They note that the word-picture treatment required less verbal feedback since the picture prompted the correct response. In the word-no picture treatment, the graphic stimulus was not sufficient to prompt correct responses, so more verbal feedback was necessary. Arlin et al. conducted their study with voice feedback regardless of correct or incorrect responses from the subjects. Their results revealed that pictures presented with words facilitated rate of acquiring sight words; the best condition appeared to be presentation of picture plus word, followed by voice feedback.

This latter conclusion agrees with the results obtained by King and Muehl (1965) in their study of two kinds of word lists with 210 kindergarten children. Five methods of teaching were compared: picture, auditory, picture plus auditory, auditory and echoic responses,

and pictures, auditory and echoic responses. Results indicated, as in the Montare study, that picture and echoic methods were superior with similar words.

There is no consensus in the research concerning the use of pictures to assist the beginner in learning new words. Contradictory evidence in the issue has not resolved the question of whether pictures assist the reader by providing context or whether they distract the reader by providing an excess of stimuli. Further attempts at solving this dilemma have involved investigating the effect of printed context on word acquisition by beginning readers.

Word, Picture, and Context Studies

As a consequence of Samuels' studies in 1967, and the upsurge of interest in the psycholinguistic approach to reading instruction, research began to investigate the area of contextual influence on word recognition.

An often-quoted study was done by Hartley (1970) with 127 grade one Caucasian and black children assigned to word study groups using either word-alone, word-context, or word-picture presentations as the method. The word lists were classified as minimal contrast (words which were alike except for one element) and maximal contrast (words which had no elements in common). The children were given ten study/test trials on each group of four words, followed 24 hours later by a test of word recognition in isolated form. A transfer test of four real words and four nonsense words was

administered after all sixteen words had been presented. Five days later, a final posttest of the total word list was given. Hartley found that the main effect of ability was significant on all tests. On the transfer test, results favoured the word-picture group; the word-alone group performed the poorest. An interaction effect was operating between list types and method; word-context was most successful with maximal contrast words and word-alone was most successful with minimal contrast words. Hartley concluded that different presentation methods are suitable for different list types.

Pursuing this same question, Singer, Samuels and Spiroff (1974) studied the effects of word-picture, word-no-picture, sentence-picture, and sentence-no-picture methods, with 164 grade one and two students. Subjects were taught oral responses to four words printed in an artificial alphabet. Results revealed that on learning the words, the word-no-picture group needed the fewest trials to criterion and yet still had the most correct responses. Samuels et al. concluded that:

> the superiority of the word-no-picture condition is explained by the fact that the only cues that the child could attend to were the graphic stimuli of the words themselves, and visual attention is an essential condition needed for learning to identify the words. (1974, p. 565)

They stress, in an effort to resolve the focal attention/contextual debate, that Samuels' theory is concerned with the learning process, whereas Goodman is testing the reading process. Therefore, they recommend that for best results in word recognition, teachers should

present words in isolation, but that not all reading should be taught that way. Four interesting points to note about this study is that, once again, words were tested in isolation, although only one group was instructed by that method of presentation. Secondly, the warm-up training trials and testing trials were all done at one sitting, which is not a severe measure of short-term retention. Also, the sentence contexts given to the subjects were not semantically rich enough to permit much prediction (e.g. Fill the _____. The _____ is pretty. The _____ Sleeps. The _____ flies.). Finally, the target words were presented in an artificial alphabet, which is not analogous to the task faced by the beginning reader. Some orthographic familiarity is characteristic of young beginners, so the observations of Samuels, Singer, & Spiroff may be atypical, and limited in their generalizability.

In a further attempt to investigate the contextual/isolation dichotomy, Wood (1976) analyzed the use of words in isolation, words with pictures, and words in sentence context to teach 108 grade one children eight new words. The target words were chosen from a basal reader, and immediately following teaching trials, each child was tested in four ways: words in isolation, words with picture, words in sentence context, and words in story context. Tests were randomly ordered and administered to each group to avoid teach/test bias. Significant differences were found on the trials to criterion, with the sentence context group requiring the fewest trials and the isolated-word group requiring the most trials. In the isolation test, subjects

taught by the word-alone method performed significantly better than the sentence-context group, but not significantly better than the word-picture group. In the sentence-context test, those children taught by the context method recognized significantly more words than the picture-trained group but not significantly more words than the word-isolation group. No significant differences were found between groups on the word-picture or the story context tests. In her discussion of the study, Wood suggests that the story context provided very little semantic or syntactic information to the reader. Five of the target words possess the characteristic of being able to go up or to fly, which offered the reader little assistance when many of the story sentences were encountered (e.g. That _____ can fly). Further examination revealed that even the episodic nature of this particular story did not seem to build context for the target words; for example, five of the seven paragraphs began with the sentence "Little frog saw a _____". The potency of the syntactic and semantic information within a sentence or story is clearly a factor influencing the performance of the reader; print which provides little linguistic information to the reader is not a strong test of the contextual hypothesis.

Considerable contribution to the area of word learning has come recently from the research of Linnea C. Ehri (1974, 1975, 1977, 1979). In her study of children from ages four to six, she taught five words as oral responses to meaningless line drawings. For all

readers, context-free words (nouns, adjectives,) took less time to learn than context-dependent words (past tense verbs, prepositions, and functors). Although she had hypothesized that defining contexts would influence performance positively, the results indicated the opposite effect; providing a sentence context did not make it easier to learn either word class. Ehri explained these results as a consequence of the inability of prereaders to segment meaningful sentences into component parts. Ehri hypothesized that lexical awareness develops as a result of learning to read.

In a more recent investigation (Ehri & Roberts, 1979), context and isolation methods of word learning were employed with 37 grade one children at the end of the year. Several pretests were given to measure various aspects of the readers' knowledge of the printed language, followed by word recognition training on 16 homonyms. Procedure involved either homonym presentation in printed context or in isolation with accompanying oral context. Finally, various posttests were administered to measure the effects of training. Results indicated that the isolation group performed significantly better on 1) identifying correct spellings of target words, 2) quickly reading the list of homonyms, and 3) making greater gains in the number of words correctly identified between the pretests and the posttests. The context group, however, performed significantly better on 1) producing oral sentences with homonyms, and 2) learning several additional words that were included in the printed context

condition but which were only available in oral form to the isolation group. This reveals an interesting separation in the type of gains made in word learning by the two groups. Context-trained subjects remembered more about the semantic/syntactic qualities of printed words, whereas isolation-trained subjects remembered more about the orthographic identities of words.

Ehri interprets these results in terms of her theory of amalgamated word learning (1978, 1979). She proposes that words have several identities; a pronunciation or phonological identity, a characteristic form class or syntactic identity, and a meaning or semantic identity. As the reader becomes able to store a printed word in his lexical memory, it becomes amalgamated with the semantic and syntactic identities that may have already been acquired in the process of learning to speak. Presenting words in isolation limits access to the semantic identity of the word, whereas presenting words in context dilutes the orthographic identity of the word. Ehri advises, "Present findings underscore the importance of distinguishing and studying both types of knowledge as they emerge, interact, and contribute to the process of learning printed words" (p. 684).

Exposure to print and the degree of experience that an individual brings to the reading task raises the issue of the differences between beginning and mature readers. The discrepancy between linguistic knowledge of readers and prereaders is reported by notable

authorities (Ehri, 1975; Downing & Oliver, 1973; Downing, 1978; Lundberg & Torneus, 1978). Perhaps a similar discrepancy exists between the use of context by beginning readers and mature readers. A second issue raised by this latest study of Ehri's is the relationship between quick and accurate performance on a word list and the ability to read in larger contexts. These questions are examined in following sections of this review.

Context and the Mature Reader

Morton (1974a) and Tulving & Gold (1963) have demonstrated that the visual duration threshold for words is reduced in the presence of congruent context. Morton's experiments with 24 female college students revealed that fewer visual cues are needed for the word to be perceived and reported accurately if the context is highly predictive of the target word. Tulving & Gold found with university students that the amount of stimulus needed was an inverse function of the amount of information available from other sources: the visual duration threshold decreases with increasing the amount of congruous context and increases with increasing the amount of incongruous context. These results are interpreted as support for a hypothesis theory of perception (Bruner & Postman, 1951) which states that perception depends on two classes of variables: 1) the stimulus factors, and 2) the expectations or hypotheses of the organism (cited in Tulving & Gold, 1963). Frank

Smith echoes this concept in his description of fluent reading: "meaning is being used as part of the non-visual information to reduce the amount of visual information required to identify words" (1978, p. 159). The role of meaning in paired-associates tasks and in the reading process in general is discussed in more detail in a later section of this literature review.

Klein & Klein (1973) examined the function of contextual information in a word identification task by university students. The problem was to separate a string of letters into words. The speed and accuracy of word recognition by the students were determined largely by the contextual richness of the material; the students progressed slowly with a random string of words, and quickly with a semantically-probable and syntactically-correct string of words. These results were interpreted as support for Neisser's theory, cited by Klein & Klein, as:

> high speed sequential identification of words cannot be explained in terms of the successive deciphering of stimulus units....Predictive, hypothesis generating behaviour seems to be involved with prior context used as a basis for inferring properties of materials to come.
> (Klein & Klein, 1973, p. 399)

The ability to predict using context varies from reader to reader. Several studies have indicated that fast readers tend to make more use of contextual constraint than poor readers. Morton discovered that, as the reading material became more closely approximated to orthodox English, fast readers' speed in reading increases

proportionately more than the speed of slow readers (1964b). Klein, Klein & Bertino (1974) diagnosed 90 grade four and grade six students and found that, as random information approached coherent information, the performance improved for subjects at both grade levels. However, the older students used contextual information more efficiently than the younger students, implying that developmental changes take place in the utilization of contextual constraint.

Aborn, Rubenstein & Sterling (1959) concluded that length, distribution, and grammatical structure of the context are independent effective sources of constraint on words. The accuracy of word prediction increases with a length of five to ten words of preceding context; however, even greater constraint is placed on a word if the printed context is distributed on both sides of the target. Predictability of the target word is lowest when it appears in the final position in the sentence.

Experiments with children have been conducted to investigate their ability to recognize words in semantically related and unrelated contexts. Schvaneveldt, Ackerman, & Semlear (1977), using 24 grade two and 24 grade four students, reported that a semantic context facilitated both the accuracy and speed of the response at all ages. Based on an experiment with 20 grade four children, Samuels (1980) likewise concluded that the effect of associative connections on word recognition speed was highly significant.

The literature indicates that mature readers do use context to assist in word prediction and identification. The next section reviews studies which investigate the use of context by beginning readers.

Context and the Beginning Reader

Samuels (1966) investigated the speed of word recognition when pairs where learned by 44 grade one students in a word association task. He reported that, when the word presented was the expected one, the mean recognition score was 1.46 whereas when an unexpected word was presented, the score dropped to .84.

In a study of grade one and grade three children, Pearson & Studt (1975) concluded that grade level, contextual richness, and word frequency all affect success in word identification. Target words were synonymous pairs of low and high frequency words of at least four letters. The investigators reported that the grade three children needed less visual stimulus than the grade one children, that all children needed fewer letters presented to identify high frequency words than to identify low frequency words, but that, for both levels of word frequency, fewer letter clues were needed as the context increased in richness, indicating that context was successfully used to assist prediction at both age levels.

Juel (1979), in a comparison study of 72 grade two and three students of high, average, and low reading ability, tested them on

reading words in isolation, in poor context, and in moderate context. Good readers were better at identifying all words, including low frequency words with which they depended more heavily on context assistance; for the majority of their reading, they knew automatic responses for words. Poor readers used a sight approach when forced to in the isolation test, but switched to context support whenever it became available. Average readers fluctuated between sight recognition and the use of context.

The literature indicates that beginning readers do use contextual information to assist in word recognition. The next section investigates the performance of readers on tests of word recognition with word lists as compared to word recognition in printed context.

Reading Performance in Isolation and in Context

There is some disagreement as to the relationship between success in reading words in isolation and reading connected text.

Shankweiler and Liberman (1972) reported studies that included the reading of both word lists and paragraphs. Subjects were four groups of school children all of average or above-average intelligence: 20 second-grade boys, 18 third-grade children, 30 third-grade boys and girls, and 20 fourth-grade boys. The correlation of scores indicated that there was a high relationship between ability to identify printed words and skill in reading connected text.

Shankweiler and Liberman conclude that:

> These correlations suggest that the child may encounter his major difficulty at the level of the word--his reading of connected text tends to be only as good or poor as his reading of individual words. (p. 298)

They continue with "...it would appear that the slow rate of reading individual words may contribute as much as inaccuracy to poor performance on paragraphs" (p. 299). The ability to read words accurately and quickly in isolated lists is an indication of reading performance in contextual conditions, according to these two researchers.

Perfetti and Hogaboam (1975) give support to this belief in their findings that skilled comprehenders are more rapid at oral word decoding than less skilled comprehenders; the discrepancy in ability was wider in the processing of pseudowords and low frequency real words than in highly familiar words. Samuels, Begy, and Chen (1976) reported the superiority of good readers on speed of word recognition, and interpreted these results in terms of the theory of automatic information processing (LaBerge & Samuels, 1974).

Dahl (1975) compared two groups of grade three children on their ability to use visual context to predict target words when given the initial consonant. After receiving seven months of training in predicting words in an isolated condition before advancing to using visual context, the trained group performed significantly better than

the control group which received no training. Dahl states that "to be able to use context as an aid in recognizing a target word, the reader must be able to recognize the words in context accurately and quickly" (p.209). She recommends that there is a need to go beyond accuracy to automaticity and that, by beginning with word training in isolation and advancing towards sentence processing, children can improve their skill level.

Contradictory advice comes from Oaken, Wiener, and Cromer (1971). After training poor readers in grade five to read all the target words on flashcards, they discovered that their comprehension of the story was no better than without such training. They suggested that no connection between the tasks was made in the minds of the readers; in the isolated condition, the students attended to the graphic stimuli, but in the connected text, they were confused by the syntactic and semantic cues.

Fleisher and Jenkins (1977) examined the effects of contextualized and decontextualized (isolated) practice conditions on word recognition by six "learning disabled" grade one boys. Students served as their own controls and experienced both instructional conditions twice. The contextualized treatment consisted of practice exclusively in connected text. The decontextualized treatment involved reading in connected text supplemented with isolated word practice. Before and after each treatment, the subjects were tested on recognition of isolated words and on oral reading in

context. Results indicated that decontextualized practice produced significantly better scores on isolated word recognition, and that contextualized practice was better than no practice at all; however, the instructional treatments did not differentially affect oral reading in context as measured by rate or accuracy. Therefore, even though recognition gains in isolation were made in the decontextualized practice condition, there was no tranfer to the contextual task.

Kenneth Goodman (1965) opposed the concept that success in reading a story had to be preceded by success in reading words on a list. Grade one, two, and three children were tested individually on a word list, followed by the oral reading of a story from which the word list had been chosen. Many of the children were able to read words in context which they had missed on the isolated list. Goodman interprets these results by saying, "In lists, children had only cues within printed words while in stories they had the additional cues in the flow of the language" (1965, p. 640).

Levitt (1970) replicated Goodman's study on the grounds that there may have been a practice effect operating in that the children all received the words in isolation before they were tested in context. She tested forty words with 26 mentally-retarded and 24 normal first grade children. The only difference in procedure was that Levitt alternated the order of reading in isolation and reading in story context with successive subjects.

The results confirmed Goodman's; provision of context produced significant improvement in the reading performance of mentally-retarded and normal children.

The number of errors in reading is not the only method of determining success or improvement. Analyzing the quality of errors can assist in discovering the extent to which beginning readers attend to context or to orthographic cues. If Goodman's theory is correct concerning the difference in performance on isolated word lists and reading in context, then the types of errors made in context should provide more information about the process of reading for beginners. According to Goodman and Burke (1970) miscues "are produced in response to the same cues which produce the expected response and ... the same mental processes are involved in generating both expected and unexpected responses" (p. 121).

Clay (1968, 1969) studied the errors made by 100 five-year old children in New Zealand, based on weekly reading samples throughout the school year. Her analysis of 10,525 errors revealed that 79% of the single word substitutions were grammatically equivalent to the correct responses. Only 41% of substitution errors were based on letter/sound cues. Verb errors agreed in number and tense in 55% of the responses. Pronouns, a rather restricted form class, were corrected in 60% of the cases, whereas the more varied category of nouns reflected only 20% correction rate. Clay concludes that, "This analysis indicated that the young child's

guesses at points of uncertainty in his reading tend to be dominated by his control over the syntax of his language" (1968, p.437).

Weber (1970a and 1970b) analyzed the oral reading errors of 21 children from one first grade classroom (1970a) and 24 children from another (1970b). From the first classroom, she collected 1072 errors and reported that 91% were found to be grammatically appropriate to the preceding sentence context. More specifically,

> The better readers approximated the correct response more closely than the weaker readers, and both groups improved during the year. The analysis therefore reflected the children's learning of sound-letter patterns, that is, their growing efficiency in the use of information that comes with achievement at the early stages of reading. On the other hand, the analysis on the level of grammatical structure did not indicate that the children had to learn to use the constraints of grammatical structure in reading. Rather, it suggested that from the very beginning the children expected sentences that they read to conform to the structure of the language that they already knew, and that they actively used this knowledge while they read. The appropriateness of the errors to semantic context also supported the conclusion that, without effort, they transferred their capacity for handling spoken language to the reading task.
>
> (Weber, 1970a, p.450)

In her second study, Weber analyzed the reading errors of 24 first grade children and reported that, of 718 errors, 87.7% of the substitutions were grammatically acceptable in terms of the preceding context. In an expanded analysis involving the oral reading errors of the initial 21 children and the additional 24

children, Weber discussed the pattern exhibited by high and low groups. In the first class, the high group made 92.3% syntactically correct responses compared to the low group's 88.9%. In the second class the results were 87.5% (high group) and 89.4% (low group) for acceptable grammatical errors. The difference between high and low groups was more apparent in the error correction behaviour; both groups ignored a major portion of the grammatical errors (73%--high group, 68%--low group) but upon reading the remainder of a sentence, the high group ignored only 15% of the ungrammatical errors whereas the low group continued to ignore 58% of the ungrammatical errors. Weber interpreted these results as proof that good and poor beginning readers depend heavily on the available grammatical information in reading connected text, but that good readers were better than poor readers at correcting errors in retrospect based on their ungrammatical nature.

Another noteworthy longitudinal study of the oral reading errors of 42 children in grade one has been done by Biemiller (1970). He indicates that there are three stages of development in beginning readers: 1) high use of context, 2) a stage of either no-response or high use of graphic information, as evidenced by graphically constrained errors, and 3) high use of both graphic and contextual constraints. Because the children who were the poorest readers were still in the first stage, he suggested that:

> The teacher should do a considerable proportion of early reading training in situations providing no context at all, in order to compel children to use graphic information as much as possible. (p.95)

In an effort to determine if Biemiller's stages were developmental or the result of classroom instruction, Barr (1972) analyzed the word recognition errors of 41 prereaders in grade one. Using either a sight method or a phonics method, she taught each child for 15 minutes and then analyzed his/her errors in connected text. Results revealed that children taught by the sight method had a majority of incorrect responses that came from the words taught during the instruction time. Children taught by the phonics method showed a greater tendency to substitute words that had not been taught during instruction, to substitute nonsense words, or to make no response; in essence, more errors were made on the graphic content. Barr concluded that the instructional method influenced the strategy used by the child.

In a follow-up study (1975b) Barr tested 32 grade one children at the beginning of the school year to see if they had any strategy at that time for determining the identification of words. The children were then divided into two instructional groups based on phonics and sight methods. At the end of the year, Barr re-tested the children and reported that ten out of sixteen children in the phonics group were using phonics as their main strategy, whereas fifteen out of sixteen children in the sight method group were using sight word knowledge as their main strategy. From this, Barr concluded that "the strategies

of the children were determined to a significant degree by the class instructional method" (p.555). Even the children who had some strategy of their own at the beginning of the year changed to fit the class strategy, methods, and materials. Barr suggested that the graphically constrained stage, the second stage in Biemiller's developmental levels, may have resulted from the instructional method of the classroom rather than from developmental causes.

Barr's studies indicate possible difficulties with teaching by one method of instruction and testing in only that mode. Children will perform according to that technique, and a teach/test bias is introduced into many studies in this way.

The methodology studies reviewed in this section illustrate the varying points of view among reading authorities on the question of the relevance of using an isolated word list as an indicator of reading ability. One extreme of the issue is that if a reader can recognize the word in isolation, it is a true indication that word identification is at the automatic stage, which is the ultimate goal. The other extreme proclaims that reading words in isolation is not a natural reflection of the reading act and, as such, puts the reasoning reader at a disadvantage.

Research concerning the similarity between the reading process engaged in by mature readers and that experienced by beginning readers is inconclusive to date. The studies of beginning readers' miscues revealed that strategies employed during this early stage of reading bear some resemblance to those of the skilled reader. But there is still much

debate about the nature of the most important cues used by beginners, and the role of meaning in the reading process. These conditions of learning are discussed in the following section.

Conditions of Learning

Meaningfulness and Learning

Although study in the relationship of meaningfulness to learning dates back to the 1930s (Davis, 1930), it became more conspicuous in the literature after Noble (1952) presented his concept of meaningfulness. The term meaningfulness, or $\bar{m}$, was operationally defined as "the mean frequency of continued written associations made by subjects within a 60-second time interval" (Noble, 1952, p.429). He hypothesized that meaning was a relationship between stimulus and response, and that meanings increase as a simple linear function of the number of stimulus-multiple response connections acquired in the history of an organism. This conception of meaningfulness became generally accepted, and is mathematically denoted as $\bar{m} = \frac{\Sigma R}{N}$ in which $\bar{m}$ symbolizes meaningfulness, R refers to the number of responses, and N is the number of subjects (Noble, 1952).

Evidence of the effect of meaningfulness on learning comes from numerous sources. Noble and McNeely (1957) reported that the rate of acquisition of paired-associate responses by 90 college students was

a positive function of $\bar{m}$. In a review of previous studies and several experiments of their own, Underwood and Schulz (1960) stated that, though they were uncertain of the cognitive mechanisms for meaningfulness, they "concluded first that there are very few variables which produce any marked effect on the rate of verbal learning shown by the adult subjects. Of these few variables, meaningfulness is by far the most powerful" (p.4).

The relationship between meaningfulness and other conditions of word learning became apparent in research in the 1960s. Bloomer (1961) disclosed that, in the learning of 149 words, ease of acquisition was a function of high frequency of word use, and high concreteness of word imagery. He suggested that "the reading teacher will be more effective if greater emphasis is placed upon words which have specific and concrete meanings, and also if greater emphasis is given to making these words meaningful to children" (p.181). More study in the area of concreteness/abstractness was conducted by Paivio. Investigating paired-associate learning by 117 adult teachers, Paivio (1965) deduced that concrete nouns evoke sensory images, which can mediate associative connections between pairs. His results revealed that a concrete noun paired with a concrete noun was the easiest learning condition, and an abstract noun paired with another abstract noun was the most difficult condition. Results of a similar experiment with adults (Yarmey & Paivio, 1965) indicated that there was superior learning, especially when concreteness was in the stimulus position. Paivio and Yuille (1966) obtained the same results with 352 children in grades four, six, and eight when the task was

learning 16 pairs of high frequency concrete and abstract nouns.

Similar conclusions have been drawn by Dukes and Bastian (1966) and Kiraly and Furlong (1974) in their studies of concrete/abstract words, and Hargis and Gickling (1978) on high imagery/low imagery nouns with kindergarten children.

Research on verbal learning has demonstrated that meaningfulness has a facilitating effect. Mickelson (1967) reported that the learning of four separate experimental paradigms by 423 nine-year olds was affected by the meaningfulness level of the words. A study of 224 grade six students with the task of learning noun pairs connected by verbs, prepositions, or conjunctions, indicated that meaningfulness combined with an ordered syntactic structure assisted in making the verbal strings more accurately recalled (Rohwer, 1966). For example, "the running cow _____ the bouncing ball" was more easily recalled if connected by a verb (e.g. chases), or a preposition (e.g. behind); it was most difficult to recall if connected by a conjunction (e.g. and). Rohwer, Lynch, Levin, and Suski (1967) disclosed the same results with 96 children in grades three and six. Miller and Selfridge (1950) discussed recall of verbal material in terms of the short range associations made over a span of five to six words. Contextual constraint dictates the probabilities of words to follow, and it is these familiar dependencies across words rather than meaning per se that facilitates learning.

There is considerable research which demonstrates that, given a choice of stimuli, an individual will choose that stimulus which functions as the most meaningful cue. Underwood, Ham, and Ekstrand (1962) found that, in a paired-associate task involving stimuli which were words or trigrams of different colours, subjects selected words as their preferred cue, and colour as a secondary cue. Results were interpreted in terms of the meaningfulness of words over trigrams. Other experiments which indicate that words function as a meaningful unit have been conducted by Smith (1969), Reicher (1969), Smith and Lott (1970), and Leeds (1976). These studies reveal that letters are identified more easily in words than in isolation, implying that letters are more meaningful and processed more quickly in their natural context.

The efforts of children to build meaning into material has already been illustrated by the review of the literature concerning reading miscues. Semantic processing is evident in the types of errors made. Page and Hocevar (1978) have examined the role of meaningful and non-meaningful reading material with first, second, and third grade children. When the reading content was directly related to a recent concrete experience of the child, there were 25% fewer oral reading errors. The meaningfulness of the material corresponded to the reader's existing cognitive structure. Some authorities (Murray, 1978) designate this to be an important factor in children's success with learning to read through the language experience approach: the reading task is based on the content and structure of the child's experiences, increasing its meaningfulness, and thus decreasing the difficulty of the learning task.

