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Assessment of Sort-Teach-Test-Sort Technique with Bilinguals Learning English Vocabulary

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Eastern Illinois University

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ASSESSMENT OF SORT-TEACH-TEST-SORT TECHNIQUE

WITH BILINGUALS LEARNING ENGLISH VOCABULARY

(TITLE)

BY

JANAYE LUCILLE MATTESON

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1974

YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

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I wish to dedicate this paper to my mother who gave me constant support, encouragement and faith throughout the course of this study.

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CHAPTER I

INTRODUCTION

With the continued influx of foreign students, laborers and professionals into the United States there is a growing population of non-native English speakers who immediately find the need to communicate in a second language (Chreist, 1969). Within an ethnic island in a large city there are many children who reach school age speaking only their mother's native foreign tongue. The process of learning English environmentally, that is, learning from day to day situations, is a painstaking and inadequate means of learning the skeleton of syntactical structures and nuances of meaning on which our language is based.

The terms bilingual, bi-cognitive and bi-literate have been loosely applied to multi-lingual and multi-dialectic people (Bernbaum, 1971). But for the purpose of this paper "bilingual" will be defined as "having knowledge of and ability to use two languages in daily conversation" (Bernbaum, 1971). Villareal (1969) says bilingualism is a common phenomenon that develops without formal instruction because genuine communication situations require it. However, the immigrant fifth grader who becomes enrolled in a school system

completely foreign to him, and the laborer who can't get a job because he lacks adequate skills in the English language are at a definite disadvantage. These people are the concern of this study.

Currently in the United States there are at least 19 different languages which co-exist with English. These languages can be found on reservations, in large cities and in other areas (Department of Health, Education and Welfare, 1972). The numbers of people in the United States who speak these languages are astonishing. In Chicago alone there are 59,778 students, or 10.4% of all school children who speak Spanish as a first language. This is a startling number when compared to the fact that only 241 or .89% of 28,383 teachers and school administrators are bilingual (Bakalis, Office of Superintendent of Public Instruction, 1972). One might put these statistics in perspective when this view is enlarged to the State of Illinois, which has over 100,000 non-English speaking children.

The plight of the United States immigrant in the American School System is probably most easily illustrated by an excerpt from an article entitled "Hispanic Experience in New Jersey Schools," by Diego Castellanos, (1972):

"Junior is about to enter school. He is a fine looking five year old, he has perfect eyesight, normal hearing and good strong teeth. He speaks very well, is in excellent health and of above average intelligence. He has no learning disabilities. Yet this young American cannot be educated in most school districts in

New Jersey. Twenty years ago his father, Martinez, was thrust into an exclusively English speaking school environment and all the skills he possessed were useless to him...Martinez vegetated in classes he did not understand, praying the teacher would not call on him...the teacher, of course, allowed him to sit in the classroom because the law required it...Some of the children would ridicule him for his imperfect grasp of English...He was not permitted to speak Spanish because it would "confuse" him. The situation peaked when Martinez was administered a test in English and was found to be "academically retarded" and was put in a class for the mentally retarded."

Of course, this example is dramatic and hopefully not totally indicative of the modern school system. With the new thrusts in the area of special education it would probably be realized that young Martinez needs special help. However, it takes more than a realization to help; it takes specific techniques and specialized personnel to help such a child achieve proficiency in English as his second language.

Carroll (1953) writes that the difficulty of deriving exact statements in the field of bilingualism arises from the fact that no generally recognized scale exists for measuring accomplishments in language. He says "a great lag exists in all foreign language measurements." One of the problems involved is the difficulty of estimating a person's vocabulary. General estimates of vocabulary do not consider multiple meanings or homonyms and as Carroll points out "the meanings of a word for a particular individual depends upon his experiences with it."

Throughout his years of study, Carroll (1953) comments that he has found that spoken language development should preclude the development of competence with reading and writing skills. He further states that the child should learn new language patterns (vocabulary and sentence construction) in the spoken language before they are produced in printed form. A child's variety of concepts are at best reflected in his vocabulary - his "verbal response system". This response system must be expanded in as natural a way as possible. One way to provide an expansion of vocabulary is to "establish a learning system which will allow the child to see relevant distinctions in meaning and differential classification of concepts". (Carroll, 1953). When this is established the child needs plentiful opportunities for practice in speaking and understanding language in difficult types of situations.

Einar Haugen (1956) who has executed extensive research in the field of bilingualism writes that "one's knowledge of the native language is a function of one's aptitude, one's opportunity and one's motivation for learning. This is equally true of a second language". But who is to provide that opportunity and what specialized systems of language instruction can best utilize one's competence and experience to build new vocabulary and language concepts?

The speech and language therapist who finds himself involved in part of an educational program for a non-English speaker, whether in the school system or in a clinic, may be

a logical person to provide the opportunities and specialization needed. Fred Chreist, author of Foreign Accent (Prentice-Hall Series, 1972) comments that "Students of teaching English as a second language throughout the world today will require training in 'oral production and audition' which their students will require". The speech therapist with his competence in oral-aural skills and knowledge of language concept formation has the potential to provide this training for students. Specialized personnel do exist; the specific need then is for better and more effective instructional methods.

STATEMENT OF PURPOSE

The purpose of this study is to assess the Sort-Teach-Test-Sort (STTS) Technique as a method of teaching English vocabulary to non-native English speakers.

PROPOSED QUESTIONS

1. What do the resultant learning curves look like for ten sessions of instruction with the Sort-Teach-Test-Sort Technique?
2. Is there evidence of transfer of learning from session to session?
3. Is there a statistically significant difference in the number of words learned in session one as compared to session 11?

4. What is the percentage of retention two weeks and five weeks after the last instructional session for the "maybe" and "no" words?
5. Is there a statistically significant difference in the number of correct "maybe" and correct "no" words on Retention Test One?
6. Is there a statistically significant difference in the number of correct "maybe" words and correct "no" words on Retention Test Two?
7. Is there a statistically significant difference between the scores from Retention Test One and Retention Test Two?

CHAPTER II

REVIEW OF RELATED LITERATURE

Literature in past years has been controversial concerning the effect of a bilingual environment on a child's school performance, IQ, personal adjustment, etc. However, research seems to show definite advantages of being bilingual as shown by higher scores on IQ tests and higher degrees of "cognitive flexibility" (Bernbaum, 1971).

CURRENT PROGRAMS OF ENGLISH AS A SECOND LANGUAGE EDUCATION

A recent report by the Department of Health, Education and Welfare (1972) states that when children are taught in a bilingual mode they are "taught the necessary concepts in their language as well as in English and they achieve academic success". In many schools today where the dominant language is not English, schools are employing aides to communicate with the children. According to one study, this is a step in the right direction. It was reported that the addition of an oral-aural English program for Navajo Indians improved school attendance as drastically as 70% (Department of Health, Education and Welfare, 1972).

The State of Arizona has initiated a pilot program of "special education" for bilingual children within the school system in grades one to three. This program provides special "oral-language" courses for the child who lacks proficiency in English. The classes are based on the idea that "emphasis must be placed initially in the development of audio-lingual skills (listening and speaking) of the bilingual child if he is to find success later in the skills of reading and writing" (Maynes, 1971). The problems with this program are the limitations of age and the rule that a child may participate in this special class one year only.

A program for teaching English as a second language currently underway on many Navajo reservations emphasizes "actual conversation situations where students are required to give a quick accurate response without help". The program is set up for 25 weeks of instruction. The first week is concerned with the learning of the production of the short oo and the voiced and unvoiced th. Pronouns and diphthongs are introduced during the fourth week of instruction (DeNuzio, 1967). Not until the thirteenth week in the program is there any mention of teaching vocabulary; and it is the vocabulary which would serve the children's most immediate needs.

The second year of this program is concerned with reviewing sound differences and studying traditional literature for the purpose of expanding vocabulary. At this point in the program, vocabulary is stressed; but the vocabulary

to be learned is that of poems written 50 or more years ago. It might be reflected that this vocabulary is not representative of the words a child needs to know in the late 20th Century. As early as 1955 Sumner Ives wrote that "when language courses are required...they generally consist of reading literature, in a stage of the language which is no longer current, or they consist mainly of tracing individual sound changes. It is possible for a student to go through such a program with excellent marks and yet remain basically ignorant of the nature of language as a socially direct activity...."

VARIABLES INFLUENCING PROGRAMS OF ENGLISH AS A SECOND LANGUAGE

As a result of Hess' work at the City University of New York (1971), it was found that the majority of all students that participate in some kind of bilingual education are grouped separately from the rest of the class and are grouped solely on the basis of ethnic background. This would seem to suggest that most bilingual education programs are overlooking factors of age and native language proficiency and are perhaps missing "optimal learning conditions" by grouping children according to native language alone.

After a series of research reports by the Board of Education of Toronto, Canada on the subject of learning English as a second language, there have been some revealing facts about how an English as a Second Language (ESL) program should be carried out and specifically who should participate.

Wright (1970) expresses the opinion that any given school system has a responsibility to provide appropriate diverse education programs for students who do not speak the native language. He further states that it is more advantageous to be an immigrant at age six or less (as far as learning language is concerned) than it is between grade five and adulthood. Wright states that learning language at these ages is more difficult and very time consuming. He goes on to say that a full-time program for teaching English can help the student achieve proficiency in a fewer number of class hours than if the program were only part time. This points out the merits of an intense full-time schedule of instruction.

Anderson (1973) also points out that the best way to achieve a significant new advance in bilingual, bi-cultural education is to take full advantage of the learning potential of a child from birth to age five. This would suggest that a bilingual program in a pre-school situation could be beneficial.

Most programs for bilingual education mentioned in this study have a common starting point of teaching "oral-aural skills". The three most prominent tests commonly given to assess a person's ability in English as his second language are: the Test of English as a Foreign Language (Princeton, New Jersey, 1970), the Test of Aural Comprehension (Ann Arbor, Michigan, 1957) and the Michigan Test of English Language Proficiency (Ann Arbor, Michigan, 1965). It is

interesting to note that these tests place greater importance on the reading and writing skills in English than the speaking and vocabulary skills (Burgess, 1970). In regard to the tests of English language proficiency, Haugen (1956) remarks that "for a full exploration of bilingual skills one would want to sample a wider vocabulary". Here he is identifying the preliminary knowledge of an expressive vocabulary as a paramount need and a basis from which to measure all phonological, morphological and syntactical parameters.

The addition of a new curriculum to produce bilingual teachers in the universities is a new step in ESL teaching. In a survey of English and Spanish teachers from all over the United States, Michel (1971) found that the three most desired courses a bilingual teacher would like to have would be "Introduction to Linguistic Science", "Phonetics and Phonology" and "Phonological Analysis". In an article entitled "Linguistics in the Classroom", Sumner Ives (1955) writes "that linguistics simply gives the teacher more effective tools and a better understanding of what he is working with".

