RECOGNITION LEARNING OF NON-NOUN WORDS BY KINDERGARTEN CHILDREN

by

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ABSTRACT

The major purpose of this study was to determine the facility of kindergarten students in learning (a) verbs which are high meaningful and concrete, (b) verbs which are low-meaningful and abstract and (c) prepositions, in order to assist teachers in teaching beginning readers non-noun words.

Ratings of meaningfulness (m) and concreteness (c) of non-noun words by grade three students were used to determine three word lists: (a) high meaningful/concrete verbs, (b) low meaningful/abstract verbs and (c) prepositions. A sample of 173 kindergarten students was drawn from the Sooke schools in April. Training groups of boys and girls were assigned a word recognition task using four words from one of the lists. Each student was pretested to ensure that none of the four words was already known as a sight word, pretrained by being told the name of the word and then repeating it, and trained to criterion by identifying the graphic word as it was presented. Students who could not identify a word were told its name and repeated it before being presented with the next graphic word. Criterion was defined as two successive trials with no errors. A maximum of 20 trials were given to a student. A 24 hour posttest

of recognition was given to all students who reached criterion.

Analyses of variance showed no differences attributable to type of word learned or the sex of the learner in either the number of trials to criterion or the errors made by the students in reaching criterion. However, analysis of variance and a Newman-Keuls test for posttest recognition of words showed that boys who learned low meaningful/abstract verbs recognized significantly fewer words than did any other training group.

Ad hoc analysis by chi-square of the number of students who failed to reach criterion showed no difference among the two verb lists and the preposition list. Chi-square analysis of the number of students who knew two or more of the words on the pretest showed that significnatly more students knew prepositions that either high meaningful/concrete verbs or low meaningful/abstract verbs.

Conclusions from this study were (a) grade three students were able to reliable rate non-nouns for m and c, (b) boys and girls were able to recognize verbs and prepositions at the same rate and with the same number of errors, and (c) boys recognized low/meaningful/abstract verbs after 24 hours less well than either boys of girls recognized any other word type.

The fact that both types of verbs and prepositions were learned with equal facility by kindergarten students was attributed to an equal linguistic awareness of verbs and prepositions despite differences in m and c values for the words. This linguistic awareness appeared to be insufficient to enable boys to recognize low meaningful/ abstract verbs after 24 hours.

Further investigation into the generation of m and c indices for non-noun words by young students and or word recognition learning or non-noun words appears to be warranted.

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CHAPTER ONE

INTRODUCTION TO THE PROBLEM

This thesis examines the relative facility by kindergarten subjects of learning to recognize three classes of words: (a) concrete/high meaningful verbs, (b) abstract/low meaningful verbs and (c) prepositions. The salient question is whether the concreteness and meaningfulness of the words affect the learning of verbs and prepositions. In order to answer this question, it is necessary to (a) define concreteness and meaningfulness, (b) apply these definitions to an experimental paradigm and (c) interprete them in light of empirical results. The main emphasis of the study is to generate knowledge which is of practical use to educators based on empirical research rather than on popular belief which is not research based.

Organization of the chapter

Chapter I is organized in the following manner: (a) a definition of concreteness, (b) a definition of imagery, (c) a definition of meaningfulness, (d) the common attributes of concreteness and meaningfulness, (e) the place of concreteness and meaningfulness within theories of learning, and (f) the scope of this study.

Concreteness

Concreteness (c) of a word can be defined as the ability of a word to arouse a visual image of the represented concept (Paivio, 1963). Bloomer (1961) stated that the concreteness of a word depended on the tangibility of the word's significate or referent. Words having significates which could be explored by the senses were deemed to be most concrete. Non-concrete words relied for definition on other words to describe them, or on a context within a spoken or written sentence for their definitions. An example of this is the word 'and', which is defined by the Concise Oxford Dictionary (1976) entirely by examples. Indeed, the word is dependent on these contextual examples for its functional existence. Words which require contexts or other words as explainers for their definitions have no specific referents and are deemed to be abstract (Bloomer, 1961). There is no definitive division between syntactical classes of words on the basis of concreteness. In general, nouns are more concrete than verbs or other syntactical classes but it is not possible to say that all nouns are more concrete than all verbs. Indeed, some words serve as both nouns and verbs (eg. 'love' and 'hate') and in these cases the verb form may be more concrete than the noun form.

Imagery

A term related to concreteness is imagery, which Paivio (1965) defined as the ease or speed of arousal of an image for a word. Hargis and Gickling (1978), Moe (1974) and Paivio (1965) used the concept of imagery as being functionally equivalent to concreteness. Concrete words were consistently referred to as those which arouse mediating imagery levels.

Meaningfulness

Mickelson (1968) noted that meaningfulness had two different definitions. She stated that to the cognitive theorist something is meaningful when an established cognitive structure exists under which a new concept may be subsumed in order to clarify, reinforce or extend the cognitive structure. To the mediational theorist, meaningfulness (m) refers to an attribute of a word which is evoked by the word stimulus. "Thus 'home' evokes 'warmth, shelter, family, love, safety'." (p. 4). The index of meaningfulness for a word is the mean number of elicited responses generated by the word stimulus. Noble (1952) generated such an index using United States Air Force subjects. Ninety-six nonsense and actual words were used and the elicited responses to these individual stimuli in a 60 second time frame were counted. Noble refined and confirmed his process of index generation in 1963.

The common attributes of meaningfulness and concreteness

Both concreteness and meaningfulness can be attributes common to the same word. A study of concreteness and of meaningfulness by Paivio and Yuille (1966) indicated that high meaningfulness of nouns was associated with concreteness of those nouns and that the two attributes were confounded. Paivio (1965) using paired-associates determined that the correlation between concreteness/imagery and meaningfulness was .90.

The role of concreteness and meaningfulness in the learning of words should be considered in light of theoretical constructs of the learning process in order to understand their role in learning. Gagne (1970) indicated that the stimulus in reading comes from outside of the reader and reaches the reader through the senses. While normally the eyes are used to perceive stimuli, if those word stimuli are able to arouse other images or to elicit other associations and hence appeal to more senses than sight, then those word stimuli would be learned more readily than those stimuli which cannot elicit such images and associations.

Gagne also indicated that eight types of learning exist: signal learning, stimulus-response learning, chaining, verbal association, discrimination learning, concept learning, rule learning and problem solving.

Signal learning refers to a conditioned emotional or non-voluntary response to simultaneously displayed stimuli. Responses are general rather than specifically restricted to one part of the body, diffuse and emotional in nature. Gagne's signal learning is the same as the classical conditioning mode of Pavlov.

Stimulus-response learning differs from signal learning in that the reaction is not an emotional one. The response can be voluntarily performed and refined. The response is generally learned through repetition and reinforcement and by successive approximation. An example is learning to correctly pronounce an unfamiliar word by imitation. Successive attempts and corrections result in the pronunciation becoming closer to the model until finally the correct pronunciation is achieved. This differs from most conceptions of S-R learning in that learning is voluntarily and consciously performed. The recall of words when the graphic stimulus is presented as in the present study is an example of stimulus-response learning.

Chaining involves connecting two or more previously learned stimulus-response reactions. The act of requesting a specific object by name by a child is an example of chaining. The first 'link' of the chain consists of the awareness of the object and its name and the second 'link' consists of the awareness that an

appeal, which initially could be non-verbal and non-specific, can result in the object being given to the child. The combination of the two links can result in an appeal using the more specific name of the object. Realization of the contiguity of established links appears to occur in a single occasion rather than gradually.

Verbal association is a form of chaining that uses words rather than objects in forming images. An example would be the realization that common root words indicate common spellings or meanings. Gagne uses the example of the verbal chain for learning the French word for 'match'. Initially, a visual image for 'match' is acquired, then the light from a flaming match is associated with the word 'illuminate' and finally illuminate is seen to be of a common root with the French word 'allumette'. The association of 'match - allumette' is made. Naturally, the more proficient a person is at associating mental images and various words, the easier such verbal associations can be made.

Discrimination learning is the ability to keep discrete those chains which are unrelated. Interference between chains causes confusion and forgetting. In word learning, chains might be very similar, differing by perhaps only one letter or the sequencing of letters (eg. the

difference between 'cat' and 'cot', 'mat' and 'tam').

Concept learning is the ability to learn something by considering not the object itself but an abstraction of the object. It is akin to verbal association but involves the linking, often without the ability to verbalize the associations, of larger chains and generalizing knowledge over a variety of stimuli. Concepts are modified according to subsequent learning. An example of concept learning would be the realization of the past tense formation of verbs by the addition of 'ed'. A child can demonstrate the concept, even using nonsense words, but might not possess the metalinguistic knowledge needed in order to explain the concept. When exceptions to the 'ed' endings are encountered, the concept is eventually refined to account for those exceptions.

Rule learning is the ability to acquire the idea which is contained in a proposition. It differs from concept learning in that in concept learning a person might apply a rule without the ability to explain what the rule is. The discovering of the underlying rule is rule learning. Rules are of the sequence: if A occurs, then B must follow. A rule might be discovered or it may be taught to someone either verbally or by demonstration.

Problem solving is the ability to generalize known rules into new, higher order rules. Combinations and applications of rules to new but similar situations constitute problem solving. Problem solving requires being aware of what the outcome is to be as well as the previous rules which are to be combined.

The present study is concerned with recognition of words which vary in grammatical class and in meaningfulness and concreteness. In Gagne's scheme of learning, this would encompass stimulus-response learning of graphic stimuli and verbal responses, verbal association of word and the image or context with which it is associated, and discrimination learning of the differences between graphic stimuli. Gagne (1970) states that the eight learning conditions are arranged hierarchically so that each learning type requires the acquisition of 'lower order' learning types, except that signal learning need not precede later learning. Of significance is the idea that learning begins with concrete concepts and is later extended to the ability to learn using defined and abstracted verbal cues rather than reference to objects which are directly perceivable. Abstract, defined concepts are seen as dependent upon the presence of concrete concepts. This would lead to the hypothesis that words which have concrete conceptual associations should be learned more

readily than should words which have only defined or abstract associations.

Ehri (1977, 1978) noted that 4 to 6 year old children are unable to segment meaningful sentences into their component words and especially are unable to differentiate function words as separate entities. Her reasons for such an inability are threefold. First, she noted that most children experience new words, especially function words in the context of other words (eg. 'the dog'). Meaning is given by the unit, not by the individual word. Second, some words, especially auxiliaries, past tense verbs, prepositions, and conjunctions are dependent for their meaning on the presence of and their associations to other words. Alone, they have no intrinsic meaning or referent association. Third, beginning readers have little experience with graphic words as representations of speech, and hence have difficulty in relating the two. Smith (1978), in describing a condition of speech association which is similar to Ehri's studies, indicated that children who are learning to talk tend to produce word clusters as one group, such as 'allgone' or drinkamilk'. He further stated that some words are encountered as separate forms only when the child begins formal reading instruction. These words, which have been so closely linked to other words in speech as to be inseparable

would certainly be less familiar to the beginning reader than the nouns and active verbs which characterize a beginning speaking vocabulary. The work of Ehri (1977, 1978) and Smith (1978) would indicate support for the hypothesis that prepositions would be recalled less readily than would verbs.