The preceding review indicates that meaningfulness facilitates learning in word tasks. Other conditions which may affect specific word recognition are discussed in the following section.

Cues for Word Recognition

Many researchers have attempted to determine the specific features within a word which assist in its recognition. Concensus on the most important cue has not been reached. The following review is a brief examination of the most notable research in this area.

Configuration studies have occupied a central role in the analysis of children's recognition and perception of words. Marchbanks and Levin (1965), in a prominent study of 50 kindergarten and 50 grade one children, reported that specific letter positions in words formed the basis for word identification. The cues, in their order of preferred use, were first letter, final letter, and second letter. In the acceptance of this study, consideration must be given to the lack of control for history bias, in that the first grade children had received five months of instruction with a whole language approach to reading with emphasis on first letter cues to identify new words in a cloze procedure. However, confirmation on the use of the initial letter as a frequent cue has been received from many sources (Mason & Woodcock, 1973; Liberman & Shankweiler, 1976; Timko, 1970; Leeds, 1976).

Rayner and Hagelburg (1975) and Rayner and Kaiser (1975) caution that word shape in connected text can never appear as a separate entity from

the letters that make up the word, and indicate that their results have shown both first letter and configuration cues are used in identifying words.

In conjunction with the use of letter cues in recognizing words, studies have investigated intralist similarity and its facilitating or debilitating effect on beginning readers. Highly similar words are declared to be more difficult to learn than words low in similarity. King and Muehl (1965) and Elman (1973) reported that pictures aided the acquisition of similar words. Otto and Pizzillo (1970) conclude that, for pragmatic reasons, both low and moderately similar words are recommended for inclusion in initial reading materials. Samuels and Jeffrey (1966a) suggest that, though highly similar words are more difficult to learn, beginning readers should be trained on their recognition; this would force identification on the basis of more than one letter. McCutcheon and McDowell (1969) respond in agreement and report that, once the children in their study had learned the similar words, fewer recognition errors were made, whereas with the dissimilar words many false generalizations were formed, resulting in more incorrect identifications on the posttest.

The previous discussion of concreteness/abstractness as it affects word learning can be applied to the difference in acquisition rate with various form class words. Ollila and Chamberlain (1979), in a study of 80 kindergarten children, revealed that graphic nouns were learned with significantly greater facility than non-nouns, and that more nouns than non-nouns were retained after twenty-four hours. Ehri (1977) observed

that nouns and adjectives (context-free words) were learned faster than verbs, prepositions, and functors (context-dependent words) by four- to six-year olds. Koehler (1971) reported that kindergarten children had more difficulty learning function words than content words taught by a sight method approach. However, contradictory findings are discussed by Richmond and McNinch (1977) who indicate that there were no significant differences between the ease of acquisition of concrete or abstract words by 22 grade one subjects. Chester (1971), in a pilot study with six-year olds, suggested that there is no difference in learnability between content and function words.

The preceding review has demonstrated that specific word characteristics influence their rate of acquisition by beginning readers. The characteristics discussed were initial letter cue, configuration, intralist similarity, and form class.

Differences in Reading Performance by Sex

There is some evidence in beginning reading studies to indicate that there may be a relationship between sex of subjects and initial success in reading. Balow (1963) studied thirteen grade one classrooms in terms of results obtained on three testing measure given throughout the school year: the Gates Reading Readiness Test (September), the Lorge Thorndike Intelligence Test (December), and the Gates Primary Reading Tests (February). Results indicated that girls performed significantly better on the readiness test ($p<.01$) and on the paragraph reading test ($p<.001$).

In 1969, Dykstra and Tinney summarized the data collected on reading readiness and reading achievement for 1659 boys and 1624 girls in grades one and two in Pennsylvania, Michigan, New York, and New Jersey. They noted that, regardless of the method or materials employed, the sex differences in both readiness and reading achievement favoured the girls.

In a study of 88 grade one children, Turnure and Samuels (1972) found that girls scored significantly higher on a word recognition test, and attributed their success to significantly greater attentiveness observed during fifteen classroom visits in a period of a month.

Braun (1969) conducted a study of 240 kindergarten children taught to recognize words by either a word-alone or a word-picture method. The target words were sex-related and interest-loaded, and results revealed that word acquisition and retention were both facilitated by the interest-loading characteristic. Treatment means consistently favoured the sex of the subject associated with the predicted sex-loading. This was particularly conclusive for low ability children.

Research involving older children has also been conducted in the area of sex differences in reading achievement. Gates (1961) analyzed the reading speed, vocabulary, and comprehension scores of 13,114 subjects, 6646 boys and 6468 girls, in grades two to eight. The results of twenty-one comparisons indicated that the mean raw score for girls was better than that of boys, with most of the differences at the significant level. The superiority of the girls' scores was as great at the upper grades as it was at the lower grades.

The evidence of sex differences in reading attainment in several English-speaking countries has been reviewed by Thompson (1975). He has approached the literature in terms of age level, dividing children's reading progress into two categories: under and over ten-years-old. He states:

> To summarize, there is a developmental trend for sex differences in reading attainment of English-speaking children, whereby a larger proportion of boys than girls make a slow beginning at learning to read but by ten years of age population differences between boys and girls are no longer apparent. (Thompson, 1975, p.21)

It seems apparent that the majority of research points to some sex differences in learning to read. Identifying the causes of these differences has received a good deal of attention by researchers, with current investigations centering around cultural expectations and sex-role standards.

One of the first to examine this area was Preston (1962) who compared the reading achievement of 1053 German and 1338 American children in grades four and six. In his analyses of reading speed and comprehension, he discovered that the mean scores for American girls exceeded those of American boys on all tests in both grades. The contrary was the case in Germany: boys performed better than girls on all tests except speed of reading in grade four. The rate of reading retardation was greater for German girls than boys, whereas in America, the boys exceeded the girls in this measure. Though some of Preston's results were not at the significant level, he concluded that cultural or environmental con-

ditioning plays a role in beginning and later reading success.

Johnson (1973) revealed in a study of performance differences in four countries that in Canada and the United States, teachers stated that they believed girls read better than boys; and indeed, five out of six significant differences on the reading test favoured girls. However, this was not the case in Nigeria and England, where it is expected that boys will succeed at reading tasks. Johnson concluded that sex-differences in performance are culturally determined rather than physiologically determined.

Another international investigation of expectations in sex differences was recently reported by Downing et al. (1979). The task was to designate reading, amongst other activities, as a boy-oriented or a girl-oriented activity. The authors hypothesized that cultural expectations and sex-role standards about reading would be congruent within one country but would differ between countries. Results indicated that in Canada and the United States, reading is viewed by young boys as a female activity whereas in Japan and Denmark, reading is viewed as an acceptable male activity by boys at all ages. These authors suggested that future research should investigate the assumption that North American girls are superior in reading achievement in the primary grades as a result of physiological and maturational differences, and that this phenomenon is universal.

To summarize, the literature on the existence of sex differences in reading is fairly consistent in indicating that differences do exist, though the direction of the differences may vary between cultures.

Regardless of the attempts made by researchers to expose and acclaim one single cause for superior achievement by either sex, the majority of the research initiated in North America points to differences in favour of the girls.

Summary of the Review of Related Literature

This chapter presents a review of research dealing with word recognition in relation to the reading process, methodologies of teaching word recognition, conditions influencing learning and word acquisition, and sex differences in reading achievement.

In general, the following statements summarize the research reviewed:

1. Theories of reading do not agree on the process undergone in word recognition.
2. Contradictory evidence is abundant regarding the efficiency and desirability of teaching word recognition by either isolated-word or word-in-context methods.
3. There is recent evidence to suggest that beginning readers try to use the linguistic information available to them when reading connected text.
4. There is disagreement on the relevance of success in reading words on isolated word lists.
5. Meaningfulness facilitates learning.
6. Instructional methods influence the strategies of beginning readers;

therefore, presentation of test material in only one mode may bias the results toward that presentation mode.

7. The specific characteristics and distinctive features of target words in a word list influence the rate of acquisition of the list.
8. There is an obvious lack of research into the long-term retention of words in relation to methods of presentation.
9. Differences in performance on early reading tasks may be observed between boys and girls in North America.

Questions Raised by the Review of Related Literature

The literature in this area raises several disconcerting issues. The core of the matter concerns the relationship between the task of reading words in isolation and the reading act in its entirety. Reading words in context more closely resembles a natural reading situation, and consequently should provide more pertinent information directly related to the reading process engaged in by beginning readers. Studies which base the learning on more distantly-related tasks such as artificial alphabets or nonsense syllables possibly cloud the issue with results atypical of the natural reading act.

A second question raised by the literature is that testing word recognition in only one condition may favour the results towards that teaching condition. Many of the studies that examined different methods of word presentation tested word recognition in only one setting; that is,

most tests only involved word recognition in an isolated condition. This not only introduces a possible teach/test bias, but also gives the investigator no information regarding the readers' performance in recognizing words under other conditions.

One other major recurring difficulty with many of the studies is that word recognition was tested either immediately following the learning session, or only twenty-four hours later. Little investigation has been conducted on long-term retention of words in relation to method of presentation.

There is a distinct lack of research with beginning readers in the use of complete sentences as a method of teaching word recognition. Current studies either incorporate oral context since the very young child has no bank of words upon which to base the task, or they rely on the use of context which is comprised of words already established in the beginner's reading vocabulary. The difficulty with introducing oral context is that it is not analogous to the situation faced by the beginning reader upon encountering an unknown word in print. The latter method of basing the sentences on already known words ignores the fact that the child has already synthesized some knowledge of the reading process, including reliance on cues other than the contextual condition which is being measured.

The major contribution of this research study is that the context is absolutely controlled in that the subjects have preknowledge of none of the words; consequently, each target word is learned in syntactic and semantic association with every other target word in the sentence.

Study in the area of meaning and its effect on learning rate has revived speculation about the effectiveness of the word-alone approach to reading. The argument presented by some theorists is that, if learning is facilitated by an increase in meaningfulness, as research has demonstrated, and if word meaning is elucidated by context, then it logically follows that teaching words in context is a more meaningful approach to reading, and word learning should be facilitated by such an approach. This study is designed in response to this controversy.

Experimental Design in Response to the Literature

The review of the literature reveals the difficulties that arise in the interpretation and utilization of many of the methodology studies. The first problem is that, when words are tested only in isolation, results may be biased in favour of that teaching method. The second problem is that results on word lists may not be an accurate indication of what children do in a natural reading situation, as is illustrated by the analyses of oral reading errors of young children. Direct transfer of word recognition from list conditions to contextual settings may not be as efficient and automatic as it appears. Other cues in the sentences may be operating which could inhibit or facilitate the readers' processing of print.

This study is designed with attention to these two factors. To reduce the effect of a teach/test bias, retention testing involves alternating the target word settings. All subjects are tested in both treatment conditions; that is, all subjects are tested with words in isolation and words in treatment sentences. These two retention tests are hereafter

referred to as the isolation and the sentence tests of word recognition.

The second problem of efficiency of transfer from one learning condition to a different contextual condition is tested by presentation of target words in a new context in an attempt to discover if either method of word presentation eases this task for the beginning reader. The final recognition test involves word designation; the target words are embedded in new contexts, and subjects indicate any words they recognize.

The third problem in the literature involves a lack of long-term retention testing. In this study, posttesting is conducted after twenty-four hours and after three weeks.

Thus, in the present research study, there are nine dependent variables. Interval data are available on the following measures:

Session	Dependent Variables			
Acquisition	trials to criterion			
Short-term Retention	isolation test	sentence test	new context test	word designation test
Long-term Retention	isolation test	sentence test	new context test	word designation test

Hypotheses

This study examines the acquisition and retention of eight new words by kindergarten children taught by two methods of presentation: a word-alone method and a word-sentence method.

The nine dependent variables in the study are: 1) trials to criterion; 2) short-term retention in four conditions: (a) isolation, (b) sentence, (c) new context, and (d) word designation; and 3) long-term retention in four conditions: (a) isolation, (b) sentence, (c) new context, and (d) word designation.

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

Hypothesis #1: There is no significant difference between treatment groups on the nine dependent variables.

Hypothesis #2: There is no significant difference between sex of subjects on the nine dependent variables.

Hypothesis #3: There is no interaction effect between treatment and sex of subjects on the nine dependent variables.

Hypothesis #4: There is no significant difference in performance of treatment groups on retention tests of isolation, sentence, new context, or word designation.

Hypothesis #5: There is no significant difference in performance of subjects on words of high or low meaningfulness.

Hypothesis #6: There is no significant difference in performance of the control group on the preliminary screening test and the three-week posttest.

CHAPTER III

EXPERIMENTAL DESIGN AND PROCEDURES

The purpose of this study is to investigate the comparative efficiency of two methods of teaching word recognition to kindergarten children. The two methods chosen, presentation of words in isolation, and presentation of words in sentence context, are representative of opposite extremes of the controversy concerning the role of word recognition in the reading act. The words in isolation method, hereafter referred to as word-alone, is an application of the stimulus-response approach to reading. It is predicated by Samuels' (1967) focal attention hypothesis as an effective method of learning to read. The words in sentence context method, hereafter referred to as word-sentence, exemplifies the whole language approach to reading, as is predicated by Goodman's (1967) psycholinguistic contextual hypothesis. Efficacy of the two teaching methods is measured by the rate of word acquisition and the short- and long-term retention of eight target words.

In addition to the two treatment conditions involving different methods of word presentation, a control group of twenty-four children was also included in the study. This group participated in two of the sessions: the preliminary screening, to ensure that no words were recognized at the beginning of the experimental period, and the test three weeks later which measured gain in word recognition at the end

of the experimental period. This group was not exposed to any of the training or teach/test trials.

All teaching and testing sessions took place between April 29 and May 28, 1980.

This chapter presents information on the subjects used in this study, the selection of target words, the teaching and testing procedures, the pilot study, and the hypotheses tested.

The Sample

The population for this study was one hundred fifteen children enrolled in six kindergarten classes in three elementary schools in middle-class socio-economic areas of Coquitlam, B.C. This particular school district has a set kindergarten curriculum; all children study the letters of the alphabet, and therefore approached the task with a uniform background of school experiences.

Using a table of random numbers, all children were initially assigned to one of the three experimental groups: word-alone, word-sentence, or control group. Table 1 indicates the number of boys and girls in each group.

Table 1

Initial Assignment of Subjects

To Experimental Groups

Group	Boys	Girls	Total
Word-alone	20	18	38
Word-sentence	21	17	38
Control	22	17	39
Total	63	52	115

Two boys and one girl were new arrivals in Canada and spoke little or no English, and one boy was a part-time attender from a children's treatment center in Vancouver. These four children were not considered to be representative of beginning readers in our public school system, and thus were excluded from the study.

After the initial assignment period, three children moved to other parts of the province and therefore had to be dropped from the study.

During the experimental period, six boys and two girls were absent for extended lengths of time, and were unavailable for testing. Reasons for absence included illness with measles, flu, and chickenpox, or holidays in Saskatchewan or England. Based on the preliminary screening, twenty-eight children identified one or more of the target words and were therefore not included in the study. Table 2 indicates the breakdown of children that were eliminated from each of the experimental groups. Table 3 indicates the subjects for which all experimental data was collected.

Table 2

Categorization of Subjects Eliminated From the Study

Reason	Word-Alone		Word-Sentence		Control		Total	
	boys	girls	boys	girls	boys	girls	boys	girls
Preliminary screening	5	3	4	4	6	6	15	3
Absence	2	1	1	1	3	0	6	2
Moved	1	1	1	0	0	0	2	1
Non-English speakers	0	1	2	0	0	0	2	1
Part-time attendance	0	0	1	0	0	0	1	0
Total	8	6	9	5	9	6	26	17
	14		14		15		43	

Table 3

Assignment of Subjects to Experimental Groups

Experimental Group	Boys	Girls	Total
Word-alone	12	12	24
Word-sentence	12	12	24
Control	13	11	24
Total	37	35	72

An information letter concerning the study was sent to the parents of all subjects. (Appendix A).

Selection of Target Words

The target words were primarily chosen on the basis of their ability to be combined into a natural, meaningful sentence. Eight was selected as the number of words for the following reasons: eight words provided a stronger test of the treatment methods than that provided by fewer words; eight words conveniently divided into two sentences of four words each; eight words provided for a variety of meaningfulness levels; and eight words was a realistic number of words to be taught to beginning readers in a typical reading lesson. An attempt was made to select each word such that it was similar to another word in at least one characteristic:

configuration, initial letter, word length, concreteness/abstractness, or meaningfulness. The words presented as new context in the retention tests were selected with the same criteria.

Methodology for Establishing An Index of Word Meaningfulness

This study addressed the question of the effect of word meaningfulness on ease of word acquisition and success with retention. In order to provide a source of empirical data for use in this study, a table of meaningfulness for the eight target words was derived. Using the procedure established by Noble (1952), the grade three population of 32 children from an elementary school in a middle-class socio-economic area of Sooke, B.C. was used to establish the meaningfulness ratings.

The target words were randomly arranged in a mimeographed booklet. Each target word was assigned to a separate page, and was reproduced on each line to reduce the subject's tendency to free-associate through returning to the stimulus each time before responding (Appendix B-2). All subjects completed the booklet at the same time in a single session with the experimenter. Response periods per target word were of 60 seconds duration, with an inter-item interval of 15 seconds. Instructions to the subjects were as follows:

> "This is an exercise to see how many words you can think of and write in a short time. You will see a key word on your paper. I will say the key word twice, then I will say 'Go'.

You are to write as many words as you can think of when you see and hear the key word. For example, think of the key word 'house'. Some words which you might think of when you see and hear the word 'house' are:

home	bedroom
building	mine
warm	huge
family	neighbourhood

We will do only one word at a time. Do not go onto the next page until I ask you to. Remember, say the word to yourself before you write each response. I will tell you when to stop.

Let's try the first word, and then we'll discuss your responses."

Two sample key words (cold, school) were completed and briefly discussed. Then the remainder of the booklet was administered. Exactly 60 seconds were allowed for the responses for each word. At the end of the session, the booklets were collected and the children were thanked.

The Meaningfulness Index for Target Words appears in Appendix B-1. Criteria for marking the responses were based on Noble (1952) and Mickelson (1967), and are given in Appendix B-3. Intra-rater reliability was satisfactory; a Pearson product-moment correlation coefficient of .756 was obtained between two measures of meaningfulness (Appendix H-5).

At this time, the eight target words were accepted as satisfying the conditions of selection: each target word matched another target word in initial letter as well as level of meaningfulness, and each target word was suited to both methods of word presentation: word-alone and word-sentence.

Tasks Required of the Experimental Subjects

The two methods of presentation, word-alone and word-sentence, required that the subjects meet individually with the experimenter on three separate occasions. The first session involved two tasks: a preliminary screening to ensure that subjects recognized none of the target words prior to inclusion in the experiment, and three training trials followed by a maximum of twenty teaching/testing trials on the eight target words. The second session was held twenty-four hours after the initial session, and involved word recognition in four different contextual settings: taught-isolation, taught-sentence, new context, and word designation. The final session was held three weeks after the first session, and was a repeat of the tasks presented during the second session. All sessions were held in a room separate from the subject's classroom.

The subjects in the control group met individually with the experimenter on two separate occasions. The first session involved a preliminary screening to ensure that none of the target words were recognized at the beginning of the experiment. The second session was held three weeks later, and was a repeat of the screening task.

Preparation of Materials

Sentence Cards

The eight target words were typed in the form of two sentences, each sentence containing four words typed on a white 5" x 8" index card using

a primary typewriter (Appendix C-1). A capital letter and period were used to begin and end the sentences. All other letters were lower case. Eight sets of sentence cards were made.

Word Cards

The eight target words were each typed in the center of a white 2½" x 4" index card, using a primary typewriter. Two of the words were typed with beginning capital letters, and all other letters for all words were lower case. A sample word card appears in Appendix C-2. Four sets of these word cards were made to be used for the training/teach/test trials. When a group of four word cards was visible, the same visual impact was achieved as with one sentence card, making the tasks more similar in physical size than if 5" x 8" index cards were used for each target word.

Two other sets of word cards, identical in size to the sentence cards, were made for testing purposes. The eight target words were each typed in the center of a 5" x 8" white index card, using a primary typewriter. A sample test card appears in Appendix C-3.

All the cards were laminated to prevent distinguishing marks such as smudges, fingerprints, or tattered corners from appearing on the cards, and being used by the subjects as extraneous cues to word identification. Three extra sets of the teach/test word cards and the sentence cards were made and kept on reserve as replacements in the event of damage, accidents, or loss during the experimental period.

One set of sentence cards and one set of small word cards were

kept in separate loose packs to allow random word presentation in the train/teach/test sessions. One set of large word cards was randomly ordered and bound in this fixed order on a metal ring. This set was used in the preliminary screening task. Therefore, all children were screened with the target words in the same order and the same condition. The other set of word cards and sentence cards was bound on a metal ring in a fixed order to be used on the short- and long-term retention tests. Word cards and sentence cards were alternated such that no target word appeared twice in succession. The target word to be tested on each sentence card was specified by a line drawn underneath it (Appendix C-4). In this way each subject, regardless of treatment group, was tested twice on each word, once with the word in isolation and once with the word in sentences.

Sentence Cards for Retention Test - New Context

Sentences written by the investigator using each of the target words in a new context were typed on white 5" x 8" index cards using a primary typewriter. Each sentence contained one capital letter and one period. All other letters were lower case. The target word in each sentence was underlined. The eight cards were laminated and bound in a fixed order on a metal ring. A sample test card appears in Appendix C-5.

Sentence Cards for Retention Test - Word Designation

Sentences written by the investigator using two target words per sentence were typed on white 5" x 8" index cards using a primary typewriter. Each sentence contained one capital letter and one period. All other letters were lower case. The target words were not indicated in any way. The four cards were laminated and bound in a fixed order on a metal ring. A sample test card appears in Appendix C-6.

Name Cards

Each subject's first name was typed on a white 5" x 8" index card using a primary typewriter. These cards were used as an intervening word task when necessary during the teach/test trials.

Order of Word Presentation

Target words were divided into two groups, A and B, and then assigned numbers from one to four. The sentence-context words naturally divided into two sentence groups, and were assigned numbers based on their positions in the sentences. The isolated words were grouped such that each group contained only two of the four words that appeared together in each of the sentences; this maintained the syntactic and semantic differences that are inherent in the two methods.

Each word in group A was taught once before continuing with the words in group B. In the word-sentence method, the order of word

presentation was the same for all three training trials. In the word-alone method, each training trial followed a pre-determined random order of word presentation, to ensure against the chance of a syntactic or semantic association being built into the word order. For each of the twenty teach/test trials, a pre-determined random order of the four words in group A was followed by a pre-determined random order of the four words in group B. Both treatment groups followed the same numerical order, with the only difference being the actual words represented by the numbers (Appendix F).

These distinctions reflect the realistic manner in which each method would be used in a natural classroom setting. The sight method approach usually involves words chosen from a story that are not syntactically linked, and are introduced by themselves as separate entities. The whole language approach advocates that words are presented in sentences and are semantically and syntactically tied. It was crucial that this difference in approach be incorporated into both the training trials and the teach/test trials.

The order of presentation of target words on all retention tests was fixed, and identical for all subjects.

Data Collection

Data collection sheets (see Appendices G-1, G-2, G-3) provided a means of recording each subject's response during each session of the experiment. Both the word-number code for the word-alone method and

the pre-determined random order for word presentation on teach/test trials were printed on Data Collection Sheet 1 to facilitate administration of the correct word order.

The data collection sheets provided the following information:

Data Collection Sheet I -- (Session I)

1. name
2. experimental treatment
3. sex
4. class
5. date
6. start time
7. finish time
8. experimental subject number
9. words correct or incorrect on the preliminary screening
10. number of trials to criterion for each target word; teach/test word order prerecorded to assist administration of trials
11. incorrect responses for each target word on teach/test trials

Data Collection Sheet II -- (Sessions II and III)

1. name
2. experimental treatment
3. sex
4. class
5. date

6. start time
7. finish time
8. experimental subject number
9. responses for test of recognition in Isolation
10. responses for test of recognition in Sentence
11. responses for test of recognition in New Context
12. responses for test of Word Designation

Data Collection Sheet III -- Control Group

1. name
2. sex
3. class
4. date
5. start time
6. finish time
7. experimental subject number
8. responses for eight target words on preliminary screening test
9. responses for eight target words on three-week posttest

See Appendices G-4, G-5, and G-6 for samples of completed data collection sheets.

The Pilot Study

A pilot study was conducted with a kindergarten class in the Sooke school district during the month of March, 1980. The purpose of the pilot study was to test the manageability of the recording procedures, to examine the appropriateness of the teach/test materials, to investigate the difficulty level and the time requirement of the learning task, to estimate the number of children from a class that were likely to be excluded from the study on the preliminary screening test, and to verify the clarity and specificity of instructions.

Procedures proved to be satisfactory. Only one additional step was deemed necessary: an oral re-naming of the four target words at the end of each teach/test cycle.

Teaching/Testing Procedures

Each child was escorted by the examiner from the classroom to a separate room available for experiment. This walk provided an opportunity to establish rapport with each subject. Conversation revolved around topics such as school, friends, and playtime.

Each subject sat down beside the examiner at a large table. The subject's data collection was ready for recording.

Preliminary Screening

The examiner began by saying, " I have some words here and I want to see how many of my words you know. When I show you a word, you can tell me what it is if you know it, and if you don't know it, that's okay too." Each word was presented in isolation, using the set of word cards bound by the metal ring and designed for this screening task. As each word was presented, the examiner said, "What is this word?". Seven seconds were given for a response to each word. All responses were recorded on the subject's data collection sheet. Correct or incorrect responses were recorded verbatim, and "I don't know" or no responses were marked with a horizontal stroke (—). No verbal feedback was given during this preliminary screening. If the child indicated that he was discouraged by not knowing the words, verbal encouragement to relax and to continue the task was given by the examiner. At the end of the screening tasks if the child knew one or more of the target words, the examiner said, "Thank you. You did very well. We can go back to your classroom now." The examiner then escorted the child back to his/her classroom.