LINGUISTIC EVALUATION OF VOCABULARY LEARNING

When considering the teaching of English vocabulary, a linguistic approach concerning the importance of words and their meanings must be examined. Linguists view words as dynamic rather than static: "words are constantly shifting their meanings and connotations and hence their status"

(Evans, 1962). For any given student, words pass in and out of his vocabulary daily. Gleason (1955) tells us that "any speaker of a language necessarily has a much more complete control of the grammar than of the vocabulary" and that "a speaking knowledge of a language requires very close to 100% control of the phonology and control of from 50-90% of the grammar while one can frequently do a great deal with one percent or even less of the vocabulary".

The word "vocabulary" can be misleading. The vocabulary of a laborer is much different from that of a professional as one would expect. According to Haugen (1956), there are two distortions which cause this heterogeneity of vocabulary: technical vocabulary and frequency distributions. He says that when a speaker is forced to speak in the latter, it is due to "failure to master different levels of style and (the speaker) is forced to over use common words". An expansion of vocabulary would be one way to help free the "common word" from the perils of over use and redundancy.

Although heterogeneity of vocabulary is a rule, as governed by social context, each individual is part of a regular "stylistic stratification". "The emergence of such regularities implies the presence of some constant factors operating in the structure and evolution of language" (Labov, 1971).

In the field of linguistics there are as many meanings of "meaning" as there are words. Among the most prominent

definitions of "meaning" are the linguistic, psychologic and representational mediation points of view. Bloomfield (1933) offers a definition of the meaning of a linguistic form as "the situation in which the speaker utters it and the response which it calls forth". The meaning of a word is not only what the word signified when it was sent, but what is signified when it was received. In the cases of bilingual speakers it is the semantic differentials - that is, the nuances of meanings that cause interferences in communication (Weinrich, 1953).

Further evidence for the importance of vocabulary learning is evidenced by Lambert (1953) who found that a "profile of language learning seemed to emerge, according to which the building of a vocabulary came first and the associational aspects of the culture came last".

A similar point of view has been expressed by Ruth Anshen (1957) when she states that language expresses human experience through three categories, the first of which is "the meanings of words," secondly, she cites those meanings as they are "enshrined in grammatical forms" and thirdly, "those meanings which lie beyond grammatical forms".

Gleason (1956) believes that the three major components of language, from a linguistic point of view are the "structure of expression, structure of content and vocabulary". He further states that "the latter comprises all the specific relations between expression and content". Bloomfield (1961)

writes that "the usage (of words) is sovereign in the long run" and that vocabulary's primary use is for social utility with all else being secondary.

SUMMARY OF THE REVIEW OF THE LITERATURE

This review of the literature has revealed that there are several pilot programs being initiated within the school systems in the United States for teaching English as a second language. Some of the effects of these programs have included increased attendance and better over-all academic success. A specific look at the ESL programs, however, reveals that there is a lack of agreement as to what approach should be taken. One approach emphasizes strictly conversational situations and the other employs techniques of oral-aural discrimination. In neither approach was vocabulary learning described as an entity in itself. However, in an analysis of the three major tests assessing English as a Second Language, it was found that vocabulary skills make up a great part of the test material.

Prominent linguists point out the need for a basic vocabulary but hasten to acknowledge that vocabulary is dynamic and ever-changing. However, without a useful and socially adequate vocabulary a child cannot communicate verbally nor employ phonemic, phonologic, morphologic, syntactic or grammatical structures.

Aside from the aspect of second language vocabulary learning, all of the aforementioned programs seem to be

based on two premises that have not been documented to date. These are: 1) that children learn better when grouped only with other children having the same native language, and 2) that English as a second language can be taught effectively only by a bilingual teacher who speaks the child's native language.

CTOGENY OF THE SORT-TEACH-TEST-SORT TECHNIQUE

The Sort-Teach-Test-Sort Technique found its origin in discussions between Dr. Lynn Miner and Dr. Jerry Griffith at Eastern Illinois University, Charleston, Illinois. These discussions were spurred by their mutual interests in an article by Richard Atkinson in American Psychologist (1972) entitled "Ingredients for a Theory of Instruction".

Atkinson expounds on a "Decision-Theoretic Analysis of Instruction" in which he cites two aspects of instructional strategy: the response-insensitive strategy and the response-sensitive strategy (Atkinson, 1972). A response-insensitive approach to learning employs a structured curriculum which is designed for all students, which is insensitive and does not take into regard an individual's strengths and weaknesses. A response-sensitive approach to learning, on the other hand, would take into consideration an individual's strengths and weaknesses, individual learning rate and direction of learning. In other words, this response-sensitive approach to learning is "sensitive" to the specialized needs of the learner.

The experimental data that was generated (Atkinson, 1972) involving each mode of instructional strategy has particular relevance to this study. The data seem to suggest that a response-sensitive learning condition by far exceeds a response-insensitive approach in a final analysis of items learned.

Atkinson goes on to say that any given item to be learned is in one of three states; that which is known, that which is in a state of ambivalence and is known only on a temporary basis, and that which is unknown. He states:

"the learning model can be used to derive equations and in turn compute the probabilities of being in state P (permanent knowledge, T (temporary knowledge) and U (unknown) for each item...Given numerical estimates of these probabilities a strategy for optimizing performance is to select that item for presentation that has the greatest probability of moving into the state P, if it is tested and studied on the trial" (1972).

Griffith and Miner have incorporated Atkinson's model of instruction into a technique which "optimizes the probabilities of learning" and thereby maximizes the resultant number of items in state "P". The Sort-Teach-Test-Sort Technique has combined the Griffith and Miner Reference Word Lists (Bell and Howell, 1973) of the most frequently occurring English vocabulary words with Atkinson's model of probability in learning, to create a theoretically optimal response-sensitive learning model for the teaching of English vocabulary.

One specific use of the Sort-Teach-Test-Sort Technique, the one entailed in this study, has been that of teaching English vocabulary to non-native English speakers. It has been used extensively at Eastern Illinois University as part of a total speech and language program for non-native speakers. The writer has become involved in this technique as a project, after having observed the technique in use by Dr. Lynn Miner.

This technique was not created to be employed as a total language program for foreign students, but was intended to be recognized as an optimal method of teaching vocabulary as an integral part of the total language program.

BASIC PRINCIPLES UNDERLYING THE SORT-TEACH-TEST-SORT TECHNIQUE

There are certain basic principles involved in the learning of a language for the first time which can be applied to the learning of a language as a foreign language. It is important to identify these principles as they operate within the structure of the Sort-Teach-Test-Sort Technique.

Principle One: Comprehension precedes production:

It is a universal communication law that students must understand words before they use them expressively in the correct manner. They must comprehend syntax and grammatical structure before they can incorporate these skills into the production of a meaningful expression. Receptive vocabularies are larger than expressive vocabularies. Elementary

education has utilized this principle of language acquisition by teaching listening before speaking and reading before writing.

The Sort-Teach-Test-Sort Technique capitalizes upon this principle by stimulating receptive comprehension prior to expression.

Principle Two: Word mastery is controlled through frequency of occurrence:

It is a common phenomenon that children will repeat what they hear others say. The words that are most generally mastered first are those words that are most frequently presented to the child. Words are the building blocks for the development of language and a child's communication confidence increases when he encounters words that he knows. While there are many words in the English language, only a relatively small number occur with high frequency. This would indicate that if a child masters the few high frequency words he will experience success in most communication situations.

The Sort-Teach-Test-Sort Technique employs the 10,000 most frequently occurring words which serve as a foundation for language building skills.

Principle Three: Teaching materials should be presented that have a high probability of being learned:

A student's "readiness" for learning is a determining factor concerning how effective any instructional method

will be. This "readiness" is dependent upon his previous learning experiences and his pre-entry knowledge. Students vary greatly in this capacity, however, no matter what the degree of pre-learning a student has, new materials tend to fall into one of three categories: 1) that which the student knows, 2) that which he may know and 3) that which he does not know.

It may be pointed out that material in the first category need not be taught for it is already understood. One mistake many teachers make is to teach a unit which is already entirely or in part mastered by the student. Giving the student an opportunity to sort out what he already knows from new material saves time and increases the efficiency of a teaching technique.

The material in the second category is material that the student may or may not know at any given time. The student has a basic frame work and perhaps several associative concepts for this material. These supportive concepts may significantly increase the probability that the second category material will be learned in a short time.

The material in the third category has the least probability of being learned because the student has not yet developed a "learning set" for this task.

Effective teaching methods should take the theory of probability into consideration and allow the student to categorize new material. In this way, he can always be working with new material which is nearest to being learned.

Principle Four: Instructional method should accommodate individual differences in learning:

Vocabulary learning is a personal skill unique to every individual. There are as many differences among students as there are students. Any teaching-learning process, it would seem, should reflect those differences. One important difference among students is the degree of prior learning with which each one begins new learning tasks. Pre-assessment of the student's abilities enables the teacher to determine how much information a child has concerning a given learning task. The teacher should then choose her method of instruction according to the following criteria:

1. application to a wide range of individual differences
2. compatibility with different teaching philosophies
3. usefulness for teachers, teacher aids and clinicians with differing amounts of experience in language skill
4. degree of assessment of the kind and amount of individual differences among students
5. effectiveness as a motivation device.

It will become evident in the data that follow that the Sort-Teach-Test-Sort Technique has proven effective in satisfying these criteria.

Principle Five: Self-competition is better than group competition:

Competition is a healthy motivator in the learning process. However, the source of the competition is crucial. In groups, competition will tend to encourage the same few students while it discourages the largest number who do not win. Speed of learning varies greatly from student to student. In the same way, there may be variations in learning rate from time to time with a given individual. Illness, excessive tension and disinterest, along with extra-curricular experiences may account for learning lags and spurts.

When building language skills, it is preferable to focus on an individual's competition with himself. This can be done by plotting learning from session to session to give the student a direction of where he's been and where he is going in regard to his learning.

Some instructors may prefer working with an entire class, others may advocate small group or individual learning. Whatever the mode of instruction, the material and teaching strategy used in the Sort-Teach-Test-Sort Technique presents language units basic to all students, allows for paced learning and graphically reveals language acquisition curves.

Principle Six: Systematic measures of learning should maintained:

Language acquisition skills are closely related to sensori-motor and perceptual motor skills. As learning

advances there is a progressive increase in the frequency of correct responses throughout the entire repertoire of responses. A graphic representation of the frequency of correct responses would reveal various parameters of the learning that is taking place. Specifically these are: rate of learning, variability of learning, transfer of learning and the over-all effectiveness of the instructional technique.