Murray (1972) and Pulaski (1971) described Piaget's theory of the development of thought which indicated that for most children an age of 6 - 7 years is necessary before thought can be about anything which is not referring to concrete, existing objects and people. At age 6 - 7, the child begins to display logic, which is at first limited to concrete operations. In the Piagetian sense, this means that a child can think in a logical and systematic manner about objects and actions that do exist. It is not essential that the objects be available for manipulation although the referent of the verbal representation will be concrete (Murray, 1972). Whereas this does not precisely refer to the knowledge of or learning of words, this theory would imply that new concrete and meaningful words should be learned faster or more readily than abstract words.

In a similar vein, Mattingly (1972), when referring to the linguistic awareness of a reader, noted that it is necessary to maintain the semantic experiences

represented by a word in order to use that word to think abstractly (p. 140). Mattingly believed that speaking must precede and be concretely linked with reading. Reading is the process of transferring the auditory aspects of a language unit which is already known to a new, visual sign which represents the same unit (p. 135). It would seem logical that, if auditory signs of concrete or highly meaningful words are learned most readily, then those signs should provide the strongest links for reading acquisition.

When viewed as a whole, the work of Gagne (1970), Pulaski (1971), Mattingly (1972), Murray (1972), Ehri (1977, 1978) and Smith (1978) would indicate that a hierarchical arrangement of learning should exist in which those words which are most concrete and/or most meaningful should be learned most readily, and words which are less concrete and/or less meaningful should be relatively more difficult to learn. Such would appear to be the case with nouns of differing levels of concreteness, and between nouns and non-nouns, as will be shown in the review of literature to follow.

Scope of the study

This study is addressed to the possibility that such a hierarchical arrangement continues through word classes which have hitherto been referred to as abstract

or of low meaningfulness, and that such a hierarchy affects the learning rate for those words by kindergarten children.

Terminology

The following terms are used in this study and in general educational literature:

Concreteness (c). Concreteness of a word indicates the tangibility of the concept or object to which the word refers.

CVCVC. A CVCVC word or pseudo-word follows the pattern consonant-vowel-consonant-vowel-consonant, such as the word 'lever'.

Free learning/free recall. This is probably the simplest and least demanding word learning task. Words to be learned are presented and the subject learns and recalls them without regard to their order of presentation.

G index. In the Thorndike-Lorge (1944) index of the occurrence of words in English, the G index refers to an index generated by all (general) literature. A G index of 250 indicates an occurrence of 250 times per million in general literature.

Imagery. A word's imagery value is its ability to arouse a mental image of the object, action, etc. to which it refers.

J index. A similar index to the G index, the J index refers to the occurrence of a word per million words in selected juvenile literature.

Meaningfulness (m). The meaningfulness of a word is its ability to arouse an association. For example, 'stone' might be associated with 'throw', 'rock', 'sling' or 'wall'.

Paired-associates. Two unrelated words or pseudo-words are paired. The first acts as a stimulus word for the second or response word. For example, the paired-associates might be mxy-cat. When mxy is presented, the learner responds cat.

Recognition. In this study, recognition means the learning of the oral name of a graphic word. The graphic word is presented and the learner says the word aloud.

Summary of the chapter

This chapter sets forth the framework of studies of concreteness and meaningfulness and the role which these two concepts appear to play in word learning. It also presents a theoretical basis for learning in which concrete experiences and objects facilitate early learning. Subsequent learning is based on abstractions of concrete experiences. Word learning, especially learning of graphic words is facilitated when the referent of

the word is a concrete object or experience.

The point is made that classes of words differ in m and c, with nouns being generally most concrete and most meaningful. Other classes of words might continue a hierarchical arrangement of m and c.

CHAPTER TWO

REVIEW OF THE LITERATURE

Organization of the chapter

In order to faciliatate the understanding of the research which has been done on the topics of meaningfulness and concreteness, and their application to word learning, I have attempted to organize the review of the literature in the following manner. Meaningfulness (m) will be considered first, beginning with the formulation of a generation model for meaningfulness data and followed by a review of the studies which have used m in the investigation of learning. Second, studies which have considered the effect of concreteness (c) and meaningfulness on learning will be reviewed. The paradigms used in this section consider the role of c and m in paired-associate learning, in auditory word recognition and in spelling and reading difficulties. Lastly, the role of concreteness in word learning and recall will be considered. In these studies, words considered for c vary in frequency of occurrence and grammatical class. In order to assist in the organization and understanding of the significance and emphasis of the studies, a table follows each section and lists the paradigms, subjects and conclusions as well as the significance of each major study to this thesis. Hypotheses are developed from the

studies and are given in chapter three.

Meaningfulness

Researchers who have investigated meaningfulness have varied in their points of view from the theoretical examination of the properties of the concept to the practical applications of the concept in classroom situations. Although meaningfulness had been investigated by Glaze (1928), no formal definition of m existed until Noble (1952) defined m as the responses elicited by a stimulus word. Noble determined that an index of m could be generated as the mean of the responses to a stimulus word elicited in 60 seconds. Using this production method, he generated an index of m for 96 CVCVC nonsense words, high frequency words and low frequency words, using the Thorndike-Lorge Scale (1944) to determine frequency of occurrence of a word. He used 119 newly enlisted U.S. airmen as subjects and recorded all of the words which occurred to the Ss within 60 seconds when the stimulus word was presented. In order to avoid having an elicited word become the stimulus for the next response, Noble used a separate page with the stimulus word typed at the beginning of each line on the page. Only one response word was written per line. In this way, the Ss were forced to refer to the stimulus before each response was given. Noble determined a range of mean m scores of .99 to 9.61

for the 96 stimulus words. In a later article Noble (1963) reiterated his production method, but changed and clarified words which had led to misinterpretation of his 1952 work.

In order to apply Noble's definition of m in classroom learning, Mickelson (1968) used Noble's production method to generate a table of meaningfulness for 120 nouns. She used three paradigms: free learning and free recall using separate high m and low m noun lists; a paired-associate paradigm using high m - high m and low m - low m noun pairs; and a serial learning task using separate high m and low m noun lists. All learning tasks involved verbal learning and recall, and subjects were all nine years old in the testing year. High meaningfulness was found to have a facilitating effect on verbal learning and on posttest retention in each experimental paradigm after one hour, three hours and twenty-four hours.

Again using Noble's production method for m as a guide, Mickelson (1972) explored the concept of associative verbal encoding (a/v/e) which she defined as the generation of associations to stimulus words. Two types of response associations were classified. Syntagmatic responses were those where the associated word was of a different grammatical class. Usually syntagmatic responses

completed a phrase such as brown - dog or jump - high. Paradigmatic responses were associations which were of the same grammatical class, such as blue - green or man - woman. Younger children responded with predominately syntagmatic responses while older children and adults used more paradigmatic responses, with the critical age for changing from syntagmatic to paradigmatic responses occurring between ages 6 and 8. Mickelson predicted that training in a/v/e should facilitate the ease of generation of associations and of word learning. Mickelson then tried to improve a/v/e scores by training, which consisted of exposure to stimulus words and the eliciting of response words for 60 seconds, followed by a class discussion of the responses. Training was seen to facilitate a/v/e scores and reading scores for the treatment group of nine year old children.

Findings contrary to Mickelson's (1972) study were those of Brescia and Brawn (1977) who used first grade subjects in their investigation of the role of meaning in sight vocabulary learning using a/v/e training. Training was given to subjects between teaching and testing cycles. They found that a/v/e training did not significantly influence the rate of vocabulary learning for beginning readers. A summary of these studies of m is given in Table 1.

Table 1

Studies on Meaningfulness

	Study	Ss	Paradigm or method	Results/Comments
1	Noble (1952)	adults	generation of table of m for 96 words and nonsense words	developed the concept of $m = \frac{R}{N}$, succeeded in generating an m index for all words used.
2	Mickelson (1968)	9 year old children	a) generation of table of m for 120 nouns b) free learning and recall of mixed m value lists c) free learning and recall of high and low m lists d) paired-associate learning of high-high and low-low m lists	m of words facilitated learning for all tasks, and on retention at one hour, three hour and twenty-four hour posttesting.
3	Mickelson (1972)		used associative verbal encoding (a/v/e) to train students to make more associations to words in an attempt to improve word learning.	A/v/e training improved the abiity of Ss to make associations to words and facilitated reading achievement.
4	Brescia and Brawn (1977)	6 year old children	used a/v/e training between teaching and testing cycles in an attempt to determine if a/v/e training would facilitate reading achievement.	A/v/e training was not seen as facilitative of vocabulary learning.

Meaningfulness and Concreteness

Meaningfulness and concreteness have been considered together in a variety of studies. Spreen, Borowski and Gordon (1966) used 30 normal and 60 mentally retarded subjects under a masking noise condition and presented single-syllable nouns of varying degrees of m and c. Both the normal and retarded subjects were able to recognize high m and concrete nouns better than low m and abstract nouns. The authors state:

> the effect of word parameters observed in this study confirmed the previous findings with normal subjects that the m of a word can to a substantial degree be defined as its concreteness and that m and c are effective determinants of auditory word recognition under superimposed noise conditions. (p. 623)

Bloomer (1961) noted three points of view on the relationship between a word and the difficulty inherent in learning it. First, a word does not communicate well if it does not have a specific significate. Words which are represented by multiple significates are more likely to create confusion. For example, words which can have a variety of grammatical functions, or which have multiple meanings or varying pronunciations such as 'read' or 'project' will be more difficult to learn. Second, the concreteness or abstractness of a word indicates that the difficulty of communication depends on the tangibility of the significate. The lowest level of

learning difficulty is with those words having significates which can be explored by the senses. Less concrete words are defined in terms of other words rather than by real objects, so their significates are abstractions. Third, familiarity with the word symbol implies that the word is well-known through repetition. Words which are most frequent in the language should communicate more specifically, and should be learned more readily.

Bloomer (1961) developed an ex post facto study in which multiple dictionary meanings were used as the index of m, and a rating out of seven by a panel of graduate students was used as the index of c. The concreteness scale was defined as the number of the five senses which could be applied to the word's significate, plus a kinesthetic and a constancy-over-time rating. The two indices were applied to the grade level of spelling and reading difficulty of the words. The ease of spelling and reading acquisition, and the concreteness and grade level at which 50% of students began to read and spell a word is negatively correlated ($r = -.36$), indicating that concrete words are learned at earlier grades than are abstract words. Multiple dictionary meanings and concreteness were not significantly correlated. Words which are more frequent in language also tended to have multiple meanings and to be easier to read and spell. More frequent

words are not correlated significantly with the concreteness of words. It must be noted that Bloomer's use of dictionary meanings for words is not the same as Noble's definition of m. Such a difference in definition of m would prevent direct application of Bloomer's finding regarding the lack of significant correlation between meaning and concreteness to Noble's definition of m. Meaningfulness and concreteness indices of 64 nouns were generated by Paivio and Yuille (1966). Paired-associates of concrete-concrete, concrete-abstract, abstract-concrete and abstract-abstract noun pairs were learned by grade four, six and eight students. Meaningfulness and concreteness of the nouns were found to be confounded variables which could not be separated. Concreteness of both stimulus and response nouns was found to be facilitative of learning of noun paired-associates. Table 2 shows a summary of studies which concern m and c.

