INFLUENCE OF MEANINGFULNESS AND FAMILIARIZATION TRAINING ON BASIC SIGHT VOCABULARY LEARNING WITH FIRST-GRADERS

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
ERNEST LOYD ADAMS
1970

This is to certify that the

thesis entitled
Influence of Meaningfulness
and Familiarization Training
on Basic Sight Vocabulary
Learning with First-Graders

presented by

Ernest L. Adams

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Elementary Education

Byron H. VanRoekel
Major professor

Date 7-20-70

ABSTRACT

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Paired-associate learning research has examined various factors that influence the rate at which a verbal stimulus is associated with a verbal response. Two such factors are the meaningfulness of the materials to be learned and the learner's familiarity with the materials. Studies investigating the influence of meaningfulness on the rate of learning have consistently shown that highly meaningful material is learned more rapidly than less meaningful material. These studies were conducted with adult subjects learning paired-associate lists consisting of nonsense syllables.

Similar subjects and lists were used to investigate the effect of familiarization training on the rate of acquisition. Experimenters familiarized their subjects

with the paired-associate units. Response familiarization was shown to influence the rate of learning significantly.

The purpose of this study was to determine whether meaningfulness and familiarization training have a similar influence on word recognition learning with first-graders.

Thirty words were selected from the Dolch basic sight vocabulary list. The meaningfulness value of each word was determined by Noble's production method for scaling meaningfulness values. Each word was scaled from high to low meaningfulness on the basis of the number of different associations that the word elicited from a group of subjects. Two groups of 20 subjects each participated in the scaling experiment. A Pearson product-moment correlation coefficient was computed to determine the agreement between Group A and Group B in the ranking of the Dolch words from high to low meaningfulness. A correlation of .93 indicated agreement between the groups.

Four high meaningfulness words and four low meaningfulness words were selected for learning. Four experimental groups were established. The subjects in the control group learned the experimental words without familiarization training. The second group received response familiarization prior to learning, and group three received stimulus familiarization prior to learning the words. The fourth

group of subjects received stimulus and response familiarization before learning the words.

The data were analyzed using a 2X2X2 factorial design with repeated measures on the meaningfulness factor. The results obtained from analysis indicated that high meaningfulness words were learned more rapidly than low meaningfulness words (significant at $p < .001$).

Further analysis showed that response familiarization facilitated the learning of low meaningfulness words. The group that received response familiarization and the group that received stimulus and response familiarization learned the low meaningfulness words more quickly than the control group (significant at $p < .01$).

Two factors, meaningfulness and response familiarization, influenced the first-graders' rate of learning the basic sight words. The third factor, stimulus familiarization, did not influence the subjects' rate of learning to recognize the experimental words.

These findings indicate that teachers may be more successful in teaching pupils the basic sight words if they will provide response familiarization exercises on the words to be learned prior to learning.

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To George Sherman,
my friend and professor

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CHAPTER I

INTRODUCTION

University libraries have been well stocked with research in the area of reading instruction and the early development of reading skills. The bulk of these efforts have investigated various traits of the learner and his level of reading achievement or the desirability of one method of instruction as opposed to another. The present exploration has attempted to investigate some of the psychological processes which operate as a first-grader learns to recognize written words.

The materials most commonly used to teach reading to children are basal readers. These materials are designed to teach students the skill of word recognition. Very often, the approach used to teach word recognition involves the learning of phoneme-grapheme correspondences. That is, the student attempts to learn the sound that is represented by each written letter and then blend these individual sounds together as they are presented graphemically to form words.

In conjunction with this instruction, pupils are also expected to begin recognizing at sight a group of words that constitute a high percentage of all the words used in materials written in English. Dolch identified these words in 1935 (Zintz, 1966). He compiled this list by taking words from three other previously organized vocabulary lists.

The first list was that published by the Child Study Committee of the International Kindergarten Union (Zintz, 1966). That study investigated the vocabulary of pre-first-grade children from a list of words which was assembled through the detailed observations of kindergarten classrooms. From that list, Dolch chose only words which occurred one hundred or more times.

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The third list, formed by Wheeler and Howell, consists of 453 words found in ten primers published between 1922 and 1929.

When the words common to all three lists were identified, they totaled 193 words. Dolch then selected twenty-seven words that appeared on two of the three lists.

The origin of the List is summarized in Table 1.1.

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List	Source	Number of Words
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Table 1.2 shows the results of a vocabulary study that determined the percentage of words found in various elementary school textbooks that are Dolch words.

TABLE 1.2.--Percentage of Dolch Words Found in Elementary Textbooks

Textbook	Number of Series	Grade I	II	III	IV	V	VI
Reading	4	70	66	65	61	59	59
Arithmetic	2			62	63	57	57
Geography	2				60	59	54
History	2				57	53	52

A successful reader learns to recognize many of these words quickly and accurately. This is necessary if he is to begin reading soon, since most of the words found in primary materials are Dolch words. Generally, students are expected to learn these words by memorization. Two factors suggest this mode of learning. First, beginning first-graders do not possess the necessary word analyzation skills to attack unknown words. Second, many of the Dolch words cannot be recognized by using analyzation skills since there is not a one to one phoneme-grapheme correspondence. For example, said contains four letters (s-a-i-d) representing only three phonemes and know has four letters (k-n-o-w) representing only two phonemes--no.

A systematic method of teaching these words has not been devised. Therefore, pupils often spend a considerable amount of time learning these words through rote drill exercises such as flash card games.

The problem investigated in this research effort examined some of the psychological processes that occur as first-grade pupils learn to recognize basic sight words in isolation. Educators have neglected this area of research, and little is known about the processes that influence the word recognition learning task. However, the task of learning to associate a written symbol with its oral representation is believed to be similar to paired-associate learning, an area which has been extensively investigated by several verbal learning psychologists.

Paired-associate learning tasks contain two elements, a stimulus and a response. In psychological research these components are usually nonsense syllables consisting of two consonants separated by a vowel. These syllables are scaled according to their meaningfulness. A syllable's meaningfulness is determined by the number of associations it elicits when presented to a subject.

In a paired-associate task the verbal unit on the left is designated as the stimulus member while the member on the right is considered the response. The subject's

objective is to learn to recall the response member when presented the stimulus member. An example of a paired-associate item is bik - rof. In this instance, the stimulus is bik and the response is rof. Table 1.3 presents two stimulus-response learning lists, a paired-associate list and a word recognition list.

TABLE 1.3.--Stimulus-Response Learning Tasks

Paired-Associate Learning			Word Recognition Learning		
S Member		R Member	S Member		R Member
rac	-	bod	(down)	-	down
cip	-	rof	(give)	-	give
nat	-	waf	(said)	-	said
fam	-	toz	(went)	-	went
pic	-	nib	(had)	-	had
tet	-	neg	(not)	-	not
kof	-	zap	(many)	-	many

A similar environment is present in a word recognition task where the subject is to look at the written symbol (down) and respond with the sound of down. In this instance, the written symbol is the stimulus and is expected to elicit the sound as the response.

Although there is an existing similarity between paired-associate learning and word recognition tasks, several differences also exist. For example:

1) The elements which make up a paired-associate task might be letters or nonsense syllables. In the word recognition task, the components are meaningful words.

2) The stimulus-response elements contained in a paired-associate task are constructed arbitrarily. Any nonsense syllable may be used in either the stimulus position or the response position. The bik (S) - rof (R) example discussed above could be reversed rof (S) - bik (R). A word recognition task does not have this flexibility because the written symbol (S) dictates the oral response (R) to be elicited.

Word recognition learning and paired-associate learning are undoubtedly similar; but if learning to recognize a word is influenced by the same variables that operate in paired-associate learning, it has not been reported in educational literature. One objective of the research recorded here was to determine the extent to which paired-associate findings are applicable to word recognition learning. The paired-associate literature shows that a verbal unit's meaningfulness value influences rate of learning. In addition, familiarization training has also been shown to facilitate the learning of paired-associate units. The relationships of meaningfulness and familiarization training to the learning of basic sight words in isolation are the specific variables examined in the present experiment.

There were no meaningfulness values available for the Dolch sight words. Thus, it was necessary to scale the

meaningfulness values of a selected number of words which were used to complete the experiment. Psychologists scaled the elements of a paired-associate list in several ways. These are reviewed in Chapter II along with the experiments concerning familiarization training and its influence on paired-associate learning.

CHAPTER II

REVIEW OF LITERATURE

Methods of Scaling Meaningfulness

Paired-associate research has shown that highly meaningful material is easier to learn than less meaningful material. Determining the meaningfulness values of various types of verbal units has necessarily preceded the experiments that examined the influence of meaningfulness on learning. Three distinct methods have been used to rank verbal units from high to low in meaningfulness. These are the association method, the production method and the rating scale method.

Early experimenters employed the association method to scale the meaningfulness values of nonsense syllables. Each S was shown a list of syllables. The syllables were presented one at a time on a tachistoscope for a given period of time. Some experiments exposed the verbal units for two seconds. Others used as much as seven seconds. Subjects were asked to give orally an association for each nonsense syllable presented. The association method

ranked a nonsense syllable from high to low meaningfulness based on the number of Ss that gave at least one association to the syllable within the time limit. This approach was used by Glaze (1928), Hull (1934), Witmer (1935), Hilgard (1951), and Arclier (1960).

Using this approach to gather association values on the Dolch list from six year old subjects presents a serious limitation because of the short period of time given to respond. The responses of a group of second-grade subjects which were recorded in a pilot project indicated that a time limit less than sixty seconds is probably not workable with primary school subjects.

Noble (1952) is primarily responsible for the production method of determining association values of verbal units. He presented a written unit to his subjects, and they were to respond by writing as many associations as possible in two minutes. The units scaled were dissyllables and nonsense syllables. In determining the meaningfulness of the items, Noble calculated the average number of responses given for each item in the time period to determine its meaningfulness. Mandler (1955) also used this method.

The production method was not suitable for scaling meaningfulness values with first-graders because they can neither read nor write. But this manner of determining

meaningfulness values can be used, however, if the verbal units are pronounced to the six year old and he is permitted then to produce his associations to the items orally.

The rating scale method required Ss to order items according to ease of learning, familiarity or pronunciation. This method, yielding a familiarity value, was used by Haagen (1949), Noble, Stockwell, and Pryer (1957), and Underwood and Shultz (1960).

The rating scale method for determining meaningfulness values did not seem appropriate for first-grade students since it assumes that the subjects can make accurate judgments concerning an item's ease of learning, pronounceability and its familiarity. This method is also dependent upon the subject's ability and willingness to verbalize this information.