If the child was in the control group, the examiner brought this session to a close by saying, "Thank you. We can go back to your classroom now."

If the child was in one of the treatment groups, and had demonstrated that he/she knew none of the target words, the examiner continued the session with, "Thank you. You did just fine. Now we're going to play a game to see how well you can learn these words."

Training Trials

Word-Alone Method

The examiner continued by saying, "And this is the way we're going to play." On the table in front of the subject, the target words from the loose pack of word cards were laid out in two columns of four words each, according to the initial pre-determined non-meaningful order (Appendix F). Covering the words in group B with a piece of cardboard so that only the four words in group A were visible, the examiner said, "Here are some words. They say _____, _____, _____, and _____."
The examiner pointed to each word as she said its name. Then, separating the first word in the scheduled order by placing it in front of the child, the examiner said, "This word is _____. What is this word?" The subject repeated the word; this ensured that he had heard it correctly. The word was then returned to its position in the column, and the second word in the scheduled order was pulled from its spot and placed in front of the child.

The same training procedure was repeated for each of four words in group A. The cardboard was then removed from group B and placed as a covering for the words in group A. The same training procedure for these four words was followed.

One time through the eight target words constituted one training trial. The examiner repeated this procedure for a total of three training trials, being careful that four words were visible at one time but that each word in turn was isolated from the others in the group. The pre-determined random order for each training trial was followed (See Appendix C).

Word-Sentence Method

The examiner continued, "And this is the way we're going to play." The two sentences were placed on the table in front of the subject. The examiner covered sentence B with a piece of cardboard and, indicating sentence A, said, "This sentence says _____." Then pointing to the first word in the sentence, the examiner said, "This word is _____. What is this word?" The subject repeated the word; this ensured that he had heard it correctly. The examiner followed the same procedure for the other three words in the sentence; then removing the cardboard from sentence B and placing it on sentence A, the four words in this second sentence were taught in the same manner.

One time through the eight target words constituted one training trial. The examiner then repeated the cycle for a total of three training trials.

It is important to note that both treatment groups heard the target words the same number of times during these training trials. The only difference in method was that the word-sentence group heard the words in a meaningful order and saw them in context, whereas the word-alone group heard them in a non-meaningful order and saw them in isolation.

Teaching/Testing Trials

Following the three training trials, each target word was tested in the order specified by the pre-determined list compiled from a table of random numbers. For both treatment groups the same procedure was followed. The examiner began by saying, "Okay. Now we're ready to play the game. When I point to a word and ask what it says, you try to say the word if you know it. I'll tell you the word after a few seconds (seven) so if you don't know what it says, that's okay; you'll still have a chance to learn it when you hear me say the word. But try to beat me by saying the word first. Okay, let's begin with this group of words." The examiner then covered group B and, pointing to the first word listed for trial #1 (Appendix E), the examiner

said, "What is this word?" If the subject gave the correct response, the examiner recorded it and said, "That's right, this word is _____." If the subject gave an incorrect response, the examiner recorded it and said, "No, this word is _____. What is this word?" If the subject gave no response in seven seconds, the examiner recorded that as a "—" and said, "This word is _____. What is this word?" The examiner then began on the next target word for that trial. When the four words in group A had been tested once each, the examiner read all four words in the order in which they were arranged. Then, covering group A with the cardboard, the examiner continued with the words in group B. Following each cycle, the four words in that group were read aloud, regardless of treatment method.

When a target word had been correctly identified on two consecutive teach/test trials, the subject had achieved criterion for that target word. The teach/test cycle was continued, excluding that specific word from the testing procedure.

As target words were eliminated, the order dictated for testing was no longer maintained. However, the order followed was exactly the order specified minus the target word(s) acquired. Also, the restriction that the same target word could not be tested twice in a row was a logical condition to enforce. In the situation that one target word was scheduled consecutively, the next target word to be tested was inserted between the two tests

of the same word. This procedure was followed until there was only one target word left to acquire. As an intervening but related reading task, the child was presented with his name card and asked, "What is this word?" Then the last target word was tested for a second time. The name card task was repeated as many times as necessary. Teach/test trials were continued until all eight words had been identified correctly twice on consecutive trials at some point in the session. If a subject did not reach criterion for a target word at the end of twenty teach/test trials he/she was allowed to stop and the word was designated as "unmastered," and recorded as "20".

At the end of the session, the subject was thanked and escorted back to the classroom.

Scoring on the teach/test trials was recorded as follows:

a correct response	.
no response or "I don't know"	-
an incorrect response	recorded verbatim

See Appendix G-4 for a sample data collection sheet.

Word-Alone Teach/Test Situation

Throughout the teach/test trials, the examiner left all eight word cards on the table, with only one group of four words visible

at a time. As each target word was tested, however, the word card was separated from the other words and presented in an isolated condition in front of the subject. It was then returned to the group in its new teach/test position, and the next target word was presented.

Word-Sentence Teach/Test Situation

Throughout the teach/test trials, the examiner left the sentence cards on the table in front of the subject, with only one sentence visible at a time. As each target word was tested, it was indicated by covering it with a small piece of coloured transparent acetate.

With four of the target words visible throughout the teach/test trials, the number of exposures to the stimuli was the same for all subjects regardless of treatment condition; the possible advantage available to the sentence group was therefore eliminated.

Retention Testing

Short-Term Retention

The examiner returned twenty-four hours later to test each subject on his/her retention of the target words. Both treatment groups were tested according to the following procedure.

Tests of Word Recognition in Treatment Conditions

Each subject was shown the target words twice each: once in isolation and once in context. All subjects received the words in the predetermined order which stipulated that no target word was tested in two successive turns.

The set of bound, alternated word and sentence cards was placed in front of the subject. The examiner said, "Today I'm going to see if you know some of these words. What is this word?" Each response was recorded verbatim on the data collection sheet. Non-responses were recorded as -. No verbal feedback, other than "Thank you" and "You're trying really hard", was given.

Test of Word Recognition in New Context

The fixed order set of eight new sentence cards was placed in front of the subject. As each sentence was presented the examiner pointed to the underlined target word and said, "What is this word?" No feedback was given, except "Thank you".

Test of Word Designation in New Context

The fixed order set of four sentence cards was placed in front of the subject. When each sentence was presented, the examiner said, "Are there any words here that you know?" All responses from the

subjects were recorded on the data collection sheet, ensuring that each response was written on the line corresponding to the word's position in the sentence. If necessary, the examiner said, "Point to the word when you read it" to make certain that the recording was accurate. Each response from the subject was followed by the experimenter's question, "Are there any other words here that you know?" until the subject replied, "No". This procedure was included to counteract the possible assumption that each sentence only contained one word; on the previous tests, only one word per sentence had been tested.

At the end of the session, the examiner escorted the subject back to the classroom.

Long-Term Retention

The examiner returned to each subject three weeks after the initial teach/test session. The tests that were used to measure short-term retention were repeated, following the identical procedure.

Summary

This chapter provides information about the sample to be used in the study, the selection of target words,the method of establishing a meaningfulness index, the preparation of materials, the teaching and testing procedures, the recording mechanisms for collecting data, and the pilot study conducted to test these experimental conditions for appropriateness and manageability.

CHAPTER IV

STATISTICAL ANALYSES AND RESULTS

Introduction

The purpose of this study was to investigate the comparative effectiveness of two methods of presentation on the acquisition and retention of eight words by kindergarten children. Consideration of the theories of S. Jay Samuels (1967) and Kenneth Goodman (1967) raised several questions concerning methods of teaching word recognition. In response to these questions, this study tested the word-alone method and the word-sentence method on the following nine dependent variables: 1) trials to criterion; 2) short-term retention of target words in four conditions: (a) isolation, (b) sentence, (c) new context, and (d) word designation; 3) long-term retention of target words in the same four conditions: (a) isolation, (b) sentence, (c) new context, and (d) word designation. Interval data are used to test the following null hypotheses at the .05 level of significance:

Hypothesis #1: There is no significant difference between treatment groups on the nine dependent variables.

Hypothesis #2: There is no significant difference between sex of subjects on the nine dependent variables.

Hypothesis #3: There is no interaction effect between treatment and sex of subjects on the nine dependent variables.

Hypothesis #4: There is no significant difference in performance of treatment groups on retention tests of isolation, sentence, new context, and word designation.

Hypothesis #5: There is no significant difference in performance of subjects on words of high or low meaningfulness.

Hypothesis #6: There is no significant difference in performance of the control group on the preliminary screening test and the three-week posttest of word recognition.

The following sources of information were used to test the null hypotheses:

1. the number of trials required to learn the eight target words,
2. the target words correctly pronounced when presented in isolation,
3. the target words correctly pronounced when presented in the taught sentences,
4. the target words correctly pronounced when presented in new contexts, and
5. the target words correctly located and pronounced when presented in new contexts.

Raw data for each subject on each of these measures are given in Appendix H.

The descriptive statistics of means and standard deviations for each of the dependent variables are presented in Table 4 for performance by the total sample and performance by the treatment groups. Performance by sex of subjects is given in Table 5 for each of these variables.

Table 4

Summary of Performance of Total Sample and of Experimental Groups on the Dependent Variables of Acquisition and Retention of Target Words

Dependent Variable	Total Sample n = 48		Word-alone Group n = 24		Word-sentence Group n = 24	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Total Trials to Criterion	41.46	24.36	56.50	25.22	26.42	10.23
Total Retention Score (24 hours)	13.33	7.58	11.33	7.64	15.33	7.12
Isolation test	2.98	1.82	2.96	1.83	3.00	1.82
Sentence test	4.65	2.61	2.88	1.99	6.42	1.86
New Context test	3.02	2.18	3.04	2.16	3.00	2.25
Word Designation test	2.69	2.21	2.46	2.17	2.92	2.28
Total Retention Score (3 weeks)	13.13	8.50	10.29	8.34	15.96	7.83
Isolation test	2.83	2.12	2.46	2.04	3.21	2.17
Sentence test	4.23	2.94	2.33	2.12	6.13	2.38
New Context test	3.17	2.17	2.88	2.29	3.46	2.04
Word Designation test	2.90	2.16	2.63	2.16	3.17	2.16

Table 5

Summary of Performance of Sex of Total Sample on the Dependent Variables of Acquisition and Retention of Target Words

Dependent Variable	Boys	n = 24	Girls	n = 24
	$\overline{X}$	SD	$\overline{X}$	SD
Total trials to criterion	45.29	27.28	37.62	20.93
Total Retention Score (24 hours)	12.92	8.18	13.75	7.08
Isolation test	2.71	2.01	3.25	1.60
Sentence test	4.63	2.76	4.67	2.51
New Context test	2.92	2.32	3.13	2.07
Word Designation test	2.67	2.28	2.71	2.20
Total Retention Score (3 weeks)	12.46	9.26	13.79	7.80
Isolation test	2.67	2.39	3.00	1.84
Sentence test	4.04	3.11	4.42	2.81
New Context test	3.04	2.37	3.29	1.99
Word Designation test	2.71	2.31	3.08	2.02

Differences in performance on the dependent variables, as suggested by the information presented in Tables 4 and 5, are examined through further statistical analyses.

Organization of the Statistical Analyses

The statistical analyses and results are reported in the following manner:

I Tests of Hypotheses #1, #2, #3, and #4 by

- A. two-way analyses of variance on trials to criterion.
- B. analysis of variance for repeated measures on the four tests of retention administered at
  1. twenty-four hours
  2. three weeks
     - a. two-way analyses of variance on each of the four retention variables.
     - b. two-way analyses of variance on the difference score between short-term and long-term retention.

II Test of Hypothesis #5 by

- A. one-way analysis of variance on trials to criterion, short-term retention, and long-term retention with words of high and low meaningfulness.
- B. Tukey comparisons (Hopkins & Glass, 1978) between means for each target word on trials to criterion, short-term retention, and long-term retention.

III Test of Hypothesis #6 by

- A. mean difference score on pretest and posttest of target word recognition

Hypotheses #1, #2, #3, and #4

Trials to Criterion

A summary of the two-way analysis of variance computed on the total trials to criterion is presented in Table 6.

Table 6

Analysis of Variance Table

for Trials to Criterion

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	10860.082	29.263	.000 *
Sex	1	705.333	1.901	.175
Method x Sex	1	5.333	0.014	.905
Error	44	371.116		
Total	47			

* $p<.001$

An examination of the information given in Table 6 reveals that:

1. there is no significant difference between sex of subjects on total trials to criterion.

2. there is no interaction effect between method of presentation and sex of subject on total trials to criterion.
3. there is a significant difference between methods of presentation on total trials to criterion ($p<.001$). An examination of the experimental group means presented in Table 4 indicates that the difference between the methods favours the word-sentence group; this group required an average of 26.42 trials to reach criterion for eight target words, whereas the word-alone group required an average of 56.50 trials to reach criterion.

Short-Term Retention

An analysis of variance with repeated measure was applied to the scores on the four tests of word recognition, collected twenty-four hours after the initial teaching session. The analysis was conducted using the BMDP2V computer program (1979), available from the Health Sciences Computing Facility, University of California, Los Angeles. A summary of the results is presented in Table 7.

Table 7

Analysis of Variance with Repeated Measures

on Four Tests of Short-Term Retention

Source of Variation	Degrees of Freedom	Mean Square	F	p
Between subjects				
Method	1	47.005	3.331	.075 *
Sex	1	1.880	0.133	.717
Method x Sex	1	1.880	0.133	.717
Error	44	14.113		
Within subjects				
Tests	3	37.574	34.458	.000 **
Tests x Methods	3	35.352	32.420	.000 **
Tests x Sex	3	0.561	0.514	.673
Tests x Methods x Sex	3	0.283	0.260	.854
Error	132	1.090		

* $p<.10$
** $p<.0001$

In relation to the first four hypotheses, an examination of the information given in Table 7 reveals that:

1. there is no significant difference between methods of word presentation on total short-term retention. Although significance does not reach the .05 level, a closer examination is warranted by the obtained F value of 3.331.
2. there is no significant difference between performance of boys and girls on tests of short-term word retention.
3. there is no interaction between methods of word presentation and sex of subjects on tests of short-term retention.

An inspection of the information on the variation between subjects reveals that:

4. there is a significant difference within the four retention tests ($p<.0001$); that is, the mean score on retention differed significantly on the four tests.
5. there is a significant interaction between retention tests and method of word presentation ($p<.0001$), indicating that the pattern of performance on retention is related to the method of instruction.
6. there is no significant interaction among retention tests and sex of subjects, nor among retention tests, method of presentation, and sex of subjects.

To summarize, the analysis of variance with repeated measures leads to an acceptance of hypotheses #2 and #3 in relation to short-term retention. Hypothesis #1, differences between treatment groups, needs to

be examined in more depth, and hypothesis #4 is rejected at the .0001 level of significance.

To determine which tests of retention differed significantly ($p<.05$) from the others, the Tukey multiple-comparison method (Hopkins & Glass, 1978) was conducted on the means. The results of the six comparisons are summarized in Table 8.

Table 8

Tukey Multiple-Comparisons Between Means on the Four Tests of Short-Term Retention

Tests	Isolation	Sentence	New Context	Word Designation
Subject Means	3.00	4.646	3.021	2.688
Isolation 3.00	---	1.646 *	.021	.312
Sentence 4.646	---	---	1.625 *	1.958 *
New Context 3.021	---	---	---	.333
Word Designation 2.688	---	---	---	---

* $p<.01$ critical difference .01 = .663

Results reveal that the sentence retention test is significantly different ($p<.01$) from the other three tests of word retention. No other test is significantly different from any of the other retention tests.

Retention in Four Contextual Settings

Two-way analyses of variance were computed for each of the four retention tests to determine if there were significant differences in performance by treatment groups, sexes, or interaction between treatment and sex of subjects. Results of the analysis of variance with repeated measures and the multiple Tukey comparisons (Hopkins & Glass, 1978) indicated there were no significant differences between boys and girls on the tests of short-term retention, and that there was no interaction effect between methods of presentation and sex of subjects. The information obtained from the two-way analyses is reported for the purpose of allowing comparisons between probability levels.

Test of Words in Isolation

A summary of the analysis of variance computed on the scores on this retention test is presented in Table 9.

Table 9

Analysis of Variance Table for Short-Term Retention on Test of Words in Isolation

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	0.021	0.006	.938
Sex	1	3.521	1.023	.317
Method x Sex	1	0.021	0.006	.938
Error	44	3.441		
Total	47			

Results reveal no significant difference between treatment groups on a test of words in isolation. Of importance to this study is the observation that the word-alone group and the word-sentence group performed equally well on this test, even though target words were presented in the condition that matched the method of presentation to the word-alone group. This result is discussed in more detail in Chapter 6.

Test of Words in Sentences

A summary of the analysis of variance computed on the scores on this retention test is presented in Table 10.

Table 10

Analysis of Variance Table for Short-Term Retention on Test of Words in Sentences

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	150.521	38.978	.000 *
Sex	1	0.021	0.005	.942
Method x Sex	1	0.521	0.135	.715
Error	44	3.862		
Total	47			

* $p<.001$

The information in Table 10 reveals that there is a significant difference in method of presentation on a retention test of words in the sentence condition ($p<.001$). A comparison of the experimental group means in the summary presented in Table 4 reveals that this difference is in favour of the word-sentence group. Of importance to this study is the observation that, unlike the performance of the word-alone group in the word-alone test, the word-sentence group is performing significantly better than the word-alone group when tested in the sentence condition matching the one in which it learned the words.

Test of Words in New Context

A summary of the analysis of variance computed on the scores on this retention test is presented in Table 11.

Table 11

Analysis of Variance Table for Short-Term Retention on Test of Words in New Contexts

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	0.021	0.004	.949
Sex	1	0.521	0.103	.749
Method x Sex	1	0.521	0.103	.749
Error	44	5.044		
Total	47			

Results reveal no significant difference between treatment groups on a test of words in new context.

Test of Word Designation

A summary of the analysis of variance computed on the scores on this retention test is presented in Table 12.

Table 12

Analysis of Variance Table for Short-Term Retention on Test of Word Designation

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	2.521	0.491	.487
Sex	1	0.021	0.004	.950
Method x Sex	1	1.688	0.328	.570
Error	44	5.138		
Total	47			

Results reveal no significant difference between treatment groups on a test of word designation.

Long-Term Retention

An analysis of variance with repeated measures using the BMDP2V computer program was applied to the scores on the four tests of word recognition, collected three weeks after the initial teaching session. A summary of the results is given in Table 13.

Table 13

Analysis of Variance with Repeated Measures on Four Tests of Long-Term Retention

Source of Variation	Degrees of Freedom	Mean Square	F	p
Between subjects				
Methods	1	96.333	5.660	.022 *
Sex	1	5.333	0.313	.579
Methods x Sex	1	0.083	0.004	.944
Error	44	17.02		
Within subjects				
Tests	3	20.514	22.870	.000 **
Tests x Methods	3	31.210	34.790	.000 **
Tests x Sex	3	0.042	0.046	.987
Tests x Methods x Sex	3	0.431	0.480	.697
Error	132	0.897		

* $p<.05$
** $p<.0001$

In relation to the first four hypotheses, an examination of the information given in Table 13 reveals that:

1. there is a significant difference between methods of word presentation on total long-term retention ($p<.05$). Comparison of the experimental means presented in Table 4 indicates that the difference is in favour of the word-sentence group; that is, the word-sentence group retained significantly more words than the word-alone group on retention tests administered three weeks after the initial teaching session.
2. there is no significant difference between performance of boys and girls on tests of long-term retention.
3. there is no interaction between methods of word presentation and sex of subjects on tests of long-term retention.

An inspection of the information on the variation between subjects reveals that:

4. there is a significant difference within the four retention tests ($p<.0001$); that is, the mean score on retention differed significantly on the four tests.
5. there is a significant interaction between retention tests and methods of word presentation ($p<.0001$), indicating that the pattern of performance on retention is related to the method of instruction.
6. there is no significant interaction among retention tests and sex of subjects, nor among retention tests, methods of presentation, and sex of subjects.

To summarize, the analysis of variance with repeated measures leads to a rejection of hypothesis #1 at the .05 level of significance, an acceptance of hypotheses #2 and #3, and a rejection of hypothesis #4 at the .0001 level of significance.

Concerning hypothesis #4, the Tukey multiple-comparison method (Hopkins & Glass, 1978) was conducted on the means to determine which tests of retention differed significantly ($p<.05$) from the others. The results of the six comparisons are summarized in Table 14.

Table 14

Tukey Multiple-Comparisons Between Means on the Four Tests of Long-Term Retention

Tests	Isolation	Sentence	New Context	Word Designation
Subject Means	2.854	4.250	3.167	2.896
Isolation 2.854	___	1.396 *	.313	.042
Sentence 4.250	___	___	1.083 *	1.354 *
New Context 3.167	___	___	___	.271
Word Designation 2.896	___	___	___	___

* $p<.01$ critical difference .01 = .606

Results reveal that the sentence retention test is significantly different ($p<.01$) from the other three tests of word retention. No other test is significantly different from any of the other long-term retention tests.

Retention in Four Contextual Settings

Two-way analyses of variance were computed for each of the four retention tests to determine if there were significant differences in performance between treatment groups. Results of the analysis of variance with repeated measures revealed that there were no significant differences between boys and girls on the tests of long-term retention, and that there was no interaction effect between methods of word presentation and sex of subjects. However, the information obtained from the two-way analyses is reported for the purpose of allowing comparisons between levels of significance.

Test of Words in Isolation

A summary of the analysis of variance computed on the scores on the test of words in isolation is presented in Table 15.

Table 15

Analysis of Variance Table for Long-Term Retention on Test of Words in Isolation

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	6.750	1.472	.232
Sex	1	1.333	0.291	.593
Method x Sex	1	0.750	0.164	.688
Error	44	4.587		
Total	47			

Results reveal no significant difference between treatment groups on a test of words in isolation. Of importance to this study is the observation that the word-alone group and the word-sentence group performed equally well on this test, although target words were presented in the condition that matched the method of presentation to the word-alone group. The significance of this observation is discussed in Chapter 6.

Test of Words in Sentences

A summary of the analysis of variance computed on the scores on a test of retention in sentence condition is presented in Table 16.

Table 16

Analysis of Variance Table for Long-Term Retention on Test of Words in Sentences

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	172.521	32.684	.000 *
Sex	1	1.687	0.320	.575
Method x Sex	1	0.021	0.004	.950
Error	44	5.278		
Total	47			

* $p<.001$

The information in Table 16 reveals that there is a significant difference in method of presentation on a retention test of words in sentences ($p<.001$). A comparison of the experimental group means presented in Table 4 indicates that this difference is in favour of the word-sentence group. Of importance to this study is the observation that, unlike the performance of the word-alone group in the word-alone condition, the word-sentence group performed significantly better than the word-alone group when tested with the sentences which matched the word-sentence treatment condition.

Test of Words in New Contexts

A summary of the analysis of variance computed on the scores on a

test of target word retention in new contexts is given in Table 17.

Table 17

Analysis of Variance Table for Long-Term Retention on Test of Words in New Context

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	4.083	0.834	.366
Sex	1	0.750	0.153	.697
Method x Sex	1	0.333	0.068	.795
Error	44	4.898		
Total	47			

Results reveal no significant difference between treatment groups on a test of words in new contexts.

Test of Word Designation

A summary of the analysis of variance computed on the scores on this retention test is presented in Table 18.

Table 18

Analysis of Variance Table for Long-Term Retention on Test of Word Designation

Source of Variation	Degrees of Freedom	Mean Square	F	p
Method of Presentation	1	3.521	0.726	.399
Sex	1	1.687	0.348	.558
Method x Sex	1	0.021	0.004	.948
Error	44	4.847		
Total	47			

Results reveal no significant difference between treatment groups on a test of word designation administered three weeks after the initial teaching session.

Difference in Short-Term and Long-Term Retention

The analyses of variance computed on total scores for retention at twenty-four hours and at three weeks indicated a difference between the treatment methods at the .075 and the .02 levels of significance (Tables 7 and 13). A two-way analysis of variance was calculated on the difference scores obtained by subtracting subjects' performance on total short-term

retention from long-term retention. A summary of results is presented in Table 19.

Table 19

Analysis of Variance Table

Retention Difference After Three Weeks

(3 week retention - 24 hour retention)

Source of Variation	Degrees of Freedom	Mean Square	F	p
Methods of Presentation	1	33.333	2.296	.137
Sex	1	3.000	0.207	.652
Method x Sex	1	6.750	0.465	.499
Error	44	14.519		
Total	47			

The results revealed that there was no significant difference between treatment groups, sex, or interaction effect between treatment and sex of subjects on loss or gain in retention of the eight target words after three weeks. Comparison of the treatment group means in Table 4 discloses that the mean retention score for the word-alone group dropped from 11.33 to 10.29 on the word recognition test administered three weeks after the initial teaching session; this is a drop of 1.04 words. The mean retention score for the word-sentence group, however, increased

from 15.33 to 15.96, an increase of .63 words, on the word recognition test administered three weeks later. This difference did not reach the .05 level of significance, but is reported in the interest of directional trends.

To allow comparison of scores between and within treatment groups on the four tests of word recognition administered twenty-four hours and three weeks after the initial teaching session, the mean group scores from Table 4 are presented in Figures 1 and 2. The significant difference between the groups on the sentence test of word recognition is evident.