Concreteness

Concreteness of words has been the subject of a variety of studies. For example, Paivio (1963) used adjective-noun paired-associates to determine if the relative concreteness of nouns had a facilitating effect on the learning of paired-associates. He hypothesized that concrete nouns would act as conceptual 'pegs' on which could be 'hung' an adjective. Concrete nouns were pre-

Table 2

Studies on Meaningfulness and Concreteness

Study	Ss	Paradigm or method	Results/Comments
1 Spreen, Borowski and Gordon (1966)	30 normal, 60 mentally retarded	A masking noise was produced and single-syllable nouns rated for m and c were presented orally. Ss were required to recognize nouns.	High m and c levels facilitated word recognition for all Ss. M and c were confounded and highly correlated.
2 Paivio and Yuille (1966)	4th, 6th, 8th grade students	a) generated c and m indices for 64 nouns. b) used a paired-associate paradigm with concrete/concrete, concrete/abstract, abstract/concrete and abstract/abstract pairs. c) four study and recall trials were used.	M and c were found to be confounded and not separable for the words used. Concreteness of both stimulus and response was found to be facilitative of learning of nouns.
3 Bloomer (1961)	5 graduate students	a) M was considered to be represented by multiple dictionary meanings. b) Concreteness was defined as the number of senses which would be applied to a word, plus a kinesthetic evaluation and a stability-over-time appraisal. c) M,c and frequency of occurance were correlated with spelling and reading difficulty of words.	a) Concrete words were found to be learned in earlier grades than were abstract words. b) Multiple meanings of words and concreteness were not significantly correlated. c) Frequency of occurance and concreteness of words were not significantly correlated.

dicted to be more effective 'pegs' than were abstract nouns because of their denotative specificity. High frequency nouns and adjectives were arranged into lists of adjective-concrete noun, concrete noun-adjective, abstract noun-adjective, and adjective-abstract noun paired associates. Subjects were 63 boys and 73 girls in 4th and 5th grades. Each subject learned 16 adjective-noun pairs and 16 noun-adjective pairs. Subjects heard the investigator speak each list pair aloud once with a two second pause between pairs. The stimulus words were spoken; and the children wrote the response word. Despite the fact that the usual English ordering for adjectives and nouns is adjective followed by noun, Paivio found that both concrete noun-adjective and abstract noun-adjective pairs were learned significantly better than pairs where the adjective was the stimulus word. Word order and noun concreteness were found to be significant ($p < .001$). This is consistent with the findings of Riegal and Riegal (1961) who investigated the effect of stimulus parameters of word frequency, word probability and word familiarity on the recognition thresholds for word learning. They found that the best predictor of the threshold was classification of words into concrete nouns versus all others.

In order to determine if the same effect of word order and concreteness would hold for other subjects

and with words which were clearly more-concrete and more-abstract than the words in his first experiment, Paivio (1963) repeated his experiment using university students as subjects and words which had a frequency of 10 to 20 per million according to Thorndike-Lorge. In this experiment, concrete noun-adjective pairs showed the greatest learning success, followed in order by adjective-concrete noun pairs, abstract noun-adjective pairs and adjective-abstract noun pairs. Again, the effect of word order and noun concreteness was significant ($p < .001$). A more-abstract noun category than in the first experiment reduced the mean number of pairs learned, but a more-concrete noun pair did not affect the mean number of pairs learned. The possibility that nouns evoke more adjective associations was considered as a possible reason for the noun-adjective recall superiority, but this was discounted as 70% of the words associated with nouns were nouns, and 45% of the word associations for adjectives were nouns (Woodworth, 1938). Precise identification of the word association data for the words used in the Paivio investigation could yield different association percentages than those found by Woodworth.

The effect of concreteness and frequency of nouns on recognition memory was also the topic of a study by Gorman (1961). Gorman used 1,791 singular common

nouns which had no other grammatical function and which had a Thorndike-Lorge G frequency of greater than six. Two trained judges classified words into an abstract/concrete dichotomy. Concrete nouns had direct references to objects, material or sensations, while abstract nouns had only an indirect reference. Each of the 16 adult males and 16 adult females who were used as subjects were presented with eight word lists of 18 words per list. A new list was then presented, containing 12 new words and 8 repeated words. Subjects were asked to identify the repeated words. Subjects were able to identify abstract words significantly less often than concrete words. Strangely, frequency of occurrence of a word in the language exerted a negative effect on recognition of the nouns which Gorman postulated was due to higher interference between high frequency nouns than between low frequency nouns. It is quite possible that this negative effect for word frequency is the result of the paradigm of recognizing words from a background, and that a similar result would not occur in a serial learning or free learning-free recall paradigm.

In a study which used a different paradigm than Gorman's study, Hargis and Gickling (1978) investigated the role of imagery, which they interpreted as the concreteness of the image elicited by a word in word recognition.

The investigation attempted to determine if there was a difference in the learning and retention rate for words of varying concreteness. A small sample of four boys and five girls aged both mentally and chronologically from 5.2 years to 6.0 years, with a mean IQ of 100.67 was used. Each subject learned 40 words which were rated as pre-primer to first grade level, from three to five letters in length, frequently used in everyday conversation, unknown as sight words and divided into 20 high imagery (concrete) nouns and 20 low imagery (abstract) nouns. Each subject learned four new words in each of 10 training sessions. Two day and ten day posttesting followed each training session. Results for both posttests showed that concrete nouns were recalled significantly more readily than abstract nouns. Throughout the training, concrete nouns were significantly easier to recognize than were abstract nouns. Although Hargis and Gickling used words which they labeled as concrete or abstract, their use of the concreteness of the image elicited by a word as the definition for concreteness would appear to introduce a confounding of their definition with that of meaningfulness, which is the ability of a word to arouse an association. Again, m and c are closely linked and, indeed, are functionally inseparable in word recognition learning.

The research which relates most closely to the emphasis of the present study is by Ollila and Chamberlain (1979), who investigated the effect of different grammatical classes on the recognition and recall of words. Forty kindergarten boys and forty kindergarten girls were randomly assigned to each of two groups. Each subject learned four words from either a high frequency noun list or a high frequency non-noun list selected from Moe's lists of high frequency words. The high frequency nouns were designated by Moe as being of high imagery (concrete) value, while the non-nouns were of low imagery (abstract) value. Training trials consisted of graphic stimulus presentation and simultaneous oral presentation, followed by a repetition of the word by the child. If the child could not repeat the word, training was repeated once before presentation of the next word. After presentation of all four graphic stimuli, the stimulus cards were randomized and again presented using the same format. Criterion was defined as two successive trials of all four words without an error. Training ceased after 20 trials if the child could not reach criterion. Posttesting was conducted after 24 hours and consisted of presentation of the stimuli for verbal identification by the child. In trials to criterion and in the number correct in retention, the nouns were consistently and significantly

recalled better than were non-nouns ($p < .001$). Significantly fewer students in the noun group failed to reach criterion than did students in the non-noun group. In the discussion following the study, the authors stated that:

> young readers have a higher level of readiness to learn graphic nouns than graphic non-nouns because their linguistic awareness of nouns in their listening vocabulary is more highly developed for these verbal representations of concrete concepts. (p. 291)

The difficulty of students in learning words which are not concrete was investigated by Moe (1974), who considered the criteria for selecting words to be taught in grade one. He noted that content words had at least some degree of imagery, while function words did not. He concluded that:

> Words such as the, and, of, to, which and where are words to which no object, action or description may be attached and consequently it is not possible to conjure up a mental image of a the or a which (p. 5) (and) the words chosen by the child will be very high imagery content words -- usually nouns. (p. 7)

Table 3 shows a summary of the studies concerning concreteness.

The studies covered in this review of literature would tend to indicate that: (a) meaningfulness and concreteness are confounded variables which cannot be

Table 3

Studies on Concreteness

	Study	Ss	Paradigm or method	Results/Comments
1	Paivio (1963)	4th and 5th grade students	part 1 Adjective-noun and noun-adjective paired associates using separate lists for concrete and abstract nouns.	a) Noun-adjective pairs were learned more readily for both concrete and abstract nouns. b) Concrete words were learned significantly more readily than were abstract words.
		university students	part 2 Adjective-noun and noun-adjective paired associates were used, but words were selected to be more concrete and more abstract than in part one.	a) Concrete-noun pairs facilitated learning the best. b) Word order and concreteness were significant in learning.
2	Gorman (1961)	adults	Ss were presented with a list of mixed abstract and concrete nouns and then had to recognize the nouns on another list.	a) Concrete nouns were recognized more significantly than were abstract nouns. b) Words which were more frequent in the language were identified less easily than were rarer words.
3	Hargis and Gickling (1978)	4 boys, 5 girls, age 5.2 to 6 years	Ss were taught 20 concrete and 20 abstract preprimer words over 7 weeks. Posttesting after 2 and 10 days was done for recall.	Concrete words were learned and retained more easily than were abstract words.
4	Ollila and Chamberlain (1979)	kindergarten children	Ss were presented with 4 high frequency nouns or 4 high frequency non-nouns for up to 20 trials. Criterion was set at 2 correct successive trials. Ss were posttested after 24 hours. Nouns were more concrete than were non-nouns.	a) In trials to criterion and in retention, nouns were learned significantly more easily than were non-nouns. b) Fewer Ss in the noun group failed to reach criterion than in the non-noun group.

separated in word learning, (b) concrete and meaningful words are learned more readily than abstract and low meaningful words, (c) that variations in m and c exist between grammatical classes of words (eg. nouns are generally more concrete and meaningful than are other grammatical classes of words), (d) that intra-class variations of m and c exist for different grammatical classes of words, and (e) this intra-class variation of m and c would result in a hierarchy of words. These five implications form the basis for this study. Hypotheses developed from the review of the literature are presented in Chapter three.

Summary of the Chapter

Chapter two details experiments which have investigated the role of meaningfulness and concreteness. Studies cited used meaningfulness alone, meaningfulness and concreteness/imagery together and concreteness/imagery alone. In all studies meaningfulness and concreteness of words (a) facilitated learning and (b) tended to be confounding variables which could not be separated in word learning.

CHAPTER THREE

METHOD

Organization of the chapter

This chapter deals with the design of data collection and analysis for the study. It is arranged into headings of (a) hypotheses, (b) subjects, (c) selection of words, (d) generation of an index of m, (e) generation of an index of c, (f) presentation of stimuli, and (g) data analysis.

The purpose of this study is to determine the relative ease of learning exhibited by kindergarten children in recognizing verbs and prepositions during training and after a 24 hour period. The effect of the concreteness and meaningfulness of those verbs and prepositions is considered as a possible cause of the ease of learning.

Hypotheses

The following hypotheses are developed from the review of the literature. All hypotheses are stated in the null form. The acceptable confidence level in all cases if $p \leq .05$.