There are many aspects of language learning that lend themselves to measurement. The instructor may best benefit from an assessment which is convenient and simple. The student, too, would benefit from an easy-to-interpret graphic assessment of learning. For these reasons, the use of learning curves can be particularly helpful.

The Sort-Teach-Test-Sort Technique facilitates assessment of learning by developing an individual learning curve which reflects the progress of each student.

Principle Seven: Feedback about rate of learning facilitates learning:

An important behavioral principle serves as a basis for the concept of "feedback". The knowledge that a response is correct reinforces the learning of that response and tends to increase the likelihood of changing a behavior. A check-sheet, a ruled form, an itemized list or any other method of accountability may serve the purpose.

Learning curves are an essential part of the Sort-Teach-Test-Sort methodology. The student is able to determine his

progress at any time and be informed of any change he may want to make.

Principle Eight: Repetition and drill should occur within a meaningful context:

Repetition and drill are common teaching strategies in most language learning programs. Repetition is necessary so that responses can become skills. Through repetition of relevant stimuli, the student learns to discriminate those stimuli from other non-relevant stimuli. Discrimination learning is the basis for all learning; that is, the ability to identify a relevant stimulus in a given context.

Slobin (1971), a noted psycholinguist, wrote "In order to acquire language the child must attend both to speech and to the contexts in which speech occurs...." The value of repetition is enhanced when carried out in meaningful contexts. The Sort-Teach-Test-Sort Technique utilizes this principle by presenting each word in sentence form.

CHAPTER III

PROCEDURE

SUBJECTS

The subjects used in this study were non-native English speakers who were chosen by their availability. They were all enrolled in the curriculum at Eastern Illinois University, Charleston, Illinois, or Lakeland Junior College, Mattoon, Illinois. The study involved ten subjects consisting of three males and seven females with an age range of 19-26 and 22-26 years for men and women respectively. The average age for each sex was 23 years.

The geographical distribution revealed subjects from four nations: five subjects from the Republic of China (Mandarin Chinese dialect), three subjects from Iran, one subject from Vietnam and one subject from Japan. With a range of 1.5 months to six years, each subject had resided in the United States an average of twelve months.

Previous years of instruction in English ranged from zero to seven years, with an average of 4.2 years of English instruction prior to United States residency. Of the ten subjects three were majors in Mathematics, three in

Chemistry, one in Medical Technology, one in Literature, one in Sociology and one in Humanities.

EXPERIMENTER

The experimenter was enrolled in the Graduate School of Speech Pathology and Audiology at Eastern Illinois University. She had only a limited knowledge of Spanish and was completely unfamiliar with any of the native languages represented in this study.

MATERIALS USED WITH THE SORT-TEACH-TEST-SORT TECHNIQUE

The Sort-Teach-Test-Sort Technique employs the use of IBM computer cards each having one word printed in the upper left corner. The words are the most frequently occurring English vocabulary words as compiled by Griffith and Miner in Reference Word Lists: Grade Levels One and Two, Reference Word Lists: Grade Levels Three and Four and Reference Word Lists: Grade Levels Five and Six (Bell and Howell, 1973). The number of cards in these first three levels are 1,000, 1,500 and 1,500 respectively; a total of 4,000 words. The remaining grade levels were not used in this study due to the level of need of the students who served as subjects.

The IBM vocabulary cards were randomly separated into packets of 20 cards. "Grade Levels One and Two" and "Grade Levels Three and Four" each contributed ten words to

make a packet of 20 for the first 100 packets used. The remainder of the cards were randomly separated into stacks of 20 within their respective grade levels.

TRAINING SESSIONS

Individual training sessions were held one week prior to the execution of this study. Each subject met with the experimenter for 30 minutes to become familiar with the Sort-Teach-Test-Sort Technique and to establish a baseline level at which the subject knew 50% of each packet of 20.

Nine subjects began their first session with the first packets of 20 which consisted of ten words from the first two grade levels. The tenth subject began with the randomly mixed word cards from Reference Word Lists: Grade Levels Three and Four (Bell and Howell, 1973) and proceeded to the next level when she had completed the previous levels.

The number of net words learned during these training sessions were tallied, labeled and plotted on the learning curves along with the remaining ten sessions.

INSTRUCTION SESSIONS

This study included one training session and ten succeeding sessions for each subject ranging over a one month period. Each subject met for 30 minutes of instruction on an average of three times a week.

CONTROLLING FOR VARIABILITY

To control for variability and to insure that each word was defined in the same manner from word to word and from subject to subject, this study utilized a structured procedure of word definition. A series of cues were presented on the backside of each word card. These cues consisted of an identification of the specific word and its grammatical function along with synonyms, antonyms, sentences using the word to be learned, suggestions for pantomime and references to possible picture aids. The backside of a vocabulary word card was cued in this manner:

| | |
|--------------------------------|---|
| WORD: in - prep. | PANTOMIME SUGGESTION: Put something in a box, take it out again. |
| SYNONYM: inside, within | |
| ANTONYM: outside, out | PICTURES: Something <u>in</u> a chair, also, not <u>in</u> a chair. |
| We are <u>in</u> the room. | |
| The card is <u>in</u> the box. | |

As the experimenter began to teach the word, he first identified the grammatical function of the word; then presented the synonyms, antonyms and contextual cues. If all these strategies failed to convey the meaning, the experimenter would then use pantomime and pictures when possible.

The synonyms and antonyms were chosen from the Advanced Learner's Dictionary of Current English, Hornby, Gatenby and Wakefield, Oxford University Press (Second

Edition), 1963. This dictionary was written with the intention of simplifying definitions of words. That is to say, the dictionary attempts to use common words in the definition of common words. Because of this, definitions may include other newly learned words and provide excellent reinforcement for learning.

In the case of multiple meanings, the first meaning of a word was defined according to the aforementioned cues and was indicated as being the most common meaning. The other meanings were briefly explained; however, there was no need to keep these definitions constant for the subject was "tested" on the primary meaning of the word only. Words that were found to have two or three-fold grammatical functions, such as a noun, verb and adjective were presented in a context for each function. The subject was required to use only one form of the word on his final assessment.

METHODOLOGY

The Sort-Teach-Test-Sort Technique carried its methodology in its name. Each step was discrete and purposeful, making orientation to each particular task easily accomplished.

STEP ONE: Experimenter selected a packet of 20 word cards to be learned by the subject.

Procedure: Decisions concerning which 20 cards among the first 1,000 common words is an instructor judgment based on her evaluation of the student's linguistic

needs. If particular words such as types of foods, articles of clothing, transportation, action verbs, etc., seem to have priority, then begin with those words. If there are no priorities among the first 1,000 words, then proceed alphabetically with cards 1-20, 21-40, etc. The author's experience suggests that 20 words is neither too many nor too few to work with.

STEP TWO: Subject sorted word cards into three piles:

Pile one: "I know these words"; Pile two: "I maybe know these words"; Pile three: "I don't know these words".

Procedures and Teaching Hints: It is crucial that the student understand the task presented at this point. He must have a clear conception of the discrete categories of the three piles "yes, maybe and no". If the student is unable to understand English directions, special orientation procedures must be taken. The instructor may want to obtain three boxes and with the use of a dictionary of the student's language, write "yes, I understand these words", "I maybe understand (know) these words", "no, I don't know these words", in his native language on the appropriate box. To further exemplify the sorting task, the instructor may want to use pantomime. For example, he may pick up a card, look confused, shake his head "no" and put the

card in the "no" box; or he may shrug his shoulders, scratch his head and put the card in the "maybe" box; or he may smile, nod his head and immediately put the card in the "yes" box. The visual stimulation helps the student discern exactly what he is to do. With small children an instructor may want to code each box with the colors of a traffic signal; "yes - green, maybe - yellow, and no - red".

STEP THREE: Experimenter counted and recorded the number of cards in each pile.

PROCEDURES: Using a recording sheet, (a sample recording sheet is included in Appendix A) the instructor writes those stimulus words in the middle pile in a column marked "maybe" on the recording sheet. He then writes those stimulus words in the "no" pile in the column marked "no" on the recording sheet. Tallies are made for each column at the start and the end of each session. These serve as a basis for measuring learning. As the technique progresses and words are learned, the instructor draws an arrow from each word to its final column indicating a shift in status of the word. In this way, each word learned can be identified by its final placement in the "yes" pile.

STEP FOUR: Experimenter began teaching cards in the middle pile.

Procedures: Because the words in the "yes" pile are already learned and the words in the "no" pile have no meaning to the individual, the words in the "maybe" pile have the highest probability of being learned. In order to check the reliability of the sorter at the beginning of the session, the instructor may wish to randomly select words from the "yes" pile and have the student give the meaning. In this way the student's reliability can be confirmed and the instructor can indeed rely on the "yes" words as being learned words. If it is found that there are many words in the "yes" pile that are unknown to the student, reliability will be low. Perhaps the most probable cause for this would be inadequate instruction or incomplete comprehension of the task that is to be performed. In this case, a more thorough explanation and demonstration of the task would probably correct for this unreliability. Teaching experience has repeatedly shown that students can go through the Sort-Teach-Test-Sort Technique with no difficulty if they understand the directions and that their judgments are usually reliable.

As he defines the words, the instructor should use every possible means to communicate. He may want to employ the use of synonyms, antonyms, contextual

presentations, pictures, pantomime, and native-language translations (only if necessary).

Once the words in the middle pile have been worked through by the student and the instructor, they are presented to the student again for testing and re-sorting. Each vocabulary card is shown to the student and he is asked to indicate his comprehension of the word in a manner acceptable to the instructor.

The experimenter in this study required the subject to use the vocabulary word in a sentence exhibiting its correct meaning in context. Then the cards would be re-sorted into one of the three piles. Usually in re-sorting, the shift was made from the middle pile to the first pile - the "yes" pile. On occasion a re-sort would shift a card to the "no" pile. This probably meant that something occurred during the instructional period which interfered with the partial information the subject had.

STEP FIVE: Subject continued to re-sort the middle pile.

Procedure: If there are any remaining cards in the middle pile the instructor defines them again and the student must show adequate comprehension of the meaning. He then re-sorts the middle pile for a final time. When there are no cards remaining in the middle pile, the student begins to re-sort the third pile. Many of these words may go back to the third pile, however,

some may shift into the middle pile. This occurrence is evidence of "transfer of learning", that is, the student's work on the prior items has facilitated his understanding of words that were previously not understood.

The entire instructional procedure (Steps Two through Five) is then repeated using the words in the third pile, that is, the "no" pile.

In summary, the words were presented, sorted, explained, discussed, tested and re-sorted to determine how many words were learned. Specific scoring procedures will be discussed.