Effect of Miscues on the Analyses

Throughout the statistical analyses on word retention, miscues that clearly maintained the meaningful intent of the expected response were scored as "no recall." To determine if the inclusion of miscues had a significant effect on the analyses, all two-way analyses of variance were computed again. Results revealed that scoring miscues as "perfect recall" made no difference to the acceptance or rejection of the hypotheses; the only observed difference was an increase in means. Miscues were not restricted to either treatment group or sex, and consequently, means were raised in all sets of subjects. The decision was made to report all statistical analyses on short-term and long-term retention with miscues scored as errors in word recognition.

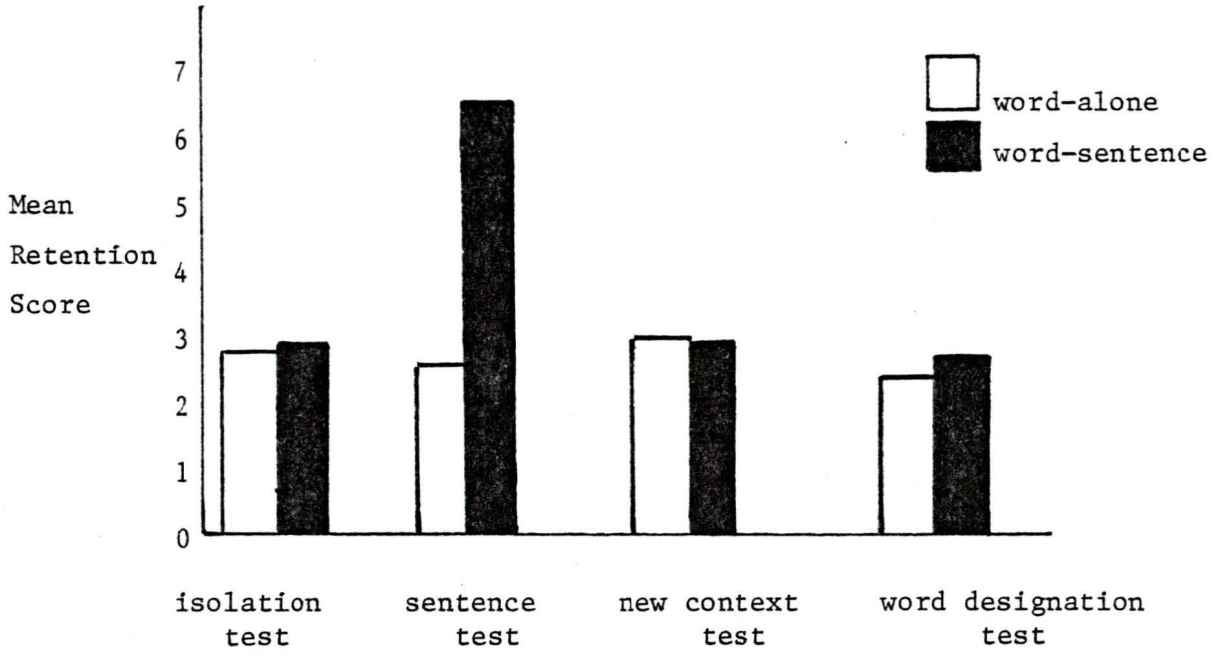


Figure I

Performance of Treatment Groups

on Tests of Short-Term Retention

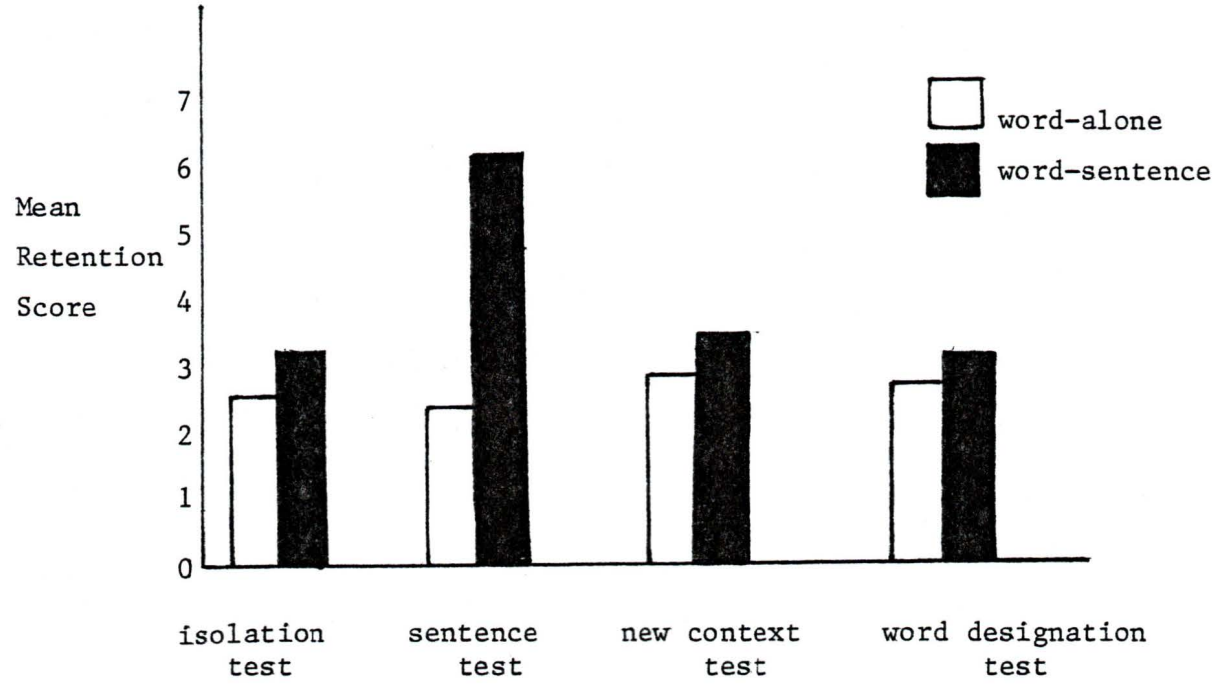


Figure 2

Performance of Treatment Groups

on Tests of Long-Term Retention

A summary of the two-way analyses of variance computed on the dependent variables is presented in Table 20. Though no significant differences were found between sex of subjects, and no interaction effects were revealed between sex of subjects and methods of presentation, the results of analyses are included to demonstrate the probability levels at which Hypotheses #2 and #3 were accepted.

Table 20

Summary of Analyses of Variance
for the Dependent Variables of
Acquisition and Retention of Target Words

Dependent Variable	Source of Variation					
	Method of Presentation		Sex of Subjects		Method x Sex	
	F	P	F	p	F	p
Trials to Criterion	29.263	.000**	1.901	.175	.014	.905
Total Retention Score (24 hours)	3.331	.075	0.133	.717	.133	.717
Isolation test	0.006	.983	1.023	.317	.006	.938
Sentence test	38.978	.000**	0.005	.942	.135	.715
New Context test	0.004	.949	0.103	.749	.103	.749
Word Designation test	0.491	.487	0.004	.950	.328	.570
Total Retention Score (3 weeks)	5.660	.022*	0.313	.578	.004	.945
Isolation test	1.472	.232	0.291	.593	.164	.688
Sentence test	32.684	.000**	0.320	.575	.004	.950
New Context test	0.834	.366	0.153	.697	.068	.795
Word Designation test	0.726	.399	0.348	.558	.004	.948
Retention Score Difference (3 weeks - 24 hours)	2.296	.137	0.207	.652	.465	.499

* $p<.05$ ** $p<.001$

Although no significant differences were found in the performance of boys and girls, a comparison of the mean scores presented in Table 4 discloses that girls consistently performed better than boys; girls required fewer trials to learn the eight words, and scored higher on all tests of short-term and long-term retention. Although these differences did not reach the .05 level of significance, they are reported in the interest of directional trends.

Hypothesis #5

Performance on the Eight Target Words

To determine if there was a significant difference in performance among the eight target words, univariate analyses of variance were computed on trials to criterion, short-term retention, long-term retention, and total retention. A summary of the results is presented in Table 21.

Table 21

Analyses of Variance Summary

for the Acquisition and Retention of Target Words

Variable	Degrees of Freedom	Mean Square	F	p
Trials to criterion	7	69.345	3.905	.0004 **
Short-term retention	7	16.764	7.515	.0000 *
Long-term retention	7	20.950	8.793	.0000 *
Total retention	7	74.614	9.510	.0000 *

* $p<.0001$
** $p<.0005$

An examination of Table 21 reveals that there is a significant difference in performance among the eight target words. The Tukey multiple-comparison method (Hopkins & Glass, 1978) was used to determine which words were significantly different from the others. Table 22 presents a summary, including means for each word, the rank-ordering of the words, and the number of words from which each ranked significantly better on the variables of acquisition and retention.

Table 22

Rank Order of Target Words for

Performance on Tasks of Acquisition and Retention

Trials to Criterion			
rank	word	superiority score†	mean trials
1	television	2	3.27
2	fixing	1	4.46
3	Our	0	4.72
4	Nicki's	0	4.90
5	out	0	5.08
6	tooth	0	5.38
7	fell	0	6.33
8	needs	0	7.25

Short-Term Retention			
rank	word	superiority score†	mean score
1	Nicki's	5	2.80
2	television	4	2.44
3	Our	1	2.17
4	fell	0	1.77
5	fixing	0	1.46
6	tooth	0	1.44
7	out	0	1.33
8	needs	0	1.12

Long-Term Retention			
rank	word	superiority score†	mean score
1	Nicki's	4	2.80
2	television	4	2.48
3	Our	2	2.19
4	fell	0	1.88
5	fixing	0	1.50
6	tooth	0	1.27
7	needs	0	1.08
8	out	0	1.04

Total Retention			
rank	word	superiority score†	mean score
1	Nicki's	5	5.58
2	television	4	4.92
3	Our	2	4.36
4	fell	0	3.65
5	fixing	0	2.96
6	tooth	0	2.70
7	out	0	2.38
8	needs	0	2.21

† Superiority score indicates the number of target words over which performance of a given target word was significantly better ($p<.05$)

Performance in Relation to Meaningfulness ($\bar{m}$)

Each target word had a meaningfulness rating ($\bar{m}$) assigned to it by 32 grade-three children, according to the procedure presented in Chapter III. This procedure, adapted from Noble (1952) and Mickelson (1967), involved presenting each target word for sixty seconds in order to investigate the number of responses elicited. A sample response sheet is presented in Appendix B-2, and the criteria for marking the student responses are given in Appendix B-3. Details of the procedure followed are given in Chapter III.

The summary of the analyses of variance computed on the eight target words in Table 21, and the results reported on the Tukey multiple-comparisons, revealed that performance varied among the target words. To determine if performance was related to meaningfulness, the meaningfulness index given in Appendix B-1, which ranks the words from high to low according to their $\bar{m}$ values, was used to calculate a Spearman rank correlation coefficient. A high correlation would indicate that meaningfulness of the target words is related to subjects' performances on acquisition and retention tasks. A summary of the computed correlations is given in Table 23.

Table 23

Spearman Rank Correlations
Between Meaningfulness Rank and Performance Rank

Trials to Criterion	Short-Term Retention	Long-Term Retention	Total Retention
.113	.030	- .042	- .018

The information available in Table 23 reveals the low relationship between meaningfulness as defined by $\bar{m}$ and performance on the acquisition and retention of the target words.

To summarize, an examination of the univariate analysis of variance reveals that, in this study:

1. there are significant differences among the target words in acquisition and retention scores ($p<.0001$).
2. there is no significant relationship between meaningfulness ($\bar{m}$) rating of these target words and performance by subjects in tasks of acquisition and retention.

The possibility was investigated that meaningfulness of target words was related to performance for one of the treatment groups and not the other. However, a comparison of the rank orders of target words according to performance by treatment group reveals no significant difference. Treatment groups performed in similar ways with all words. A summary of the rank order of performance by the treatment groups is presented in Table 24.

Table 24

Rank Order of Target Word Performance

by Treatment Groups on Tasks of Acquisition and Retention

Trials to Criterion		
rank	word-sentence	word-alone
1	television	television
2	Our	Nicki's
3	fixing	fixing
4	tooth	out
5	fell	Our
6	out	tooth
7	Nicki's	fell
8	needs	needs

Short-Term Retention		
rank	word-sentence	word-alone
1	Nicki's	Nicki's
2	Our	television
3	television	Our
4	fell	fell
5	fixing	tooth
6	out	fixing
7	tooth	needs
8	needs	out

Long-Term Retention		
rank	word-sentence	word-alone
1	Nicki's	Nicki's
2	Our	television
3	television	fell
4	fell	Our
5	fixing	fixing
6	tooth	tooth
7	needs	needs
8	out	out

Total Retention		
rank	word-sentence	word-alone
1	Nicki's	Nicki's
2	Our	television
3	television	fell
4	fell	Our
5	fixing	fixing
6	tooth	tooth
7	out	out
8	needs	needs

A close examination of the rank orders reveals that the treatment groups performed in relatively similar ways with the eight target words,

especially on the tests of retention. Some difference in the order of words acquired by the word-sentence group compared with the order of words by the word-alone group reflects acquisition of the words in one sentence more quickly than the words in the other sentence.

Hypothesis #6

A control group of twenty-four children were tested on the eight target words at the beginning of the experimental period and again three weeks later. Descriptive data indicating the testing scores on these two tasks are given in Appendix H. The mean gain in word recognition was .016 words. Twenty-one children demonstrated no knowledge of the target words at the end of the three weeks; two girls and one boy successfully recognized one word each. These are not significant gains.

Hypothesis #6 is accepted; there is no significant difference in performance of the control group on the preliminary screening test and the three-week posttest of word recognition.

This result is of importance in the study in that gains in word recognition made by the treatment groups is thus attributable to the methods of word presentation. The lack of gain made by the control group removes the possibility of contamination of the results by maturation or history.

Summary of Statistical Analyses and Results

The statistical analyses for this investigation included analyses of variance with repeated measures, two-way analyses of variance on each of the dependent variables, univariate analyses of variance on the eight target words, and Tukey multiple comparisons. The results were as follows:

1. The null hypotheses for differential effects caused by sex of subjects and interaction effects between sex and method of word presentation were accepted for all dependent variables. There were no significant differences between boys and girls on trials to criterion, or on retention of target words at twenty-four hours or at three weeks. There were also no significant differences in the performance of either sex as a result of method of word presentation.
2. The null hypothesis for treatment effects on trials to criterion was rejected at the .001 level of significance. Subjects receiving the word-sentence method learned the eight target words in significantly fewer trials than subjects receiving the word-alone method of presentation.
3. The null hypothesis for treatment effects on overall short-term retention was accepted ($.05<p<.10$). Subjects receiving the word-alone method and the word-sentence method performed equally well on an overall test of target word retention administered twenty-four hours after the initial teaching session.

4. The null hypothesis for treatment effects on overall long-term retention was rejected ($p<.05$). Subjects taught by the word-sentence method recognized significantly more words than the subjects taught by the word-alone method on tests administered three weeks after the initial teaching session.
5. The null hypothesis for no significant difference in performance on the four tests of retention was rejected ($p<.0001$). On both short-term and long-term retention:
   a. there was a significant difference in treatment scores within the four retention tests; the test of retention in the sentence condition was significantly different from the other tests ($p<.0001$).
6. The null hypotheses for treatment effects on retention tests of target words in isolation, new contexts, and word designation were accepted. On both short-term and long-term retention, no significant differences were found between subjects taught by the word-alone method and subjects taught by the word-sentence method in performance on these tests of word recognition.
7. The null hypothesis for treatment effects on retention of target words on the sentence test was rejected ($p<.001$) for both short-term and long-term retention. Subjects taught by the word-sentence method recognized significantly more words on the sentence test than did subjects taught by the word-alone method.

8. The null hypothesis for differences in performance of subjects on words of high and low meaningfulness was accepted. Significant differences ($p<.0001$) between the target words in performance by subjects on tasks of word acquisition and retention were not significantly related to word meaningfulness ($\bar{m}$) as established by the procedures outlined by Noble (1952) and Mickelson (1967).
9. The null hypothesis for differences in performance by the control group on the preliminary screening test and the three-week posttest of word recognition was accepted. Subjects made no significant gain in recognition of the eight target words after three weeks.

CHAPTER V

POST HOC ANALYSES AND OBSERVATIONS

Several post hoc analyses were conducted on the available data. This chapter discusses these analyses in order to present behavioural trends of subjects, treatment groups, or sex groups. Experimenter observations during the training and testing sessions are also discussed.

Preliminary Screening Test

During the experimental period, one hundred children were given the preliminary screening test of word recognition. Approximately one-quarter of the sample correctly recognized one or more of the target words: twenty-eight children recognized words, whereas seventy-two children recognized none. Though the null hypothesis for differential effects caused by sex of subjects was accepted, a chi-square analysis was used to determine if there was a significant difference between boys and girls on the recognition of target words on the screening test. The results presented in Table 25 reveal that there was no significant relationship between sex of subjects and word recognition performance; boys and girls were performing equally on this screening task.

Table 25

Chi-Square Analysis of Sex of Subjects

and Performance on Preliminary Screening Test

		Word Recognition		
		Yes	No	Total
Sex	Boys	15	37	52
	Girls	13	35	48
	Total	28	72	100
			$\chi^2 = .038$ *	

*χ^2 value not significant at $p<.05$

The results of the analysis of variance conducted to investigate Hypothesis #5 revealed that there is a significant difference in performance with the eight target words; that is, performance with some target words is better than with other target words. To determine if there was a difference in the specific target words that were recognized on the preliminary screening test, a chi-square analysis was conducted, as shown in Table 26.

Table 26

Chi-Square Analysis on Target Words

Recognized on the Preliminary Screening

	Target Words								Total
	#1	#2	#3	#4	#5	#6	#7	#8	
	fell	Nicki's	needs	Our	tooth	fixing	out	television	
Frequency	17	3	15	8	8	10	11	3	75
							$\chi^2 = 18.97$ *		

* $p<.01$

Results indicated that there was a significant difference in the recognition scores for the eight target words ($p<.01$). The graph presented in Figure 3 illustrates this difference.

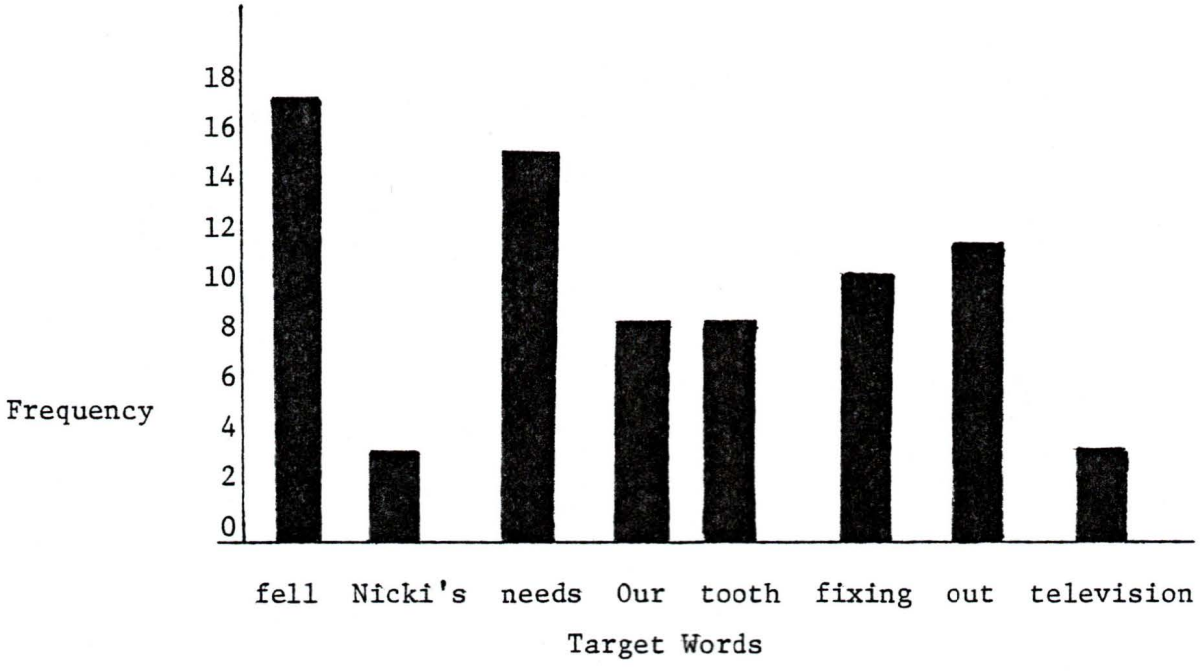


Figure 3

Recognition Frequencies for Target Words

on the Preliminary Screening Test

An explanation for the high recognition score for the words "fell" and "needs" may be that these two words appear in the beginning SWRL (Southwest Regional Laboratory) books, which are in the libraries of the kindergarten classrooms of the district where the testing took place. Subjects who recognized these words have probably learned them in this context, for it is customary for the children in these classrooms to be encouraged to pursue the reading of these books when the classroom teacher thinks they can cope with the task, or when the children appear curious about the identities of words.

A chi-square analysis conducted on the target words recognized by boys and girls disclosed that sex of subject was not related to word recognition scores for target words; that is, boys did not recognize different target words than those identified by girls. A summary of this analysis is presented in Table 27.

Table 27

Chi-Square Analysis of Frequency of Target Word Recognition in Relation to Sex of Subjects

		Target Words								
		#1	#2	#3	#4	#5	#6	#7	#8	Total
Frequency	Girls	8	2	8	3	5	5	4	2	37
of Word	Boys	9	1	7	5	3	5	7	1	38
Recognition	Total	17	3	15	8	8	10	11	3	75
							$\chi^2 = 2.597$ *			

*χ^2 not significant at $p<.05$

Although the analysis presented in Table 27 revealed that sex of subject was not related to the recognition scores for target words, and the results given in Table 25 disclosed that there was no significant difference in the number of boys and girls who recognized words on the preliminary screening test, the possibility remained that there may be a difference between the scores obtained by either sex on the recognition task; that is, the actual number of words recognized by the boys or the girls may be significantly different. A univariate analysis of variance was computed on the recognition scores given in Appendix H-3. A summary of the results is presented in Table 28.

Table 28

Analysis of Variance Table for Recognition Scores for Boys and Girls on Preliminary Screening Test

Source of Variation	Degrees of Freedom	Mean Square	F
Between sexes	1	4.361	.854 *
Within	26	5.103	
Total	27		

* critical F = 4.23; not significant at $p<.05$

The results presented in Table 28 reveal that there is no significant difference between the recognition scores obtained by either sex on the preliminary screening task. The raw data presented in Appendix H-3 reveals that there is a range in recognition scores for both boys and girls, but that neither sex is performing significantly better on this task.

To summarize the results in this section, the analyses conducted on the preliminary screening data support the null hypothesis for differential effects caused by sex of subjects; there are no significant differences between boys and girls on this task of target word recognition. Though differences in performance with specific target words do reach the .01 level of significance, these differences are not related to sex of subjects; rather, they may reflect the vocabulary of the reading materials used by these kindergarten children.

Non-Mastery of Target Words During Training Session

Subjects were allowed twenty teach/test trials for each target word; at the end of that time, the task was stopped and the word was designated as unmastered. This section concerns the number and identities of unmastered words in the study.

One observation of importance to the study is that all subjects in the word-sentence group reached criterion with all target words, whereas six subjects, three boys and three girls, in the word-alone group did not

reach criterion on a total of nine words. Appropriate explanations may center around the difficulty level of the two tasks; that is, the word-alone task may be more difficult than the word-sentence task of learning the eight words. The significant difference between the treatment groups in the number of trials to criterion ($p < .001$) also suggests that the word-sentence method eases the acquisition task. Possible explanations for this difference in treatment groups are discussed at greater length in the next chapter.

To determine if there was a difference in the target words that were not mastered, a chi-square analysis was conducted. The expected result was that target words of low meaningfulness would be more frequent in the set of unmastered words. Table 29 presents a summary of the analysis.

Table 29

Chi-Square Analysis of Target Words
Not Mastered in Twenty Trials

	Target Words								
	#1	#2	#3	#4	#5	#6	#7	#8	total
Frequency	0	1	4	1	0	0	3	0	9
							$\chi^2 = 16.875$ *		

* $p < .025$

The results indicate that there is a difference in the words that were not mastered by the word-alone group. Table 29 presents word #7 ("needs") and word #3 ("fell") as being the most often unmastered. The

word "needs" corresponds with the information in Table 22, which identified this word as requiring the greatest number of trials by subjects, and the word retained the least. "Fell" was the word which required the second most teach/test trials, as indicated in Table 22, but was retained better by subjects than the word "needs". Thus, the word "needs" presented the most difficulty for all subjects, whether mastery was or was not attained with this word; "needs" was the word most difficult to learn and to remember on tests of recognition at twenty-four hours and at three weeks. The word "fell" was the second most difficult word to learn, but retention scores were not consistently low for all subjects.

The low performance with these two words by treatment groups is opposite to the performance of children who recognized words on the preliminary screening test. These two words were the most frequently recognized. This contradiction in results may not be a function of the words themselves; the explanation may lie in the fact that certain children in the classroom are given the SWRL books to read, and it is in these books that the words "needs" and "fell" appear. Thus, the availability of the books may form the basis for the discrepancy between the performance of children in the treatment groups on the acquisition and retention of these two words, and the performance of children who recognized these words on the preliminary screening test.

With respect to word meaningfulness ($\bar{m}$), "needs" is the target word that was rated lowest (Appendix B-1). The low meaningfulness of this word may be an explanation for the difficulty which subjects experienced in

learning and retaining this word. However, the word "fell" ranks third out of eight words in meaningfulness, which suggests that the difficulty with this word is either not related to its $\bar{m}$ value, or the $\bar{m}$ value established for this word is not representative of the strength of meaning elicited in the minds of kindergarten children.