Hypothesis one: there is no difference among kindergarten children in learning to recognize (a) concrete/high meaningful verbs, (b) abstract/low meaningful verbs or (c) prepositions.

Hypothesis two: there is no difference in the ability of groups of kindergarten children to recognize after 24 hours (a) concrete/high meaningful verbs, (b) abstract/low meaningful verbs or (c) prepositions.

Hypothesis three: there is no difference between kindergarten boys and girls in their rate of learning to recognize (a) concrete/high meaningful verbs, (b) abstract/low meaningful verbs or (c) prepositions.

Hypothesis four: there is no significant difference between kindergarten boys and girls in their recognition after 24 hours of (a) concrete/high meaningful verbs, (b) abstract/low meaningful verbs and (c) prepositions.

Hypothesis five: there is no difference among the teacher ratings of students' readiness scores of kindergarten students who are eliminated from the study for (a) prior knowledge of stimulus words on the pretests, (b) those who fail to reach criterion for word recognition within twenty trials and (c) those who meet criterion within twenty trials.

Subjects

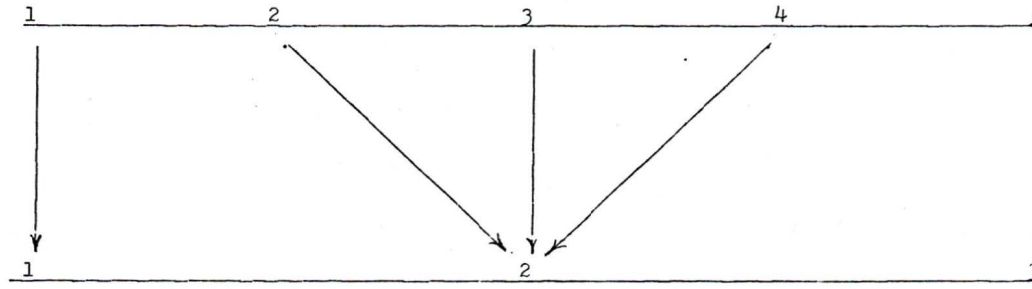
A sample of seventy-five kindergarten boys and seventy-five kindergarten girls was drawn from the Sooke area schools in April of the kindergarten year and twenty-five boys and twenty-five girls from this sample were assigned to each of three training groups. A subjective teacher rating of reading readiness was given for each

subject by the kindergarten teacher as a measure of readiness for learning to read. Teachers were asked to rate their students on a scale of one to five: one signified a student who was predicted to have great difficulty with learning to read in grade one, two signified a student who was predicted to have some difficulty but who generally should succeed in learning to read, three signified the "average" student who should be successful in learning to read, four signified an above average student in terms of readiness to learn to read and five indicated a student who should have no difficulty in learning to read and who has already shown growth in reading. In order to simplify the scaling of kindergarten students for readiness and so that students could be grouped into categories of not ready, ready and very ready to learn to read, teacher ratings were collapsed into a three point scale where one indicated probable difficulties and possible failure in learning to read, two indicated students who are "average" and three indicated students who are definitely above average and who should have no difficulty in learning to read. Figure one shows schematically the teacher five-point scale and the resulting collapsed scale. Analysis of variance determined the equality of groups according to readiness scores. Fifteen boys and fifteen girls from each group were randomly selected to receive training. The

Figure 1

Original five point rating scale for kindergarten students' ratings of readiness to learn to read and the resulting collapsed three point scale

student is predicted to be unsuccessful in learning to read	student is predicted to have some difficulty, but should be successful in learning to read	'average' student who is predicted to be successful in learning to read	above average student	student has already shown growth in reading



not ready, student is predicted to be unsuccessful in learning to read	ready, student is predicted to be successful in learning to read	very ready, student has already shown growth in reading

remaining twenty students per group were kept as a pool to be drawn on as subjects were rejected if they could not meet criterion or if they already knew a word during pretesting. For convenience, high meaningful/concrete verbs were referred to as high verbs and low meaningful/abstract verbs as low verbs. Specific training groups were referred to as boy-high verb, girl-preposition, etc.

Word Selection

Probably the most widely known word list for beginning readers is the Dolch list which contains the 220 most commonly used words in elementary school (Dolch, 1941). Recently the Dolch list as a measure of the reading vocabulary required of present day primary school children has been criticized because of its forty year old norms (Hillerich, 1973). Three other word lists based on a current sample of the reading vocabularies presented to primary grade students were consulted. Verbs were selected if they were common to at least three of the following lists: Dolch (1941), Durr (1973), Johnson (1971) and the Starter Words (Hillerich, 1973). It should be noted that all of the four lists contain approximately the same number of words, but the Dolch list is the only one which does not contain words which function only as nouns. As a result, the Dolch list yielded more verbs not found on any other list than did any of the

other lists. It is quite possible that if the Dale, Johnson and Hillerich lists were also designed to exclude nouns, most of the Dolch verbs would have been included on those lists.

If more than one form of a verb occurred on a word list, the repeated verb form was rejected if it was a predictable variant (eg. look, looks, looking), but was retained if the variant was irregular (eg. see, saw; run, ran). All verbs were checked using the Thorndike-Lorge J index (1944) which gives the number of occurrences per million words in juvenile literature. An arbitrary cut off point of a J index of 500 times per million was established to ensure that all verbs were of high frequency. The verbs were also checked using the Dale list (Dale and O'Rourke, 1979) which gives percentages of recognized definitions for words for various grades beginning with grade four. A minimum rating of 67% is considered by Dale and O'Rourke as indicative of an appropriate grade level for knowledge of a word. Only verbs with a minimum of 67% at grade four were retained. It is recognized that definitions known by grade four students may not also be known by the same percentage of kindergarten students, but ratings for younger students are not available, due mainly to Dale and O'Rourke's format of having students read and select definitions. However, it seems reasonable

that definitions of words which are known by a large percentage of fourth grade students should be known by more kindergarten students than would words which are not known by grade four students. Dale list percentages for the verbs and prepositions used in this study are given in Appendices D and E.

Some verbs were found to have multiple grammatical usages (eg. 'work' can be a verb, noun or adjective). The Dale list was checked and if the verb usage showed the highest percentage at the grade four level, the word was retained. If the non-verb usages were the higher percentages at the grade four level, the word was eliminated to prevent the possibility that the non-verb usage was forming most of the concreteness/meaningfulness clue and that the word was not being learned as a verb.

Prepositions were also selected from the Dolch, Dale, Johnson and Hillerich lists in the same manner as verbs. It is interesting to note that no prepositions were found on the Dolch list which were not also on all of the other lists which indicates the permanence of prepositions and other function words in our language. One preposition, 'before', was eliminated from consideration as it was not listed on the Dale and O'Rourke list as known by 67% of the population below grade six.

Generation of an index of m

Noble's (1952) production method was used to develop an index of meaningfulness for the verbs and prepositions used in the study. Subjects used to rate words for meaningfulness were (a) two male and three female education graduate students who are all experienced teachers at the primary or grade four level, and (b) five male and five female grade three students who have all been judged by their teacher as being of average ability. An interesting and potentially useful extra consideration of the study is the comparison of the ratings of m and c by third grade students and experienced teachers.

Subjects were presented with each stimulus word on a separate page with each line of the page beginning with the stimulus word. The subjects were required to say the stimulus word to themselves and to write a word which occurred to them as an association to the stimulus. Grade three students were chosen for this task rather than kindergarten students because grade three students are capable of writing responses to stimuli which younger children could not do. Stimulus repetition preceded each association so that an elicited word did not inadvertently become the stimulus for a new response (Noble, 1952). Rather than using the 60 second per stimulus time used by

Noble (1952), a 30 second interval per stimulus was given. Paivio, Yuille and Madigan (1968) used such an interval in generating an index of m for 925 nouns and found that a 30 second time correlated with a 60 second response time .65. The shorter response time is more appropriate than a 60 second response time for generating ratings for a relatively large number of words. Appendix A gives a sample pro forma sheet for ratings of m. Appendix B gives the scoring procedure for student responses to stimuli.

Generation of an index of c

Using Bloomer's (1961) method, an index of c was defined as the mean rating on a seven point scale for each verb and preposition so that one was scored for each of the five senses which can be applied to the word's significate, plus a kinesthetic and a constancy-over-time appraisal. For example, the verb 'leap' can have the senses of sight and hearing applied to it because these senses are used to perceive a leap. 'Leap' also involves a kinesthetic attribute and does not change appreciably over time. Thus, 'leap' would score four.

The same groups of graduate students and of grade three students which rated the words for m appraised each verb and preposition for concreteness. No time limit was given, and no communication between judges was per-

mitted while appraisal was in progress. Three stimulus words were duplicated to determine intra-rater reliability. Appendix C gives a sample pro forma sheet for the rating of c. Appendices D and E give m and c ratings for words.

Presentation of Stimuli

Once the m and c of the words were established, the words were arranged into three groups: (a) verbs which were above the mean in both c and m, (b) verbs which were below the mean in both c and m, and (c) prepositions. Appendix F shows the three word lists. Within each word list the words were assigned a number and a table of random numbers was used to yield groups of four words for each subject. No two students were permitted to have the same set of words in order to control the possibility that words might cue each other. In order to avoid an intra-list variable, no group of four words contained words which begin with the same initial letter (Kiraly and Furlong, 1974; Montare, Elman and Cohen, 1977).

Word stimuli were centered on a 12.7 cm by 7.6 cm white card using a primary typewriter and lower case letters. No other marks appeared on a card.

Each subject met individually with an examiner away from the classroom for two sessions. The first session took up to approximately twenty minutes for word recognition training. The second was for approximately

five minutes twenty-four hours after the first for post-test of recognition. If a student was absent on the day following training, the posttest was extended to a maximum of forty-eight hours following training. Only one student had the posttest delayed in this manner.

Each subject received pretesting, pretraining, and training to criterion of four words taken from one of the three word groups, and twenty-four hour posttesting if criterion was met. Criterion was defined as two successive trials with no errors. A maximum of twenty trials was given.

Pretesting consisted of the statement, "Today we are going to play a game to see how fast you can learn some words. If you get some wrong, it doesn't matter, but you should try your best and listen carefully. Before we start the game, let's see if you know any of the words already. What is the name of this word?" The subjects were each presented with the four graphic stimuli using a non-correcting format. A subject who was able to name one or more of the words was given a new set of four graphic words. If a word from the second set was known, the child was replaced by another subject of the same sex in order to maintain the balance between the three groups.

Pretraining consisted of presentation of the graphic stimuli individually with the statement, "This

is the word _____. What is the name of this word?" After pretraining, the words were presented in random order for each trial. Subjects were presented with the graphic stimulus and asked, "What is the name of this word?" If the subject responded correctly, he/she was praised and the next card was presented. If an incorrect response was given, the card was presented again, along with the statement, "This is the word _____. What is the name of the word?"

A subject who was unable to reach criterion in twenty trials was replaced and excluded from the analysis of learning and retention rate, but was retained for ad hoc analysis. Posttesting after twenty-four hours followed the same procedure as pretesting.