The writer modified Noble's production method to accommodate the six year old's communication skills and used it to determine the meaningfulness values of the words to be learned.

Several studies have shown that the three methods discussed above produce similar results.

A correlation coefficient of .65 between the results of the production method and the number of associations method was found by Mandler (1955). In 1957, Noble, Stockwell

and Pryer found a correlation coefficient of .81 and .86 between the meaningfulness values derived from the rating scale method and the values obtained by the number of associations method for 100 syllables. Correlation coefficients of .90, .92 and .78 were found in three independent studies done by Underwood and Schultz (1960) investigating the relationship between the production method and the rating scale method.

The materials that have been scaled for meaningfulness by those researchers mentioned above have been used in many studies to point out that rate of learning is functionally related to meaningfulness. Study after study has shown that material of H meaningfulness value is significantly easier to learn than material of L meaningfulness value. Some of the studies showing this relationship are: Reed (1929), Davis (1930), McGeoch (1930), Sisson (1938), Noble (1952), Underwood and Richardson (1956), Sowling and Brown (1957), Sarason (1957), Braun and Heyman (1958), Kimble and Dufort (1955), Mandler (1956), Noble (1957), and Noble, Stockwell and Pryer (1957).

These studies have dealt with scaled nonsense syllables, numbers, nonsense figures using adult subjects. No studies have scaled the meaningfulness values of the

basic sight words using beginning first-grade pupils as subjects.

The investigations concerning meaningfulness have utilized four types of paired-associate units. These are: (1) high m stimulus-high m response, (2) low m stimulus-high m response, (3) high m stimulus-low m response, and (4) low m stimulus-low m response (H-H, L-H, H-L, and L-L). Experiments have been carried out to determine which of these types is learned most readily.

Stoddard in 1929 had one group of Ss learn from French words to English words (L to H), and another group from English to French (H to L). The English words were considered to be more meaningful than the French. Learning was measured in terms of number of correct responses recalled immediately after acquisition. The mean score for the group learning the L-H list was 15.1 words of the 25 presented. Those learning the H-L list had a mean score of 8.0 for the 25 items presented.

A 1933 effort by Cason employed 18 paired-associate lists. Each contained 16 pairs. Units are referred to as familiar words and unfamiliar words (F-F, U-F, F-U, and U-U).

Two groups were involved in Cason's study; each was given lists with mixed types of verbal units. One group was given four to eight minutes to study the list; the

other group had the pairs read to them. The recall was given just after acquisition with the experimenter spelling and pronouncing the stimulus. Subjects were to recall the response. No difference was found between the auditory and visual treatments. However, Ss recalled a significantly higher number of F-F pairs than of U-U pairs with the learning of the U-F and F-U types falling between the F-F and U-U types.

Sheffield's 1946 study was similar except for the addition of a memory drum to control the time factor per unit. His study showed that H-H material is learned faster than L-L materials. Also L-H units were learned at a slower rate than were H-H units, and H-L were learned somewhat more quickly than L-L units.

He concluded that differences in meaningfulness of stimulus has less influence on learning rate than does meaningfulness of response.

Kimble and Dufort (1955) constructed lists of ten paired-associates using as stimuli, items from Noble's dissyllables. These items represented the entire range of meaningfulness according to Noble's scale. Common three letter words were paired in the response position. Each list contained the following types of S-R components: H-H, L-H, and H-L.

The researchers asked one group to learn a list with dissyllables in the stimulus position and another group to learn a list with the same dissyllables in the response position. They concluded that the units with the dissyllables in the stimulus position were more difficult to learn.

In 1958 Noble, Stockwell and Cieutat made paired-associate lists using four types (H-H, L-H, H-L, L-L); however, each list was limited to one type only. Pairs in the L-H list were identical with the H-L list except for a reversal of position. Each subject was given twelve learning trials. A test trial was administered at the end of each learning trial. The percentage of correct answers for each test trial on each list was used as the criterion for learning. Ease of learning came in the following order: H-H, L-H, H-L, L-L.

The finding has been replicated many times under varying conditions by Goss (1965), Nodine (1963), Harleston (1963), Martin, Cox, Boersma (1965), Underwood and Schultz (1960), Lambert and Paiva (1956), and Weiss (1958). Results are the same when the material is presented to individual subjects or to groups; or when material is presented in a constant order or varied order. It appears that meaningfulness of response has a greater influence on learning than does meaningfulness of stimulus.

In order to examine the extent to which factors in paired-associate learning are present in word-recognition learning, the basic sight words to be learned were scaled for meaningfulness. No attempt was made to scale the meaningfulness values of the written words (S) because the Ss could not read the words. However, the oral representations of the words (R) were scaled from high to low meaningfulness.

Prior to the scaling of association values for the basic sight words, a pilot study was conducted to determine the feasibility of scaling Dolch words with primary pupils. Twelve second-grade pupils were selected at random from a lower middle-class school for the pilot study. Noble's production method was altered to accommodate the Ss' communication skills. Twenty-five Dolch words were selected for scaling after the pupils were asked to read the Dolch list. Any word recognized by the Ss was eliminated from the study. Subjects were given two minutes to emit orally as many associations as possible to each word. The pupils were given practice with a free association exercise before being asked to give associations to the Dolch words. Example: "John, what do you think of when I say dog?" Response--"Spot." "What else?" Response--"Black and white." "What else?" Response--"Cat." etc. As soon as the subject understood the free association "game," the

"service" words were presented in place of the common nouns such as dog, food, house, animal, etc. The words were ranked from H-L according to the number of different associations given for each word by the twelve subjects. The number of different associations ranged from 11 for the word brown to one association for the word does. Eight of the words were presented to the Ss in a series of learning trials. The four words with the highest number of different associations and the four words having the lowest number of different associations were selected. The words chosen for the learning trials occur with the same frequency according to Thorndike's word list. The words were also controlled for length. No word was longer than five letters or shorter than three. The words were also of similar configuration.

The learning trials were presented on a memory drum. Subjects were shown each word for ten seconds. The instructor pronounced the word as it was shown and asked the subject to say the word. Each subject was asked to read the words at sight following each learning trial. Accurate recognition on two successive trials was the criterion for learning each word. Test trials and learning trials were alternated until the S learned all the words.

The result of this brief effort indicated that there was a negative correlation between the meaningfulness

value of a word and the number of trials necessary to learn it. The number of trials required for learning to recognize the written symbol (stimulus) decreased as the number of different associations given for the oral representation (response) increased.

TABLE 2.1.--Pilot Study Data

Word	$\bar{X}$ Trials to Criterion	No. of Different Associations
1. does	15	1
2. come	14	3
3. been	11	2
4. for	8	3
5. carry	6	5
6. not	6	5
7. once	5	7
8. brown	4	11

$r = -.84$.

This experiment apparently indicated that meaningfulness does affect the rate at which basic sight words are learned. However, it was realized that this notion needed to be demonstrated with a greater number of subjects with the variables carefully controlled.

Familiarization Techniques

Several researchers feel that H meaningful material can be learned more rapidly than L meaningful material

because the H material is more familiar to the learner. It has also been suggested that material which is encountered most frequently becomes the most meaningful. Hence, it is learned more rapidly.

Experiments have been conducted that examined the effect of familiarization training prior to learning, to determine the influence of familiarity and frequency on meaningfulness.

Familiarization training has been presented in various ways. Some researchers ask the Ss to repeat silently the verbal units to be learned. Gannon and Noble (1961). Others have asked their Ss to repeat the materials to be learned aloud for a period of time. Cieutat (1960) had Ss simply look at the verbal units to be learned. Underwood and Schulz (1960) asked their Ss to spell the items prior to learning. It seems quite obvious that the technique used as well as the amount of pre-training will influence the rate of learning. The skills and abilities of the Ss dictate the type of familiarization training that is feasible. Familiarization training that requires Ss to use skills they do not possess can not facilitate learning. Familiarization exercises requiring the learner to read could not be employed with first-grade pupils. However, six year old Ss can speak and hear. Therefore, it was

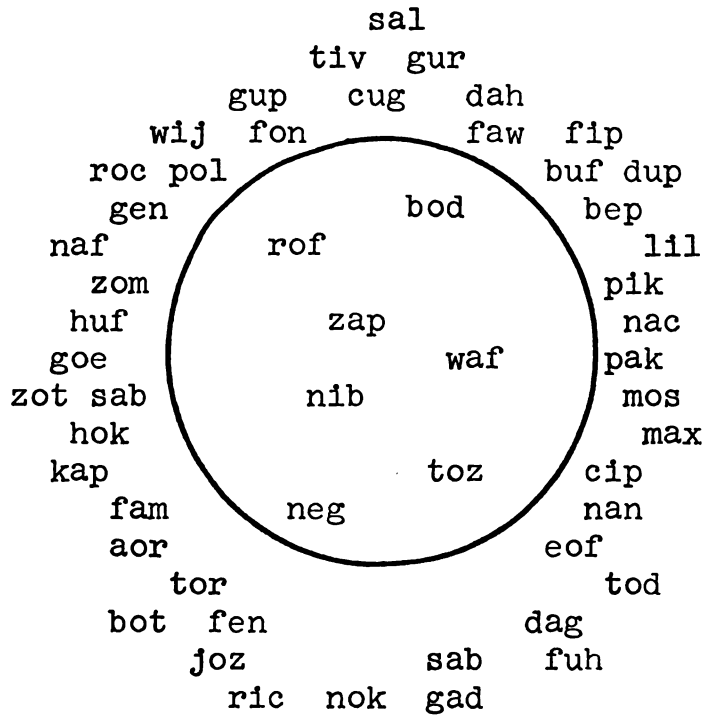
reasonable to assume that the Ss could listen to the words to be familiarized and repeat them orally. In addition, primary school Ss could trace or copy the word to be learned and become familiar with the written symbol or stimulus prior to learning. The experiment reported in Chapter IV reports the influence of stimulus and response familiarization on learning prior to word recognition learning.

Theoretical Role of Familiarization

Several researchers support the notion that becoming familiar with materials to be learned prior to acquisition trials facilitates learning.