To summarize, the results in this section support the acceptance of the fifth null hypothesis: there is a significant difference in performance with the eight target words, but this difference is not consistently related to the word meaningfulness established according to the procedures outlined by Noble (1952) and Mickelson (1967).

The Effect of Trials on Retention Performance

In order to investigate the effect of practice on word retention, a post hoc analysis was conducted on the correlation between the number of trials to criterion for the eight words and performance on the word recognition tests administered twenty-four hours and three weeks after the initial acquisition session. Tables 30 and 31 present summaries of the computed Pearson product-moment correlations between trials and retention for treatment groups, sexes, and total subjects.

Table 30

Correlations Between Trials and
Performance on Tests of Short-Term Retention

		Treatment Groups		Total
		Word-sentence	Word-alone	
Sexes	Boys	-.403	.049	-.207
	Girls	-.026	-.310	-.395
	Total	-.256	-.163	-.174

Table 31

Correlations Between Trials and
Performance on Tests of Long-Term Retention

		Treatment Groups		Total
		Word-sentence	Word-alone	
Sexes	Boys	-.206	.033	-.221
	Girls	.038	-.315	-.414
	Total	-.191	-.148	-.283

Examination of the correlations given in Tables 30 and 31 reveals that no consistent relationship exists between the number of trials to acquire the words and the retention of those words after twenty-four hours and three weeks, by members of the total sample, either treatment group, or either sex. Examination for the correlations pertaining to the sex of subjects reveals that the boys in the word-sentence group obtained a

higher negative correlation between trials and retention than did girls in this treatment group; that is, the combination of requiring many trials to learn the words and receiving low scores on the retention tests occurred more frequently among the boys in this group than among the girls. The opposite situation arose in the word-alone group: the negative correlations indicate that the girls rather than the boys in this group exhibited the behavior of requiring many trials, yet remembering few words.

With respect to overall tendencies of either treatment group, the rejection of the null hypothesis for treatment effects on trials to criterion ($p < .001$) and an examination of the raw data presented in Appendices H-1 and H-2 reveals that the range of trials to the word-sentence group is not as large as the range for the word-alone group, and yet the range in short-term retention and long-term retention scores is approximately the same. The negative correlation for both treatment groups on trials with retention indicates that many presentations of the words did not ensure high retention scores after twenty-four hours or after three weeks.

Though these correlations did not reach the significant level, and account for a small percentage of the variance between and within groups, they are reported and discussed in the interest of directional trends.

Effect of Age on Performance

The review of literature on sex differences in reading achievement disclosed age and readiness as topics related to success in initial reading experiences (Balow, 1963; Stanchfield, 1962; Dykstra & Tinney, 1969). A post hoc analysis on performance in the acquisition and retention tasks in this study was conducted to investigate the possibility that age range within the sample is an influential factor on performance. A summary of the Pearson product-moment correlations computed between age of subjects and trials to criterion, short-term retention, and long-term retention for treatment groups, sexes, and total subjects is presented in Table 32. In addition, the mean ages of these groups are also reported.

Table 32

Summary of the Correlations Between Age of Subjects in Months and Performance on Acquisition and Retention of Target Words

Group and Mean Age in Months	Trials to Criterion	Short-Term Retention	Long-Term Retention
Word-alone (69.25 mo.)	.176	-.533 *	-.592 *
Word-sentence (69.13 mo.)	-.024	.032	-.036
Boys (70.50 mo.)	-.021	-.131	-.243
Girls (67.83 mo.)	.095	-.240	-.148
Total subjects (69.17 mo.)	.067	-.186	-.237

$p<.005$

Interpretation of these results must be prefaced with the cautionary note that the range of ages in kindergarten classrooms is relatively small, with the majority of children falling within a twelve month span; such is the case with the subjects of this study.

As indicated in Table 32, age is not consistently related to performance on tasks of learning and retaining new words by treatment groups, sexes, or the total sample. The highest correlations reported, significant at the .005 level, are between the age of word-alone subjects and scores on the tests of short-term and long-term retention; these negative correlations of -.533 and -.592 reveal that, as age increases amongst the subjects in the word-alone group, there is a tendency for the retention scores to decrease. The correlations between age and retention for the word-sentence subjects, however, are noticeably small. A possible explanation for this difference in groups may be that younger children in the word-alone group perform better than older children on a task involving rote learning; perhaps older children rely more on meaning in learning than do younger children. This explanation is based solely on speculation, and does not negate the possibility that these are only chance results with a small sample of subjects. Also, this correlation, based on a limited range of ages, accounts for only 28% - 35% of the variance, and cannot be designated as the major factor influencing the performance of these subjects.

Of importance to the validity of the study is that the mean age of the subjects in the control group is similar to that of the experimental

groups (69.71 months); the mean ages of the treatment groups, in turn, are not significantly different (69.25 months and 69.13 months). Of interest is that the mean age of the subjects who were excluded from the study on the basis of recognition of one or more words on the preliminary screening test is 70.89 months which, though slightly higher, is also not significantly different from the mean ages of the other groups. Thus, all groups were not significantly different in terms of age.

Analyses of Errors

The nature of the recording techniques throughout the experiment allowed for an examination of both quantity and quality of errors made by each subject on acquisition attempts and retention tests. The results of these analyses are reported and discussed in this section of the study. Throughout these analyses, miscues that clearly maintained the meaningful intent of the expected response were treated as correct because they reflected a different quality of response than that of other error types.

Attempts and Non-Attempts at Response

Several comparisons were made between subjects' behaviour in attempting answers on the retention tests. Some reading authorities state that, in order to learn to read, there must be a willingness to take the necessary risk (Smith, 1978). The following analyses were conducted to

investigate the risk behaviour of the subjects in this study.

To determine if there was a significant difference in the attempts and the non-responses given throughout the experiment, a chi-square analysis was computed on the totals. As indicated in Table 33, a significant difference was revealed ($p<.001$).

Table 33

Comparison of Frequencies of Response Behaviours on Retention Tests

Attempts	Non-Responses	Total Errors
701	989	1690

$\chi^2 = 49.08$ *

* $p<.001$

To determine if this difference in response/non-response behaviour was related to either treatment groups or sex of subjects, chi-square analyses on the behaviours exhibited by these groups were computed. Tables 34 and 35 present summaries of the analyses.

Table 34

Comparison of the Frequencies of Response Behaviours of Treatment Groups on Retention Tests

	Attempts	No Responses	Total
Word-sentence	311	436	747
Word-alone	390	553	943
Total	701	989	1690
		$\chi^2 = .013$ *	

* not significant at $p<.05$

Table 35

Comparison of the Frequencies of Response Behaviours of Boys and Girls on Retention Tests

	Attempts	No Responses	Total
Boys	308	571	879
Girls	393	418	811
Total	701	989	1690
		$\chi^2 = 31.29$ *	

* $p<.001$

As indicated in the summaries in Tables 34 and 35, there was no significant relationship between response behaviour and treatment groups,

but there was a significant relationship between response behaviour and sex of subjects. As revealed in Table 35, girls made significantly more attempts at correct responses than did boys ($p<.001$); that is, girls demonstrated a greater willingness to take risks than did boys. This behavioural difference is of interest to the study in that, though differences in performance on acquisition and retention tasks have not reached the significant level, the mean performance of the girls has consistently been higher than the mean performance of boys (Table 5). The girls' greater willingness to attempt a correct response may be responsible for the slight difference in scores. According to the research cited in Chapter II on sex differences in reading achievement, in our culture the task of reading is viewed as an activity more suited to females. One explanation for the difference in response behaviour between boys and girls on these tests of word recognition may lie in the subjects' awareness of cultural expectations and sex-role standards about reading; the girls in this study may view reading as an expected and desired activity, and may be responding with less anxiety. This explanation is based solely on speculation rather than on statistical facts, and is offered within those limitations.

One final investigation into the number of attempts at correct responses and no responses centered around the four retention tests of word recognition. The totals for error behaviour on each of the four

contextual settings were compiled for use in a chi-square analysis on short-term retention (Table 36).

Table 36

Comparison of Response Behaviours

on the Four Tests of Short-Term Retention

	Attempts	No Responses	Total
Isolation test	84	142	226
Sentence test	70	80	150
New Context test	108	118	226
Word Designation test	61	186	247
Total	323	526	849
		$\chi^2 = 32.577$ *	

* $p<.001$

Results of the chi-square analysis presented in Table 36 disclosed that there was a significant difference in response behaviour on the four tests of word recognition ($p<.001$). The largest differences appear between response behaviour on the isolation test and on the word designation test. To determine if the same trends were observed on the tests of word recognition after three weeks, the chi-square analysis was repeated on the response behaviours in the long-term retention sessions. Results are reported in Table 37.

Table 37

Comparison of Response Behaviours

on the Four Tests of Long-Term Retention

	Attempts	No Responses	Total
Isolation test	116	117	233
Sentence test	85	78	163
New Context test	127	94	221
Word Designation test	59	175	234
Total	387	464	851
		$\chi^2 = 56.23$ *	

* $p<.001$

As revealed in Table 37, there was a significant difference in response behaviour on the four tests of word recognition given after three weeks ($p<.001$). The large difference continued between attempts at correct response and non-responses on the test of word designation, but the difference between attempts and non-attempts on the isolation test is much smaller than was observed on the short-term retention test.

To determine a possible reason for this difference between response behaviour on the isolation test, a further examination was made on the behaviour of the treatment groups on this particular test of retention. On the short-term test, the word-sentence subjects were contributing more non-responses than were the word-alone subjects, the respective

frequencies being 85 and 57, for a total of 142 non-responses. However, on the long-term retention test, the word-sentence subjects made 30 fewer non-responses on the isolation test; instead, these 30 behaviours became either attempts at response or correct responses. This accounts for the difference in frequencies of non-response behaviours between tests at twenty-four hours and at three weeks. The word-sentence group was initially more reluctant than the word-alone group to attempt a response when presented with the word in isolation; however, on the test of word recognition given three weeks later, the word-sentence group appeared to demonstrate a greater willingness to take a risk, whereas the behaviour of the word-alone group did not change on this particular test of retention. Possibly the first contact with the words in an isolated condition had an inhibiting effect on the behaviour of the word-sentence subjects, which was no longer operating on their second experience with the isolated words.

An explanation for the large difference between attempts at response and non-responses on the word designation tests at twenty-four hours and at three weeks may center around the difficulty of this task. The target words were not underlined, as they were in the previous three test conditions; subjects were faced with the task of finding words that they recognized, and identifying them by name. If a word was not located, it was scored as a non-response; if a word was located but an error was made in identification, it was scored as an attempt. Thus, the nature of the word designation task would account for the greater number of non-responses by all subjects.

Error Patterns

Recording techniques allowed for a post-hoc analysis of the errors made by the subjects during the two retention-testing periods. A classification system of common error types was compiled. Table 38 presents a summary of the frequencies.

Table 38

Categorization of Errors and Frequencies

by Treatment Groups and Sex

	Error Type	Total Occurrences	Treatment Group		Sex	
			Word	Sentence	Boys	Girls
1	Same initial letter	259	178	81	108	151
2a	Target word from the same group in the word-alone treatment (Appendix F)	83	83	0	31	52
$2b_i$	Target word from the wrong sentence in the sentence method (Appendix F)	33	0	33	25	8
$2b_{ii}$	Target word in wrong position in the sentence method (Appendix F)	16	0	16	15	1
2c	Another target word	79	50	29	47	32
3	Letter confusion f / t	23	10	13	11	12
4	New word given	184	67	117	64	120
5	Sentence/letter/word confusion	24	0	24	7	17
	Total Errors	701	390	311	308	393

There were two general categories of errors exhibited by the subjects: errors which were connected in some way to the eight target words, and errors which were not related to the words mentioned in the teaching session. The majority of errors fell in the first category. A separate description of each type follows.

1. Initial letter: In accordance with the research of Marchbanks and Levin (1965) on the cues children use to recognize words, the most frequent error behaviour involved choosing a target word that had the same initial letter as the one being tested: our/out; television/tooth; fixing/fell; needs/Nicki's. Target words were originally chosen with this cue as criteria in order to determine if subjects in both treatment groups exhibited the same use. In this study, the word-alone group demonstrated the use of this cue more often than the word-sentence group, as revealed in Table 38.

2. Target word replacement: The second most frequent response behaviour was to substitute the target word with another word that was taught during the instructional period. These results are consistent with the word recognition strategies reported by Barr (1972) in her analyses of word recognition errors. Choices of target words varied as follows:

a) The word-alone group was taught two groups of four words each. Several times the substitution came from the group of words that were taught together. (Refer to Appendix F)

b) The word-sentence group was taught two sentences of four words each. Substitutions common to this treatment group

in the test which matched their sentence method of acquiring the words was: i) to choose the wrong sentence and thus substitute the word in sentence #2 that was in the same position as the word in sentence #1; or ii) to choose the correct sentence, but to name a word in another position in that sentence. (Refer to Appendix F)

c) All children demonstrated the "guessing" behaviour; substitutions were chosen from any target word that the subject could remember. For example, one subject pronounced the word "television" eleven times. He remembered that word, but couldn't match it to its graphic form.

3. Letter confusion: Several subjects demonstrated a confusion between the typewritten letters "t" and "f." These children were actually using the initial letter as their cue, but were mistaken in their recognition of that letter. Comments such as "I know that one because of the 't'" were accompanied by children indicating an "f." Most often the words "television and "fixing" were confused. Cueing to word length may be another explanation for the number of errors on these words.

The second category of response behaviour involved naming a word that was not a member of the target words taught. Although these errors do not seem to be related to the treatments, closer examination of the actual responses reveal that they are based on the same cues as have already been discussed. For example, in this set of errors were responses that matched the initial letter of the target word tested, but the word

pronounced was one derived from the regular classroom work (e.g. "fixing" elicited "Freddy Fox" and "our" elicited "Ollie Owl"). Also in this category fell subjects who, mistakenly concluding that they had never seen this word before, would attempt to sound it out. The Coquitlam kindergarten program devotes attention to learning the names and sounds associated with letters of the alphabet, and several children, recognizing the sound of the initial letter, would pronounce a nonsense word after failing at efforts to 'decode' into a real word.

Another response behaviour that characterized this category was the tendency for subjects to say any word rather than give no response or say they didn't know. One subject, for example, began on a list of animals; another named friends in his classroom. Sometimes the subjects' choice was a word that they had recently seen their teacher print, such as "look," "come," or "make." One subject constantly interjected the word "excellent" when the target word was not known.

One behaviour that was limited to two children in the word-sentence treatment involved errors which reflected confusion over the perceptual unit required. Downing (1978) expresses concern over the technical language that invades the teaching of reading. These children exhibited the behaviour specified by Downing, revealing that they had no concept of the boundaries of a word, a sentence, or a letter. Responses to "What is this word?" varied from "h," to "Mary had a little lamb." On the word designation test, in response to the question, "Are there any words here that you know?", the subjects' behaviour included pronouncing

one word or one letter while pointing to two-and-a-half words, or pronouncing an entire sentence while pointing to a single word.

In addition to analysis of the error responses, strategies and techniques for recognizing words were evident in observations of subject behaviour during the testing sessions. A discussion of these observations is presented in the next section.

Observations on Subject Behaviour

Throughout the experimental period, careful notes were kept of subjects' comments and observed strategies concerning the tasks. Some strategies were common to a single treatment group, whereas others were employed by subjects from either group. For example, many children, regardless of treatment, commented on the length of the words "television" and "fixing," saying "I sure remember the biggies" or "That's that long one." Also, references to particular letters were made by children in both groups: "That's the one with the 'x' in it," or "That's the 'o' word." On the retention tests, rather than saying the word or admitting that they didn't remember it, some subjects would spell the word; however, this response behaviour usually lasted for only five or six words before it was abandoned from fatigue. Another response to letters was an attempt to blend the individual sounds associated with the letters to form a word; very few children achieved success on any words, though their persistence with this strategy lasted for as many as eight consecutive words. Often this behaviour was limited by

the word-sentence group to the test of words in new contexts. A possible explanation may rest in the comments of two or three children who remarked that "This is a different sentence." Perhaps realizing that it was a different sentence led to the conclusion that this must be a different word.

Differences between subjects in their conceptualization of word constancy were apparent. In the test of word designation, the experimenter continued to ask, "Are there any other words here that you know?" until the subject replied that there weren't any more. Several children commented on the sentence in which the target words "our" and "out" appeared together, observing that "This one says 'our'...and that one says something else 'cuz this one has an 'r' and that one has a 't' ", or "This one is 'our'...and this one is 'our'. Hey, that can't be right. They both can't say 'our'." This level of comparison differed greatly from those subjects who were observed pointing to the same word three times and saying three different names for that word; for example, the word "pulling" in the last retention test, although it was not a target word, was designated by one subject as the word "pig," then "penny," and finally "puppy."

Meaningful miscues were common to both treatment groups. "Television" was the target word most frequently miscued, being referred to as "t.v.". Some children corrected themselves on this miscue with comments about the length of the word; it had to be "television" because t.v. was too short. "Nicki's" was frequently called "Nick's" or "Nicki," and "fixing" was pronounced as "fix."

Some differences were noted between treatment groups on the graphic- or semantically-constrained miscues. For example, the word-alone group made numerous errors on the word "fell," pronouncing it as "feel," "full," "fall," "fill," or "felled," which were not among the errors recorded for the word-sentence group on this word. Other graphic errors for the word-alone group included "sour" for "our," "knees" for "needs," "knittings" for "Nicki's," and "fishing" for "fixing." The absence of graphically-constrained errors from the incorrect responses made by the subjects in the word-sentence group suggests that the two groups depended on different strategies for retention of the words. The word-alone group appeared to demonstrate a greater reliance on rote memory of the sound of the words they had heard the previous day. Substitutions of words that sounded similar to the target word when subjects were unsure of the correct response indicate that attention was given to the auditory features of the word in addition to the graphic form during the teaching/testing session.

The word-sentence group, in contrast, appeared to demonstrate a stronger dependence on sentence memory for assistance in recognizing the words on the retention tests. The difference in semantically-constrained errors by the treatment groups reveals the use of the entire meaningful sentence by the word-sentence subjects, and the use of meanings of single target words by the word-alone subjects. For example, "out" was mistaken for "in" by some members of the word-alone group, which was not a semantically-linked error common to the word-sentence group; the meaning

of the sentence "Nicki's tooth fell in" makes this substitution unlikely for subjects taught by the sentence method. This same contextual restraint explains the absence of other semantic miscues which were made by the word-alone subjects: "toothpaste" for "tooth," "outings" for "out," "working" and "tools" for "fixing." For the same semantic reason, subjects in the word-sentence group made miscues that were not duplicated by subjects in the word-alone group. For example, "our" was mistaken for "my," and "Nicki's" was referred to as "Johnny's" by one subject. Another subject, commenting on being unable to remember the word, said "It's that girl's name. I just can't remember. You know--the one who lost her tooth." Thus, the behaviour of this group on meaningful miscues indicates an involvement with the meaning of the sentence, and a retention of the words in relation to the learned sentence.

There was a noticeable difference in the amount of language that was elicited by the introduction to the words during the first training trial. "Television" and "tooth" were the only words that were greeted with responses by the word-alone subjects. Comments were limited to "I have a loose tooth" or "We have a television at home." The word-sentence subjects, on the other hand, invariably made a comment on at least one of the sentences. Some children laughed, some announced that they had lost a tooth too, some said they knew Nicki, that she was ____'s sister or that she lived on their street, and others told about their television that was broken and a man had to come and fix it. These responses were not limited to the training session; the same kind of personal experiences

were repeated three weeks later. The subjects in this group were clearly attending to the meaning of the sentence, rather than the meaning of single individual target words.

One other difference between the groups involved their strategies for learning the word or retaining it. Some children in the word-alone group practised a process of elimination, repeating a single target word every time, knowing that eventually that word would be presented. In contrast, subjects in the word-sentence group would start at the beginning of the sentence, proceeding word by word until the specified word was reached. Sometimes the sentence would be said aloud, sometimes it would be whispered, but when the word being tested was reached, the subject would say it to himself, stop, and then announce it to the experimenter. It was observed, too, that several subjects in the word-sentence group proudly commented on the fact that they knew all the words in the sentence, whereas none of the subjects in the word-alone group made this statement, even though several children recognized all four words in isolation.

A final observation made during the retention testing involves recognition of words that were not taught to the subjects. On the tests of words in new context and word designation, the words most frequently mentioned were : "Dad," "the," "my" (mostly pronounced as "me"), "and," "I," "am," "is," and "Mom." Some of these words appear in the SWRL books, which are part of the libraries in the kindergarten classrooms involved in the study.

Summary

This chapter presents post hoc statistical analyses on the preliminary screening data, the words not mastered after twenty teach/test trials, acquisition trials for words in relation to retention, and errors on the retention tests. A summary of the results follows:

1. No significant differences were found between the number of boys and girls who knew one or more of the target words on the preliminary screening test.
2. Significant differences were reported between the frequencies for target words recognized on the preliminary screening test. ($p<.01$)
3. None of the word-sentence subjects failed to reach criterion for all words, whereas six subjects in the word-alone group failed to reach criterion on all words.
4. There was no consistent relationship between the number of trials needed to acquire the target words and performance on tests of short-term and long-term retention.
5. Significant differences were found between the number of attempts and non-attempts at correct responses on tests of short-term and long-term retention ($p<.001$). These differences were significant for sex of subjects ($p<.001$); girls made more attempts at correct responses than did boys. No significant differences were found between the subjects in the treatment groups.

6. Significant differences were reported between attempts and non-attempts on the four tests of short-and long-term retention. ($p<.001$)

The chapter concludes with a description of errors on the retention tests, and observations made by the experimenter on subjects' behaviour during the teaching and testing sessions.

CHAPTER 6

SUMMARY AND DISCUSSION

Summary of Investigation

This study was designed to investigate methods which use words in isolation and words in sentences for teaching word recognition to beginning readers. The effectiveness of the method was measured by acquisition trials for eight target words, and retention scores on four tests administered twenty-four hours and three weeks after the initial teaching session. Analyses of variance with repeated measures and two-way analyses of variance were employed to determine significant differences on the nine dependent variables.

One hundred fifteen children from six kindergarten classes were initially assigned to three experimental groups: word-alone treatment group, word-sentence treatment group, and control group. During the experimental period, twenty-eight children were excluded from the study on the basis of recognition of one or more target words, eleven children were unavailable (absent, on holidays, moved), and four children were not considered to be representative because they spoke little or no English, or were part-time attenders in the kindergarten class. The final sample consisted of seventy-two children who recognized none of the target words on a preliminary screening test. These subjects were

considered to be representative of beginning readers who had little or no knowledge of the reading process.

During April and May, 1980, forty-eight children, twenty-four boys and twenty-four girls, were taught individually by one of the treatment methods: word-alone or word-sentence. Acquisition criterion for each word was two consecutive correct responses to a maximum of twenty trials. Retention testing was conducted twenty-four hours later. Target words were tested in four conditions: in isolation, in sentences, in new context, and in word designation. No feedback was given. Posttesting in these four conditions was again conducted three weeks later.

Data utilized in the statistical analyses included the number of trials required to learn each word, and the number and names of target words correctly pronounced on each of the four tests.

Summary of Results

The results discussed in this section relate directly to the six hypotheses tested.

The first hypothesis stated that there is no significant difference in treatment groups on the nine dependent variables. This hypothesis was rejected for trials to criterion ($p<.001$) and for total long-term retention ($p<.05$). Subjects receiving the word-sentence method of presentation acquired the target words with significantly fewer trials, and recognized significantly more words after three weeks. No significant

differences were found between treatment groups on total retention after twenty-four hours ($p<.075$).

Analyses of variance computed on the four tests of short-term and long-term retention led to the acceptance of the null hypothesis for treatment effects on the tests of words in isolation, new contexts, and word designation. Subjects taught by the word-alone and the word-sentence methods performed equally well on these three tests of varied contextual conditions.

The null hypothesis for treatment effects on the test of words in sentences was rejected ($p<.001$) for both short-term and long-term retention. Subjects taught by the word-sentence method performed significantly better on the word-sentence test than did subjects taught by the word-alone method.

The second hypothesis stated that there is no significant difference between sex of subjects on the nine dependent variables. This hypothesis was accepted. In this study, there was no difference between the ability of either sex to learn the eight target words, or to recognize them on tests of retention after twenty-four hours and after three weeks.

The third hypothesis stated that there is no interaction effect between treatment and sex of subjects on the nine dependent variables. This hypothesis was accepted. There was no significant difference in the performance of either sex as a result of method of word presentation; that is, effectiveness of the instructional method was not related to sex of the learner.

The fourth hypothesis stated that there is no significant difference in performance of treatment groups on the four retention tests. This hypothesis was rejected ($p<.0001$). For both short-term and long-term retention, the analysis of repeated measures disclosed significant differences between scores on the four tests. Tukey comparisons revealed that the word-sentence test was significantly different from the word-isolation, new context, and word designation tests; these latter three tests were not significantly different from each other.

The fifth hypothesis stated that there is no significant difference in performance of subjects on words of high or low meaningfulness. This hypothesis was accepted. Although significant differences were revealed among the eight target words on trials to criterion ($p<.0005$) and on retention at twenty-four hours and three weeks ($p<.0001$), these differences were not consistently related to the word meaningfulness ratings ($\bar{m}$) established in this study using the procedures outlined by Noble (1952) and Mickelson (1967).

The sixth hypothesis stated that there is no significant difference in the performance of the control group on the preliminary screening test and the three-week posttest. This hypothesis was accepted. The twenty-four subjects in the control group recognized none of the target words at the beginning of the experimental study, and made no significant gain in word recognition at the end of three weeks.