Data analysis

Once the children completed the word learning task, the following data were available: (a) the number and readiness levels of students in each group who were eliminated because they knew two or more of the words on pretest, (b) the number and readiness levels of students in each group who were eliminated because of failure to reach criterion, (c) the number of trials to criterion for subjects in each group, and (d) the number of errors made by students in each group in reaching criterion. Twenty-four hour posttesting added the number of words correctly named on a delayed test for each group.

Chi-square was used to determine if the number of students eliminated for previous knowledge of a word is statistically different for treatment groups. Similarly, chi-square was applied to the numbers of students who did not reach criterion to determine if the treatments groups differ in this respect.

The mean readiness level of the students who were eliminated during pretesting and of those who failed to reach criterion were subjected to analysis of variance to determine if those students differed significantly from the mean readiness level of the total group. If students so eliminated differed significantly from the group readiness mean, the limitation that only a restricted readiness range was considered would be forced on the conclusions which can be drawn from the study.

Trials to criterion and errors to criterion were analyzed separately by analysis of variance using a 2 (sex) x 3 (word list) design to determine the effect of sex, word list and sex x word list interaction. Similarly, posttest recognition of words was analyzed for the same information.

Summary of the Chapter

Chapter three presents the five hypotheses of the study and details the selection of verbs and prepositions for the study along with the procedures followed to

generate indices of m and c for both verbs and prepositions. Word lists used in the study were derived from m and c indices. Specific formats for kindergarten students' word learning tasks are set forth. The data analyses used to determine the validity of the hypotheses are also given.

CHAPTER FOUR

RESULTS OF THE STUDY

Organization of the chapter

This chapter details the results of this investigation. It is arranged in the following manner: (a) the generation of indices of m and c by adults and grade three students, (b) the characteristics of the kindergarten sample used, (c) results of analyses of trials to criterion (TTC), errors to criterion (ETC) and 24 hour recognition for word lists and sex of subject, (d) the results of chi-square analysis for students who had prior knowledge of words or who failed to reach criterion, and (e) teacher predictions of readiness. Throughout the chapter, specific hypotheses of the study are addressed.

The generation of indices of meaningfulness and concreteness

Both adults and grade three children rated verbs and prepositions for meaningfulness (m) and concreteness (c). A summary of mean m and c scores for the two sets of raters is given in Appendices D and E. In order to determine the consistency with which children were able to perform the task of rating words, three words were rated twice for m and c, and correlations

were calculated for the first and second ratings. Child intra-rater reliabilities of .62 ($p < .01$) for ratings of c and .58 ($p < .01$) for ratings of m were found. It would appear from these correlations that grade three children are capable of consistently determining m and c values.

Correlations were also found between mean child ratings of m and c and mean adult ratings for the same words. Table 4 shows the correlation matrix for m and c. Child-m and child-c ratings are significantly correlated ($r = .26$, $p < .05$). Adult-m and adult-c ratings are also significantly correlated, but in this case the correlation was a negative one ($r = -.27$, $p < .05$). No other correlations are significant. A t-test between the mean m and c values for prepositions and verbs showed that prepositions are not significantly different from verbs for m ($t_{(45)} = 1.49$, $p > .05$), but were significantly lower than verbs for c ($t_{(45)} = 3.62$, $p < .01$).

The kindergarten sample

All of the kindergarten subjects used in this study were drawn from the Sooke area schools. The nine kindergarten classes used ranged in socio-economic status from high-middle to low-middle as estimated by the experimenter and the children's teachers, with the total sample representing the SES range found within the district. Appendix G gives a breakdown of the sample by school and

Table 4

Correlation Matrix for
Child and Adult Ratings of M and C

	Child M	Child C	Adult M	Adult C
Child M	---	0.26*	0.18	-0.02
Child C		---	0.10	-0.14
Adult M			---	-0.27*

* $p < .05$
all other correlations $p > .10$

students' socio-economic status.

Sooke school district is a basically middle class suburban and rural area, but it does include a very transient population of military personnel and their families who are housed in an older area and who represent an important lower-middle class group. It would appear to be reasonable to extend the general results concerning word recognition learning and recall to other similar socio-economic areas.

As no subjects were eliminated from the study because they were from a particular ethnic group, the kindergarten sample is also representative of the Sooke area schools in terms of ethnicity, with the exception that no native Indian students were included in the sample. Indian students in the Sooke schools tend to be clustered in a small number of schools near reservations and none of these schools were part of the sample used.

Analysis of variance for sex, word list and sex x word list interaction showed that no difference exists between word list groups for student age. However, when readiness of students was considered using the same analysis of variance, girls ($\bar{X} = 2.14$) were found to be rated as more ready to learn to read than were boys ($\bar{X} = 1.96$) $F_{1,172} = 4.40$, $p < .05$.

The original research plan of drawing six samples of twenty-five students each and testing until fifteen children from each group reached criterion proved to be inadequate. At the end of scheduled testing, two groups (boy-high verb and girl-preposition) did not contain the required fifteen successful subjects. In the case of the boy group, fifteen of the original twenty-five children did not reach criterion, while in the girl group, eleven children failed to reach criterion and four children demonstrated prior knowledge of prepositions and so were eliminated from all but post hoc analysis. In order to ensure a sufficiently large number of children who reached criterion in each group, a further sample of kindergarten students was drawn and children were assigned to those groups which required them. Table 5 shows the distribution of subjects for prior knowledge of words, failure to reach criterion and for reaching criterion for the original and extended samples.

In order to determine if the students who reached criterion differed statistically in their readiness to read from those who failed to reach criterion or those who had prior knowledge of words, an analysis of variance was calculated using teacher ratings of student readiness scores. The difference between group readiness means was found to be significantly different

TABLE 5

DISTRIBUTION OF SUBJECTS AFTER TESTING FOR ORIGINAL AND EXTENDED SAMPLES

	Low Verbs				High Verbs				Prepositions					
	Boys		Girls		Boys		Girls		Boys		Girls			
	Orig.	Ext.	Orig.	Ext.	Orig.	Ext.	Orig.	Ext.	Orig.	Ext.	Orig.	Ext.	Orig.	Ext.
failed to reach criterion	7	7	8	8	15	18	9	10	7	7	11	15	57	65
prior knowledge	1	1	0	0	0	0	1	1	2	2	4	4	8	8
reached criterion	15	15	15	19	10	20	15	15	15	15	10	16	10	16
total	23	23	23	27	25	38	25	26	24	24	25	35	147	173

($p < .001$). A Newman-Keuls test showed that no difference exists between readiness scores of those students who had prior knowledge of words and those who reached criterion, but that both of these groups were different from the group of students who failed to reach criterion ($p < .05$). Hypothesis five, that no difference exists between readiness scores of groups of students who reach criterion, fail to reach criterion or who have prior knowledge of words is, therefore, rejected. Table 6 shows the ANOVA and Newman-Keuls results.

Another analysis of variance was calculated using readiness scores of students who failed to reach criterion to determine if any differences exist between word list groups in the readiness level of those students. This time, no significant difference between word groups was found for readiness ($p > .50$).

Analysis of word recognition learning and recall

Analyses of variance for sex, word list and sex x word list interaction were calculated for TTC, ETC and recall. No significant differences were found for either TTC or ETC using data for those subjects who reached criterion. In order to ensure that no differences attributable to the sex or word list variables or their interaction existed, a further analysis of variance was calculated using data for all subjects who were tested.

Table 6

Analysis of variance and Student-Newman-Keuls tests for readiness

Analysis of Variance

Source of Variation	df	Mean Square	F ratio	P
Between word lists	2	3.69	14.52	0.0001
Within word lists	170	0.25		
Total	172			

Newman-Keuls Test

Subset 1*

Group	Failed to reach criterion
Mean	1.80

Subset 2

Group	Reached Criterion	Prior Knowledge
Mean	2.18	2.50

*Subsets are homogeneous, so that group means within a subset are not significantly different, but are significantly different ($p < .05$) from groups not in the subset.

Those children who had prior knowledge of the stimulus words were considered to have learned the words in zero trials with zero errors. Data for TTC and ETC were available for those children who failed to reach criterion. Again, no significant differences for either TTC or ETC were found. Appendix H shows the ANOVA results for TTC and Appendix I shows the relative mean TTC scores for boys and girls by word list. Similarly, Appendix J shows ANOVA results for ETC and Appendix I shows mean ETC scores for boys and girls by word list. As a result of these analyses, hypothesis one, that no difference exists among kindergarten children in learning to recognize concrete/high meaningful verbs, abstract/low meaningful verbs and prepositions, and hypothesis three, that no difference exists between boys and girls in their rate of learning to recognize concrete/high meaningful verbs, abstract/low meaningful verbs and prepositions cannot be rejected.

Twenty-four hour posttest

An analysis of variance for sex, word list and sex x word list interaction was also calculated using 24 hour recognition scores for those children who reached criterion. For this analysis, word list and word list x sex interaction were significant, as can be seen in Table 7. A Newman-Keuls test, shown in Table 8, for differences

Table 7

Analysis of Data for 24 hour recognition

24 hour posttest means by word group

Word List	Boys	Girls	Total
Low Verbs	1.87	2.84	2.41
High Verbs	2.70	2.60	2.66
Prepositions	3.20	2.88	3.03
Means by Sex	2.60	2.78	2.69

Analysis of Variance for 24 hour recognition

Source of Variation	df	Mean Square	F
Main Effects	3	2.412	3.410*
Group	2	3.213	4.182*
Sex	1	0.934	1.216
Two-way interaction			
Group X Sex	2	3.972	5.171**
Explained	5	3.036	3.952**
Residual	94	.768	
Total	99	.883	

* $p < .05$
* $p < .01$
all other probabilities $p > .05$

Table 8

Summary of Student-Newman-Keuls Tests for Twenty-four hour recognition

Test 1 - Differences among Word Lists

One Way Analysis of Variance of Recall

Source of Variation	df	Mean Square	F Ratio	F Prob.
Between Word Lists	2	3.1506	3.769	.03
Within Word Lists	97	0.8360		
Total	99			

Student-Newman-Keuls Results

Subset 1*

Group	Low Verbs	High Verbs
Mean	2.41	2.66

Subset 2

Group	High Verbs	Prepositions
Mean	2.66	3.03

Test 2 - Differences among Boys' Groups

One Way Analysis of Variance of Recall

Source of Variation	df	Mean Square	F Ratio	F Prob.
Between Boy Groups	2	6.8333	8.378	.001
Within Boy Groups	47	0.8156		
Total	49			

Student-Newman-Keuls Results

Subset 1*

Group	Low Verbs
Mean	1.87

Subset 2	High Verbs	Prepositions
Group	High Verbs	Prepositions
Mean	2.70	3.20

Test 3 - Differences among Girls' Groups

One Way Analysis of Variance of Recall

Source of Variation	df	Mean Square	F Ratio	F Prob.
Between Girl Groups	2	0.3518	0.488	.62
Within Girl Groups	47	0.7208		
Total	49			

Student-Newman-Keuls Results

Subset 1*

Group	High Verbs	Low Verbs	Prepositions
Mean	2.60	2.84	2.86

* subsets are homogeneous, so that group means within a subset are not significantly different, but are significantly different ($p < .05$) from group means not in the subset.

between word lists showed that a significant difference ($p < .05$) exists only between prepositions ($\bar{X} = 3.03$) and low verbs ($\bar{X} = 2.41$).