Underwood and Schulz (1960) felt that the familiarization process made responses more available during the learning trials that followed. Mandler (1954) sees the pre-training on the response component as an exercise that decreases the probability of error as the responses to be learned become more integrated or familiar to the subject. Underwood and Schulz (1960) concluded that familiarization has two purposes: (1) to reduce the number of alternatives to the learned one and (2) to reduce the separate information elicited by the components of the familiarized item, make them more integrated and available during learning. An illustration of this idea is presented in Figure 2.1 using the paired-associate response items and

Paired-Associate Response Learning



Word-Recognition Response Learning

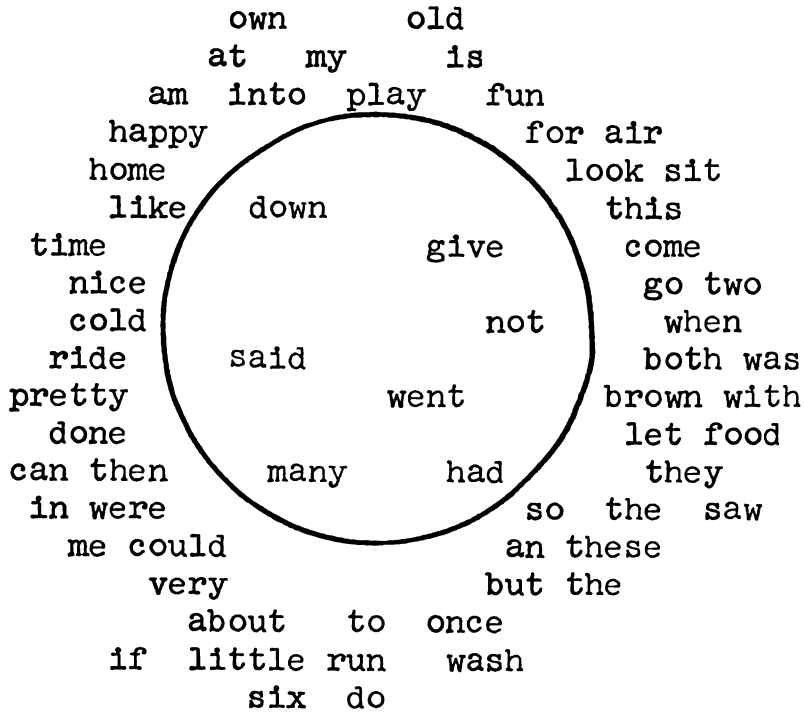


Figure 2.1.--Paired-Associate and Word-Recognition Response Learning

word-recognition response items shown in Table 3. The items shown within the circles are the responses to be learned by the subject. Isolation of these items within the learner's memory to the exclusion of all other possible responses seems to have a facilitating influence upon response learning. This has been shown in paired-associate studies.

A second type of learning, stimulus learning, has been facilitated by familiarization also. Gibson (1940) feels familiarization aids in the discrimination between items to be learned. Stimulus items become more distinctive as they become familiar. Familiar stimuli have become distinctive in the learner's memory, and are more readily joined with the appropriate response during acquisition trials. This conclusion leads one to hypothesize that a learner would learn the stimulus member (written word) of a word recognition task more readily if he were familiar with the shape or configuration of the stimulus prior to acquisition trials. It seems logical that being familiar with the shape of a word would decrease the difficulty of associating that word with the proper oral response. If a subject were familiar with the paired-associate and word recognition stimuli shown in Table 2.2, the ease of associating each stimulus with the proper response is increased.

TABLE 2.2.--Paired-Associate and Word-Recognition Stimulus Learning

Paired-Associate Stimulus Learning			
(S_1) rac	(r_1) bod (r_2) rof (r_3) waf (r_4) neg	(S_2) pic	(r_1) zap (r_2) rof (r_3) toz (r_4) nib
Word-Recognition Stimulus Learning			
(S_1) (not)	(r_1) /not/ (r_2) /had/ (r_3) /many/ (r_4) /down/	(S_2) (had)	(r_1) /give/ (r_2) /down/ (r_3) /had/ (r_4) /said/

There are two positions regarding the effect of familiarization on the learning of a paired-associate list. It is held by some researchers that familiarization facilitates learning of low meaningfulness units. However, Lambert and Jakobvits (1960) and Kanungo, Lambert and Mauer (1963) feel that familiarization can have a prohibitive effect. This is very likely to be the case if the material being familiarized is of H meaningfulness value. The proponents of this idea state that too much repetition decreases the meaningfulness value causing the item to become L in meaningfulness. If a H meaningfulness item becomes L as a result of familiarization, then it would follow that such pre-training retards the learning of H meaningfulness

material. This theory also states that the opposite is true. Familiarization of a L meaningfulness item will cause it to become H and easier to learn. The following reports the results of studies that support these ideas concerning the effect of familiarization exercises.

A 1946 experiment by Scheffield examined the learning of a H-H list without response familiarization and H-L list which received response familiarization. The treatment given the H-L list had an effect of facilitation. A comparison of H-H, H-L, and L-L which had received response training and similar lists receiving no treatment was made by Weiss in 1958. He found the average number of trials to criterion on the familiarized units to be less than those receiving no treatment.

Other research efforts have found no difference in the acquisition of familiarized response members and those receiving no treatment prior to learning. For example, in 1960 Cieutat arranged two mixed lists containing four pairs of L dissyllables. The same Ss were utilized for all treatments. Familiarization was given by having the Ss look at the items for sixty seconds. The finding in this instance was that familiarization of the response component inhibits learning when paired with an unfamiliarized component. Ranking the four combinations in terms of ease of learning from

easiest to most difficult was found to be familiarized-familiarized, unfamiliarized-unfamiliarized, familiarized-unfamiliarized, and unfamiliarized-familiarized.

A 1961 study by Kanungo, Lambert and Mauer indicated that response familiarization did not facilitate learning. Two groups were used in this study. The researchers constructed a paired-associate list containing H-H components. The groups were given learning on the same list with one group receiving response familiarization prior to learning. This group's acquisition rate was inferior to the group receiving no treatment.

The research that has been primarily concerned with stimulus familiarization is also inconsistent. In 1961 Gannon and Noble showed that familiarization of the stimulus element improved learning. This finding was supported by Martin (1963) and Martin and Schulz (1964). However, no significant difference in learning with familiarization of either component was found by Bailey and Jeffery in 1958.

In any case, there appear to be three learning processes which include stimulus learning, response learning and the learning which occurs between stimulus and response learning. Several of the studies discussed above suggest that meaningfulness facilitates these learning processes as does familiarization training prior to learning.

The present study concerned itself with two factors, meaningfulness and familiarization. If these factors operate in learning to recognize words in isolation as they have influenced paired-associate learning, the following predictions can be logically made.

Research Hypotheses

H_{01} The number of trials to criterion on high m words receiving no familiarization training is significantly less than the number of trials to criterion on low m words receiving no familiarization training.

H_{02} The number of trials to criterion on low m words receiving high response familiarization training is significantly less than the number of trials to criterion on low m words receiving no familiarization training.

H_{03} The number of trials to criterion on low m words receiving high stimulus familiarization training is significantly less than the number of trials to criterion on low m words receiving no familiarization training.

H_{04} The number of trials to criterion on low m words receiving high stimulus and high response familiarization training is significantly less than the number of trials to criterion on low m words receiving no familiarization training.

H_{05} The number of trials to criterion on high m words receiving high response familiarization training is significantly less than the number of trials to criterion on high m words receiving no familiarization training.

H_{06} The number of trials to criterion on high m words receiving high stimulus familiarization training is significantly less than the number of trials to criterion on high m words receiving no familiarization training.

H_{07} The number of trials to criterion on high m words receiving high stimulus and high response familiarization training is significantly less than the number of trials to criterion on high m words receiving no familiarization training.

CHAPTER III

METHODOLOGY

Scaling of Materials

Several methods of scaling the meaningfulness of verbal units were discussed in Chapter II. One of the modes used to scale the meaningfulness values of such material was devised by Noble in 1952. His system of determining the meaningfulness of a verbal unit consisted of presenting the written unit to a subject, and the subject was expected to write as many associations as possible in two minutes. Noble counted the average number of responses given for each unit to determine its meaningfulness value. This manner of scaling meaningfulness required subjects who could read and write.

In scaling the material to be studied in this experiment, Noble's production method was modified to accommodate the communication skills of first-graders at the beginning of the year. Instead of presenting the subject with a written symbol, the experimenter pronounced a word to the subject. The subject was instructed to give orally as many

associations to the word as possible in 150 seconds. For example: Experimenter--"What do you think of when I say run?" Subject--"fast." Experimenter--"What else?" Subject--"go." Experimenter--"What else?" Subject--"car." This continued for 150 seconds or until the subject failed to give any response for 60 seconds. The only encouragement given by the experimenter was to ask "What else do you think of when I say run?" or "What else?"

Materials

The words scaled in this experiment were selected from the Dolch list of basic sight words. Two criteria were used for their selection. Each word has been identified by Thorndike's research as having a similar frequency of occurrence in the English language (AA rating). The words were also controlled for a length of two to six letters. Words with homophonus forms such as ate and eight were excluded. These words were presented to each subject in the order shown in Table 3.1.

Forty first-grade subjects were selected for this experiment. Using standard randomization procedures, the subjects were selected from a population of 120 first-graders attending a lower-middle class public school in Tallahassee, Florida. Subjects found to be repeating first

grade were eliminated from the study. The subjects were randomly assigned to two groups of 20 each.

TABLE 3.1.--Words Selected for Scaling

1 brown	7 saw	13 six	19 them	25 were
2 walk	8 if	14 wash	20 very	26 then
3 little	9 was	15 cold	21 yellow	27 about
4 ride	10 many	16 run	22 go	28 how
5 play	11 went	17 done	23 can	29 where
6 could	12 seven	18 once	24 pretty	30 into

The subjects were interviewed individually by the experimenter between 9:00 A.M. and 11:30 A.M. on regular school days. Before asking a subject to give associations to the words in Table 3.1, he received instructions on how to free associate. These instructions were in the form of a simple game. Example: Experimenter--"Johnny, what do you think of when I say food?" Subject--"a hot dog." Experimenter--"What else?" Subject--"breakfast" and etc. This was continued until the subject consistently gave expected associations to such common nouns as food, animal and house. When a subject had demonstrated an understanding of the free-association technique, the basic sight words were introduced in place of the common noun. Each subject responded with as many associations as possible for each of the thirty words. This procedure involved approximately

one hour with each subject. Therefore, it was necessary to stop the activity at fifteen minute intervals allowing the first-grade subject a rest.

A word was assigned a value of high or low meaningfulness on a basis of the number of different associations it received from a group of subjects. Example: If every subject in a group gave the same association to the word into, that word received a score of one different association. Several subjects, when asked, "What do you think of when I say brown?" responded with "a dog." This response counted as one different association for the word brown. Since brown received 24 different associations from Group A and 20 different associations from Group B, it was considered to be of high meaningfulness value. The word were received one different association from each group and was considered to be low in meaningfulness value.

A Pearson product-moment correlation coefficient statistic was used to determine the agreement of the order of the scaling between Group A and Group B. The results are shown in Chapter IV.