Interpretation of Results

Acquisition of Words

The results of this study indicated that the use of sentence context, as defined by the word-sentence method, assisted the beginning reader in initial acquisition of eight target words. Subjects taught by the sentence method learned the eight target words in approximately half as many trials as subjects taught by the word-alone method.

Retention of Words

The results of this study indicated that subjects taught by the word-alone method and the word-sentence method performed equally well when tested twenty-four hours after learning the words. This result must be interpreted in light of the fact that the word-alone group needed twice as many trials to learn the words, and yet did not perform significantly better on the short-term retention test; that is, not only did the word-sentence group learn the words more quickly than the word-alone group, but they also retained them equally well.

The difference between the two treatment groups becomes even greater when total long-term retention is considered. On a test of word recognition given three weeks after the teaching session, the word-sentence group performed significantly better. Phrased in reverse, this result becomes: the word-alone group needed more trials to learn the words,

and yet scored less well on word recognition three weeks later.

An examination of performance in the four tests of retention reveals that the sentence test is the source contributing to the rejection of the null hypothesis for treatment effects on total long-term retention. On this particular test, the word-sentence group performed significantly better than the word-alone group. This indicates the presence of a teach/test bias for this specific section of the total retention test. It does not, however, weaken the overall performance results. Simply stated, the results indicate that subjects taught by the word-sentence method acquired the target words with fewer trials and retained them equally well as subject taught by the word-alone method; in addition, when tested in the contextual condition matching the condition in which the words were taught, the word-sentence group performed significantly better than the word-alone group, and significantly better than their own performance in the other contextual conditions. In comparison, the word-alone subjects did not acquire the words as quickly, and did not perform significantly better than the word-sentence subjects on tests of short-term or long-term retention, including tests which matched the condition in which the words were taught.

Discussion

This study was designed in response to issues raised by the review of literature, and to questions posed by consideration of the theories

of S. Jay Samuels (1967) and Kenneth Goodman (1967).

Much of the support for Samuels' focal attention hypothesis comes from the research on word-alone/word-picture studies. Few research studies test this theory with studies of contextual methods of teaching word recognition to beginning readers. The difficulty that constantly arises is that beginning readers, by their very nature, do not have a base of printed context from which to draw the semantic and syntatic cues that are the cornerstones of Goodman's contextual theory. The methodology used in the present investigation successfully removes this difficulty by teaching entire sentences to the subjects.

The results of the present study are interpreted as support for Goodman's contextual hypothesis. The semantic and syntactic cues available to the beginning readers taught by the word-sentence method facilitated the learning of the eight words: the word-sentence subjects required fewer trials to learn the words. In contrast to the results reported by Singer et al. (1974) and Ehri (1979), the word-sentence group scored as well as the word-alone group on a test of word retention given twenty-four hours later.

Methodological differences may account for the variance between results of the present study and those reported in previous investigations. For example, Singer et al. (1974) reported that subjects taught by the word-alone method required the fewest trials to criterion and yet still attained the highest recognition scores. However, comparison of experimental procedures reveals one major difference in that Singer presented target words printed in an artifical alphabet, whereas the

present investigator employed the standard orthographic system. Secondly, teaching and testing in the Singer study were conducted in one sitting, whereas this study involved retention tests given twenty-four hours and three weeks after the teaching session. Also, words were tested only in isolation in the Singer study; retention testing was conducted in four contextual settings in the present investigation. Finally, the contextual information contained in the sentences varies greatly between the two studies; the sentences used by Singer, though approximately the same length as those used by this investigator, tested only one target word each. This differs from the whole language approach used here which links the target words into meaningful sentences.

The methodology used by Ehri (1979) also differed from the present study. The purpose of Ehri's investigation was to assess the gains made in orthographic, syntactic, and semantic knowledge through the two types of word-learning. However, all target words were presented in context, either oral or printed; thus, both treatment tasks were meaningful. In the present investigation, context was provided to the word-sentence subjects only. Also, the number of training trials varied among subjects in that word acquisition rate was of interest in the comparison of the two methods, whereas in Ehri's study, all subjects were given the same number of training trials in an attempt to ensure that, on the measures of semantic and syntactic knowledge, the oral pronunciation of target words would pose no difficulties.

Wood (1976) reported results that are more closely aligned with those of this study; significant differences were found on trials to criterion, with the sentence-context group requiring the fewest trials

and the word-alone group requiring the most trials. Retention tests in varied contextual settings revealed a teach/test bias for both the isolated word group and the sentence-context group; both groups performed significantly better in the condition that matched the one with which they had been taught. The results of the present investigation revealed a teach/test bias on the word-sentence test only; on all other tests, including the test that matched the condition in which the word-alone group was taught, performance was equivalent for the treatment groups. However, methodological differences must again be noted. In Wood's study, tests of word recognition were given immediately following mastery of the words, as in the Singer study. Also, subjects were included who knew as many as four of the eight target words, and who were tested in a story context which demanded some previously-acquired knowledge of the reading process. The present study conducted retention testing after twenty-four hours and three weeks, which is more rigorous than a test immediately following the teaching session. Also, the subjects in this study knew none of the words on a preliminary screening test, ensuring that increases in word recognition were a result of the instructional method rather than the subjects' preknowledge of the reading process.

It is this last methodological difference which makes it difficult to compare the results of the present study with those reported by previous investigators. The word-sentence method employed is significantly different from the method of word presentation used in other contextual studies: the presentation of whole sentences composed entirely of unknown

words deletes extraneous information from the task. With this method, every target word tested is semantically and syntactically bound to other target words, whereas the literature refers to methods which present one target word surrounded by printed context that the subject can already read. Although the contexts in these other studies may provide meaningful settings for target words, the presentation of four target words in four unrelated contexts places a larger burden on the memory of the subjects than does the presentation of a single sentence containing all four target words. The subject presented with this latter task has only one meaningful context to remember, whereas, with the methods cited in previous studies, the subject has four key words linked to four different contexts. The presentation of words according to the word-sentence method defined in this study may therefore be a more economical means of teaching children to recognize words in contextual settings.

It is this economical presentation of meaningful material to subjects in the word-sentence group which may, in fact, account for their noteworthy performance. An examination of the literature which reports that meaning facilitates learning could provide a possible explanation for the ease of word acquisition for subjects taught by the sentence method. The essential difference between the two methods, word-alone and word-sentence, is that the latter presents target words in larger, more meaningful chunks which, according to previous research, makes them easier to process and retain. This, too, may be the explanation for the significant difference in the performance of the word-sentence subjects

when tested in the condition matching the one in which they were taught: retention of the larger meaningful chunk, the sentence, assists in the retention of the smaller meaningful chunk, the word.

The lack of meaningfulness involved in the word-alone task of learning eight disconnected words could also explain the greater number of trials needed by this group to acquire the words, and the observation that, once acquired, a single target word was recognized with attention to the words around it. None of the members of this treatment group reacted to more than the single word being tested, even though in the sentence test of word recognition they were exposed eight times to sentences which were composed solely of target words. Ehri's hypothesis (1977) that lexical awareness develops as a result of learning to read may be a "fringe benefit" of teaching children by using the sentence method, for these subjects clearly voiced the fact that they could read the whole sentence, whereas the word-alone group possibly didn't notice or didn't think it mattered.

The review of literature revealed that acquisition of a word list is determined by the distinctive features and specific characteristics of the words in that list. Previous investigations have reported the influence of initial letters, word length, word shape, concreteness/abstractness meaningfulness, and similarity of letter order on the rate of word acquisition. In this study, significant differences in performance were found among the target words; however, rank ordering of performance on the words was not significantly related to the meaning-

fulness ratings established on the basis of responses by grade three children. Possible explanations may lie in the procedure outlined by Noble (1952) or Mickelson (1967) which have previously been applied to nouns only. In this study, the same procedure was employed to establish $\bar{m}$ values for the eight target words, which spanned all word classes. This procedure may not be as valid for non-noun words. Certain classes of words elicited only one class of response, whereas nouns elicited responses from several classes. Possible explanations for this variation in classes of response may center around either the associative strength of the target words or the types of associational responses of eight and nine-year-old children. Previous research has revealed that younger children give syntagmatic responses to words, whereas older children and adults are more apt to give paradigmatic responses. The shift from syntagmatic to paradigmatic associations begins around the age of eight or nine years old. Consequently, the children may have been responding with syntagmatic associations to some classes of words, and with paradigmatic associations to other classes of words. This would possibly explain the observation that all children responded to the words "Nicki's" and "Our" with a series of nouns, whereas words such as "tooth" and "television" elicited synonyms, adjectives, possessives, determiners, and verbs. The possibility cannot be eliminated that the associative responses of the nine-year olds were not representative of the associations in the minds of the kindergarten children upon hearing the target words; this would also explain a lack of correlation between performance with the words

and rank in meaningfulness.

Another factor which needs to be considered is that, once presented as a sentence, the target words no longer retain their individual meaningfulness value, but become linked semantically to each other. Establishing a word meaningfulness under these conditions becomes even more difficult because, as Miller (1965) explains, the meaning of an utterance is not the linear sum of the meaning of words that comprise it.

One final explanation for greater performance by all subjects on specific target words may be that other cues were operating that separated those words from the others; cues such as the capital letter in the word "Our" or the apostrophe in the word "Nicki's" or the uncommon letter "x" in the word "fixing" may have been used by subjects, regardless of treatment or word meaningfulness.

The literature on sex differences in beginning reading achievement is fairly consistent in pointing to differences in North America in favour of the girls. The results of this study indicated that directional tendencies favoured the girls, although differences were not at the significant level. The small sample size may have contributed to this insignificance. In addition to the lack of differences between performance of boys and girls, it is of importance to the study that treatment methods were not significantly linked to sex of subject; that is, neither sex performed significantly better or worse with one method of instruction than with the other, allowing for the effectiveness of the methods to be generalized with greater confidence to all subjects.

The results of the post hoc analyses of error patterns on tests of retention revealed that the word-sentence subjects were responding to the meaningful component of the sentence, whereas the word-alone subjects were guessing from their "response pool." This observation is consistent with the research reported by Barr (1972); in her analyses of word recognition errors of grade one children, a frequent response behaviour was to substitute another word taught during the instructional period. The subjects in this study exhibited this same behaviour. Children in the word-sentence group often substituted a word from the same sentence as the one in the test situation, or a word from the other learned sentence. Children in the word-alone group often substituted another target word that was in their repetoire of responses. The meaningful miscues indicated that the word-sentence subjects relied on the meaning of the sentence, whereas the word-alone subjects relied on the sound of the target word or the graphic features of the word. These observations of subject behaviour support Barr's conclusion that the method of instruction influences the strategy used by the child.

Conclusions

Within the limitations of the study, with particular reference to the unique use of whole sentences as a method of teaching word recognition, the following conclusions seem justified:

1. Evidence does not support the focal attention hypothesis in that the use of sentences facilitated rather than inhibited the acquisition of new words by kindergarten children.
2. Evidence supports the contextual hypothesis in that subjects taught by the sentence method used the syntactic and semantic information in those sentences to recognize words on a recognition test in the same contextual condition.
3. The instructional methods were equally effective with retention of target words after twenty-four hours.
4. The sentence method of teaching word recognition was more effective than the isolated word method with retention of target words after three weeks.
5. Children taught by an isolated word method performed equally well on tests of word recognition under varied contextual conditions. However, children taught by a sentence method performed significantly better on a word recognition test which matched the condition under which the words were taught.
6. The method of teaching word recognition was independent of the sex of the learner.

7. Performance of subjects on acquisition and retention of words varied in accordance with certain distinctive features of those words.

Implications

The implications for educational practice derived from this study are subject to the limitations within the study. The following implications appear to be appropriate.

Sentences can be used effectively to teach word recognition to beginning readers. Sentences used in this study were highly structured and economical in presentation of information, yet contained content that appealed to young children. The interest expressed by the sentence group implies that this is a pleasant, meaningful, and rapid way to learn to read words. Interesting sentences can be remembered for long time periods and can lead to word recognition in new contexts in addition to the original learned sentence. Drawing attention to the position of words in sentences may help to develop the child's linguistic awareness, and expand his concepts of the perceptual units in reading. Efforts by teachers to help beginning readers develop strategies in word recognition could include writing sentences that allow the child to use the syntactic, semantic, and orthographic information provided by the language he already knows; that is, teachers could write sentences that allow the child to predict. Efforts to extend the child's developing bank of

sentences and phrases could include writing stories that are built on an already-acquired sentence, which would provide a contextual base from which the child can anticipate and make meaningful guesses.

Publishers of children's reading material could assist the beginner's progress by distribution of short books based on events that are meaningful to children. The amount and nature of the spontaneous language elicited by the children in the sentence group suggests that, when material is interesting and directly related to children's life experiences, the task becomes more engaging. Interesting sentences that convey meaningful information should be included in the child's reading material. Reading tasks should be avoided which do not allow the child to link words together in a meaningful way; otherwise the reading becomes a game of guessing the isolated word. Non-meaningful miscues should act as warnings to the teacher that the reader is not comprehending.

A final implication is that children should be encouraged to orally respond to what they read. The subjects in the sentence group voluntarily displayed an understanding of the message presented by the sentence, whereas subjects in the isolated word group did not verbally respond to the words, and it was clear from their mispronunciations, uncertain facial expressions, and intonations during the training and the teach/test trials that words were not always understood, but merely repeated. Teachers who encourage responses to printed messages will quickly recognize a child who is not understanding. Making the message and the intended response functional would allow the teacher to build meaning into the reading task.

Recommendations for Further Study

This study, though providing evidence for the use of contextual information in the teaching of beginning reading, also provides evidence of the need for further investigations into the effects of teaching reading from a meaningful base. Further study that would enhance our understanding of the word recognition process engaged in by beginning readers might include the following:

1. Replication of the present study with a larger sample.
2. Replication of the present study with a wider span of socioeconomic groups.
3. Replication of the present study with different retention measurements, including a measure of target word understanding, in order to determine if either method has a significant effect on word meaning.
4. Replication of the present study with pretests and posttests of orthographic and semantic knowledge in an attempt to determine if either treatment effects significant advances in these areas.
5. Provision of oral context to the word-alone group in an attempt to determine if sufficient meaningfulness is added to the target words to increase acquisition to a rate equal to that of the sentence method.

6. Reduction of the target words to four, but repetition of these four words in several printed sentences to determine if transfer using the sentence method is possible.
7. Replication of the study with a combination of the two methods of presentation, word-alone and word-sentence, adding this third treatment to determine if significant differences in acquisition and retention are effected.
8. Increase the criterion level to two consecutive responses for all eight target words in order to determine if differences in retention are attained.
9. Increase the meaningfulness level of the sentences by allowing the subjects to compose their own sentences, given several target words. Posttesting of target words could include presentation of their created sentences plus a variety of other contextual settings, including isolated words and words in new contexts.
10. Conduct a study in which: 1) target words are written in a story following a language experience approach, 2) the story is read several times by the investigator and the subjects, and 3) subjects are individually tested on the target words in the story context and in other contextual conditions. A comparison group could involve subjects who are taught the

words in isolated form, who read them in list form with the investigator, and then are tested on the target words in a story context, in list form, and in other contextual conditions.

11. Conduct a study in which several target words are taught in isolation and in a story to determine if, upon testing, performance in one condition exceeds the other.
12. Conduct a long-term follow-up of classrooms using isolated word or whole language approaches.

BIBLIOGRAPHY

Aborn, M., Rubenstein, H., & Sterling, T.D. Sources of contextual constraint upon words in sentences. Journal of Experimental Psychology, 1959, 57, 1971-180.

Allington, Richard L. Developmental trends in the discrimination of high frequency words. In P.D. Pearson (Ed.), Reading: Theory, Research, and Practice. Twenty-sixth Yearbook of the National Reading Conference, Clemson, South Carolina: National Reading Conference, Inc., 1977, 187-192.

Arlin, M., Scott, M., Webster, J. Effects of pictures on rate of learning sight words: a critique of the focal attention hypothesis. Reading Research Quaterly, 1978-1979, 4, 645-660.

Balow, Irving H. Sex differences in first grade reading. Elementary English, 1963, 40, 303-306, 320.

Baron, J. Phonemic stage not ncessary for reading. Quarterly Journal of Experimental Psychology, 1973, 25, 241-246.

Barr, Rebecca. The influence of instructional conditions on word recognition errors. Reading Research Quarterly, 1972, 7, 509-529.

Barr, Rebecca. Processes underlying the learning of printed words. Elementary School Journal, 1975a, 4, 258-268.

Barr, Rebecca. The effect of instruction on pupil reading strategies. Reading Research Quarterly, 1975b, 10, 555-582.

Barron, Roderick W. Access to the meanings of printed words: some implications for learning to read. In Frank B. Murray (Ed.), The Recognition of Words. Newark: International Reading Association, 1978, 34-56.

Barron, R.W. & Baron, J. How children get meaning from printed words. Child Development, 1977, 48A, 587-594.

Biemiller, A. Development of use of graphic and contextual information as children learn to read. Reading Research Quarterly, 1970, 6, 75-96.

Bloomer, R.H. Concepts of meaning and the reading and spelling difficulty of words. Journal of Educational Research, 1961, 54, 178-182.

Braun, C. Interest loading and modality effects on textual response acquisition. Reading Research Quarterly, 1969, 4, 428-444.

Burke, C. & Goodman, K. When a child reads--a psycholinguistic analysis. Elementary English, 1970, 47, 121-129.

Carroll, John B., Davies, Peter, & Richman, Barry. The American Heritage Word Frequency Book. Boston: Houghton Mifflin, 1971.

Carroll, John B. The nature of the reading process. In H. Singer & R. B. Ruddell (Eds.), Theoretical Models and Processes of Reading (2nd ed.). Newark, Del.: International Reading Association, 1976, 8-18.

Chall, J. Learning to Read: The Great Debate. New York: McGraw-Hill, 1967.

Chester, Robert Davis. Differences in learnability of content and function words presented in isolation and oral context when taught to high and low socio-economic level subjects. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, 1972. (ERIC Document Reproduction Service No. ED 965 847)

Clay, Marie M. A syntactic analysis of reading errors. Journal of Verbal Learning and Verbal Behaviour, 1968, 7, 434-438.

Clay, Marie M. Reading errors and self-correction behaviour. British Journal of Educational Psychology, 1969, 39, 47-56.

Dahl, Patricia Rawerts. Mastery-based experimental program for teaching high speed word recognition skills. Reading Research Quarterly, 1975-1976, 11, 203-211.

Davis, Frances Coon. The relative reliability of words and nonsense syllables. Journal of Experimental Psychology, 1930, 13, 221-234.

Dollinger, Robert A., & Walker, David N. The effect of three methods of presentation and socio-economic class on recognition performance in presentation of low-frequency words to kindergarteners. Journal of Reading Behaviour, 1978, 10, 303-307.

Downing, John. The psycholinguistic basis of cognitive clarity. Paper presented at the Annual Meeting of the National Reading Conference, Florida, Nov. 30 - December 2, 1978.

Downing, John; Dwyer, Carol A.; Feitelson, Dina; Jansen, Mogens; Kemppainen, Ritva; Matihaldi, Hilkka-Liisa; Reggi, David R.; Sakamoto, Takahito; Taylor, Hugh; Thackray, Derek, V.; & Thomson, Douglas. A cross-national survey of cultural expectations and sex-role standards in reading. Journal of Research in Reading, 1979, 2, 8-23.

Downing, John & Oliver, Peter. The child's conception of 'a word'. Reading Research Quarterly, 1973-1974, 9, 568-582.

Dukes, W.F. & Bastian, J. Recall of abstract and concrete words equated for meaningfulness. Journal of Verbal Learning and Verbal Behaviour, 1966, 5, 455-458.

Dwyer, C.A. Sex differences in reading: an evaluation and a critique of current theories. Review of Educational Research, 1973, 43, 455-466.

Dykstra, Robert. The effectiveness of code-and meaning-emphasis beginning reading programs. Reading Teacher, 1968, 22, 17-23.

Dykstra, R. & Tinney, R. Sex differences in reading readiness - first-grade achievement and second-grade achievement. In J.A. Figurel (Ed.), Reading and Realism. Newark, Delaware: International Reading Association, 1969, 623-628.

Ehri, Linnea C. Word consciousness in readers and pre-readers. Journal of Educational Psychology, 1975, 67, 204-212.

Ehri, Linnea C. Word learning in beginning readers and pre-readers. Paper presented at the Annual Meeting of the American Educational Research Association. New York City: April, 1977. (ERIC Document Reproduction Service No. ED 140 248)

Ehri, Linnea C. Beginning reading from a psycholinguistic perspective: amalgamation of word identities. In F.B. Murray (Ed.), The Recognition of Words. Newark, Delaware: International Reading Association, 1978, 1-33.

Ehri, Linnea C. & Roberts, Kathleen T. Do beginners learn printed words better in contexts or in isolation? Child Development, 1979, 50, 675-685.

Elman, Elaine. The Effect of Pictures on the Acquisition and Retention of Sight Words. M.Ed. Thesis, Rutgers University, 1973. (ERIC Document Reproduction Service No. ED 071 048)

Erickson, L. & Otto, W. Effect of intra-list similarity and impulsivity-reflectivity on kindergarten children's word recognition performance. Journal of Educational Research, 1973, 66, 466-470.

Fleisher, L. S. & Jenkins, J.R. Effects of contextualized and decontextualized practice conditions on word recognition. Technical Report No. 54. Cambridge, Massachusetts, July, 1977. (ERIC Document Reproduction Service No. ED 144 043)

Forester, Anne Dora. The Acquisition of Reading. Unpublished Master's thesis, University of Victoria, 1975.

Gates, Arthur. Sex differences in reading ability. Elementary School Journal, 1961, 61, 431-434.

Gibson, E.J., Tenney, Y.L., & Sharabany,R. Is discovery of structure reinforcing? The role of semantic and syntactic structure in anagram solution. Reprinted in E.J. Gibson & H. Levin (Eds.), The Psychology of Reading. Cambridge, Massachusetts: The MIT Press, 1979, 55.

Gleitman, L. R. & Rozin, P. Phoenician go home? A response to Goodman. Reading Research Quarterly, 1973, 8, 494-501.

Goodman, Kenneth. A linguistic study of cues and miscues in reading. Elementary English, 1965, 42, 639-643.

Goodman, Kenneth. Analysis of oral reading miscues: applied psycholinguistics. Reading Research Quarterly, 1969, 5, 9-30.

Goodman, Kenneth. Decoding--from code to what? Journal of Reading, 1971, 14, 455-462, 498.

Goodman, Kenneth. Reading: the key is in children's language. Reading Teacher, 1972a, 25, 505-508.

Goodman, Kenneth. Orthography in a theory of reading instruction. Elementary English, 1972b, 49, 1254-1261.

Goodman, Kenneth. The thirteenth easy way to make learning to read difficult: a reaction to Gleitman and Rozin. Reading Research Quarterly, 1973, 8, 484-501.

Goodman, Kenneth. Reading: a psycholinguistic guessing game. Journal of the Reading Specialist, 1967, 4, 126.

Goodman, Kenneth. Behind the eye: what happens in reading. In H. Singer & R.B. Ruddell (Eds.), Theoretical Models and Processes of Reading (2nd ed.). Newark, Delaware: International Reading Association, 1976, 470-496.

Goodman, Yetta & Burke, C. Do they read what they speak? Grade Teacher, 1969, 26, 144-150.

Gorman, A.M. Recognition memory for nouns as a function of abstractness and frequency. Journal of Educational Psychology, 1970, 61, 23-29.

Groff, Patrick. Should children learn to read words? Reading World, 1978, 17, 256-264.

Groff, Patrick. Goodman and his critics. Reading World, 1979, 18, 376-383.

Hall, J.W. Effects of three variations in learning instructions on children's word recognition performance. Journal of Educational Psychology, 1969, 60, 461-464.

Hargis, Charles H. & Gickling, Edward E. The function of imagery in word recognition development. Reading Teacher, 1978, 31, 870-874.

Hartley, R.N. Effects of list types and cues on learning word lists. Reading Research Quarterly, 1970, 6, 97-121.

Hopkins, K.D. & Glass, G.V. Basic Statistics for the Behavioural Sciences. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1978.

Howes, Davis. The Davis-Howe count of spoken English. Journal of Verbal Learning and Verbal Behaviour, 1966, 5, 572-606.

Johnson, Dale D. Sex differences in reading across cultures. Reading Research Quarterly, 1973-1974, 9, 67-87.

Juel, Connie. Comparison of word identification strategies with varying context, word type, and reader skill. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, California: April, 1979. (ERIC Document Reproduction Service No. ED 169 494)

King, E. & Muehl, S. Different sensory cues as aids in beginning reading. Reading Teacher, 1965, 19, 163-168.

Kiraly, J. & Furlong, A. Teaching words to kindergarten children with pictures, configuration, and initial sound cues in a prompting procedure. Journal of Educational Research, 1974, 67, 295-298.

Klein, Gary A. & Klein, Helen Altman. Word identification as a function of contextual information. American Journal of Psychology, 1973, 86, 399-406.

Klein, H.A., Klein, G.A. & Bertino, M. Utilization of context for word identification decisions in children. Journal of Experimental Child Psychology, 1974, 17, 79-85.

Koehler, John Jr. The effects of serial pattern discrimination and mixed word identification training on sight word acquisition and retention. Paper presented at the meeting of the American Educational Research Association, New York, New York: Feb. 4-7, 1971. (ERIC Document Reproduction Service No. ED 057 989)

LaBerge, D. & Samuels, S.J. Toward a theory of automatic information processing in reading. Cognitive Psychology, 1974, 6, 293-323.

Leeds, Bette G. Kindergarten children and the influence of letter shapes and meaningfulness of vocabulary as factors influencing word recognition. 1976, 17 pages. (ERIC Document Reproduction Service No. ED 136 250)

Levitt, E. The effect of context on the reading of mentally retarded and normal children at the first grade level. Journal of Special Education, 1970, 4, 425-429.