RECORDING OF DATA

The recording sheet used in this study consisted of three columns entitled "yes", "maybe" and "no" with 20 lines under each column (See Appendix A). As each packet of 20 cards was presented and sorted, the experimenter listed the words in the "maybe" and "no" piles in the appropriate column on the recording sheet. As the subject re-sorted the words, any change in status of a word was indicated by an arrow from the word to the appropriate new column.

(To exemplify, let's work with the word come. The word card with the word come is sorted and placed in the middle pile on the table denoting only partial understanding. The instructor writes the word come in the appropriate column on the recording sheet. He then defines the word (along

with any other words in the middle pile). At this time the student re-sorts the words and places come in the "yes" pile. The instructor then draws an arrow from the word come in the middle column to the "yes" column on the recording sheet to indicate a change in status of the particular word.)

In like manner all the words dealt with were recorded at the beginning of each session and shifted on the recording sheet to the appropriate column to indicate the total number of words learned at the end of the session.

The number of words that were moved from the "maybe" and "no" piles to the "yes" pile were recorded as "net words learned" per session. The number of words that were learned from each session were plotted on an axis, with the number of words learned represented on the ordinate, the session numbers on the abscissa.

SAMPLING AND TESTING PROCEDURES FOR RETENTION TEST ONE

A retention test was given two weeks after the final instruction session. A random sample of 50 words was compiled for each subject. Twenty-five words were obtained from the words originally categorized in the middle pile, that is, those words with a high probability of being learned. Another 25 words were obtained from the original words in the third pile that contained words with a lesser probability of being learned readily. A table of random numbers was used for word selection.

Each subject was given a list of the 50 words that were chosen from the words he had "learned" during the instructional sessions and the following directions were administered:

"Please read each word aloud, then make a sentence with the word to show me that you know what the word means. For instance, if the word were cat, you could say "I have a baby cat". This shows you know the meaning of the word. Do not say "I see a cat." because that sentence does not show that you know what a cat is. If you do not understand the meaning of a word, you may guess and make a sentence if possible. The instructor will write each sentence as you say it."

Each sentence that the subject formulated was written next to the appropriate word on a recording sheet. The subject proceeded to use each word in context until all 50 words had been tested.

SCORING OF RETENTION TEST ONE

The criterion for scoring the test responses was based wholly on the subject's indicated comprehension of the meaning of the word rather than the correct grammatical use of the word. A response sentence was scored as correct if the context of the sentence reflected the correct meaning of the word being tested.

Two scores were computed for the retention test:
1) the percentage of correct words of the 25 high probability words and 2) the percentage of correct words of the 25 lesser probability words.

SAMPLING AND TESTING PROCEDURES FOR RETENTION TEST TWO

Three weeks after the administration of Retention Test One, a second retention test was given. Each subject was informed of the test in advance in order to insure his availability. Word lists were not given to the subjects for home study prior to either retention test. The second retention test consisted of the same words that were presented on Retention Test One, however, the subjects were not aware before the second test that the words would be repeated. Instructions for the second retention test were identical to the first.

SCORING FOR RETENTION TEST TWO

The criterion for scoring Retention Test Two was the same as it was for Retention Test One. A percentage of the words correct for each of the two categories (high probability words and low probability words) was then computed.

ANALYSIS OF DATA

A learning curve was plotted for each subject to represent graphically the rate, variability and transfer of learning throughout the eleven instructional sessions. Transfer of learning can be defined as "...Any method for measuring the influence of practice at one activity upon the rate or characteristics of the learning of the second activity" (McGeoch and Irion, 1953). They further explain,

"...Transfer of training occurs whenever the existence of a previously established habit has an influence upon the acquisition, performance or relearning of a second habit".

At the outset of this study the question was raised concerning whether or not the number of words learned in session one was significantly different from the number of words learned in session eleven. A null hypothesis would state that there is no statistically significant difference between scores from session one and scores from session eleven. A Mann-Whitney-U test was utilized to test this hypothesis.

Another purpose of this study was to investigate the relationship between the number of "maybe" words and "no" words retained as revealed by the percentage correct on two retention tests. Although the "maybe" words were words already partially known by the subject and the "no" words were initially unknown words, the investigation proposed to discover whether any possible differences in retention scores for those two classifications of words were due solely to chance or whether other relevant factors contributed to the differences. The null hypothesis states: there is no statistically significant difference between retention scores for "maybe" words and "no" words on Retention Tests One and Two.

A t-test for Matched Samples was used to determine whether or not there was a statistically significant

difference between: 1) the number of "maybe" and "no" words retained on Retention Test One, and 2) the number of "maybe" and "no" words retained on Retention Test Two.

This study was also concerned with discovering differences in retention scores between Retention Tests One and Two. The methodology of this study required a three week time interval between administration of Tests One and Two. The specific concern was to determine whether or not any differences in scores from Test One to Test Two were due solely to chance or whether other variables relevant to this study may have accounted for the differences. The null hypothesis states: there is no statistically significant difference in the percentage scores of Retention Test One and Retention Test Two for "maybe" and "no" words for each subject. The Lawshe-Baker Nomograph was utilized to test the statistical significance of differences between percentage scores on the retention tests.

CHAPTER IV

RESULTS AND DISCUSSION

The Sort-Teach-Test-Sort Technique of teaching English vocabulary to non-native English speakers was administered to ten non-native adult speakers. Each subject received eleven one-half hour instructional sessions. All words presented to the subjects were categorized by the subject as: already known ("yes" words), partially known ("maybe" words) and unknown ("no" words). After being categorized the word cards were placed in appropriate piles. The words were then taught and totals of words learned and learning curves were plotted for each subject. Retention tests were given two and five weeks following the last instructional session and percentage scores were recorded for each subject.

In order to determine the significance of this instructional technique, statistical analysis was applied to the data. Following are the findings and discussion of the data analysis.

NEW WORDS LEARNED

Each subject was provided with packets of 20 vocabulary word cards to be learned at his own pace. When all cards were categorized by the subject as "yes", "maybe" and "no"

words they were taught according to the specific methodology. After being tested and judged as learned, the total words learned were recorded and another packet was presented to the subject. Table I shows a compilation of the total number of vocabulary words that were designated as learned throughout eleven sessions for each subject. A breakdown of the total words showed the number of words that changed their status from being partially known ("maybe") words and unknown ("no") words to become fully known or learned ("yes") words.

TABLE I. NUMBER OF NEW WORDS LEARNED BY INDIVIDUAL SUBJECTS WITH ELEVEN INSTRUCTIONAL SESSIONS INITIALLY CATEGORIZED AS "MAYBE" AND "NO" WORDS.

| SUBJECT | "MAYBE" | "NO" | "TOTAL" |
|---------------|---------------|---------------|---------|
| #1 | 124 | 98 | 220 |
| #2 | 94 | 109 | 203 |
| #3 | 133 | 119 | 252 |
| #4 | 42 | 196 | 238 |
| #5 | 98 | 82 | 180 |
| #6 | 57 | 228 | 285 |
| #7 | 129 | 115 | 244 |
| #8 | 95 | 118 | 213 |
| #9 | 52 | 175 | 227 |
| #10 | 52 | 164 | 216 |

Due to the fact that each subject worked at his individual pace, there were differences in the total numbers of words learned as well as in the sub-totals of "maybe" and "no" words. The proportions of "maybe" to "no" words did not remain constant among the subjects because of each individual's prior experiences and knowledge of the words presented.

ANALYSIS OF LEARNING CURVES

Each subject's learning curve represents the number of vocabulary words learned per session; that is, the total number of vocabulary words which were transferred from the "maybe" and "no" piles to the "yes" pile during each session.

Figure 1 represents the learning curve for subject one. Examination of this curve revealed rapid learning as shown by its steep ascent throughout the first five sessions. This subject cued into the learning task easily by the second session and transferred his knowledge of that task to each remaining session. This is demonstrated by the steadily increasing number of words learned per session up to session nine. The last two sessions appear to mark a beginning of a stabilization of responses.

A curve of best fit for Figure 1 would reflect the curve's ascent and would not reveal deviations from the rising pattern. The subject was able to learn to discriminate relevant features of the task and to generalize the discrimination learning from session to session.

Subject two's learning curve is represented in Figure 2. This curve demonstrated an extremely rapid acquisition of the learning task as shown by the doubled and tripled number of words learned in the second and third instructional sessions, respectively. The fourth and fifth sessions showed return to the level of words recorded on the second session. However, from the fifth to eleventh session there was a rapidly