After the words were scaled from high m to low m, four of the high m words and four of the low m words were chosen for use in further exploration. The eight words chosen are shown in Table 3.2. These words were used to

determine if meaningfulness or familiarization training influences the rate of learning the words.

TABLE 3.2.--Basic Sight Words Selected for Familiarization Treatment and Learning Trials

Word	Number of Different Associations		m Value
	A	B	
brown	24	20	H
play	23	22	H
run	20	24	H
seven	19	17	H
if	1	2	L
could	1	2	L
done	1	1	L
were	1	1	L

Subjects

Sixty first-grade subjects were selected at random from the population described previously. Students repeating first-grade were eliminated. In addition, any student who could recognize any of the eight words was eliminated from the study. These restrictions reduced the total population to 106 first-graders.

Procedures

Subjects were randomly assigned to four treatment groups of fifteen Ss each. The treatments of these groups

were designed to examine the influence of meaningfulness and familiarization training on the learning of the basic sight words listed in Table 3.2.

One group received no treatment or familiarization training. This particular group of subjects served as a control group (C-group). After the experiment was completed and the statistical procedures were applied, a comparison of the number of trials necessary for learning high m words and low m words was made to examine the effect of meaningfulness on learning.

Another experimental group of subjects were given response familiarization training (R-group). This group's performance was used to test the predictions that learning is facilitated when subjects have memorized the oral response of the sight words prior to the word recognition task.

A third group received stimulus familiarization (S-group). The results of this group's performance were employed to test predictions made at the conclusion of Chapter II regarding the effect of pre-training on the stimulus member of a word recognition task on the learning of that word.

Finally, a group of subjects were given both stimulus and response training (S-R-group). The two types of familiarization were given separately. The subjects were

given stimulus training prior to response training. The two research predictions made concerning the effectiveness of both treatments prior to learning were examined by comparing this group's performance with that of the control group.

Response familiarization required Ss to memorize the oral representation of the eight words to be learned. The words were tape recorded in five different random orders (see Table 3.3). The words in each list were recorded in four second intervals. Subjects were instructed to say each word after it was voiced on the recorder. Subjects attempted to recall each word from memory after each familiarization exercise. Accurate recall of all the words was the criterion for response familiarization. Response familiarization trials and recall trials were alternated

TABLE 3.3.--Response Familiarization Lists

A	B	C	D	E
brown	done	run	if	could
could	seven	play	done	run
seven	brown	seven	run	done
done	run	could	brown	if
if	were	were	were	play
run	if	brown	could	brown
were	play	done	seven	seven
play	could	if	play	were

until the S reached criterion. Recall periods were a maximum of 30 seconds. Learning trials began immediately after the S was familiar with the experimental responses.

Stimulus familiarization training involved two activities. Subjects receiving this treatment traced and copied the eight words (stimuli) to be learned. The words were presented in isolation on 4x6 cards. Each word was printed in lower case letters. Without telling the Ss the word, each was asked to look carefully at the word and trace it three times. After training, the subject then copied each word one time with a crayon. After the stimulus familiarization exercise, the S was shown a list of twelve words containing the eight words involved in this study (see Table 3.4). The S attempted to underline the eight words being considered. Subjects reached criterion for stimulus familiarization when the experimental words (stimuli) could be identified. The familiarization exercise was repeated if the subject could not accurately identify all the experimental words. Complete stimulus familiarization trials were alternated with identification trials until criterion was reached by the subject. Since these Ss were first-graders, attention span problems had to be considered. Therefore, it was often necessary to meet with a subject more than one time. However, no

subject failed to reach criterion after three twenty minute sessions.

TABLE 3.4.--Stimulus Familiarization Identification List

brown	ran	many	were
cat	done	play	so
could	if	seven	three

Learning trials were presented to each S individually. All familiarization training, learning trials, and test trials occurred between 9:00 A.M. and 11:30 A.M. on regular school days.

The learning trials were presented on a memory drum. The five lists used during response familiarization were reordered and typed on a memory drum in lower case letters (see Table 3.5). Each word was presented for four seconds. As the word appeared, the experimenter pronounced it and then the S pronounced it. This procedure continued until each word in the list had been exposed to the subject. This procedure was repeated three times on the same list prior to each test trial. For example: Subjects began with list A. After looking at each word individually as it appeared on the drum, the subject pronounced it after hearing the experimenter say the word. After going through list A three times a test trial was attempted. Following

a test trial, three more learning trials were given using list B, at the end of which another test trial occurred. The lists shown in Table 3.5 were used repeatedly from A through E until criterion for learning was reached by the subject.

TABLE 3.5.--Learning Trial Lists

A	B	C	D	E
brown	were	play	done	ran
done	done	ran	if	seven
ran	seven	done	seven	were
were	brown	if	could	if
could	if	could	were	play
play	ran	brown	ran	done
seven	could	were	brown	could
if	play	seven	play	brown

Test trials were presented on a Keystone Overhead Projector which was equipped with a flash meter. The words were projected onto a white screen six feet from the subject. Projections were adjusted to the subject's eye level. As a word appeared on the screen, the subject was instructed to look at the word and say it. Each word was exposed for two seconds. The subject was given only one opportunity to recognize each word during a test trial. All the words were included on each test trial. For example, if a word were learned on test trial number four, it was not eliminated

from subsequent learning trials or test trials. Total exposure time on the eight words for a test trial was sixteen seconds.

A word was considered learned when the subject accurately recognized it on two successive test trials. If a S accurately recognized the word ran on test trials numbers five and six, the experimenter considered the word learned on trial number six. The dependent variable was the sum of the number of trials to reach criterion on each word.

Every word was included in each learning trial and test trial. Learning trials and test trials were continually alternated until each word had been recognized successfully on two successive test trials or until twenty test trials were completed. Any word not learned after twenty test trials was given a score of twenty.

Two days after acquisition, Ss were asked to read the words at sight. Two types of grammatical structures were constructed to test the Ss recall of these words.

One task required the Ss to read the complex sentence, "If you were done, you could run and play with the seven brown dogs." All words in this sentence except If were printed in lower case letters on standard notebook paper. It required the Ss to learn the additional words

you, and, the, with and dogs. The classroom teachers provided instruction on these words. Each S demonstrated that he knew these words before attempting the recall sentence.

The second recall task required the Ss to read the following: I run, I play, I could, seven dogs, brown dogs, you were, I am done, if I go . . . . All the words except I in these structures were printed in lower case letters on standard notebook paper. The Ss were required to learn the additional words I, dogs, you and am. The Ss classroom teachers provided this additional instruction also.

The Ss were given 30 seconds to read the complex sentence. The number of experimental words read correctly was recorded.

The Ss were allowed five seconds to read each of the simple structures. The number of experimental words read correctly was recorded. The highest possible score on either task was eight, with the lowest possible score being zero.

CHAPTER IV

RESULTS

Scaling Meaningfulness Values

Following the procedure described in Chapter III, two groups of 20 subjects each were employed in the scaling of the meaningfulness values of the thirty basic sight words listed in Table 3.1. The words were scaled from high m to low m according to the number of different associations given by an entire group. Table 4.1 presents a summary of the number of different associations given by each group on the individual words. Appendix A summarizes the associations given by both groups.

A Pearson product-moment correlation coefficient was computed to determine the agreement between Group A and Group B in the ranking of the Dolch words from high m to low m. A correlation of .93 indicated a high degree of agreement between the groups (significant at .001 level).

The high significance of the correlation indicates both that the two student groups are from the same population (measure of reliability) and that these words have been

consistently ranked from high m to low m by both groups. This agreement between the groups of Ss used for scaling provided a defensible base for the latter phase of the study.

TABLE 4.1.--Number of Different Associations for Each Word

Word	Groups A	Groups B	Word	Groups A	Groups B	Word	Groups A	Groups B
brown*	24	20	six	15	11	how	5	6
play*	23	22	yellow	15	14	was	5	4
run*	20	24	wash	14	16	very	3	2
seven*	19	17	can	11	11	them	3	3
cold	19	20	saw	10	8	where	3	4
ride	17	15	many	10	10	then	2	1
walk	17	13	once	9	7	if*	1	2
little	17	18	went	9	10	could*	1	2
go	15	15	into	6	7	done*	1	1
pretty	15	17	about	5	5	were*	1	1

*indicates experimental words

Two complexities were noted during the collection of the scaling data. First, the first-grade Ss often became restless, thus it was necessary to provide a short period of rest every fifteen minutes. Secondly, Ss often abandoned the task of giving associations to the "word" being scaled and began a rhyming game. An example of this would be: Experimenter: "What do you think of when I say run?" Subject: "fast." Experimenter: "What else?" Subject: "far." Experimenter: "What else?" Subject" "around the

house." Experimenter: "What else?" Subject: "go." Experimenter: "What else?" Subject: "poe." Experimenter: "What else?" Subject: "row." Experimenter: "What else?" Subject: "doe." The subject described here obviously ceased to give associations to run and began to play a rhyming game. These types of associations were discounted. It is interesting that this type of behavior occurred only on words scaled as high m and never on the words that were eventually scaled as low m. Therefore, ignoring the rhyming responses in no way influenced the scaling of the list.

Experimental Design

The data used to examine the null hypotheses were analyzed using a 2x2x2 factorial design with repeated measures on the third factor. These factors were (1) response familiarization (R), (2) stimulus familiarization (S), and (3) meaningfulness (m). A model of the experimental design is shown in Figure 4.1. Using four high m words and four low m words from Table 3.5 an experiment to study the influence of the factors shown in the experimental model on the rate of learning high m and low m words was conducted.