Liberman, Isabelle Y. & Shankweiler, Donald. Speech, the alphabet, and teaching to read. Paper presented at the Conference on Theory and Practice of Beginning Reading Instruction, Pittsburgh, May, 1976. (ERIC Document Reproduction Service No. ED 155 631)

Lott, Deborah & Smith, Frank. Knowledge of intra-word redundancy by beginning readers. Psychonomic Science, 1970, 19, 343-344.

Lundberg, I. & Torneus, M. Nonreaders' awareness of the basic relationship between spoken and written words. Journal of Experimental Child Psychology, 1978, 25, 404-412.

MacGinitie, W.H. Research suggestions from the 'Literature Search'. Reading Research Quarterly, 1975-1976, 11, 7-35.

McCutcheon, B.A. & McDowell, E.E. Intralist similarity and acquisition and generalization of word recognition. Reading Teacher, 1969, 23, 103-107, 115.

Marchbanks, G. & Levin, H. Cues by which children recognize words. Journal of Educational Psychology, 1965, 56, 57-61.

Mason, George E. & Woodcock, Carol. First graders' performance on a visual memory for words task. Elementary English, 1973, 50, 6, 865-870.

Mickelson, Norma. Meaningfulness ($\bar{m}$) in Children's Verbal Learning. Unpublished Master's thesis, University of Victoria, 1967.

Miller, George A. Some preliminaries to psycholinguistics. American Psychologist, 1965, 20, 15-20.

Miller, G.A. & Selfridge, J.A. Verbal context and recall of meaningful material. American Journal of Psychology, 1950, 63, 176-185.

Moe, Alden J. Approaches to the introduction of words or deciding which words to teach first in beginning reading instruction. Paper presented at the Annual Meeting of the International Reading Association, New Orleans, 1974. (ERIC Document Reproduction Service No. ED 090 505)

Montare, Alberto; Elman, Elain; & Cohen, Joanne. Words and pictures: a test of Samuels' findings. Journal of Reading Behaviour, 1977, 9, 269-285.

Morton, John. The effects of context on the visual duration threshold for words. British Journal of Psychology, 1964a, 55, 165-180.

Morton, J. The effects of context upon speed of reading, eye movements, and eye-voice span. Quarterly Journal of Experimental Psychology, 1964b, 16, 340-354.

Murray, Frank B. Implications of Piaget's theory for reading instruction. In S.J. Samuels (Ed.), What Research Has To Say About Reading Instruction. Newark, Del.: International Reading Association, 1978, 98-108.

Noble, C.E. An analysis of meaning. Psychological Review, 1952, 59, 421-430.

Noble, C.E. Tables of the e and $\bar{m}$ scales. Psychological Review, 1958, 4, 590.

Noble, C.E. & McNeely, D.A. The role of meaningfulness in paired-associate verbal learning. Journal of Experimental Psychology, 1957, 53, 16-22.

Noble, C.E. & Parker, G.V.C. The Montana scale of meaningfulness ($\bar{m}$). Psychological Report, 1960, 7, 325-331.

Nodine, C.F. & Hardt, J.V. Role of letter-position cues in learning to read words. Journal of Educational Psychology, 1970, 61, 10-15.

Newman, H. Psycholinguistics and reading: a dissenting point of view. Reading World, 1979, 18, 368-375.

Oaken, R., Wiener, M., & Cromer, W. Identification, organization, and reading comprehension for good and poor readers. Journal of Educational Psychology, 1971, 62, 71-78.

Ollila, Lloyd O. & Chamberlain, Larry. The learning and retention of two classes of graphic words: high frequency nouns and non-noun words among kindergarten children. Journal of Educational Research, 1979, 72, 288-293.

Ollila, Lloyd O., & Olson, J. The effect on learning rate of pictures and realia in presentation of words to kindergartens. Journal of Educational Research, 1972, 65, 312-314.

Otto, Wayne & Pizzillo, Carole. Effect of intralist similarity on kindergarten pupils' rate of word acquisition and transfer. Journal of Reading Behaviour, 1970, 3, 14-19.

Page, Susan Hocevar & Hocevar, Dennis. Effect of meaningful versus nonmeaningful reading material on oral reading errors in first through third grade children. Journal of Reading Behaviour, 1978, 10, 297.

Paivio, A. Abstractness, imagery and meaningfulness in paired-associate learning. Journal of Verbal Learning and Verbal Behaviour, 1965, 4, 32-38.

Paivio, A. & Yuille, J.C. Word abstractness and meaningfulness and paired-associate learning in children. Journal of Experimental Child Psychology, 1966, 4, 81-89.

Pearson, P. David. A psycholinguistic model of reading. Language Arts, 1976, 53, 309-314.

Pearson, P. David & Studt, Alice. Effects of word frequency and contextual richness on children's word identification abilities. Journal of Educational Psychology, 1975, 67, 89-95.

Perfetti, C.A. & Hogaboam, T. Relationship between single-word decoding and reading comprehension skill. Journal of Educational Psychology, 1975, 67, 461-469.

Preston, Ralph. Reading achievement of German and American children. School and Society, 1962, 90, 350-354.

Rayner, Keith. The perceptual span and peripheral cues in reading. Cognitive Psychology, 1975, 7, 65-81.

Rayner, K. & Hagelburn, E.M. Word recognition cues for beginning and skilled readers. Journal of Experimental Child Psychology, 1975, 20, 444-455.

Rayner, K. & Kaiser, K . Reading mutilated test. Journal of Educational Psychology, 1975, 67, 301-306.

Reicher, G.M. Perceptual recognition as a function of meaning-fulness of stimulus material. Journal of Experimental Psychology, 1969, 81, 275-280.

Richmond, M.G. & McNinch, G. Word learning: concrete versus abstract acquisition. Perceptual and Motor Skills, 1977, 45, 292-294.

Robinson, H. Alan. A study of the techniques of word identification. Reading Teacher, 1963, 16, 238-241.

Rohwer, W.D. Jr. Constraint, syntax and meaning in paired-associate learning. Journal of Verbal Learning and Verbal Behaviour, 1966, 5, 541-547.

Rohwer, W.D., Lynch, S.D., Levin, J.R., & Suski, N. Pictorial and verbal factors in efficient learning of paired-associates. Journal of Educational Psychology, 1967, 58, 278-284.

Ruddell, Robert B. The effect of four programs of reading instruction with varying emphasis on the regularity of grapheme-phoneme correspondences and the relation of language structure to meaning on achievement in first grade reading. California University, Berkeley: 1965. (ERIC Document Reproduction Service No. ED 003 820)

Saba, Allison McBain. An Investigation of the Reading Strategies of Grade One Children. Unpublished Master's thesis, University of Victoria, 1975.

Samuels, S. Jay. Effect of experimentally learned word associations on the acquisition of reading responses. Journal of Educational Psychology, 1966, 57, 159-163.

Samuels, S. Jay. Attentional process in reading: the effect of pictures on the acquisition of reading responses. Journal of Educational Psychology, 1967, 58, 337-342.

Samuels, S. Jay. Recognition of flashed words by children. Child Development, 1970, 41B, 1089-1094.

Samuels, S. Jay. Modes of word recognition. In H. Singer & R.B. Ruddell (Eds.), Theoretical Models and Processes of Reading, (2nd ed.). Newark, Del.: International Reading Association, 1976, 270-282.

Samuels, S. Jay. Can pictures distract students from the printed word: a rebuttal. Journal of Reading Behaviour, 1977, 9, 361-364.

Samuels, S.J., Begy, G. & Chen, C.C. Comparison of word recognition speed and strategies of less skilled and more skilled readers. Reading Research Quarterly, 1976, 11, 73-86.

Samuels, S.J. & Jeffrey, W.E. Intralist similarity and facilitation of paired-associated learning by fixed order presentation. Psychonomic Science, 1966, 5, 141-142.

Samuels, S.J. & Jeffrey, W.E. Discriminability of words, and letter cues used in learning to read. Journal of Educational Psychology, 1966, 57, 337-340.

Samuels, S.J., Spiroff, J., & Singer, H. Effect of pictures and contextual conditions on learning to read. Occasional Paper No. 25, Minnesota University, March, 1974. (ERIC Document Reproduction Service No. ED 101 307)

Samuels, S. Jay. The age-old controversy between holistic and sub-skill approach to beginning reading instruction revisited. In C.M. McCullough (Ed.), Inchworm, Inchworm: Persistent Problems in Reading Education. Newark, Delaware: International Reading Association, 1980, 202-221.

Schvaneveldt, R., Ackerman, B., & Semlear, T. The effect of semantic context on children's word recognition. Child Development, 1977, 48, 612-616.

Shankweiler, D. & Liberman, I. Misreading: a search for causes. in J.F. Kavanagh & I.G. Mattingly (Eds.), Language by Ear and By Eye. Cambridge, Massachusetts: MIT Press, 1972, 293-317.

Singer, Harry. Research in reading that should make a difference in classroom instruction. In S.J. Samuels (Ed.), What Research Has to Say About Reading Instruction. Newark, Del.: International Reading Association, 1978, 57-71.

Singer, Harry. Sight word learning with and without pictures: a critique of Arlin, Scott, and Webster's research. Reading Research Quarterly, 1980, 15, 290-298.

Singer, Harry, Samuels, S.J., & Spiroff, J . Effects of pictures and contextual conditions on learning responses to printed words. Reading Research Quarterly, 1974, 9, 555-567.

Smith, Edward E., & Kleiman, Glenn. Word recognition: theoretical issues and instructional hints. Paper presented at the Conference on Theory and Practice of Beginning Reading Instruction, Pittsburgh, May, 1976. (ERIC Document Reproduction Service No. ED 155 632)

Smith, Frank. The use of featural dependencies across letters in the visual identification of words. Journal of Verbal Learning and Verbal Behaviour, 1969, 8, 215-218.

Smith, Frank. Limitations on reading and learning to read. English Quarterly, 1972, 5, 45-57.

Smith, Frank. Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read. (2nd ed.) New York: Holt, Rinehart, Winston, 1978.

Smith, Frank & Goodman, Kenneth. On the psycholinguistic method of teaching reading. Elementary School Journal, 1971, 71, 177-181.

Smith, Frank & Holmes, Deborah. The independence of letter, word, and meaning identification in reading. Reading Research Quarterly, 1971, 6, 394-415.

Stanchfield, J.M. Sex differences in learning to read. Fastbacks 19. Bloomington, Indiana: Phi Delta Kappa Educational Foundation, 1973.

Strachan, Lillian Evelyn. Effects of presentation and reinforcement of a word list by kindergarten children. Unpublished Master's thesis, University of Victoria, 1973.

Thompson, G.B. Sex differences in reading attainments. Educational Research, 1975, 18, 16-23.

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

Timko, Henry G. Configuration as a cue in the word recognition of beginning readers. Journal of Experimental Education, 1970, 39, 68-69.

Timko, Henry G. Effects of three variables on the discrimination of letters. Journal of Educational Research, 1977, 70, 269-271.

Tulving, E. & Gold, C. Stimulus information and contextual information as determinants of tachtiscopic recognition of words. Journal of Experimental Psychology, 1963, 66, 319-327.

Turnure, James E. & Samuels, S. Jay. Attention and reading achievement in first grade boys and girls. Research Report No. 43 Minnesota University: December, 1972. (ERIC Document Reproduction Service No. ED 074 447)

Underwood, B.J., Ham, M., & Ekstrand, B. Cue selection in paired-associate learning. Journal of Experimental Psychology, 1962, 64, 405-409.

Underwood, B.J. & Schulz, R.W. Meaningfulness and Verbal Learning. Chicago: J.B. Lippincott Company, 1960.

Weber, Rose-Marie. The study of oral reading errors: a survey of the literature. Reading Research Quarterly, 1968, 4, 96-119.

Weber, Rose-Marie. A linguistic analysis of first grade reading errors. Reading Research Quarterly, 1970a, 5, 427-451.

Weber, Rose-Marie. First graders' use of grammatical context in reading. In H. Levin & J. Williams (Eds.), Basic Studies in Reading. New York: Basic Books, Inc., 1970b, 147-163.

Weintraub, S. Research: some implications for beginning reading. Reading Teacher, 1968, 22, 63-67.

Williams, Joanna; Blumberg, Ellen; & Williams, David. Cues used in visual word recognition. Journal of Educational Psychology, 1970, 61, 310-315.

Van der Veur, Barbara. Imagery rating of 1000 frequently used words. Journal of Educational Psychology, 1975, 67, 44-56.

Wood, Martha. Multivariate Analysis of Beginning Readers Recognition of Taught Words in Four Contextual Settings. Unpublished Doctoral dissertation, Texas Women's University, 1976.

Yarmey, A.D. & Paivio, A. Further evidence on the effects of word abstractness and meaningfulness in paired-associate learning. Psychonomic Science, 1965, 10, 307-308.

APPENDICES

APPENDIX A

COVERING LETTER SENT TO PARENTS

OF TOTAL SAMPLE

_____Elementary School

Date

Dear Parents:

Ms. Judy Rash, a Coquitlam teacher currently at the University of Victoria, has received permission from the Superintendent of Schools, Mr. Paton, to conduct a study involving Kindergarten children. The study is concerned with two methods of teaching children to read words: through the use of either sentences or single words.

Children in our Kindergarten classes have been randomly selected and work individually with Ms. Rash on the following activities:-

- learning to read eight words by one of the methods on the first day.

- checking on how well the words are remembered on the second day.

- checking how well the words are remembered after three weeks.

To ensure anonymity, all information gathered in the study will refer to children by number rather than name.

If you have any questions regarding this study, please contact Ms. Rash at 524-5246.

Yours truly,

Principal

APPENDIX B-1

MEANINGFULNESS ($\bar{m}$) INDEX OF TARGET WORDS

word	m	rank
tooth	5.54	1
television	5.22	2
fell	4.50	3
out	2.28	4.5
fixing	2.25	4.5
Nicki's	1.41	7
Our	1.40	7
needs	1.38	7

APPENDIX B-2

SAMPLE RESPONSE SHEET USED TO ESTABLISH

MEANINGFULNESS RATINGS FOR EIGHT TARGET WORDS

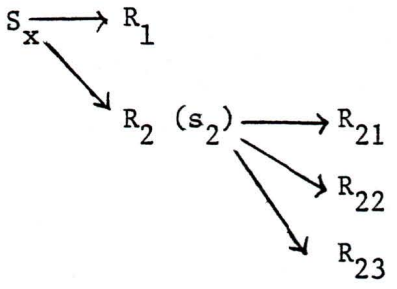
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____
fixing _____	fixing _____

APPENDIX B-3

MARKING CRITERIA FOR MEANINGFULNESS RESPONSES

Noble (1952) established certain objective criteria for unacceptable responses. Mickelson (1967) adapted these criteria for responses generated by children. These same criteria were used for the purposes of this study. These are:

1. illegible responses: $S_x \longrightarrow ?$
2. perservative responses: $S_x \longrightarrow R_1 \longrightarrow R_1$
3. failure of set:



This last class of unacceptable responses was classified into free or tangential associations, such as:

COLD — hot
sun
solar system

and clang or alliterative associations, such as:

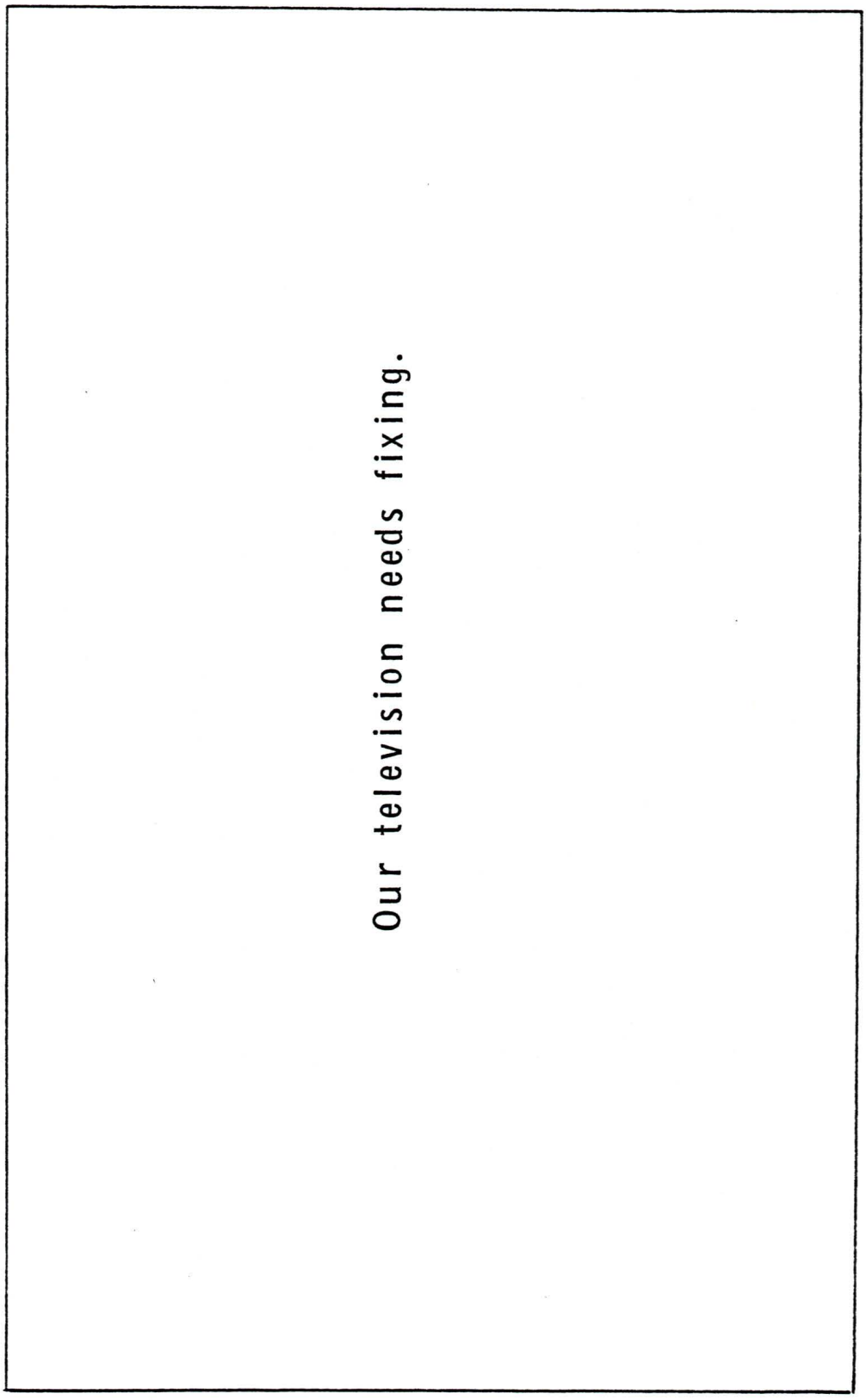
COLD — bold
hold
fold
rolled

APPENDIX B-3 (cont'd.)

In each case, one credit was given for the first response. Finally, a general rule of giving subjects the benefit of the doubt was adopted. In marking young children's responses, spelling was not counted if the intention of the subject was clear. Also, chained responses such as "in the fridge" were given one credit. (Adapted from Noble, 1952; Mickelson, 1967).