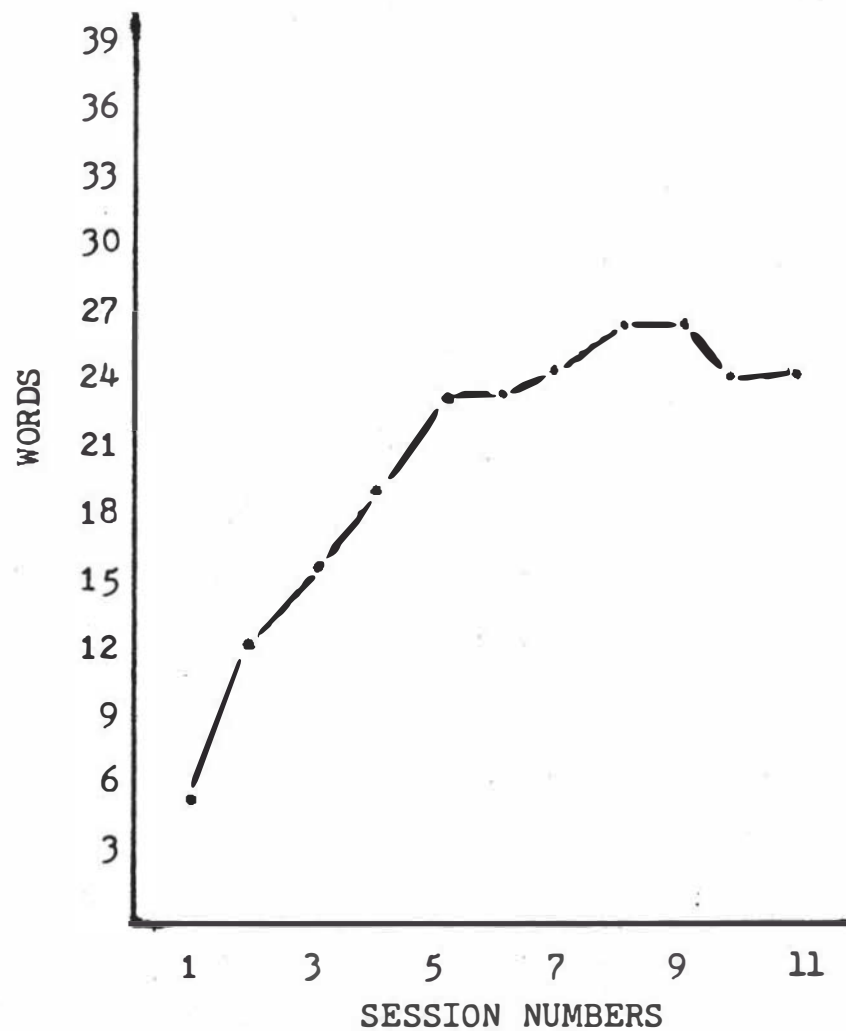


Figure 1. Learning Curve - Subject One

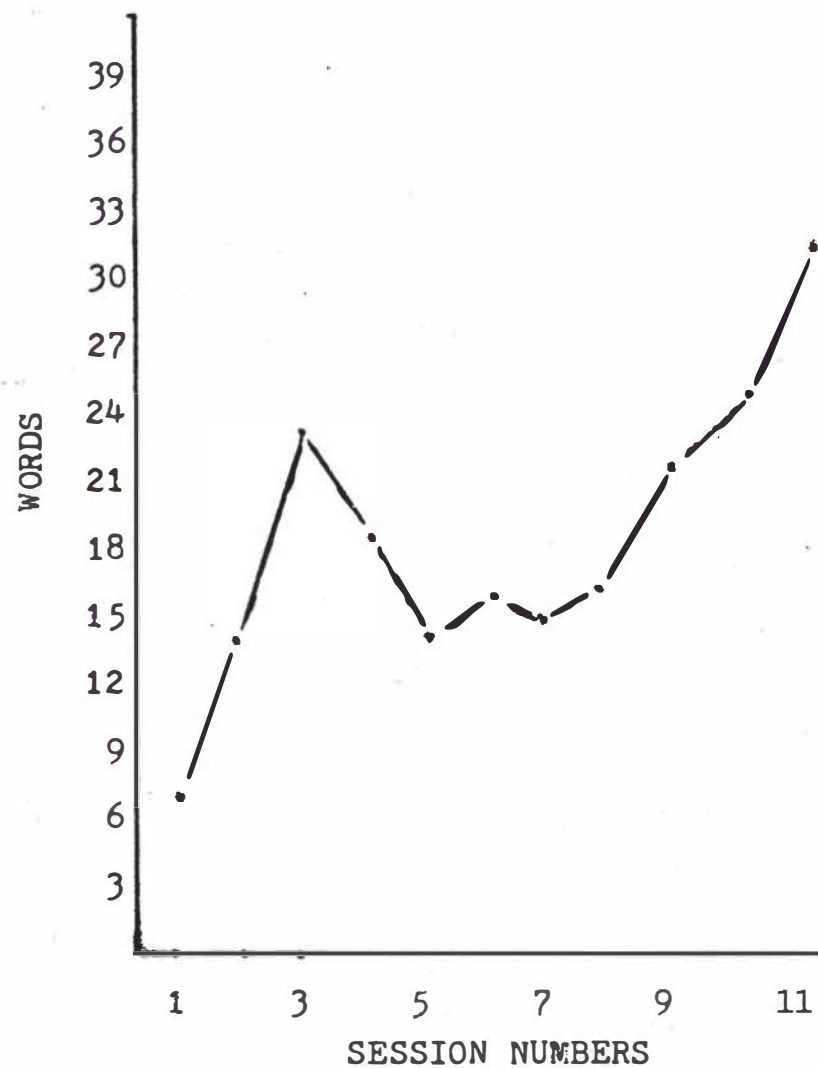


Figure 2. Learning Curve - Subject Two

increasing value per session. This gave strong evidence of a learning task which was quickly learned and generalized. A curve of best fit would show an ascending curve which had not reached a plateau.

Examination of subject three's learning curve in Figure 3 revealed a rapidly rising curve showing a transfer of the subject's ability to cue into the learning task from session to session. This subject began with a learning rate of 11 words per session in session one and proceeded to 29-30 words per session in session eleven. There was no plateau of values noted for this subject; the curve would indicate at this point that its direction was upward.

Figure 4 represents the learning curve for subject four. Analysis of this data showed a steadily increasing number of words learned from session one to session five. Sessions six to eleven exhibited a plateau-type performance between 22 and 28 words per session. The form of this curve indicated that stabilization of the ability to perform the task had taken place at this time.

Subject five once again exhibited a rapid increase of learned words from session to session as shown in Figure 5. Sessions one to six revealed an increase from five to 20 words per session, this would indicate that there was a carry-over of the knowledge gained in the beginning sessions to the remaining ones. The subject's final sessions showed a maximum of 26 and 25 words. At that point the curve did not indicate that a plateau of responses had occurred.