Word list x sex interaction for 24 hour recognition was also investigated using t-tests for differences between boys' and girls' scores for each of the three word lists and between girls' word lists. The t-tests results which are given in Table 9 showed only that the girl-low verb group ($\bar{X} = 2.84$) scored significantly higher than the boy-low verb group ($\bar{X} = 1.87$) $t(32) = -2.90$, $p < .01$. The Newman-Keuls tests showed that no differences exist among girls' word groups for 24 hour recognition, but that the boy-low verb group was significantly lower (p .05) than the other two boys' groups. Twenty-four hour recognition scores are shown graphically in Figure 2. Hypothesis two, that there is no significant difference in the ability of groups of kindergarten children to recognize after twenty-four hours concrete/high meaningful verbs, abstract/low meaningful verbs or prepositions is rejected. Hypothesis four, that there is no significant difference between kindergarten boys and girls in their recognition after twenty-four hours of the three classes of words used in this study is also rejected.

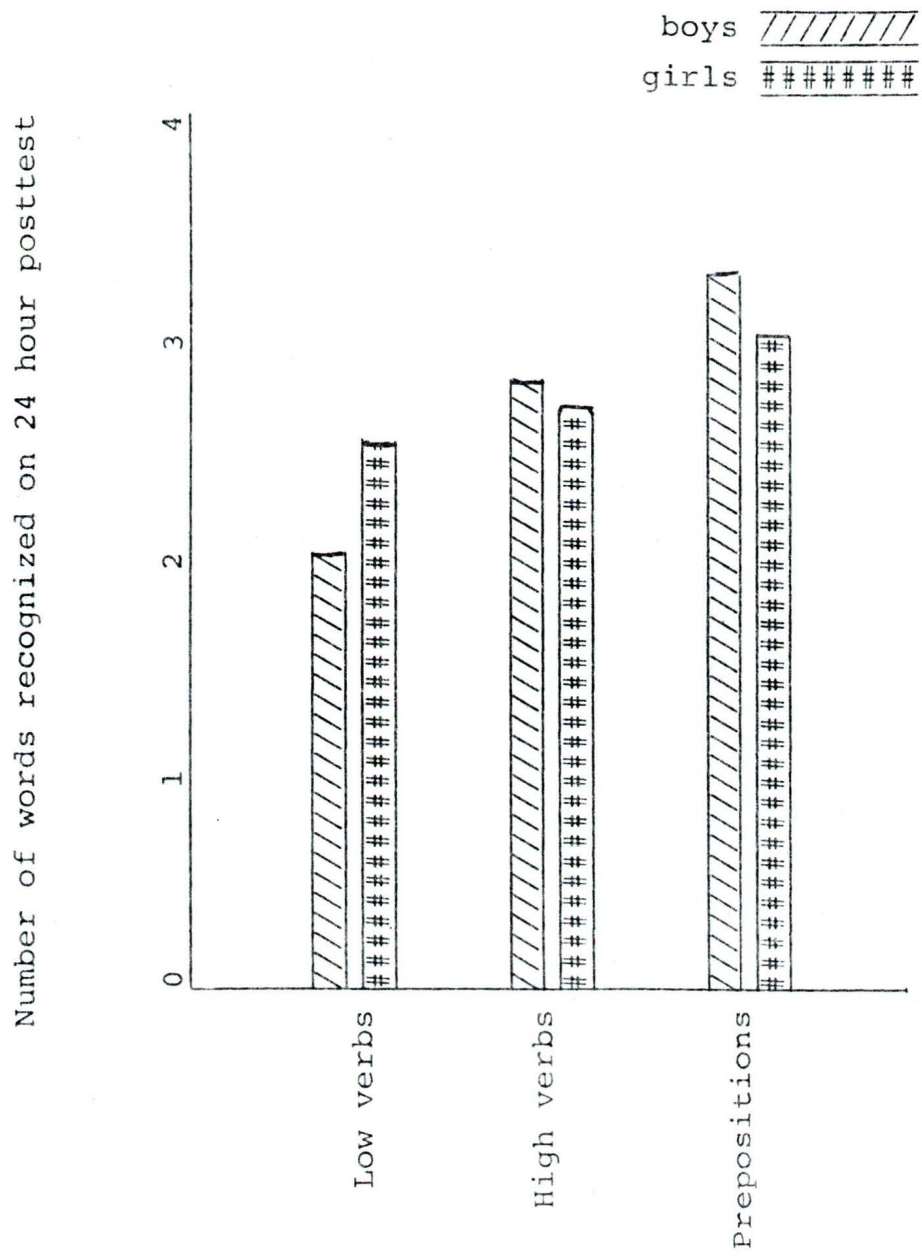


Figure 2

Twenty-four hour posttest recognition
of words for boys and girls

Table 9

Summary of T-Tests for Twenty-four hour Recognition

Variable	No. of Cases	Mean	S.D. of Mean	t Value	df	2-Tail Prob.
T-Test 1						
Boys' Low Verbs	15	1.8667	0.915	-2.90	32	0.007
Girls' Low Verbs	19	2.8421	1.015			
T-Test 2						
Boys' High Verbs	20	2.7000	0.923	0.34	33	0.732
Girls' High Verbs	15	2.6000	0.190			
T-Test 3						
Boys' Prepositions	15	3.2000	0.862	1.14	29	0.262
Girls' Prepositions	16	2.8750	0.719			

Ad hoc analysis of eliminated subjects

A total of eight students (4.6%) had prior knowledge of the words used in the study; one each in low verb and high verb groups and six in the preposition group. Post hoc analysis by chi-square revealed that significantly more students had prior knowledge of prepositions than either low or high verbs ($\chi^2 = 6.25$, $df = 2$, $p < .05$). Data for prior knowledge are reported in Appendix H.

Out of the 173 subjects tested, 65 failed to reach criterion; 15 in the low verb group, 28 in the high verb group and 22 in the preposition group. Post hoc analysis by chi-square revealed that no significant difference ($p > .05$) exists between the number of students in the three word groups for failure to reach criterion.

Teacher predictions of readiness

Final analysis of data concerned the correlations between teacher prediction of students' readiness to read and their success on the word learning task as measured by TTC, ETC and 24 hour posttest of recognition. As can be seen from Table 10 readiness correlated significantly with age, TTC, ETC and posttest recognition when all words and all subjects are considered. Considering that readiness scores for students are estimates of readiness to read and the word learning task given to the students was

Table 10

Correlations of Readiness with TTC, ETC, Recall

Readiness	Age	Trials to Criterion	Trials to Criterion	Posttest Recognition
Whole group	.23 **	-.39 **	-.40 **	.43 **
Low verbs	.23 **	-.50 **	-.50 **	.54 **
High verbs	.25 *	-.31 **	-.39 **	.3982 **
Prepositions	.20	-.37 **	-.37 **	.39 **
Boys	.17	-.35 **	-.42 **	.41 **
Girls	.28 **	-.43 **	-.37 **	.44 **
Boys Low Verbs	.12	-.46 *	-.55 **	.34
Girls Low Verbs	.38 *	-.59 **	-.50 **	.61 **
Boys High Verbs	.27 *	-.37 **	-.5 **	.50 **
Girls High Verbs	.22	-.20	-.14	.21
Boys Prepositions	-.01	-.26	-.24	.34
Girls Prepositions	.24	-.45 **	-.45 **	.46 **

** $p < .01$

* $p < .05$

all other correlations $> .05$

strictly controlled and avoided the use of the types of teaching strategies which teachers instinctively use to assist students who are having difficulty with a task, the readiness correlations with TTC, ETC and recall are quite consistently significant.

Twenty-four hour posttest recognition scores used in determining correlations with teacher predictions of readiness shown in Table 10 are defined as four for those students who had prior knowledge of words and zero for those who failed to reach criterion. As some of the students who failed to reach criterion could have recognized at least one of the words after twenty-four hours had they been tested, the posttest recognition correlations are probably somewhat inaccurate. It may be that the non-significant correlations found for posttest recognition would have been significant had actual scores for those students who failed to reach criterion been available.

To determine if relatively large numbers of errors in achieving criterion and the resulting increase in the students' exposure to verbal and graphic words influenced students' posttest recognition, a correlation was calculated between ETC and posttest recognition. The correlation ($r = -.30$, $p < .01$) indicated that no practice effect was evident. In fact, students who made relatively

high numbers of errors did not recall the words as well as did those who made few errors.

Summary of the chapter

Chapter four presents the study's findings of m and c indices, word recognition learning and posttest recognition, and the ability of teacher ratings of readiness to learn to read to predict word recognition learning and posttest recognition of verbs and prepositions. Specifically:

1) Grade three children appear to be able to reliably rate words for m and c.

2) Child-m and child-c ratings are significantly and positively correlated.

3) Adult-m and adult-c ratings are significantly and negatively correlated.

4) Child-c and adult-c, and child-m and adult-m ratings are not significantly correlated.

5) No difference attributable to sex, word list or sex x word list interaction for trials to criterion or errors to criterion was found.

6) Boys-low verb group recognized words on a twenty-four hour posttest significantly less well than did all other groups.

7) More students had prior knowledge of prepositions than either high or low verbs.

8) Teacher ratings of students' readiness to read were predictive of TTC, ETC and posttest recognition, except for girl-high verbs and boy-prepositions.

CHAPTER FIVE

CONCLUSIONS FROM THE STUDY

This chapter explores the possible reasons for and ramifications of the results reported in Chapter four. The chapter is arranged into headings of (a) the words used, (b) the kindergarten sample, (c) the results of the study of word learning, (d) implications for teachers, and (e) suggestions for further research.

The words used in the study

Correlation of the m and c values given for words by adult and grade three raters (Table 4) is .27 ($p < .05$) for child-m and child-c ratings. This tends to support the findings of Spreen, Borowski and Gordon (1966) and Hargis and Gickling (1978) that m and c are significantly and positively correlated and confounded variables. However, the negative correlation between adult-m and adult-c ratings ($r = -.27$) would tend to show the reverse of those findings. The correlations between m and c for child ratings of verbs only ($r = .13$), prepositions only ($r = .56$) and for all words ($r = .27$) indicate that m and c are variables which are confounded for prepositions, although the correlation is considerably lower than the .90 correlation reported for paired-associate learning by Paivio (1965). It is beyond the scope of this study to determine if words which are high in, say, c and low

in m are learned differently than those which are high in m and low in c, or high in both values, or low in both values.

As noted in Chapter four, t-test results for differences between m and c values for verbs and prepositions showed that the mean preposition c value was lower than that for verbs ($p < .01$), but that the mean m values of verbs and prepositions were not significantly different. As prepositions were learned as readily as verbs, this difference could be construed as indicating that m is the significant variable in word learning for non-nouns. However, until such time as further data are available it would seem reasonable to continue to consider m and c to be separate variables and worthy of separate consideration when determining the relative 'difficulty' of words.