Analysis of Data

The raw data used to examine the statistical hypotheses are recorded in Appendices C and D. Appendix C contains

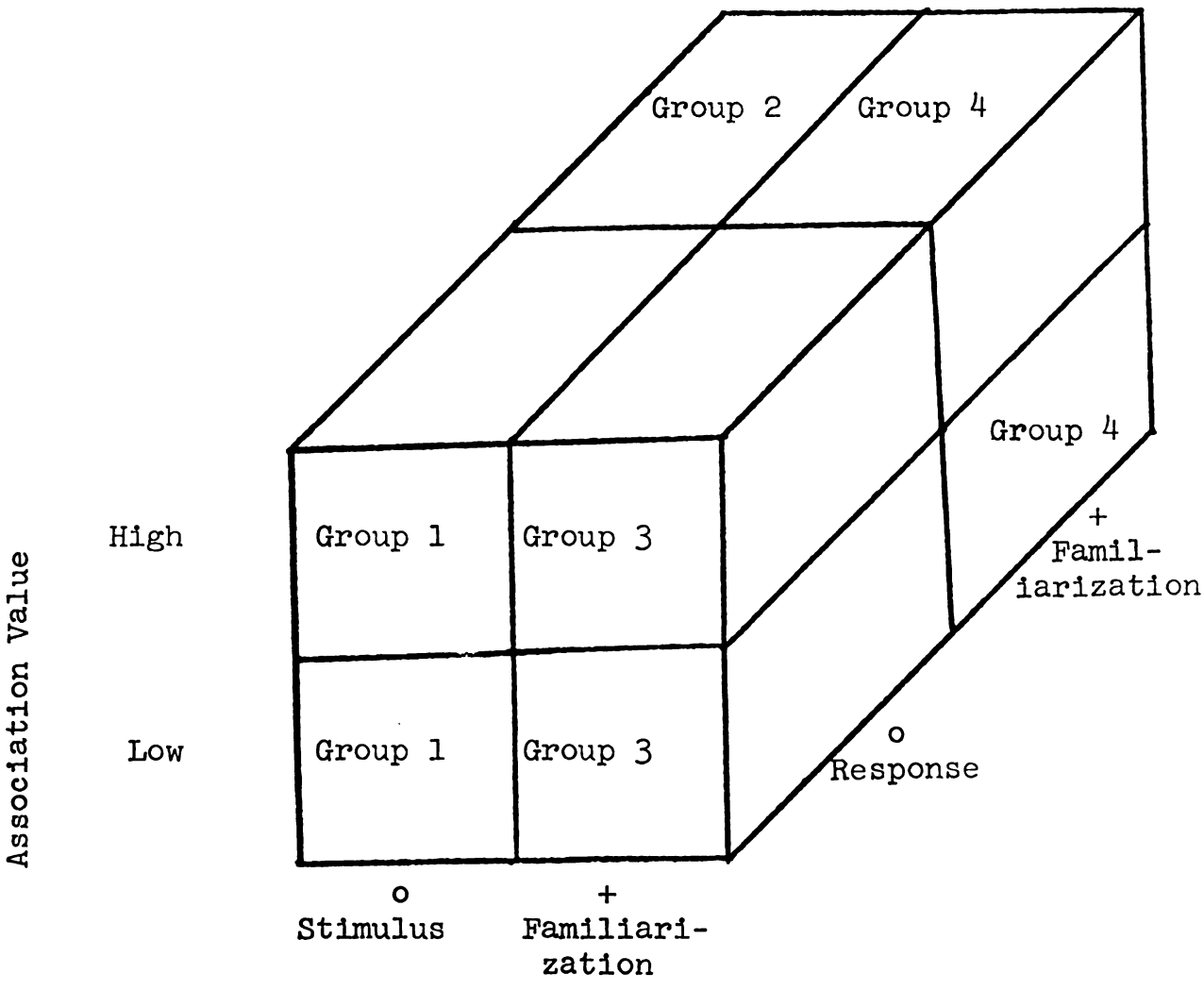


Figure 4.1.--Model of Experimental Design

a record of the number of test trials to criterion for each subject. Appendix D is a compilation of the number of words accurately recognized on each of the retention tasks by each subject.

Each of these three sets of data was treated with an analysis of variance. Summary tables for these analyses are included in the following discussion along with interaction

graphs which have been plotted for each set of data.

Test Trial Analysis

Only the following F values were found to be significant. The main effect of meaningfulness of words within subjects was significant at $p < .001$ supporting the assumption that words assigned to high m and low m categories do differ significantly in mean number of trials to criterion and therefore are not from the same level of difficulty.

The main effect of response familiarization between Ss was found to be significant at $p < .01$. This result shows that prior response memorization in the R and S-R groups significantly influenced the rate at which the words were recognized during original learning.

The interaction effect of response familiarization and meaningfulness within subjects was found significant at $p < .001$. The interaction is plotted in Figure 4.2 and shows that low m words receiving response familiarization were learned significantly faster than low m items receiving no response familiarization.

The implications of these findings will be discussed in Chapter V.

TABLE 4.2.--Summary Table for Analysis of Variance on Test Trial Data

Source	df	SS	MS	F	P
Between Subjects	59				
(S-Fam.)	1	19.20	19.20	.121	ns
(R-Fam.)	1	1228.80	1228.80	7.74	<.01
(S-R Fam.)	1	8.53	8.53	.053	ns
error (b)	56	8885.33	158.67		
Within Subjects	60				
(m)	1	2861.63	2861.63	66.74	<.001
(S-Fam. x m)	1	14.70	14.70	.34	ns
(R-Fam. x m)	1	1598.70	1598.70	37.28	<.001
(S-Fam. x R-Fam. x m)	1	7.50	7.50	.17	ns
error (w)	56	2401.47	42.88	(1.56)	

TABLE 4.3.--Means of Test Trial Data

Cell Number	Word Meaningfulness	Treatment	$\bar{X}$	S
1	High	Control	42.27	10.05
2	Low	Control	59.13	8.77
3	High	Response	44.20	11.63
4	Low	Response	45.47	12.26
5	High	Stimulus	41.80	6.86
6	Low	Stimulus	59.07	7.33
7	High	Stimulus and Response	41.67	10.01
8	Low	Stimulus and Response	45.33	11.90

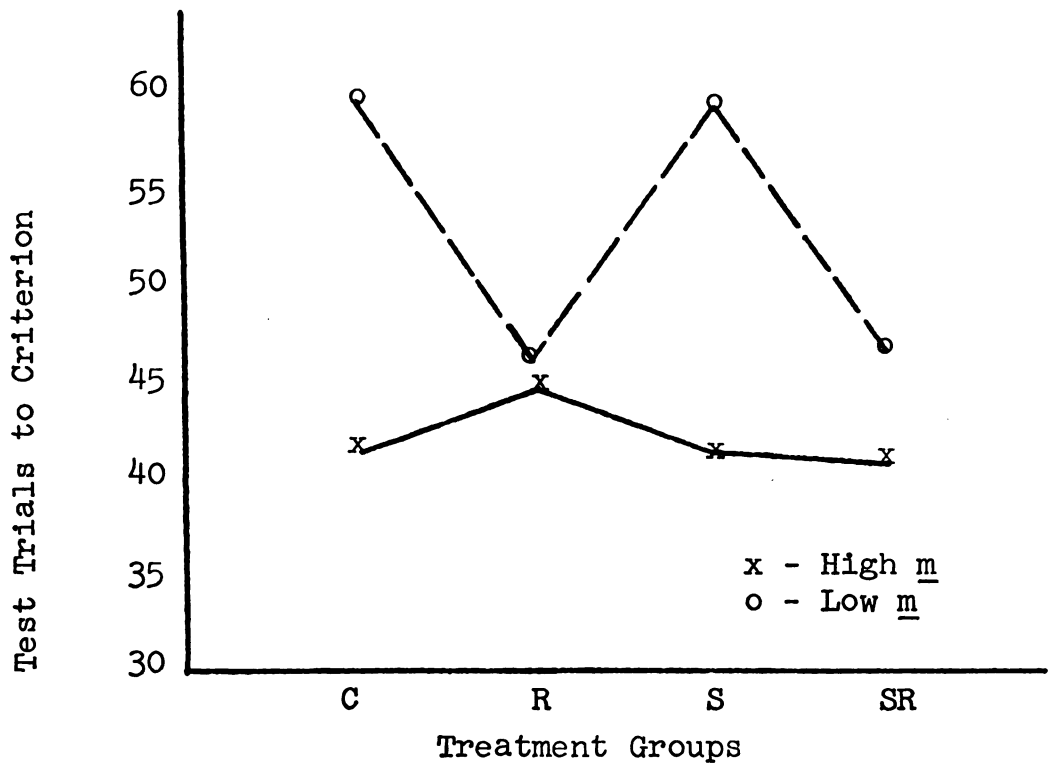


Figure 4.2.--Interaction Effects of Association Value by Treatment Conditions

Analysis of Complex Retention Data

The following F values were found to be significant. The main effect of meaningfulness of words within subjects was significant at $p < .001$ which supports the hypotheses that meaningfulness does in fact influence the acquisition of basic sight vocabulary just as it (m) has been shown to affect the learning of paired associate items.

The main effect response familiarization was found to be significant at $p < .01$. This finding parallels the results of the test trial data.

The interaction effect of response familiarization and meaningfulness within subjects was found to be significant at $p < .001$ further emphasizing the relationship between response familiarization and the meaningfulness level of the word. The interaction has been plotted and shows that a significantly greater number of words receiving response familiarization were retained than words not receiving this treatment (see Figure 4.3).

TABLE 4.4.--Summary Table for Analysis of Variance on Complex Retention Data

Source	df	SS	MS	F	P
Between Subjects	59				
(S-Fam.)	1	.4083	.4083	.369	ns
(R-Fam.)	1	8.0083	8.0083	7.234	<.01
(S-R Fam.)	1	.0750	.0750	.067	ns
error (b)	56	62.0000	1.1071		
Within Subjects	60				
(m)	1	46.8750	46.8750	93.750	<.001
(S-Fam. x m)	1	.2083	.2083	.417	ns
(R-Fam. x m)	1	23.4083	23.4083	46.817	<.001
(S-Fam. x R-Fam. x m)	1	.0083	.0083	.017	ns
error (w)	56	28.0000	.5000		

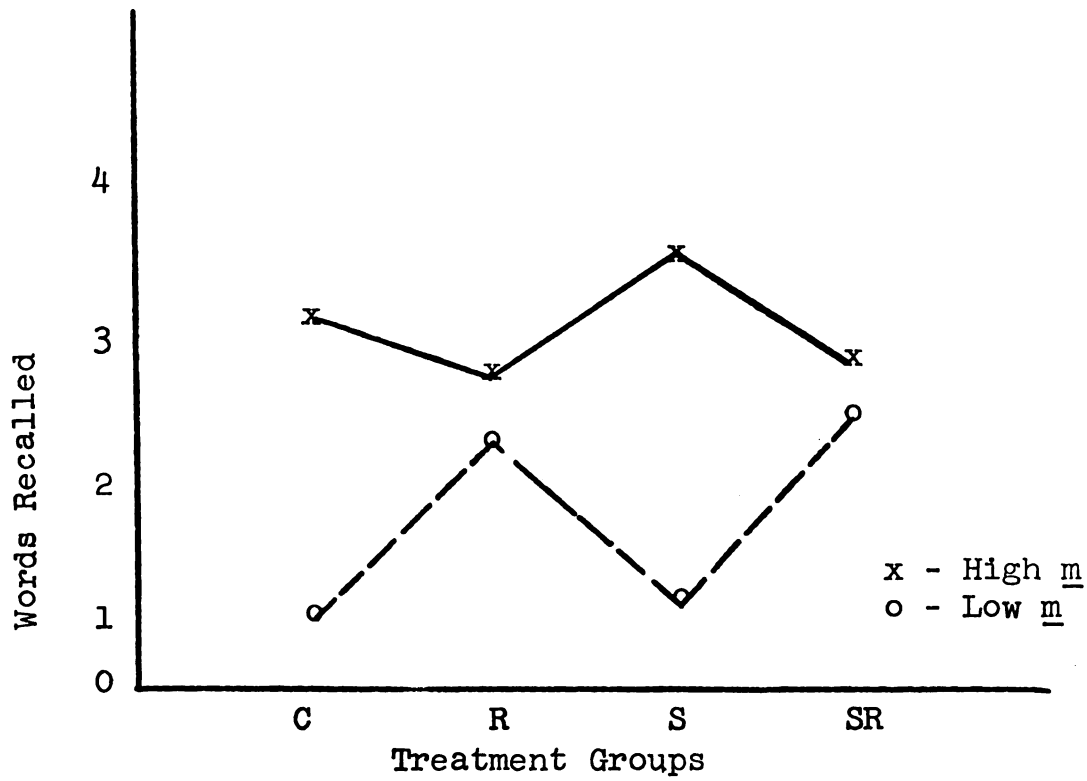


Figure 4.3.--Interaction Effects of Association Value by Words Recalled on Complex Retention Task

Analysis of Simple Retention Data

The F values shown to be significant in these data were parallel to those obtained in the test trial data and the complex retention task data. This is shown in the analysis of variance summary table and the corresponding interaction graph (Figure 4.4).