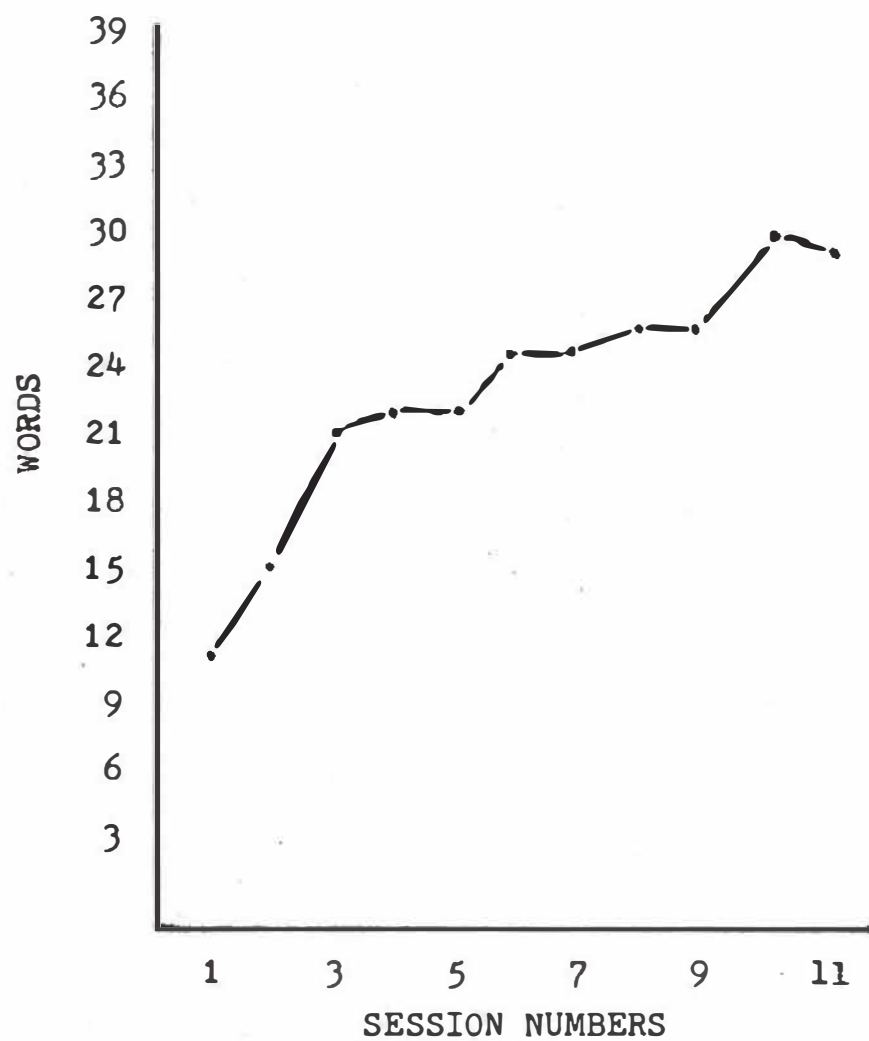


Figure 3. Learning Curve - Subject Three

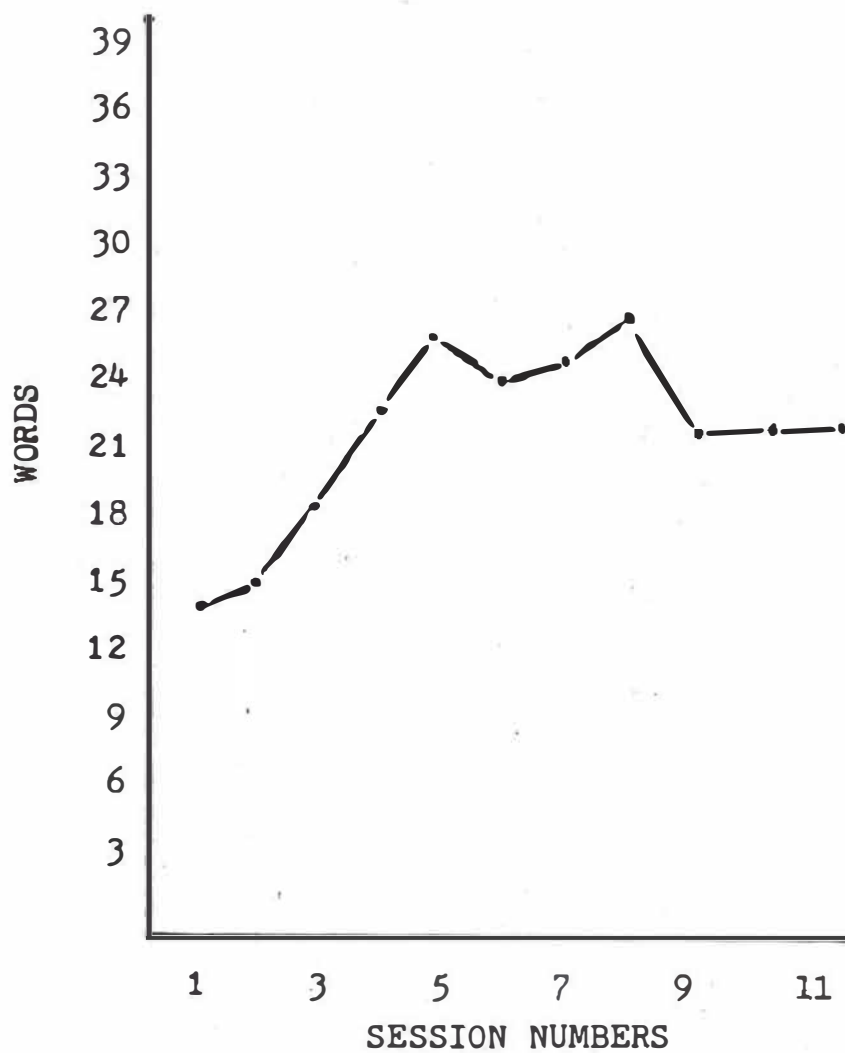


Figure 4. Learning Curve - Subject Four

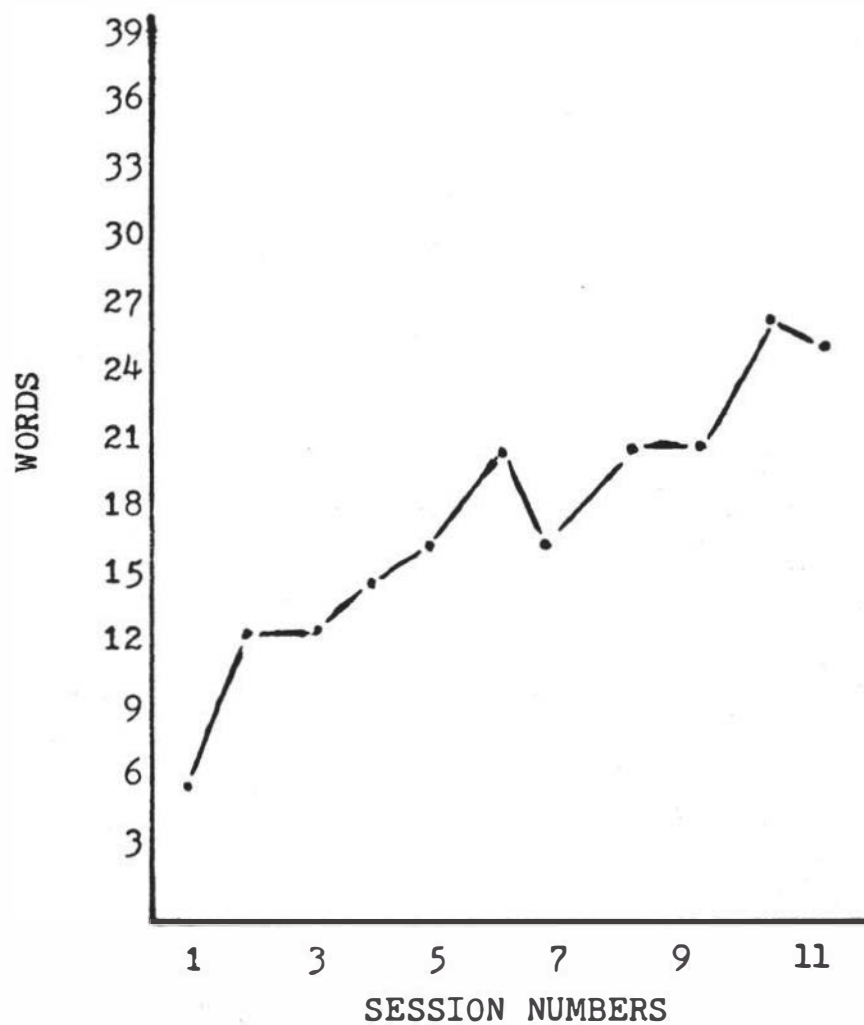


Figure 5. Learning Curve - Subject Five

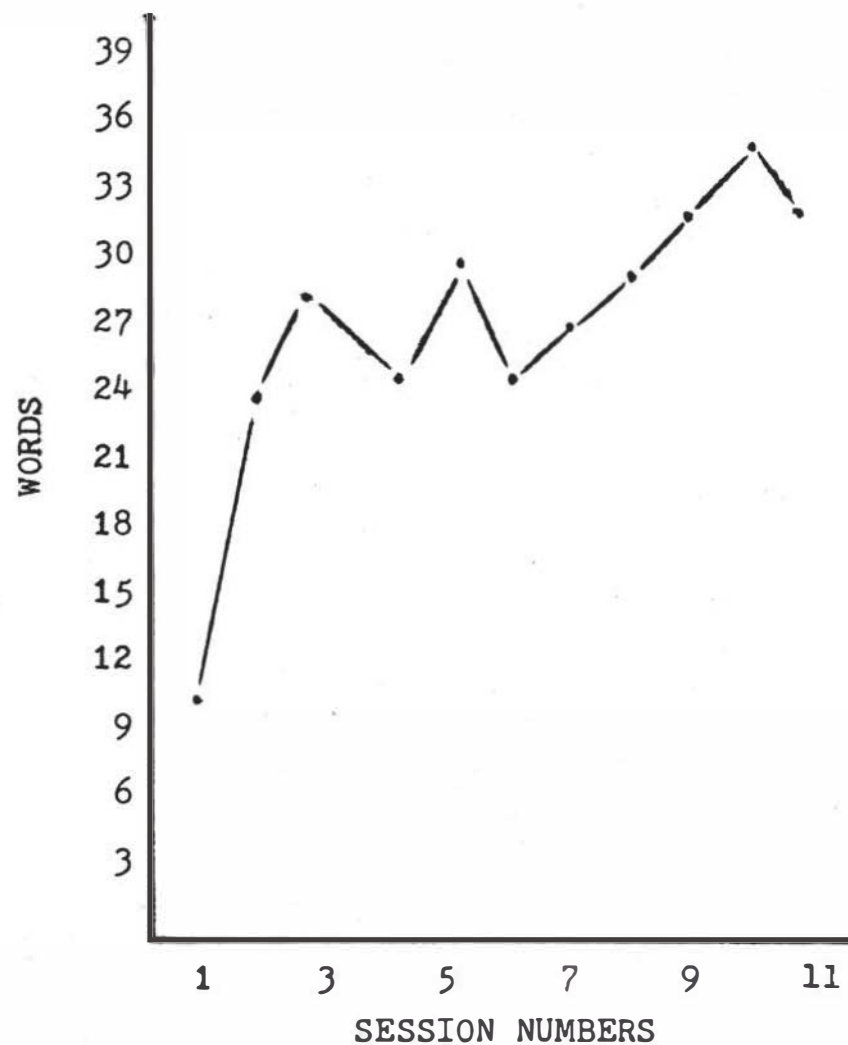


Figure 6. Learning Curve - Subject Six

Figure 6 shows that subject six exhibited an immediate competence for task by learning twice as many words in the second session as in the first session. Sessions two through eight showed a small variability of the number of words per session, maintaining performance between 24 and 29 words. Session nine marked the beginning of another increase in values which then varied from 31-34 words until the eleventh session. As noted in the previous curves, there was no determinable plateau to the learning by the eleventh session.

Subject seven's learning is reflected in Figure 7. With a relatively high first-session value, the subject showed a rather flat acquisition curve through the first five sessions as compared to those subjects whose learning curves have already been discussed (See Figures 1-6). However, sessions seven through eleven evidenced a transfer of learning by rendering an increase in the number of words learned from session to session. The curve did not exhibit a response plateau after the eleven sessions.

Subject eight's acquisition of vocabulary words is shown in Figure 8. An analysis of this curve showed a rapid increase in the values from session one to session two. Sessions three through eleven showed an upward movement of the curve with slight variability from session three to six. The curve indicated that a plateau had not yet been obtained.

An analysis of subject nine's learning curve (Figure 9) showed an overall upward movement from session one to eleven.