Because only five adult and ten grade three raters were used to generate indices of m and c, conclusions regarding ratings and their correlations would be at best premature until further data are available using a larger number of raters. At this time, however, it can be said that the judgements of experienced elementary school teachers of the m and c values for verbs and prepositions and the judgements of primary school aged students do not appear to be sufficiently correlated to permit one group

to judge what is concrete or abstract, meaningful or non-meaningful for the other group.

In general, marking of student responses for meaningfulness for verbs and prepositions called for a considerable amount of marker judgement and planning in advance to determine what categories and types of responses would be accepted and which would be rejected as outlined in Noble's (1952) criteria, which are given in Appendix B. The m values of words are sufficiently low that a difference of one or two associations among raters is more apparent than if the values were much larger. As a result, an increase in the number of subjects used to generate future indices would be advisable. It is apparant, however, from intra-rater reliability coefficients that the concept of the generation of indices of m and c can be extended to include both grade three subjects as raters and non-noun words.

Because the student raters represent a basically white middle class socio-economic stratum, it would be difficult to generalize specific m or c ratings to other cultural groups because of varying cultural values, dialects and student experiences. Lower socio-economic strata students might benefit from a variation in generating indices. For example, the method of producing an index of m and c could be varied to include oral responses to

stimuli. This method of gathering data would likely produce fewer meaningfulness responses which would be rejected according to Noble's criteria because the oral repetition of stimuli plus the tester's presence should tend to keep the rater 'on task' better than only visual stimuli. It would, however, require considerably more tester time.

Because some of the words used in the study were close to the mean m and c values, it is possible that a 'more meaningful/more concrete'word might be learned more readily than another word, despite the fact that both words are in the same word list. Table 11 shows a breakdown of word lists into their constituent words, along with their m and c ratings and the percentage of correct responses made by students who failed to reach criterion, reached criterion, and the combined percentage for all students during word recognition learning. As can be seen from the table, there is a marked range of correct response percentages within each word list. Correlations between m and c values for words and percentages of correct responses made by students are shown in Table 12. None of these correlations are significant, indicating that a word's designated m and c values do not significantly affect the ability of students to give a correct oral response when learning to recognize the word.

Table 11

Percentages of Correct Responses in Trials to Criterion

For Students Who Failed to Reach Criterion, Reached Criterion, and Total Students

Word List 1 - Low Verbs

word	be	am	want	had	were	like	are	did	know	see
m rating	1.4	1.6	1.6	1.7	1.5	1.3	1.5	1.7	1.5	1.4
c rating	.7	.8	1.7	1.1	.9	1.6	.8	1.6	1.6	1.5
Failed	46.3	63.7	25.6	12.1	21.7	18.3	77.0	13.1	57.8	47.5
Reached	68.5	71.8	51.4	69.8	55.0	39.1	55.0	51.7	80.4	79.4
Total	59.1	63.4	39.2	25.7	41.7	27.1	63.9	29.5	68.5	73.1

Word List 2 - High Verbs

word	went	found	ran	gave	came	let	say	call	can	look
m rating	2.0	1.8	2.2	2.1	2.0	1.9	1.8	1.8	1.8	2.6
c rating	2.1	2.4	3.4	1.9	2.5	1.9	2.5	2.0	1.9	2.2
Failed	13.8	44.5	43.5	28.6	52.0	10.5	16.4	47.2	28.3	21.5
Reached	59.2	73.3	66.5	48.8	62.2	57.5	52.8	80.0	92.1	74.7
Total	27.5	56.3	54.3	39.3	55.4	26.4	32.7	56.7	52.0	44.6

Word List 3 - Prepositions

word	with	after	under	over	on	for	of	by	from	in	to	at
m rating	1.4	1.8	2.0	2.0	1.6	1.1	.8	1.4	1.8	2.0	1.7	1.4
c rating	1.6	.9	1.6	1.2	1.3	.9	.6	.8	1.5	1.5	.6	.8
Failed	34.7	12.8	25.2	51.1	34.4	63.3	19.2	20.7	38.0	45.7	60.0	30.0
Reached	59.5	58.1	74.4	73.5	51.7	82.1	63.2	77.7	80.2	69.8	89.1	50.0
Total	45.8	35.5	45.0	60.7	37.7	69.0	29.8	46.0	57.5	54.9	80.3	36.7

Table 12

Correlations of Percentages of Correct Response made during training for Students

Who Failed to Reach Criterion, Reached Criterion, and Tota Students with m and c

	Low Verbs		High Verbs		Prepositions	
	m	c	m	c	m	c
Failed	-.27	-.42	-.09	.41	.09	-.03
Reached	.15	-.18	-.12	-.11	.11	-.17
Total	-.32	-.28	-.03	-.09	.27	.35

p >.10 in each case

The kindergarten sample

The readiness ratings for the kindergarten children used in this study are subjective assessments made by the kindergarten teachers. Readiness correlates with age .23 ($p < .01$) for the whole group, .17 ($p > .05$) for boys only and .28 ($p < .01$) for girls only. Because teacher assessments of readiness could not be validated by the use of a readiness test due to school district policy, it is not possible to draw meaningful conclusions from this data. Because boys' readiness ratings do not correlate significantly with their ages and girls' ratings do, the assumption that the boys' readiness ratings are incorrect could be inferred as a possible reason. This argument, however, would appear to be invalid as boys' readiness scores correlate significantly with TTC ($r = -.34$, $p < .01$), ETC ($r = -.42$, $p < .01$) and posttest recognition ($r = .41$, $p < .01$), which is remarkably similar to the correlations of girls' readiness and TTC, ETC and recall, as is shown in Table 10.

In order to check to see if a significant correlation could be determined if the boys' age data were rearranged, groupings of boys' ages into equal divisions of three months and four months were made, but no significant correlation could be found. Unless boys' readiness scores were validated by future readiness tests or sub-

sequent reading achievement further speculation regarding reasons for a non-significant correlation with age would be questionable.

Results of the study of word learning and posttest recognition

ANOVA results demonstrated that no difference exists between boys and girls and between word groups for TTC and ETC. However, the word list group x sex interaction indicated that a significant difference exists for posttest recognition. A Newman-Keuls analysis showed that this was due to an inability of boys to recognize low verbs after twenty-four hours. This would indicate that for boys in this study, high meaningfulness and concreteness are significant attributes for the posttest recognition of low verbs but not for learning to recognize them.

In terms of theoretical constructs of learning, such as those of Gagne and Mattingly outlined in Chapter one, the results of this study could best be explained by linking together Mattingly's (1972) and Smith's (1978) views of linguistic awareness. It is probable that the children in this study had an equal awareness of the uniqueness, function and meaning of verbs and prepositions and that this equal awareness resulted in no difference in TTC and ETC. All subjects used Gagne's (1970) stimulus-response learning in associating the graphic and oral stimuli with the required oral response. Fewer than ten

students used verbal associations in their learning. These children, when told the name of the word and asked to repeat it would repeat a phrase which began with the word. For example, the stimulus 'at' might elicit 'at the store'. All of these children were able to isolate the required word from the phrase but appeared to use the phrase as an aid to learning. It is possible that these students in fact demonstrated that the stimulus word was meaningful to them as a preliminary to learning. Another small group of children, again less than ten in all, used phonics clues in word learning. Almost exclusively this was restricted to the sound of the initial letter. For some students, the initial sound was all that was looked at, which resulted in some students guessing the remainer of the word from the initial letter. This was apparent when the student repeated the initial sound, usually four or more times, and then gave an incorrect word which began with that same sound. Fewer than ten of the students were able to identify words by shape or the presence of a distinguishing letter. Most students, when questioned as to how they recognized words could not explain the strategy which they used. When prompted, most claimed that their word learning was the result of just looking at the word and recognizing it as a whole much as one would learn to recognize someone's face.

One remarkable feature of most students' examination of the stimulus words was the comparatively short time which was spent actually looking at the word. Most students could recognize at least one word instantly after a few trials. Others would look at the stimulus word for only a fraction of a second, look away and not commit themselves to a response until up to 15 seconds had elapsed. This short use of vision, relatively long delay and correct response could be explained by Smith's (1978) reference to a visual image being stored briefly in short term memory while a connection is made with the long term memory (pp. 44-51). As no other graphic word stimuli entered the short term memory to displace the original stimulus the 'image' of the word could be retained for some time. In actual reading, the short term memory image would be replaced by further incoming images and the child would not recognize the word.

Implications for teachers

Variables investigated in this study for effect on word recognition learning are (a) readiness of students to read, (b) age of learner, (c) sex of learner and (d) the type of word learned. As has been shown the readiness ratings of girls in this study generally increase as the girls' age increases. This, however does not appear to be the case for boys. Teachers' ratings of

readiness for the boys used in this study are not significantly correlated with their ages ($p > .05$). Because the readiness ratings of both boys and girls correlate significantly ($r = -.39$, $p < .05$) with the number of trials needed to reach criterion in the recognition learning task a teacher should consider a readiness rating for beginning readers rather than chronological age as an indication of the students' probable success in a word learning task similar to that of this study.

Because no significant difference existed between boys and girls in learning to recognize either verbs or prepositions a teacher might expect that there will be no difference in heterogeneous classes between boys and girls, or between the learning of high verbs, low verbs, and prepositions. In general, as many boys as girls whould succeed or fail at the task and there should be no differences between boys and girls of equivalent readiness in the number of errors made while learning. Thus student groups formed on the basis of ability will include both boys and girls and a range of ages. The teacher should not expect that grouping for ability will be dependent on student age or sex.

Students who are rated by their teachers as not ready to learn to read will be far more likely to fail at word recognition learning than will those rated

as generally ready to learn. For students who are not ready to learn to read, the teacher must decide whether or not presenting the learning task to the students is appropriate as little benefit will result from their failure to learn. For such students, a program of readiness training might be initiated. Such training might emphasize (a) awareness of the function of words as a means of specific communication of ideas, (b) awareness of the discreteness of words such as articles and conjunctions which are abstract and normally found as parts of phrases, (c) awareness of concrete nouns and verbs and their verbal and graphic 'names' by actual experience using the five senses, (d) the effect on meaning caused by changing words in a sentence, (e) awareness of the existence, importance and function of less concrete words, beginning with intangible nouns, and (f) awareness of the existence, meaning and syntactic function of words which are of low meaningfulness and abstract.

The last two points are the most difficult and are highly dependent upon the establishment of linguistic awareness of concrete words and their graphic representations. Meaningfulness of abstract, context dependent words can be developed by such devices as oral cloze procedure to systematically delete those words which the teacher desires to teach and having children rely on their

syntactical and semantic knowledge to predict what the word will be (Gunn and Elkins, 1976). Other words can be made more meaningful when their impact on the sentence becomes apparent when the word is changed. For example, 'the boy' becomes 'a boy', 'under the table' becomes 'behind the table'.