TABLE 4.5.--Means of Complex Retention Data

Cell Number	Word Meaningfulness	Treatment	$\bar{X}$	S
1	High	Control	3.07	.88
2	Low	Control	.87	.74
3	High	Response	2.67	.82
4	Low	Response	2.20	1.21
5	High	Stimulus	3.70	.88
6	Low	Stimulus	1.00	.76
7	High	Stimulus and Response	2.73	.70
8	Low	Stimulus and Response	2.47	1.06

TABLE 4.6.--Summary Table for Analysis of Variance on Simple Retention Data

Source	df	SS	MS	F	P
Between Subjects	59				
(S-Fam.)	1	.1333	.1333	.147	ns
(R-Fam.)	1	9.6333	9.6333	10.646	<.01
(S-R Fam.)	1	.0333	.0333	.037	ns
error (b)	56	50.6667	.9048		
Within Subjects	60				
(m)	1	22.5333	22.5333	93.195	<.001
(S-Fam. x m)	1	.1333	.1333	.512	ns
(R-Fam. x m)	1	40.8333	40.8333	178.101	<.001
(S-Fam. x R-Fam. x m)	1	.0333	.0333	.138	ns
error (w)	56	13.4667	.2405		

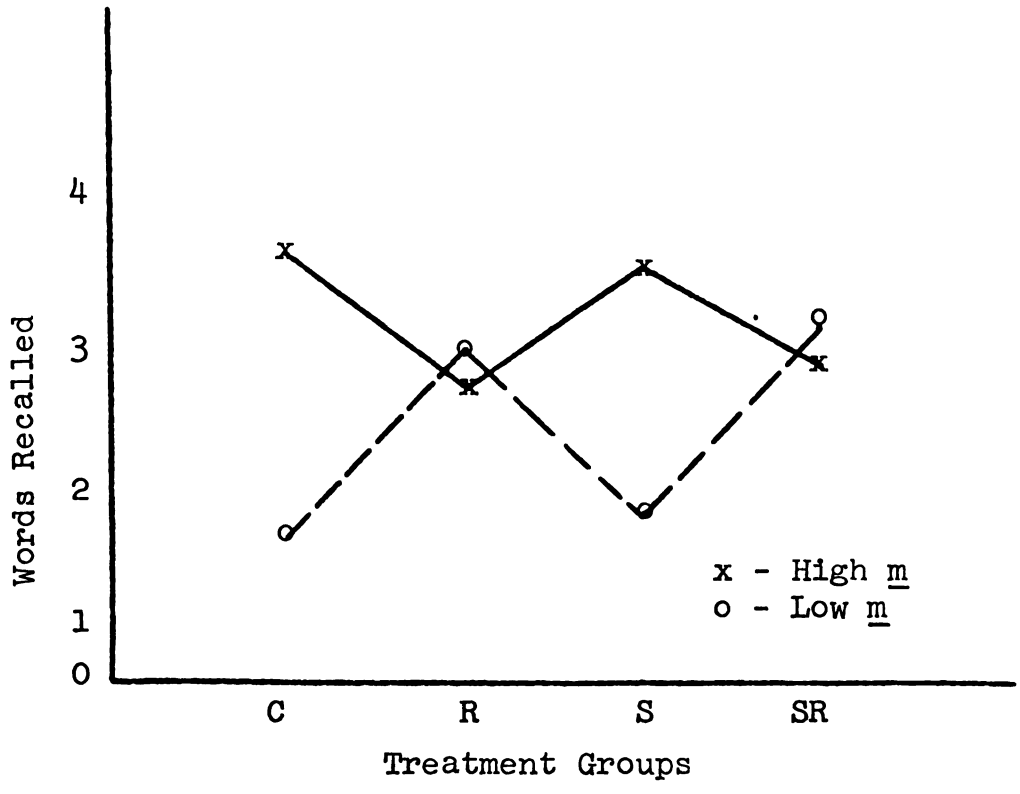


Figure 4.4.--Interaction Effects of Association Value by Words Recalled on Simple Retention Task

Following the factorial analysis of the data, the statistical hypotheses were examined using the Scheffe' post-hoc comparison method. All possible pairs of obtained test trial means were compared to test for significant differences between them. These comparisons yielded the following information. Each of the comparisons yielded insignificant

results with three exceptions. The first of these involved the difference between the rate of learning high and low m words by the control group. The difference obtained between rate of learning high and low m words was significant at $p < .001$ with the high m words being learned more rapidly than low m words.

TABLE 4.7.--Means of Simple Retention Data

Cell Number	Word Meaningfulness	Treatment	$\bar{X}$	S
1	High	Control	3.53	.64
2	Low	Control	1.40	1.06
3	High	Response	2.87	.74
4	Low	Response	3.13	.64
5	High	Stimulus	3.47	.64
6	Low	Stimulus	1.53	.92
7	High	Stimulus and Response	2.93	.70
8	Low	Stimulus and Response	3.27	.59

The comparison of the rate of learning low m words by the control group and low m words by the group receiving response familiarization only resulted in a significant difference at $p < .01$ with the response familiarization group learning the words more rapidly than the control group.

Finally, a significant difference was obtained at $p < .01$ as the rate of learning low m words by the control

group was compared with the rate of learning the low m words by the group that received both stimulus and response familiarization with the familiar words being learned more rapidly.

CHAPTER V

DISCUSSION

Introduction

This chapter centers its attention upon a brief discussion of word recognition as it relates to Strang's model of reading. The relationship of meaningfulness and familiarization training to word recognition shown in this study is also presented. Finally, the findings of this study are summarized and suggestions for additional investigations into the psychological processes involved in word recognition are outlined.

Word Recognition

Word recognition has been the target of countless discussions and experiments. Too often, however, these efforts have provided additional confusion to an area of study that has puzzled teachers for years. Strang has suggested a model for reading which provides a framework for discussing various aspects of reading behavior.

Strang's model consists of four categories. These are products, prerequisites, processes and procedures. In acquiring the ability to read, the learner must develop the several skills required of successful readers. Word recognition is certainly a necessary reading skill. Strang refers to reading skills as products of reading. Learning to recognize words is similar to many types of learning in that there are necessary prerequisites. Learning to sight read words requires adequate visual and auditory perception. Also, the student must have an adequate meaning vocabulary if development of word recognition skills are to be successful.

Much of the research dealing with word recognition has focused its attention on the procedures employed to teach the skill. Volumes have been written in reference to these methods of instruction and the materials available for learning to recognize words. Many research efforts have been conducted comparing various approaches and materials used in this instruction.

The fourth facet of Strang's model is the process of reading behavior. This includes the chemical, physiological, and psychological operations that occur within the learner as he learns to read and should not be confused with prerequisites, products or procedures.

This study has given its attention to some of the psychological processes which are thought to operate as one learns to recognize written words. Specifically, the processes examined here have been meaningfulness and its influence upon word recognition learning and familiarization training as it affects the learning of high and low meaningful words.

Several experimental psychologists have investigated these processes as they relate to a paired-associate learning task. The bulk of these studies dealt with adult subjects and the learning of nonsense syllables.

In 1964 Underwood made a point that "studying the conditions of association learning with adults" is clouded by the years of previous learning. Continuing, he voiced doubt that learning from "scratch" could be examined using adult Ss and urged that similar studies be conducted with children.

This study has attempted to look at association learning at its genesis by using first-grade subjects. Two basic questions were of interest to the investigator. First, "Does the meaningfulness value of a verbal unit influence the rate at which that unit is learned?" Secondly, "Does familiarization training alter the rate at which high and low meaningfulness words are learned?"

Answers to these questions were entirely dependent upon the scaling of meaningfulness values of the basic sight words shown in Table 4.1. Meaningfulness is determined not by a word's meaning but by the number of associations that the learner has for the word.

The fact that the two groups of first grade subjects were in agreement of the rank order of the thirty Dolch words that were scaled provided a defensible base for the second phase of this study.

Additional attempts to scale these words with various populations are needed to determine whether these basic sight words have similar meaningfulness values or if the meaningfulness changes with the population. A change in meaningfulness value certainly would alter teaching of the words since this study showed that high m words are learned significantly faster than low m words. This finding is in agreement with the studies done previously by Underwood with adults.

Finding that the high m words were learned more quickly than the low m words, causes one to wonder if a given word's meaningfulness value can be increased through training. If this is possible, teachers could possibly eliminate some of the frustrations often encountered with first-graders as they attempt to master the basic sight words. Prior to instruction on the Dolch words, the students would be taught

to generate several associations for the low m words. Several studies that were reviewed by DeCecco from the Psychological Monographs suggest that Ss can be taught to produce new associations for words (Maltzman, Simon, Raskin, and Licht, 1960). These originality studies were conducted with adult subjects, but the point was made that originality is a learned behavior. Researchers have not reported any results of attempts to teach young subjects to produce new associations to words. However, if the results reported by the above researchers can be replicated with first-grade subjects, the meaningfulness values of low association words could be favorably altered.

This study, in an attempt to examine the influence of familiarization training on the learning of stimulus and response members of a word recognition task, found itself in agreement with several experiments completed earlier by paired-associate researchers.