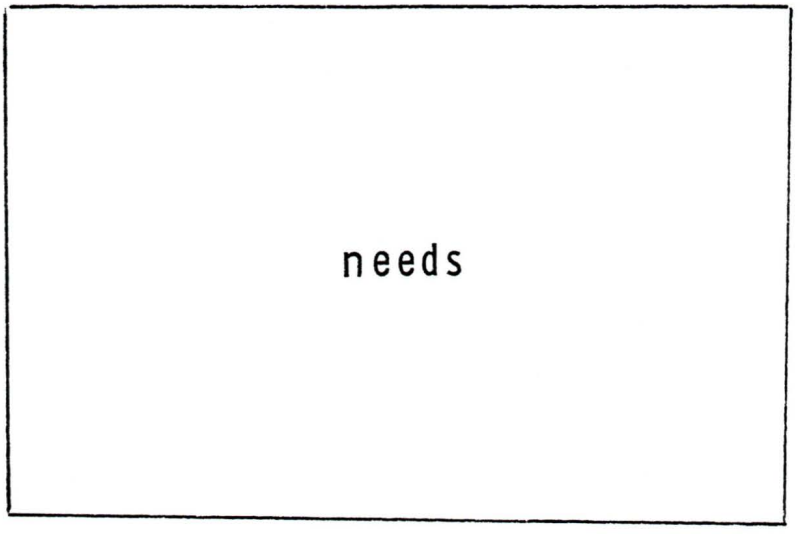
APPENDIX C-1

SAMPLE SENTENCE CARD FOR TEACHING



APPENDIX C-2

SAMPLE WORD CARD FOR TEACHING

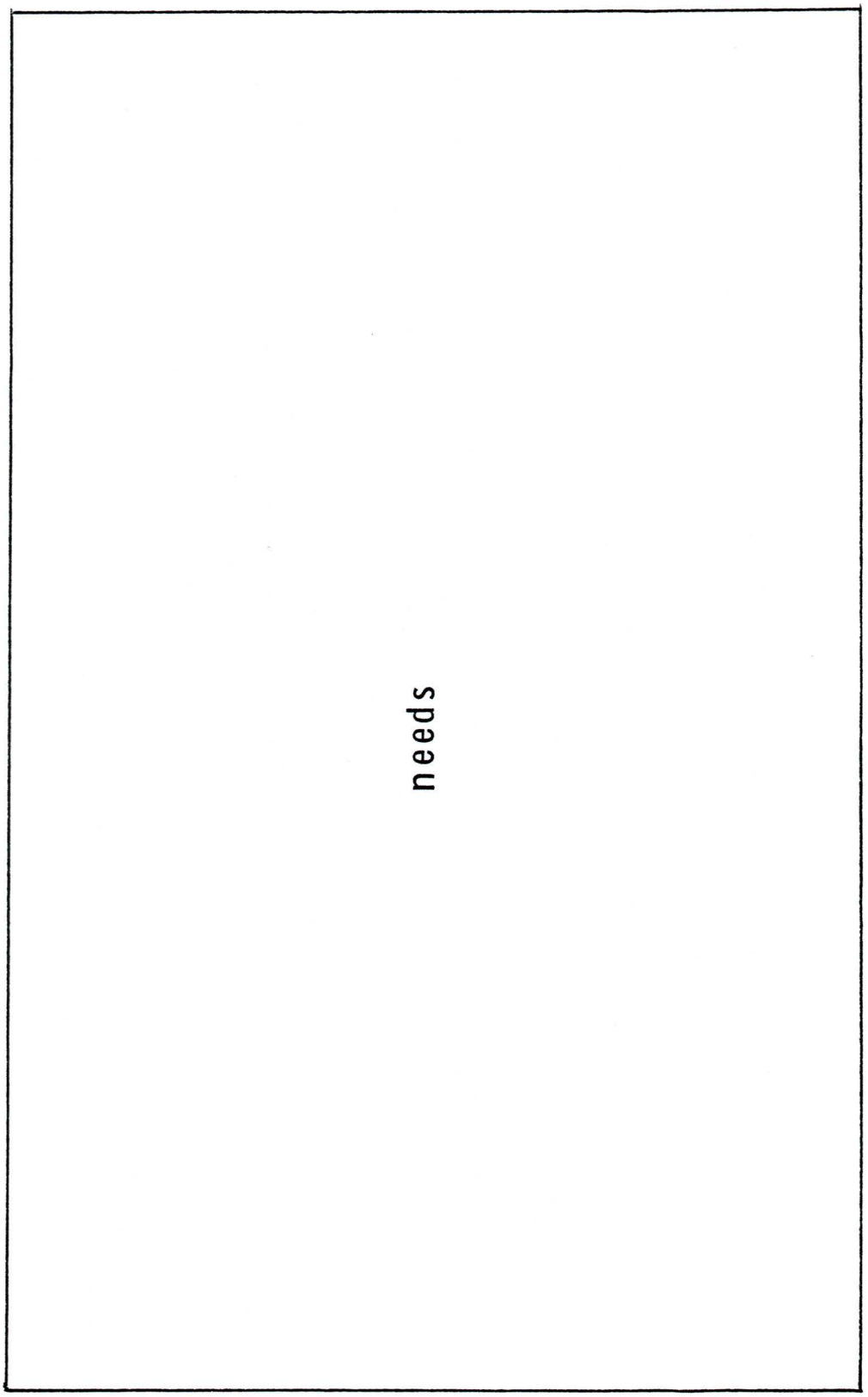


APPENDIX C-3

SAMPLE CARD FOR PRELIMINARY SCREENING

AND RETENTION TEST CARD FOR WORDS IN

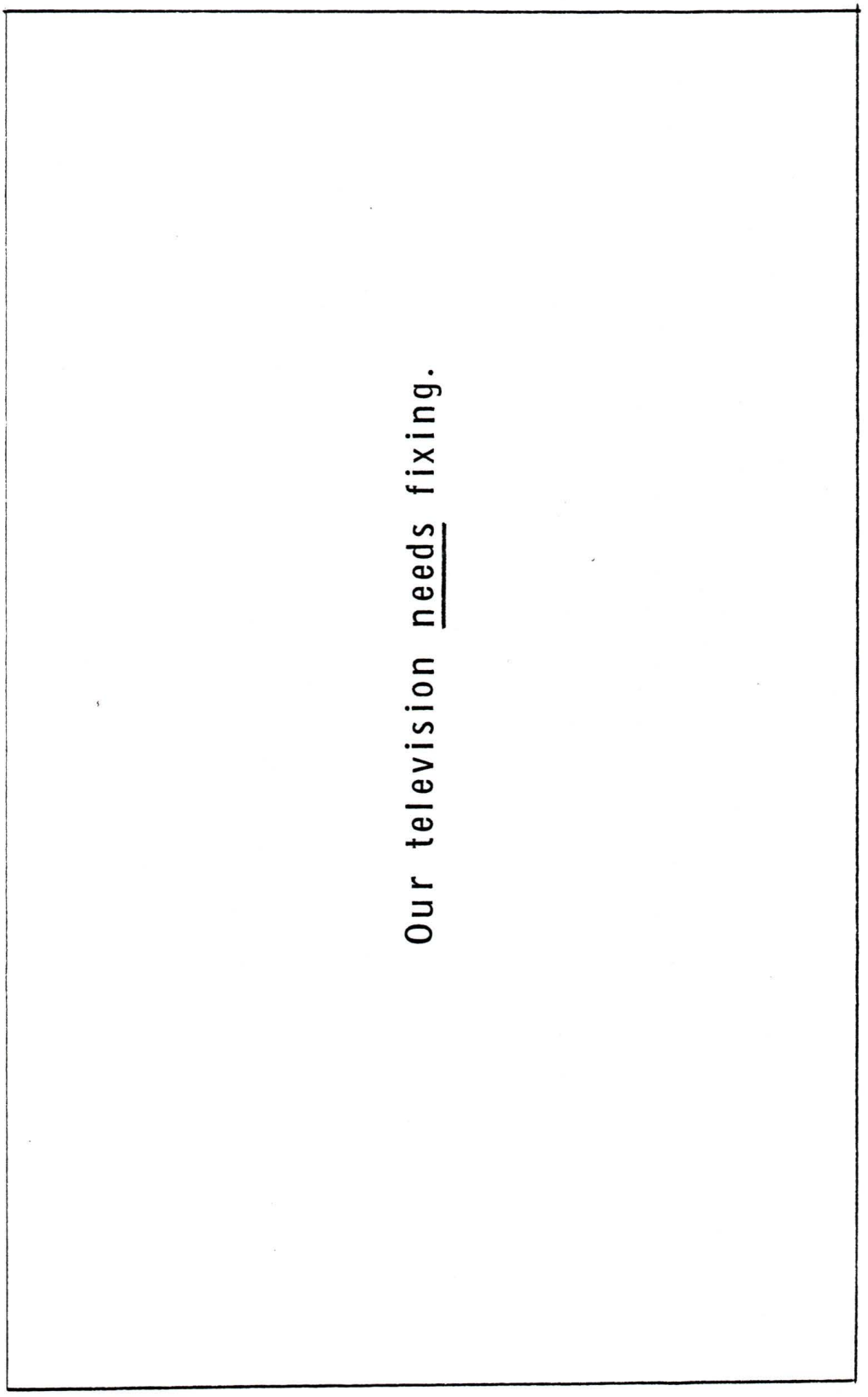
ISOLATION



APPENDIX C-4

SAMPLE RETENTION TEST CARD FOR

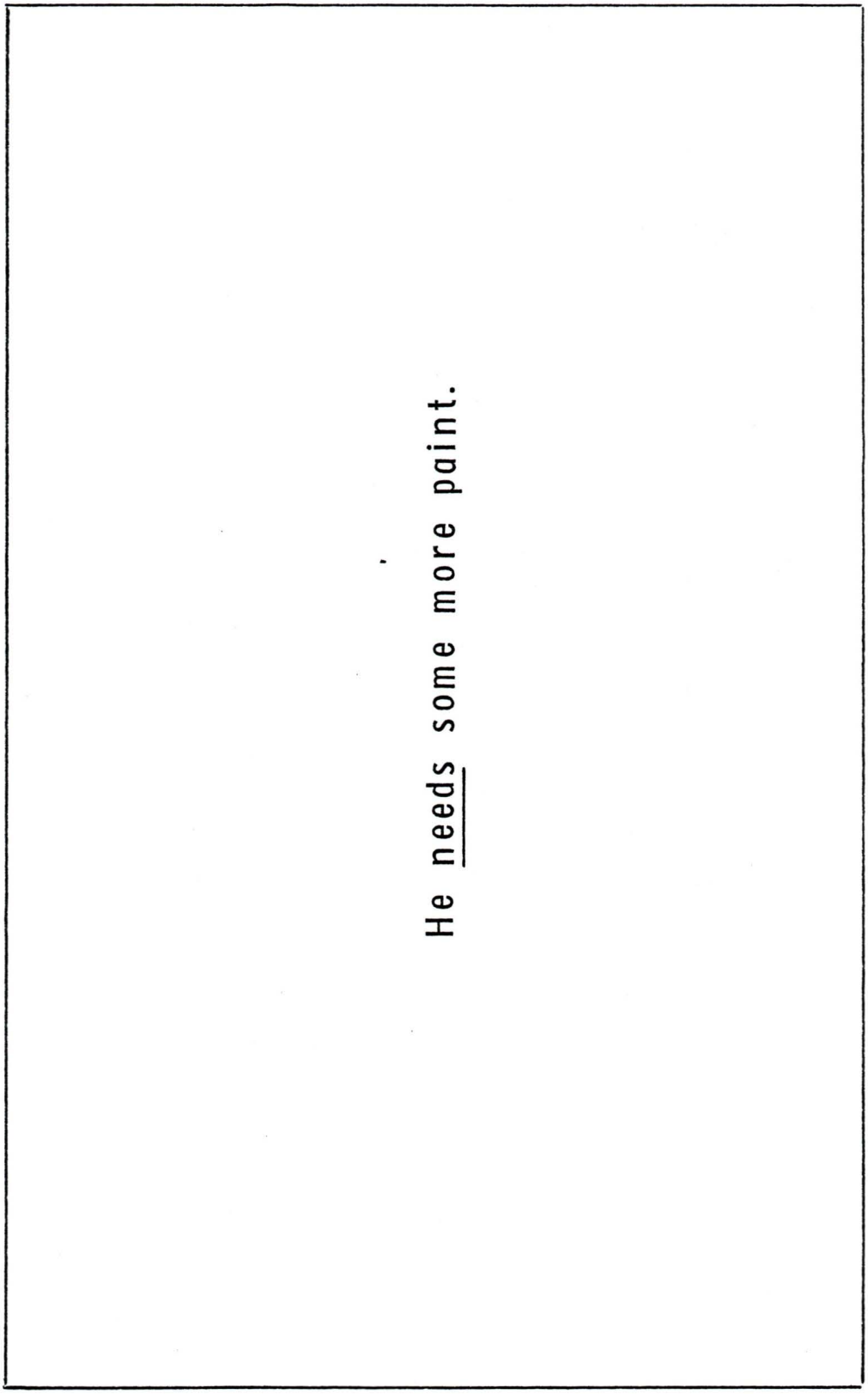
WORDS IN SENTENCES



APPENDIX C-5

SAMPLE RETENTION TEST CARD FOR

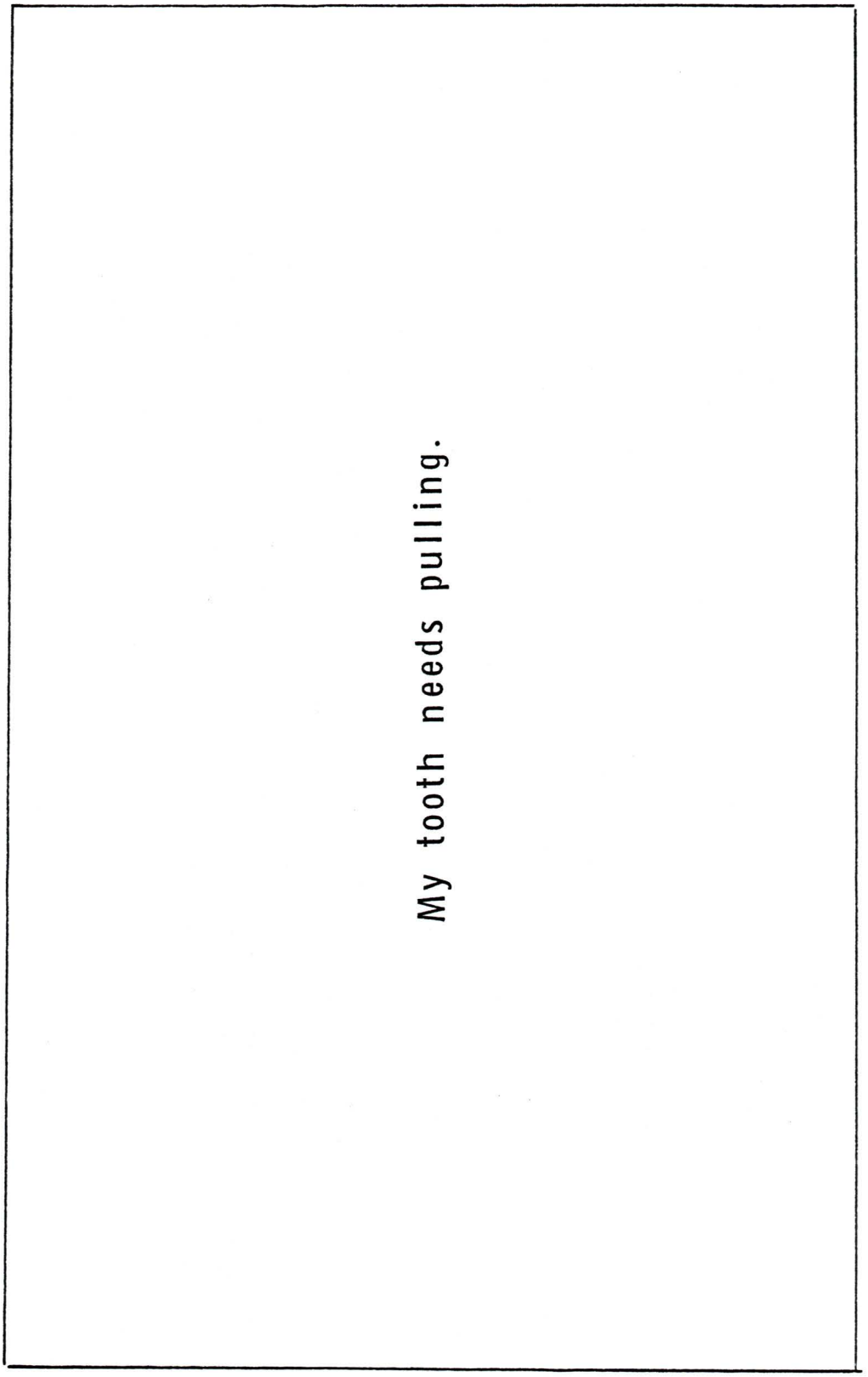
WORDS IN NEW CONTEXT



APPENDIX C-6

SAMPLE RETENTION TEST CARD FOR

WORD DESIGNATION



APPENDIX D

SENTENCES FOR RETENTION TESTS OF NEW CONTEXT AND WORD DESIGNATION

New Context Sentences

1. Can you come out and play?
2. This is Nicki's bike.
3. I am watching television.
4. The book is Our Family.
5. I fell off the swing.
6. He needs some more paint.
7. Mom is fixing my sweater.
8. I lost a tooth today.

Word Designation Sentences

1. My tooth needs pulling.
2. Our lights went out.
3. Dad's fixing the television.
4. Nicki's thermos fell over.

APPENDIX E

ORDER FOR TEACH/TEST TRIALS

A	Trial	B
2 4 3 1	#1	2 4 1 3
4 3 1 2	#2	3 1 2 4
4 2 3 1	#3	4 3 1 2
3 4 2 1	#4	1 2 4 3
3 1 2 4	#5	2 3 4 1
3 4 1 2	#6	1 3 2 4
4 2 3 1	#7	1 2 3 4
2 4 1 3	#8	2 1 3 4
2 4 1 3	#9	1 4 3 2
1 2 3 4	#10	4 1 2 3
2 4 1 3	$11	1 2 4 3
4 2 3 1	#12	4 2 3 1
3 1 4 2	#13	1 4 3 2
1 4 3 2	#14	2 1 3 4
3 2 1 4	#15	4 2 1 3
1 2 3 4	#16	1 4 2 3
2 1 3 4	#17	4 1 2 3
4 1 2 3	#18	2 3 4 1
4 3 2 1	#19	3 1 4 2
3 4 1 2	#20	3 4 1 2

APPENDIX F

NUMBER CODES FOR TARGET WORDS

		Word-alone			Word-sentence
A	1	needs	A	1	Nicki's
	2	tooth		2	tooth
	3	fell		3	fell
	4	Our		4	out
B	1	out	B	1	Our
	2	television		2	television
	3	Nicki's		3	needs
	4	fixing		4	fixing

A Nicki's tooth fell out.

B Our television needs fixing.

APPENDIX G-1

DATA COLLECTION SHEET I

Name _____ Date _____

Time--start _____

finish _____

Word-alone
Male
Class # _____

Word-sentence
Female
Subject # _____

A. PRELIMINARY SCREENING

_____ _____ _____ _____ _____ _____ _____

B. TRAINING TRIALS order for word-alone trials 1 2 3 4
3 2 1 4
2 1 4 3

C. TEACH/TEST TRIALS

word-alone word code:

A. 1. needs
2. tooth
3. fell
4. Our

B. 1. out
2. television
3. Nicki's
4. fixing

trial	A words 1	2	3	4	order	B words 1	2	3	4	order
#1					2431					2431
2					4312					3124
3					4231					4312
4					3421					1243
5					3124					2341
6					3412					1324
7					4231					1234
8					2413					2134
9					2413					1432
10					1234					4123
11					2413					1243
12					4231					4231
13					3142					1432
14					1432					2134
15					3214					4213
16					1234					1423
17					2134					4123
18					4123					2341
19					4321					3142
20					3412					3412
					Total Trials					

APPENDIX G-2

DATA COLLECTION SHEET II SESSION II III

Name _____ Date _____

Word-alone Word-sentence Time--start _____

Male Female finish _____

Class #_____ Subject # _____

TEST OF RECOGNITION

Isolation	Sentence	
1. _____	2. _____	
3. _____	4. _____	
5. _____	6. _____	
7. _____	8. _____	isolation _____
9. _____	10. _____	sentence _____
11. _____	12. _____	total _____
13. _____	14. _____	
15. _____	16. _____	

TEST OF RECOGNITION--NEW CONTEXT

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____ total _____

TEST OF WORD DESIGNATION

1. _ _ _ _ _ _ _____ _____ _ _ _ _ _ _ _.
2. _____ _ _ _ _ _ _ _ _ _ _ _ _ _ _____.
3. _ _ _ _ _ _ _____ _ _ _ _ _ _ _ _____.
4. _____ _ _ _ _ _ _ _____ _ _ _ _ _ _ _.

Total words designated _____

APPENDIX G-3

DATA COLLECTION SHEET FOR CONTROL GROUP

Name _____

Male Female

Class #_____ Subject #_____

Date _____ Date _____

Time -- start _____ Time -- start _____

finish _____ finish _____

1. _____	fell	1. _____
2. _____	Nicki's	2. _____
3. _____	needs	3. _____
4. _____	Our	4. _____
5. _____	tooth	5. _____
6. _____	fixing	6. _____
7. _____	out	7. _____
8. _____	television	8. _____

total _____ total _____

APPENDIX G-4

DATA COLLECTION SHEET I

Name Student

Date April 28/80.
Time--start 1:40
finish 1:55

(Word-alone) Word-sentence
(Male) Female
Class # 2 Subject # 2

A. PRELIMINARY SCREENING

none

B. TRAINING TRIALS order for word-alone trials 1 2 3 4
3 2 1 4
2 1 4 3

C. TEACH/TEST TRIALS

word-alone word code:

A. 1. needs
2. tooth
3. fell
4. Our

B. 1. out
2. television
3. Nicki's
4. fixing

	A words					B words				
trial	1	2	3	4	order	1	2	3	4	order
#1	fixing	—	—	fixing	2431	—	tv	•	needs	2431
2	fixing	—	—	—	4312	—	•	•	—	3124
3	Nicki's	fixing	—	tooth	4231	tooth	•		needs	4312
4	•	•	tooth	tooth	3421	fixing			needs	1243
5	•	needs	needs	needs	3124	tooth			•	2341
6		television	tooth	out	3412	•			•	1324
7		•	—	—	4231	•				1234
8		—	•	•	2413					2134
9		—	•	•	2413					1432
10		—			1234					4123
11		—			2413					1243
12		•			4231					4231
13		•			3142					1432
14					1432					2134
15					3214					4213
16					1234					1423
17					2134					4123
18					4123					2341
19					4321					3142
20					3412					3412
	5	13	9	9	Total Trials	7	3	2	6	

APPENDIX G-5

DATA COLLECTION SHEET II SESSION (II) III

Name Student Date April 29/80

(Word-alone) Word-sentence Time--start 1:25

(Male) Female finish 1:35

Class # 2 Subject # 2

TEST OF RECOGNITION

"I still remember the biggies."

Isolation		Sentence	
1. out ✓		2. "no idea"	
3. —		4. —	
5. —		6. television ✓	
7. Nicki's ✓		8. out	
9. "no idea"		10. —	isolation 2
11. out		12. is	sentence 2
13. out		14. Nicki's ✓	total 4
15. —		16. Nicki's	

TEST OF RECOGNITION--NEW CONTEXT

1. out ✓ ..... "aren't you going to tell me if I'm right?"
2. Nicki's ✓
3. television ✓
4. out
5. fell ✓ ..... "How will I know if I'm right?"
6. Nicki's
7. —
8. is ("it something like that")

total 4

TEST OF WORD DESIGNATION

1. _____ _____ Nicki's _____.
2. out _____ _____ _____.
3. _____ _____ _____ television ✓.
4. _____ television _____ _____.

total words designated 1

APPENDIX G-6

DATA COLLECTION SHEET FOR CONTROL GROUP

Name Student

Male (Female)

Class # 4 Subject # 53

Date	may 1/80	Date	may 21/80
Time--start	1:35	Time--start	1:25
finish	1:40	finish	1:30

1.	—	fell	1.	off
2.	—	Nicki's	2.	—
3.	—	needs	3.	—
4.	—	Our	4.	on
5.	off	tooth	5.	—
6.	—	fixing	6.	exit
7.	on	out	7.	—
8.	—	television	8.	—
	total 0			total 0

APPENDIX H-1

RAW DATA

1. total trials to criterion
2. short-term retention
   a. isolation
   b. sentence
   c. new context
   d. word designation
3. long-term retention
   a. isolation
   b. sentence
   c. new context
   d. word designation

Word-Alone Subjects

subject	1	2	a	b	c	d	3	a	b	c	d
					Boys						
1.	53	5	2	1	1	1	4	1	1	1	1
2.	54	11	3	3	3	2	9	2	2	4	1
3.	53	5	2	1	1	1	3	0	0	2	1
4.	59	15	3	4	5	3	11	3	2	3	3
5.	19	23	6	6	6	5	27	6	7	7	7
6.	21	29	7	7	7	8	27	7	6	7	7
7.	116	2	1	0	0	1	0	0	0	0	0
8.	59	7	0	3	3	1	6	1	2	2	1
9.	101	1	1	0	0	0	3	2	0	0	1
10.	65	5	0	2	1	2	4	0	2	1	1
11.	37	16	5	4	4	3	18	3	4	6	5
12.	91	7	2	2	3	0	3	1	0	1	1
					Girls						
13.	65	5	1	1	2	1	5	1	1	1	2
14.	56	16	3	5	4	4	14	3	3	4	4
15.	84	11	3	3	3	2	19	5	4	5	5
16.	37	12	4	3	3	2	14	4	3	3	4
17.	50	6	2	1	2	1	5	1	1	2	1
18.	81	7	2	2	1	2	1	0	0	0	1
19.	42	9	3	2	2	2	4	1	1	1	1
20.	32	13	4	2	3	4	11	3	3	3	2
21.	22	29	6	7	8	8	25	6	6	7	6
22.	39	19	4	5	6	4	19	4	5	5	5
23.	43	7	4	2	1	0	4	2	0	1	1
24.	77	12	3	3	4	2	11	3	3	3	2

APPENDIX H-2

RAW DATA

Word-Sentence Subjects

Subject	1	2	a	b	c	d	3	a	b	c	d
25.	61	7	3	2	1	1	10	2	4	2	2
26.	40	11	2	5	2	2	16	3	8	3	2
27.	30	16	3	7	3	3	17	3	7	4	3
28.	17	23	5	7	6	5	30	8	7	8	7
29.	36	19	2	6	4	5	19	4	8	4	3
30.	30	14	2	8	2	2	2	0	0	1	1
31.	25	11	1	8	0	2	11	1	7	2	1
32.	38	23	5	8	5	5	18	5	7	2	4
33.	24	8	1	5	2	0	6	1	2	2	1
34.	17	17	3	8	3	3	18	3	8	3	4
35.	25	7	0	6	0	1	8	1	5	1	1
36.	16	30	6	8	8	8	29	7	8	7	7
					Girls						
37.	27	14	4	4	3	3	14	3	5	3	3
38.	25	13	2	5	3	3	19	4	8	4	3
39.	26	25	7	6	6	6	18	2	7	4	5
40.	17	21	5	8	4	4	17	3	8	3	3
41.	18	13	3	8	2	0	12	1	7	3	1
42.	28	18	4	6	4	4	24	5	7	6	6
43.	16	10	2	7	0	1	15	4	5	3	3
44.	17	29	7	8	7	7	30	7	8	7	8
45.	28	8	1	5	1	1	10	2	4	3	1
46.	18	19	3	8	4	4	23	5	8	6	4
47.	32	13	3	8	2	0	16	3	8	2	3
48.	23	2	0	2	0	0	1	0	1	0	0

APPENDIX H-3

RAW DATA

CONTROL GROUP

Recognition Score for Target Words

Boys			Girls		
Subject	Before	After	Subject	Before	After
60.	0	0	49.	0	1
61.	0	0	50.	0	0
62.	0	0	51.	0	0
63.	0	0	52.	0	0
64.	0	0	53.	0	0
65.	0	1	54.	0	0
66.	0	0	55.	0	0
67.	0	0	56.	0	0
68.	0	0	57.	0	0
69.	0	0	58.	0	1
70.	0	0	59.	0	0
71.	0	0			
72.	0	0			

PRELIMINARY SCREENING

Recognition Score for Target Words

Boys' Score		Girls' Score	
Subject		Subject	
73.	2	88.	4
74.	2	89.	4
75.	8	90.	1
76.	4	91.	3
77.	2	92.	1
78.	5	93.	1
79.	1	94.	1
80.	2	95.	2
81.	1	96.	2
82.	2	97.	2
83.	1	98.	1
84.	1	99.	7
85.	6	100..	8
86.	1		
87.	1		

APPENDIX H-4

RAW DATA

MEANINGFULNESS RATINGS

Subject	Word							
	a	b	c	d	e	f	g	h
#1.	1	1	1	2	4	4	3	2
#2.	4	2	1	2	4	9	6	1
#3.	4	1	1	1	2	6	4	1
#4.	6	2	1	3	4	6	7	1
#5.	6	2	2	3	1	6	4	1
#6.	5	2	1	3	2	4	5	2
#7.	5	2	1	2	3	9	8	3
#8.	6	1	0	1	2	6	3	2
#9.	4	1	2	1	1	8	7	1
#10.	5	2	2	2	2	4	3	1
#11.	4	1	0	1	1	3	2	1
#12.	5	2	2	2	5	6	6	1
#13.	1	1	3	2	2	6	6	2
#14.	9	1	2	1	2	7	8	1
#15.	7	1	2	4	4	9	9	1
#16.	6	3	3	4	3	5	6	1
#17.	6	1	1	2	2	7	6	1
#18.	4	2	1	1	1	4	5	1
#19.	3	2	2	4	3	8	8	2
#20.	6	2	2	3	3	8	6	1
#21.	5	1	1	3	1	5	4	2
#22.	2	1	1	1	0	2	3	1
#23.	2	0	2	1	2	3	3	2
#24.	5	2	1	5	1	4	8	1
#25.	4	1	2	3	3	5	5	2
#26.	4	1	1	2	3	4	6	1
#27.	4	1	1	1	2	5	5	1
#28	6	1	1	3	3	5	5	1
#29.	5	2	1	4	3	6	5	3
#30.	4	1	1	3	2	5	4	1
#31.	4	1	1	1	2	2	3	2
#32.	2	1	1	1	2	6	4	1

a = fell

b = Nicki's

c = needs

d = fixing

e = out

f = tooth

g = television

h = Our

APPENDIX H-5

RAW DATA

TWO MEASURES OF MEANINGFULNESS

Subject	fell		tooth		needs		Our	
#2	4	5	9	9	1	2	1	2
#3	4	4	6	7	1	1	1	1
#4	6	5	6	7	1	2	1	2
#8	6	7	6	7	0	1	2	1
#10	5	6	4	5	2	3	1	2
#17	6	3	7	2	1	2	1	1
#18	5	6	4	6	1	1	1	1
#20	6	6	8	8	2	1	1	1
#21	5	4	5	5	1	1	2	1
#23	2	3	3	4	2	1	2	2
#26	4	5	4	6	1	2	1	1
#29	5	6	6	7	1	2	3	1
#30	4	5	5	4	1	2	1	2

APPENDIX I

EXPERIMENTAL SUBJECTS BY CLASS

	Word-alone		Word-Sentence		Control		
class	boys	girls	boys	girls	boys	girls	total
#1	1	3	3	3	2	3	15
#2	5	2	1	2	2	-	12
#3	2	1	2	2	1	3	11
#4	1	4	1	-	2	2	10
#5	-	1	5	2	2	2	12
#6	3	1	-	3	4	1	12
total	12	12	12	12	13	11	72

VITA

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Place of Birth: OLDS, ALBERTA Date of Birth July 8, 1950

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