Words can also be made to appear to be concrete if students are given a chance to 'experience' the function of a word by portraying it in a sentence. Different students could 'become' words which are arranged in different patterns. The effect of function words on meaning can become 'concrete' in this manner.

Implications for further research

In this study various levels of m and c did not influence the learning of words, with the exception of boys' posttest recognition of low m/abstract verbs. Several questions might arise because of this, the most important being which attribute, m or c, is the more important in word learning. A study to compare high m/low c and high c/low m non-nouns would be indicated.

Other attributes of a word, such as a child's ability to use the word in a sentence or to otherwise demonstrate knowledge of the word's meaning and function may prove to be more significant than either m or c. For example, the word 'from' might generate a low m score as

it tends to be associated with the same class of words, such as 'from Mary, from John, from Dad, from you, from home'. However, the concept of 'from' might be clearly understood by a child who has seen or heard the word often in relatively restricted contexts. This could readily result in efficient learning of a graphic word which relates to a known concept, and is a topic worthy of further investigation.

The generation of indices of m and c by relatively young raters appears to be feasible. Further investigation into the meaningfulness and concreteness of words using varying times for responses and larger numbers of student raters would seem potentially useful in understanding word learning. A possibility noted earlier would be to use oral associations to stimuli which are presented both orally and graphically to get meaningfulness data.

Mickelson's (1972) associative verbal encoding (a/v/e) training, where students are taught to associate more responses to stimulus words might prove to be potentially rewarding in terms of efficient word learning. A study to compare a control group with a group which received a/v/e/ instruction, and perhaps with another group which received a program of linguistic awareness using cloze or another method would be valuable.

Summary

Overall, this study demonstrates the possibility that research of the meaningfulness and concreteness of non-noun words is both possible and potentially rewarding. As is common with such studies, it opens up more areas for investigation than it can specifically address. It is hoped that future research studies will attempt to extend and validate the conclusions reached in this study. However, of paramount importance must be the practical applications of knowledge for teachers. On the basis of this study, teachers may develop more awareness of some of the possible attributes of non-noun words and may develop teaching strategies which more effectively can meet the needs of their students.

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APPENDIX A

SAMPLE PRO FORMA FOR THE GENERATION OF AN INDEX OF m

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

am_____

Total_____

APPENDIX B

MARKING CRITERIA

(Adapted from Noble, 1952, and Mickelson, 1968)

Student responses as associations to stimulus words were accepted unless one of the following conditions was met.

1) Illegible responses.

2) Perseverated responses: The student repeated a response or gave a response which was syntactically equal, such as FROM home
house

3) Failure of set: a new stimulus is used by the student in making associations, such as

GO home
dome
Rome
Nome

or

WANT money
dollar
dime
nickle

A general policy of accepting responses from students if none of the above conditions were met was adopted.

APPENDIX C

SAMPLE PRO FORMA FOR THE GENERATION OF AN INDEX OF c

	sight	touch	taste	smell	hearing	something you do	doesn't change much	total
are								
ask								
ate								
be								
bring								
came								
carry								
come								
did								
do								
done								
for								
from								
in								
on								
over								

APPENDIX D

Verbs

Adult and Child Ratings - Scaled for M

Word	No. of Letters	Dale % at gr. 4	Child m	Child c	Adult m	Adult c
look	4	91	2.6	2.0	4.4	2.8
ran	3	92	2.2	3.4	3.4	2.4
gave	4	89	2.1	1.9	4.0	1.4
is	2	83	2.2	.6	3.8	1.0
came	4	91	2.0	2.5	4.2	1.2
went	4	83	2.0	2.1	3.4	.6
let	3	74	1.9	1.9	5.4	2.4
get	3	89	1.9	1.6	4.2	1.0
do	2	76	1.9	1.4	4.6	1.2
say	3	94	1.8	2.5	5.4	2.4
found	5	78	1.8	2.4	5.4	3.2
call	4	89	1.8	2.0	5.8	2.2
can	3	82	1.8	1.9	4.4	1.4
has	3	72	1.8	1.1	2.8	.8
was	3	84	1.8	1.0	3.2	.6
play	4	94	1.7	2.9	5.0	2.4
find	4	91	1.7	2.8	4.4	2.2
said	4	86	1.7	2.1	3.0	2.0
see	3	92	1.7	2.1	5.2	2.4
tell	4	87	1.7	1.9	5.6	2.0
did	3	88	1.7	1.6	4.2	1.6
had	3	94	1.7	1.1	3.0	2.0
help	4	73	1.6	2.7	3.4	2.6
want	4	77	1.6	1.7	3.2	1.6
am	2	67	1.6	.8	4.2	1.6
give	4	90	1.5	2.0	4.6	2.2
know	4	87	1.5	1.6	4.6	1.4
made	4	84	1.4	2.8	3.2	3.2
take	4	87	1.4	2.2	4.4	1.4
be	2	73	1.4	.7	4.6	.6
make	4	76	1.4	3.5	4.8	4.0
like	4	80	1.3	1.6	3.2	1.8

APPENDIX E

Prepositions

Adult and Child Ratings - Scaled for M

Word	No. of Letters	Dale % at gr. 4	Child m	Child c	Adult m	Adult c
under	5	90	2.00	1.6	4.6	1.0
in	2	92	2.00	1.5	6.8	1.0
over	4	84	2.00	1.2	6.2	.2
to	2	90	1.78	1.5	4.4	.2
after	5	87	1.78	.9	3.4	.4
from	4	94	1.78	1.50	4.2	.2
on	2	95	1.56	1.3	5.2	1.6
at	2	84	1.44	.8	3.8	.2
by	2	85	1.44	.8	3.8	.6
with	4	84	1.38	1.6	4.6	.8
for	3	95	1.11	.9	5.2	.2
of	2	88	.75	.6	2.6	.2

APPENDIX F

WORD LISTS

List one Abstract/low meaningful verbs	List two Concrete/high meaningful verbs
am	call
are	came
be	can
did	found
had	gave
know	let
put	look
want	ran
was	say
were	went

List three
Prepositions

after
at
by
for
from
in
of
on
over
to
under
with

APPENDIX G

Breakdown of Kindergarten Sample by School and Socio-Economic Status

School	Number of Classes	Socio-Economic Status*
Sangster	2	upper-middle
John Stubbs	3	low-middle
David Cameron	1	upper-middle
Ruth King	2	middle
Langford	1	middle

* as estimated by experimenter and teachers

APPENDIX H

Analysis of Variance for Trials to Criterion

Source of Variation	df	Mean Square	F	P
Main effects	3	17.944	0.562	0.641
Group	2	18.917	0.593	0.555
Sex	1	18.272	0.573	0.451
Two-way Interaction				
Group x Sex	2	4.045	0.127	0.881
Explained	5	12.385	0.388	0.856
Residual	94	31.916		
Total	99	30.929		

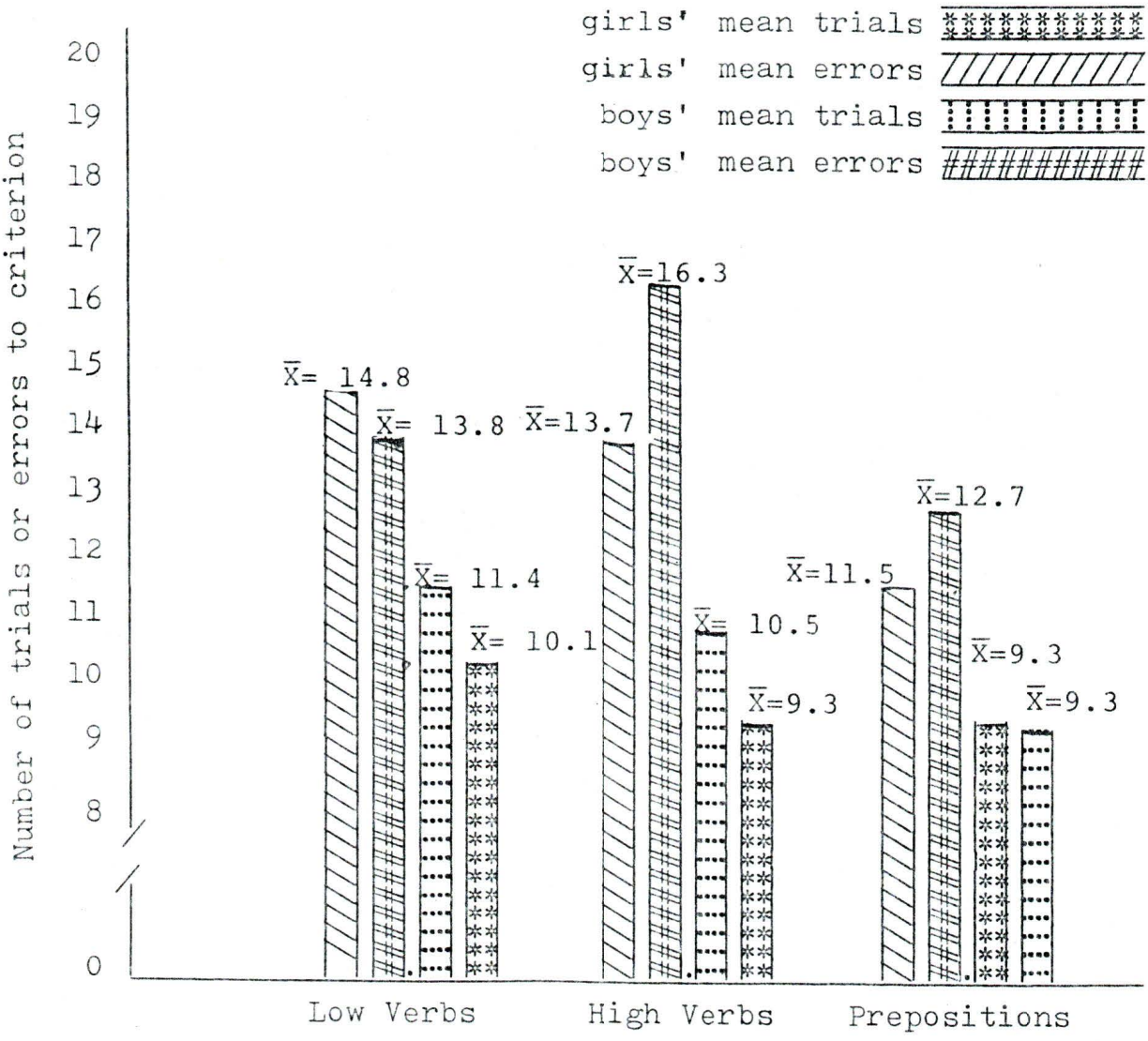
APPENDIX J

Analysis of Variance for Errors to Criterion

Source of Variation	df	Mean Square	F	P
Main Effects	3	62.889	0.574	0.634
Group	2	80.813	0.737	0.481
Sex	1	21.418	0.195	0.659
Two-way interactions				
Group X Sex	2	27.149	0.248	0.781
Explained	5	48.593	0.443	0.817
Residual	94	109.602		
Total	99	106.520		

APPENDIX I

Mean Number of Trials and Errors to Criterion for Boys and Girls



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