Paired-associate studies have shown that familiarization of a response member increases the availability of that member during the acquisition period. It has also been presumed that familiarization of stimulus members produce similar effects. When these expected results are obtained the acquisition rate of low m words or verbal units becomes similar to that of high m items. The results of this

experiment support this hypothesis. The Ss who received the response familiarization training learned the low m words significantly faster than the Ss in the control group.

This finding may indicate that reading teachers can facilitate the learning of low m words if they teach their students the specific responses to be learned prior to presenting the stimuli (written words) for recognition learning. This idea is reasonable even from a common sense point of view. If the responses to be learned can be isolated in memory from the infinite number of responses that are existent in the language, they become more available at the time of learning. The probability of connecting a stimulus with the appropriate response is simply increased when the learner has eliminated the thousands of possible responses by memorizing the correct response prior to acquisition.

As this result became apparent during the course of this experiment, a question arose concerning the significance of the difference between the time necessary for a control group to learn the words and the combined time of the response familiarization and the learning trials necessary to learn the eight words.

Since the experimenter had not anticipated this obvious point of interest prior to data collection, the number of familiarization trials necessary to reach criterion

was not recorded. Therefore, a satisfactory comparison of the two times cannot be made.

However, a pilot study was conducted following the collection of the primary data in order to find some answer to this question. Twenty subjects were selected at random from the same population of first-graders employed in the main experiment. These subjects were given response familiarization training just as described in Chapter III in order to determine the time necessary for reaching response familiarization criterion.

The response familiarization pilot study data showed that the average time necessary for each Ss to reach response criterion was 9 minutes 47 seconds. This time was combined with the average time necessary for reaching learning criterion on the low meaningfulness words by the group receiving only response familiarization (R). A comparison of these combined times with the average time necessary for learning by the control group shows that there may not be a significant difference in learning time for a control group and learning time for a response familiarization group when the time necessary for response familiarization is included. Since it would require a violation of several assumptions, no formal statistical analysis has been attempted for a comparison of these means. If in future studies it is found

that no actual time is conserved by the use of pre-training on the response member, it must be concluded that response familiarization, while producing a facilitating influence of word recognition learning, is of no value as a short cut to instruction. It should be remembered, however, that the response training in this study was done on an individual basis. If response familiarization could be provided to small groups of children or if children using various types of technological devices could provide their own response familiarization, it seems that time could be saved in the learning of the basic sight words. Even though it appears that no significant time has been conserved by providing response training, the post-hoc comparisons that followed the analysis of variance on the retention data indicated that significantly more low meaningfulness words receiving response training were recalled two days following acquisition than low meaningfulness words in the control group.

The post-hoc comparisons that were used to examine the effect of stimulus familiarization revealed that this treatment produced no facilitating influence on the learning of the high or low meaningfulness words. The fact that high meaningfulness words that received stimulus and response training were learned no faster than the high m words in the control group, was interesting, since the low meaningfulness

words in that group were learned significantly faster than the low m words in the control group. Other comparisons of the low meaningfulness words showed no difference in learning rate of the response familiarization and the stimulus-response familiarization group. Therefore, it seems evident that the facilitating effect obtained on the low meaningfulness words receiving stimulus and response familiarization was due to the response familiarization and not the familiarization of the stimulus member.

A negative conclusion should not be drawn concerning the effect of stimulus training with basic sight words. In this study, both pre-training procedures were provided to one group. The stimulus familiarization was given before response training. Experiments should be conducted in which these factors are manipulated in terms of which treatment is given first. If response training preceded stimulus training, the effect would possibly reverse the above findings.

Summary and Conclusion

The results of this study have emphasized again that meaningfulness has an effect on learning. In this instance, first graders learned high meaningfulness words more rapidly than low meaningfulness words.

The evidence obtained here has shown that low meaningfulness words can be learned with greater ease if subjects become familiar with the oral responses of the words prior to learning. A similar finding regarding stimulus familiarization was not obtained.

The results of the retention data show that the influence of meaningfulness and response training was not limited to acquisition of the words but also enhanced the learners' retention of the materials.

In the opinion of the writer, the most encouraging part of this effort is the foundation it provides for other experiments that examine word association learning with first-grade subjects.

Future experiments will surely include efforts to determine various methods of scaling meaningfulness values with elementary school subjects.

Attempts will be made to see if meaningfulness values vary with different populations. If a significant difference is shown in these efforts, the instructional differences should follow.

Realizing that meaningfulness is determined by the associations that one can give for a word, experiments which endeavor to teach subjects to free associate to new words are needed.

This study employed a somewhat sterile approach to both response and stimulus familiarization. Other experiments which alter the method of pre-training may prove to be more facilitating than the mode used here.

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APPENDICES

APPENDIX A

DIFFERENT ASSOCIATIONS

		Group A	Group B
1	brown	a house	cookies
		a car	paint
		a tree	fence
		horse	my sack (lunch)
		my dog	my lunch
		a color	the chair
		cows	the pencil
		my dress	animal
		that desk	the ball
		our car	shoes
		the ground	gloves
		the leaves	my hair
2	play	with my gun	I play by myself
		games	I play with my sister
		recess time	We play in gym
		go outside	don't play around in your seat
		nice	
		in my room	I play with my dog
		with my toys	I play after school
		on the swings	it's bad (in the schoolroom)
		on the slide	
		fun	run around
		army	with my friend
		today	in your own yard
			I want to play football

		Group A	Group B
3	run	I can run	around the house
		fast	into the house
		don't run	around the room
		the car	under a tree
		and play	in the road
		homerun	like a squirrel
		games	obey the rules
		hurry up	my dog
		home	horses run
		walk	run out of gas
		run slow	at recess we run
		slow down	my mother runned a red light
4	seven	seven people	I'm seven years old
		seven horses	It's seven o'clock
		seven cows	seven days make a week
		seven pigs	I get up at seven
		six	my brother is seven
		eight	I'll be seven next year
		seven days	counting
		a week	arithmetic
		seventh grade	
		a number	
		one, two, three, four, five, six, seven	
5	cold	ice is cold	we don't get to go out
		I am cold	ice maker
		water	food
		I have a cold	drink
		winter	milk
		snow	pepsi
		air	refrigerator
		ice box	pop
		it's raining	we drink tea at supper
		hot	up north

		Group A	Group B
6	ride	my horse	on the merry-go-round
		in the car	we have two cars
		in the backseat	we went on airplane
		down the street	don't ride my bike on the street
		to school	my sister has a tricycle
		on my bike	on a mini bike
		down the slide	on the spools (a playground toy)
		I like to drive	dad rides to work
		on the sidewalk	
7	walk	in the room	I walk to school
		walk fast	don't ride on the grass
		walk slow	I walk with my legs
		go to the park	I walk with my feet
		on the sidewalk	I walked to the store
		sit down	walk out the door
		run	
		myself	
		people	
		move around	
		we don't suppose to run in the school building	
8	little	we had a big car	we have a little car
		I'm too little	my little brother
		we have a baby	a frog is little
		like a kitten	I have a doll house
		a little bit	children are little
		my sister	I have a little dog
		kids are little	babies are little
		Chris is little	my brother is littler than me
		big	my doll is little
9	go	go to school	walk around
		fast	go to the end of the line
		in the car	to your seat
		on my bike	home after school
		I can go	my dad goes to work
		in the house	G - O (S spelled the word go)
		to the store	I can't go
		stop	around the block
		run	

		Group A	Group B
10	pretty	colors	kitten
		red	picture
		blue	the dress
		shirt	the shirt
		teacher	my pants
		mom	our house is
		horse	our car
		dog	I'm pretty
11	six	seven	my brother is eight
		pennies	I was six my birthday
		five, six	we had a party
		I am six	count to six
		a number	when you have six
		six people	six, seven, eight
		arithmetic	I can count to six
			1, 2, 3, 4, 5, 6
12	yellow	car	the swing
		a color	my shirt
		yellow cat	our telephone
		bus	the paper
		safety patrol	the pencil
		rain	flowers
		paint	our bathroom
		on the trees	
13	wash	my hands	my baby sister
		my face	brush my teeth
		bath	my hair
		clothes	dryer
		car	windows
		washer	germs
		soap	dirty
		water	
14	can	tin can	can Tommy play
		can I go	can you come out
		can we quit	when can I go
		opener	kick the can
		cut it	open a can
		can of soup	

		Group A	Group B
15	saw	cut a tree we saw a wreck cut something I sawed it look at it	look at something I saw the teacher logs for our fire-place my dad has a saw I seen something
16	many	how many many people many girls many boys a lot	how many days til my birthday many horses not very many many times sometimes
17	once	a story I did it once upon a time in awhile I had a dog	rode a airplane once I rode a horse once twice one time
18	went	with mother fast today yesterday up the tree	around the house around the room over the fence down the slide over the hill
19	into	in the house the room the car trouble	in the swimming pool run into the fence go in
20	about	about done about gone	are we about through it's about recess time book about animals
21	how	it is a word how are you how far	how do you know how many how did it break
22	was	was it you we was window was broke	the boys was bad we was at recess

		Group A	Group B
23	very	be very quiet very good	Christmas comes very soon
24	them	I seen them I go with them	them boys are mean
25	where	where is it where is my dog	where my daddy works where is my lunch
26	then	then I go home	then we rest after recess
27	if	if I can go	if mother will let me
28	could	could I go	could I have a drink
29	done	I'm done	
30	were	were it	

APPENDIX B

LEARNING TRIAL DATA

Control Group

Trials to Criterion

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}
H	45	42	36	48	60	51	21	30	45	39	36	36	30	33	45
L	60	51	42	60	60	60	39	39	45	48	54	51	48	51	54

Time to Criterion

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}
H	24:00	22:24	19:12	25:36	32:00	27:11	11:12	16:00	24:00	25:3	19:12	19:12	16:00	17:36	24:00
L	32	27:12	22:24	32	32	32	20:48	20:48	24:96	25:36	28:48	27:12	25:36	27:12	28:48

Response Familiarization Group

Trials to Criterion

	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	S_{26}	S_{27}	S_{28}	S_{29}	S_{30}
H	42	36	45	30	30	33	33	54	33	36	45	33	42	33	60
L	36	36	48	36	33	33	33	51	36	36	51	36	39	36	60

Time to Criterion

	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	S_{26}	S_{27}	S_{28}	S_{29}	S_{30}
H	22:24	19:12	24:00	16:00	16:00	17:36	17:36	28:48	17:36	19:12	24:00	17:36	22:24	17:36	32:00
L	19:12	19:12	25:36	19:12	17:36	17:36	17:36	27:12	19:12	19:12	27:12	19:12	20:48	19:12	32:00