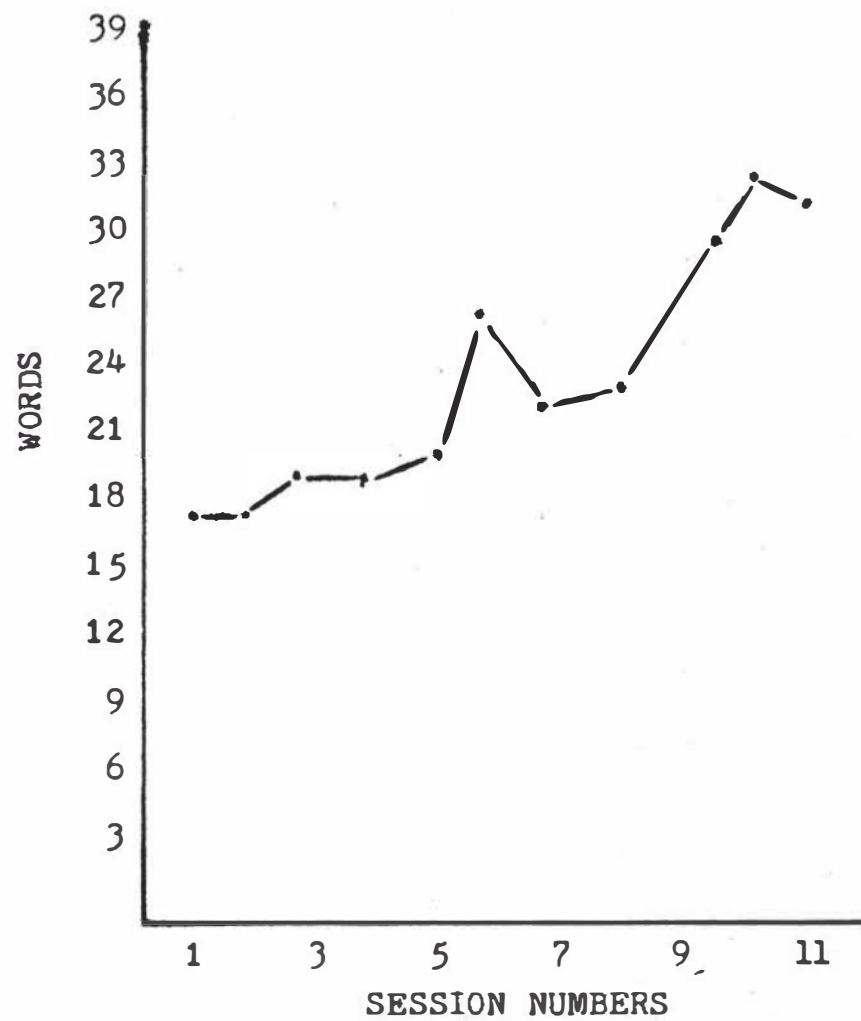


Figure 7. Learning Curve - Subject Seven

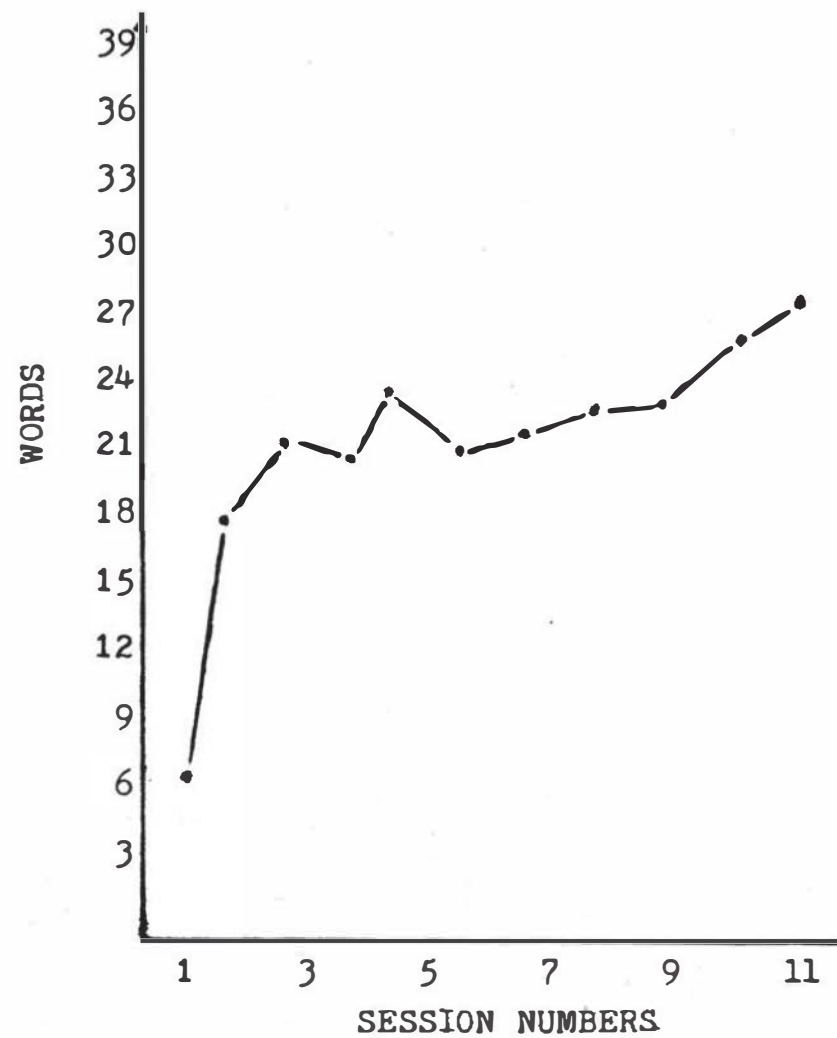


Figure 8. Learning Curve - Subject Eight

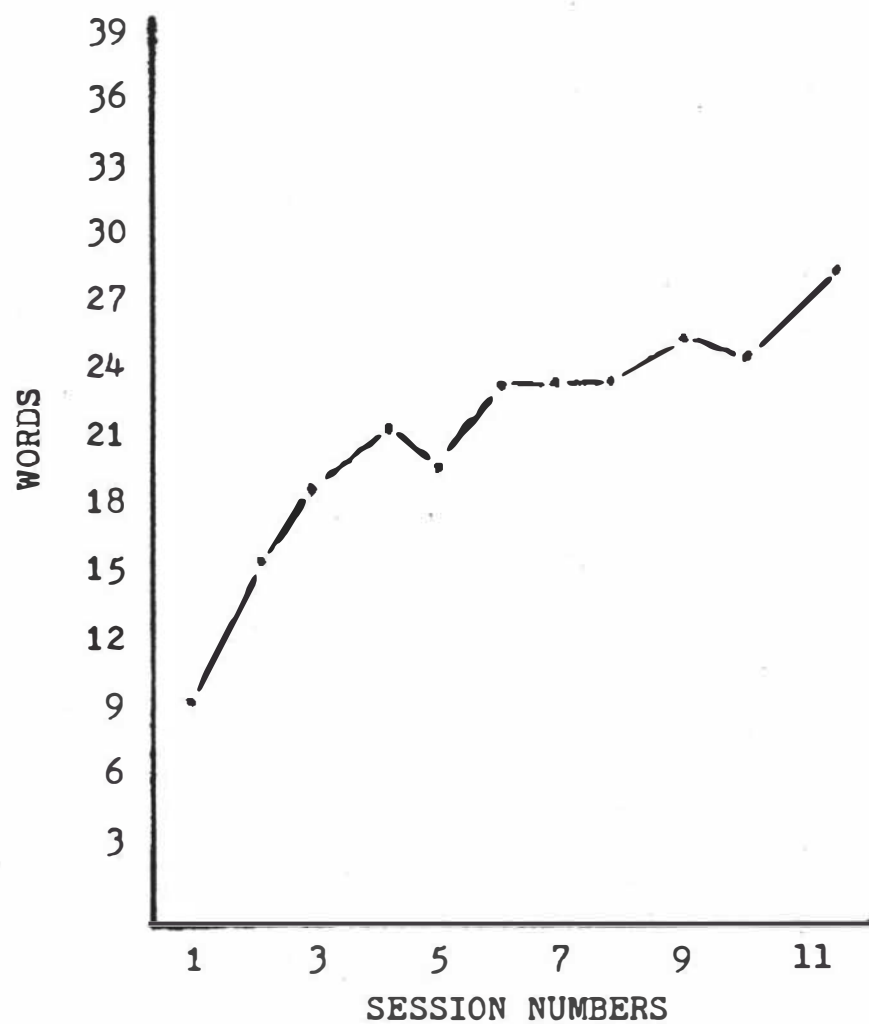


Figure 9. Learning Curve - Subject Nine

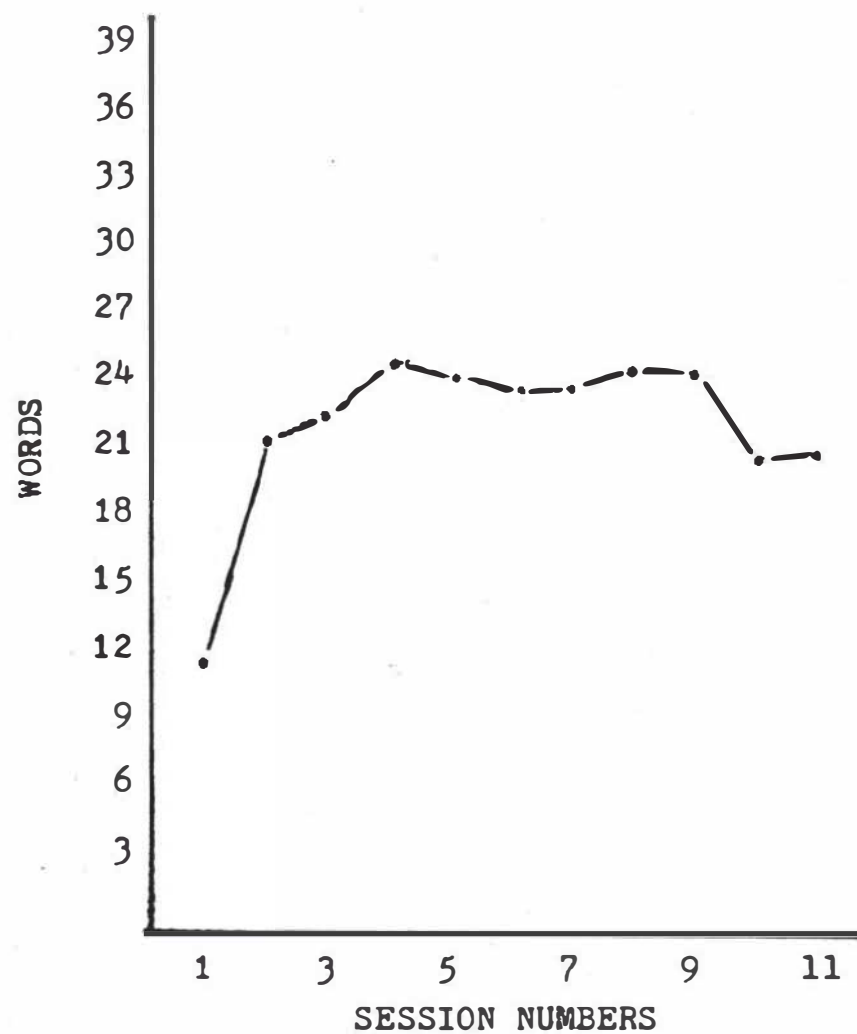


Figure 10. Learning Curve - Subject Ten

As the subject learned the relevant features of the learning task, he carried this knowledge with him from session to session which resulted in an increase in the number of words recorded per session. There was no learning plateau evidenced through the eleven sessions for this subject.

Figure 10 displays the learning curve of vocabulary words learned per session for subject ten. This subject cued into the task rapidly as revealed by a sharp increase in the recorded values from session one to session two. From session four to session nine there was a plateau of learning evidenced. This is represented by a small variance from 21-25 words. Sessions ten and eleven displayed a small decrease indicating a possible loss of the "learning set" and discriminative skills which were necessary for the task.

It should be noted that due to unforeseen complications and increased work load, subject ten could not complete the remaining procedures of this study. It was felt that these factors may explain the decreased scores from the last two sessions.

At the outset of this study, the relationship between the number of words learned in session one and session eleven was hypothesized. In null form it stated: there is no statistically significant difference between the number of words learned in session one compared to session eleven.

To test this hypothesis a Mann-Whitney-U Test was utilized. A U of 0.00 was obtained. A table of critical

values showed that a U of less than 19 was needed to be significant at the .01 alpha level. Since the obtained U value of 0.00 was less than the critical value of 19 the null hypothesis was rejected at the .01 level.

The rejection of the null hypothesis suggested that as a result of the application of the Sort-Teach-Test-Sort Technique, the number of words learned in the last session was significantly higher than the number of words learned in the first session. By the eleventh session each subject was learning, on the average 27 words per 30 minutes. This means that the Sort-Teach-Test-Sort Technique was effective in significantly increasing the number of words learned per session over an eleven session duration.

SUMMARY OF ANALYSIS OF LEARNING CURVES

The learning curves were presented and analyzed for the following factors: rate of acquisition of the task, variability of response, presence or absence of a plateau performance and significance of difference between first session and last session values.

All subjects showed rapidly increasing values from the first session to the fifth with the exception of subject number seven. A rapid increase in the number of words learned demonstrated that the subjects cued into the task rapidly and transferred the relevant features from session one to the following sessions. The subject's chances for a better score with each new session were increased due to the

very nature of the learning task. That is, as vocabulary enlarged, there was a corresponding increase in the body of knowledge from which the subject could command relevant and related cues.

Subject seven's first session yielded a score of approximately 12 words more than the scores for the other subjects. There was no immediate upward movement of the curve until session six where the curve then began its climb. This subject's scores may indicate that he was cued into the learning task at the outset of instruction. However, as time went on he discriminated other relevant features and used them, along with the words learned in the first sessions to improve his score for each remaining session after seven.

The rapid acquisition and comprehension of the learning task as revealed by the ten learning curves in this study suggested that the Sort-Teach-Test-Sort Technique for teaching English vocabulary is a method that is easily learned and one where the student can see progress often as soon as the second session.

Eight of the ten learning curves exhibited very little variability of learning, that is, upward and downward fluctuations in words per session. Figures 2 and 6 showed slightly variable responses around session 3-7, however, each curve returned to a rising configuration around sessions 8 or 9. Variability in learning is an expected part of any

learning curve. Each session is subject to the feelings of the student at that particular time; just as work performance is affected by personal feelings. There was, however, very little variability in learning as indicated previously. Perhaps this can be explained by one or a combination of the following points:

- 1) Each day the learning task became easier due to an expanded vocabulary (from the previous session),
- 2) The learning curves themselves acted as stimulation for self-competition,
- 3) The material to be learned included material with a high probability of being learned because it was already partially known,
- 4) The subjects did not tire of the task because new material was being presented at all times.