Stimulus Familiarization Group

Trials to Criterion

	S_{31}	S_{32}	S_{33}	S_{34}	S_{35}	S_{36}	S_{37}	S_{38}	S_{39}	S_{40}	S_{41}	S_{42}	S_{43}	S_{44}	S_{45}
H	48	27	33	42	36	39	42	33	45	51	33	39	33	36	45
L	51	42	42	45	51	60	51	45	60	60	51	54	51	45	57

Time to Criterion

	S_{31}	S_{32}	S_{33}	S_{34}	S_{35}	S_{36}	S_{37}	S_{38}	S_{39}	S_{40}	S_{41}	S_{42}	S_{43}	S_{44}	S_{45}
H	25:36	14:24	17:36	22:24	19:12	20:48	22:24	17:36	24:00	27:12	19:12	20:48	17:36	19:12	24:00
L	27:12	22:24	22:24	24:00	27:12	32:00	27:12	24:00	32:00	32:00	27:12	28:48	27:12	24:00	30:24

Stimulus and Response Familiarization Group

Trials to Criterion

	S_{46}	S_{47}	S_{48}	S_{49}	S_{50}	S_{51}	S_{52}	S_{53}	S_{54}	S_{55}	S_{56}	S_{57}	S_{58}	S_{59}	S_{60}
H	39	39	39	45	60	33	30	33	36	48	24	51	33	39	39
L	33	36	45	33	30	33	33	54	33	33	39	51	60	36	36

Time to Criterion

	S_{46}	S_{47}	S_{48}	S_{49}	S_{50}	S_{51}	S_{52}	S_{53}	S_{54}	S_{55}	S_{56}	S_{57}	S_{58}	S_{59}	S_{60}
H	20:48	20:48	20:48	24:00	32:00	17:36	16:00	17:36	19:12	25:36	12:48	27:12	17:36	20:48	20:48
L	17:36	19:12	24:00	17:36	16:00	17:36	17:36	28:48	17:36	17:36	20:48	27:12	32:00	19:12	19:12

APPENDIX C

TEST TRIAL DATA

Control Group

Trials to Criterion

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	$\bar{X}$	$\bar{S}$
H	45	40	35	46	70	55	28	34	42	39	35	39	36	46	44	42.27	10.05
L	62	63	53	67	80	69	45	48	53	57	57	60	54	56	63	59.13	8.77

Time to Criterion

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}
H	12:00	10:40	9:20	12:16	18:40	14:40	8:08	9:04	11:12	10:24	9:20	10:24	9:36	12:16	11:44
L	16:32	16:48	14:08	17:52	21:20	18:24	12:00	12:48	14:08	15:12	15:12	16:00	14:24	14:56	16:48

Response Familiarization Group

Trials to Criterion

	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	S_{26}	S_{27}	S_{28}	S_{29}	S_{30}	$\bar{X}$	$\bar{S}$
H	45	39	56	37	34	38	38	61	36	38	55	36	42	37	73	44.20	11.63
L	44	39	56	37	34	39	39	62	37	40	59	41	41	37	77	45.47	12.26

Time to Criterion

	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	S_{26}	S_{27}	S_{28}	S_{29}	S_{30}
H	12:00	10:24	14:56	9:52	9:04	10:08	10:08	16:16	9:36	10:08	14:40	9:30	11:12	9:52	19:28
L	11:44	10:24	14:56	9:52	9:04	10:24	10:24	16:32	9:52	10:40	11:44	10:56	10:56	9:52	20:32

Stimulus Familiarization Group

Trials to Criterion

	S_{31}	S_{32}	S_{33}	S_{34}	S_{35}	S_{36}	S_{37}	S_{38}	S_{39}	S_{40}	S_{41}	S_{42}	S_{43}	S_{44}	S_{45}	$\bar{X}$	$\bar{S}$
H	45	41	36	45	56	55	32	45	42	39	35	38	36	38	44	41.80	6.86
L	61	62	52	69	74	64	48	49	55	58	59	62	56	52	65	59.07	7.33

Time to Criterion

	S_{31}	S_{32}	S_{33}	S_{34}	S_{35}	S_{36}	S_{37}	S_{38}	S_{39}	S_{40}	S_{41}	S_{42}	S_{43}	S_{44}	S_{45}
H	12:00	10:50	9:36	12:00	14:56	14:40	8:32	12:00	11:12	10:24	9:20	10:08	9:36	10:08	11:44
L	16:16	16:32	13:52	18:24	19:44	17:04	12:48	13:04	14:40	15:28	11:44	16:32	14:56	13:52	17:20

Stimulus and Response Familiarization Group

Trials to Criterion

	S_{46}	S_{47}	S_{48}	S_{49}	S_{50}	S_{51}	S_{52}	S_{53}	S_{54}	S_{55}	S_{56}	S_{57}	S_{58}	S_{59}	S_{60}	$\bar{X}$	$\bar{S}$
H	43	37	39	46	69	36	35	38	35	48	29	56	34	41	39	41.67	10.01
L	41	39	54	38	35	39	41	63	40	36	42	58	76	41	37	45.33	11.90

Time to Criterion

	S_{46}	S_{47}	S_{48}	S_{49}	S_{50}	S_{51}	S_{52}	S_{53}	S_{54}	S_{55}	S_{56}	S_{57}	S_{58}	S_{59}	S_{60}
H	11:28	9:52	10:24	12:16	18:24	9:36	9:20	10:08	9:20	12:48	8:24	14:56	9:04	10:56	10:24
L	10:56	10:24	14:24	10:08	9:20	10:24	10:56	16:48	10:40	9:36	11:12	15:28	20:16	10:56	9:52

APPENDIX D

RETENTION DATA

Control Group

Complex Task

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	$\bar{X}$	$\bar{S}$
H	2	3	4	3	1	2	4	3	4	3	4	3	4	3	3	3.07	.88
L	0	1	1	0	0	1	2	2	1	1	1	0	1	2	0	.87	.74

Simple Task

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}	S_{12}	S_{13}	S_{14}	S_{15}	$\bar{X}$	$\bar{S}$
H	3	3	4	3	2	3	4	4	4	4	4	4	4	3	4	3.53	.64
L	0	1	2	1	0	1	3	2	2	1	3	1	3	1	0	1.40	1.06

Response Familiarization Group

Complex Task

	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	S_{26}	S_{27}	S_{28}	S_{29}	S_{30}	$\bar{X}$	$\bar{S}$
H	3	2	1	3	3	3	4	2	2	3	2	3	3	4	2	2.67	.82
L	2	1	0	3	2	1	3	2	4	4	1	4	2	2	2	2.20	1.21

Simple Task

	S_{16}	S_{17}	S_{18}	S_{19}	S_{20}	S_{21}	S_{22}	S_{23}	S_{24}	S_{25}	S_{26}	S_{27}	S_{28}	S_{29}	S_{30}	$\bar{X}$	$\bar{S}$
H	3	2	2	3	3	3	4	2	3	4	2	3	3	4	2	2.87	.74
L	3	3	2	4	3	3	4	3	4	4	2	3	3	3	3	3.13	.64

Stimulus Familiarization Group

Complex Task

	S_{31}	S_{32}	S_{33}	S_{34}	S_{35}	S_{36}	S_{37}	S_{38}	S_{39}	S_{40}	S_{41}	S_{42}	S_{43}	S_{44}	S_{45}	$\bar{X}$	S
H	3	4	3	3	3	4	3	3	4	4	2	1	4	3	2	3.70	.88
L	1	1	1	2	0	2	2	0	1	2	1	0	1	1	0	1.00	.76

Simple Task

	S_{31}	S_{32}	S_{33}	S_{34}	S_{35}	S_{36}	S_{37}	S_{38}	S_{39}	S_{40}	S_{41}	S_{42}	S_{43}	S_{44}	S_{45}	$\bar{X}$	S
H	4	4	3	4	3	4	3	4	4	4	3	2	4	3	3	3.47	.64
L	2	3	1	2	1	3	2	1	2	2	1	0	2	1	0	1.53	.92

Stimulus and Response Familiarization Group

Complex Task

	S_{46}	S_{47}	S_{48}	S_{49}	S_{50}	S_{51}	S_{52}	S_{53}	S_{54}	S_{55}	S_{56}	S_{57}	S_{58}	S_{58}	S_{60}	$\bar{X}$	S
H	2	3	3	2	4	2	3	2	3	3	3	2	2	4	3	2.73	.70
L	1	3	4	2	3	2	4	1	2	1	3	4	3	2	2	2.47	1.06

Simple Task

	S46	S47	S48	S49	S50	S51	S52	S53	S54	S55	S56	S57	S58	S59	S60	$\bar{X}$	S
H	2	3	4	2	4	2	3	2	3	3	3	3	3	4	3	2.93	.70
L	3	4	4	3	4	3	3	3	3	2	4	3	3	3	4	3.27	.59

APPENDIX E

RESPONSE FAMILIARIZATION PILOT STUDY DATA

Subjects	Trials to Criterion	Time to Criterion
S_1	15	8:00
S_2	20	10:40
S_3	14	7:28
S_4	16	8:32
S_5	22	11:44
S_6	13	6:56
S_7	15	8:00
S_8	21	11:12
S_9	19	10:08
S_{10}	14	7:28
S_{11}	22	11:44
S_{12}	17	9:04
S_{13}	18	9:36
S_{14}	17	9:04
S_{15}	19	10:08
S_{16}	16	8:32
S_{17}	17	9:36
S_{18}	23	12:16
S_{19}	26	13:52
S_{20}	22	11:44
	$\bar{X}$ = 18.30	$\bar{X}$ = 9:47

APPENDIX F

INSTRUCTIONS GIVEN TO SUBJECTS

A. Scaling of Materials

"Tell me what you think of when I say _____."

When a subject gave an association, he was asked, "What else do you think of?"

B. Stimulus Familiarization

Each subject receiving this treatment was asked, "Look at this word carefully and trace it three times with your crayon." After completion of this task he was told, "Now copy the word on this paper with your pencil."

C. Response Familiarization

Subjects receiving this treatment were told, "You are going to hear a few words on the recorder. Listen very carefully and say each word after you hear it."

This same procedure was used for the response familiarization pilot data collection.

D. Learning Trial Data

Learning trials were presented on a memory drum. Subjects were told, "Look at each word carefully and listen as I say each word. After I have pronounced a word you say it, too."

E. Test Trial Data

Subjects were asked, "Look at the word on the screen and say it."

F. Retention Task Data

Instructions for both retention tasks were the same. Subjects were instructed, "Look at these words and read as many as you can."