Seven of the ten learning curves did not demonstrate evidence that a plateau of learning had occurred by the eleventh session. This lends strong support for the interpretation that each session's learning supplemented the performance of the following sessions. The three subjects that exhibited a plateau performance (subjects one, four and ten) did so beginning from the third to fifth sessions and remained fairly stable throughout the remaining sessions.

It would be interesting to discover where a plateau of responses would occur for the seven subjects whose curve did not plateau, if the number of instructional sessions

were increased. The presence or absence of a leveling of response values may reflect individual capabilities of the subjects of this study. Theoretically, there may be a maximum value that any individual can obtain, given a specific time period in which to learn.

A statistical analysis of the ten learning curves revealed a significant increase in the number of words learned in session eleven as compared to session one as a result of the application of the Sort-Teach-Test-Sort Technique.

COMPARISON OF THE NUMBER OF CORRECT "MAYBE" WORDS TO THE
NUMBER OF CORRECT "NO" WORDS ON RETENTION TEST ONE AND
RETENTION TEST TWO

At the outset of this study the question was raised concerning whether or not there would be a statistically significant difference in the number of "maybe" words and "no" words learned and scored as correct on the Retention Tests. Retention Tests One and Two consisted of 50 words which were different for each subject. The words were randomly chosen from each subject's total set of words learned which were accumulated in eleven sessions. Each test was divided into two subtests consisting of 25 words each. Twenty-five words were chosen from the initially categorized "maybe" words (those having a high probability of being learned because they are partially known) and 25 were chosen from the previously designated "no" words (whose

probability of being learned was hypothesized as being lesser). The null hypothesis stated in Chapter III said: there is no statistically significant difference between retention scores for "maybe" words and "no" words on Retention Tests One and Two.

Table II displays the raw scores for each of the two subtests on Retention Test One for nine subjects. Each raw score represents the number of words scored as correct from the total of 25 words on each subtest. An examination of Table II showed higher scores for the "maybe" word subtest than the "no" word subtest for every subject.

TABLE II. NUMBER OF CORRECT "MAYBE" WORDS AND "NO" WORDS FROM A TOTAL OF 25 WORDS PER SUBTEST ON RETENTION TEST ONE.

| SUBJECT | RAW SCORE "MAYBE" | RAW SCORE "NO" |
|--------------|----------------------|-------------------|
| #1 | 21 | 18 |
| #2 | 22 | 13 |
| #3 | 22 | 15 |
| #4 | 20 | 16 |
| #5 | 21 | 18 |
| #6 | 19 | 15 |
| #7 | 19 | 17 |
| #8 | 18 | 15 |
| #9 | 23 | 16 |

A t-test for Matched Samples was used to determine the acceptance or rejection of the null hypothesis. The resulting t-value was 5.84. This value exceeded the .05 alpha level of 2.32 and the .01 alpha level of 3.36. This indicated there was a significantly higher number of "maybe" words retained

than "no" words; the null hypothesis was therefore rejected. The direction of the difference was shown by consistently higher scores for the "maybe" words. In view of this, the research hypothesis was accepted. It stated: there is a statistically significant difference between the number of "maybe" words and "no" words retained on Retention Test One.

These findings suggested that those items that were initially only partially known by the subject had a significantly higher probability of being retained after instruction than did those items which were totally unknown before instruction. This implied that a teaching strategy may well benefit by including in its body of material, some items for which the student has some previous reference.

Besides the categorizing of words into high probability and low probability sections, the Sort-Teach-Test-Sort Technique had in its methodology the ability to increase the probability of those words initially categorized as low probability words. That is, the "no" words that were not completely learned and retained "took on" a reference, thereby increasing their probability of being learned and retained.

Table III shows the raw scores obtained for each of the two subtests on Retention Test Two. An examination of this table showed consistently higher scores for the "maybe" words than for the "no" words for every subject.

TABLE III. NUMBER OF CORRECT "MAYBE" WORDS AND "NO" WORDS FROM A TOTAL OF 25 WORDS PER SUBTEST ON RETENTION TEST TWO.

| SUBJECT | RAW SCORE "MAYBE" | RAW SCORE "NO" |
|--------------|----------------------|-------------------|
| #1 | 25 | 20 |
| #2 | 22 | 16 |
| #3 | 24 | 24 |
| #4 | 20 | 19 |
| #5 | 24 | 22 |
| #6 | 24 | 17 |
| #7 | 20 | 19 |
| #8 | 21 | 19 |
| #9 | 25 | 22 |

A t-test for Matched Samples was again employed to determine the acceptance or rejection of the null hypothesis which stated: there is no statistically significant difference in the number of "maybe" words and "no" words retained on Retention Test Two. The resulting t-value for Test Two was 3.6. This value exceeded the .05 alpha level of 2.3 and the .01 alpha level of 3.3. This analysis revealed that there was a significantly higher number of "maybe" words retained and scored as correct. The null hypothesis is therefore again rejected. The acceptance of the research hypothesis means that there was a statistically significant difference in the number of "maybe" words than "no" words retained on Retention Tests One and Two.

In accord with the data of Retention Test One, those items initially categorized as partially known ("maybe") words showed significantly higher retention than did those which were completely unknown before instruction. Items

which have some reference with the student have a higher probability of being retained than those that do not.

COMPARISON OF PERCENTAGE SCORES OBTAINED FOR "MAYBE" WORDS
AND "NO" WORDS ON RETENTION TESTS ONE AND TWO

One purpose of this investigation was to discover differences in scores between Retention Test One and Retention Test Two. In order to do this, each subtest on Test One was compared with the corresponding subtest on Test Two. That is, scores from the "maybe" subtest on Test One were compared with the scores from the "maybe" subtest on Test Two for each subject. The "no" word subtests were compared accordingly. For purpose of statistical analysis, each subject's raw score (which represented words correct from a total of 25 for each subtest) was converted to a percentage score. Each percentage score represents the percent correct for each subtest from an N of 25 items.

Table IV shows the percentages correct of "maybe" words on both Retention Tests. Upon examination of this table it was evident that in no case was there a decrease in the percentage scores of Test Two as compared to Test One. Further perusal revealed that for seven of the nine subjects there was an increase in the percentage of correct words on Retention Test Two. The remaining two subjects' scores yielded the identical values as the null hypothesis indicated. The null hypothesis dealing with this aspect of this study

stated: there is no statistically significant difference in the percentage scores of Retention Test Two as compared to Retention Test One. To test this hypothesis, the Lawshe-Baker Nomograph for significant differences between percentages was employed. As Table IV shows, there were no decreases in the percentage scores on Test Two, but there was a statistically significant increase in scores on Test Two for three of the nine subjects as determined by Lawshe-Baker difference values. Subject one received a Lawshe-Baker score of .6, subject six yielded a .45 and subject nine obtained a .40; all of which exceeded the .05 alpha level of .39.

Lawshe-Baker difference values did not reveal a statistically significant difference in percentage scores of Test Two for "maybe" words for six of the nine subjects and the null hypothesis was accepted for these six subjects.

The acceptance of the null hypothesis for the six subjects implied that there was no significant decrease in retention from Test One to Test Two. In other words, retention was maintained over the three week period between the two tests.

Rejection of the null hypothesis for the three subjects previously identified means that there was a significant increase in retention scores on Test Two. In view of the fact that the subjects were not aware of the test words before the tests and were not permitted to have word lists, this increase in retention must have been a result of other

relevant factors. Some of the possible factors responsible for this increased retention are discussed shortly.

TABLE IV. TEST RETEST SCORES FOR "MAYBE" WORDS DISPLAYED AS PERCENTAGE CORRECT.

| SUBJECT | TEST ONE | TEST TWO |
|--------------|----------|----------|
| #1 | 84% | 100% |
| #2 | 92% | 100% |
| #3 | 76% | 96% |
| #4 | 88% | 88% |
| #5 | 88% | 96% |
| #6 | 72% | 84% |
| #7 | 84% | 96% |
| #8 | 80% | 80% |
| #9 | 76% | 80% |

Table V shows the percentages correct for the "no" words on both Retention Tests. Examination of this table shows a range from 52% - 72% on Test One and 64% - 96% on Test Two. In no case was there a decrease in percentage scores on Test Two. The table reveals that in fact each subject showed an increase of percentage values on the second test. Subject three and subject nine obtained Lawshe-Baker values of .70 and .45, respectively, which indicated a statistically significant increase in percentages on the second test by exceeding the .05 alpha level of .39.

TABLE V. TEST-RETEST SCORES FOR "NO" WORDS DISPLAYED AS PERCENTAGE CORRECT.

| SUBJECT | TEST ONE | TEST TWO |
|--------------|----------|----------|
| #1 | 72% | 80% |
| #2 | 64% | 88% |
| #3 | 60% | 68% |
| #4 | 52% | 64% |
| #5 | 60% | 96% |
| #6 | 60% | 76% |
| #7 | 72% | 88% |
| #8 | 64% | 76% |
| #9 | 68% | 76% |

The remaining seven subjects received Lawshe-Baker difference values which fell below the indicated alpha levels and did not show differences large enough to be considered more than a chance occurrence. For these seven subjects, the null hypothesis was accepted. In accord with the statistical analysis of the "maybe" words, the acceptance of the null hypothesis for these seven subjects (for the "no" words) showed that in seven of the nine cases there was no statistically significant decrease in retention over a three week period.

Rejection of the null hypothesis for subjects three and nine implies that there was indeed a statistically significant difference between retention scores on the two tests. This difference is in the positive direction. Those subjects actually received higher scores after a three week time interval had elapsed.

Tables IV and V are essentially showing an increase of scores over a three week period with no intermediate structured review of words, additional structured vocabulary learning and no previous knowledge of the words to be tested. Perhaps this increase in learning can be explained by one or a combination of the following points.

1. The words learned were chosen because of their high frequency of occurrence in the English language. The vocabulary that was presented was being reinforced, presented and re-presented in the everyday conversational language of the subjects, i.e., the words that were missed on Test One because they were only partially or incompletely understood gained meaning through their occurrence in everyday speech and the subject had a reference for the meaning that he previously did not have. When the same word appeared on Test Two the subject could express the meaning he had previously missed.

2. Those words missed on the "no" subtest had shifted their status from being unknown to being partially known because of the instructional procedure. Thus, the probability that these words will be closest to being learned is much greater than when their status was completely "unknown".

3. The subject is more "sensitive" to words and their meanings after having been involved in an intensive vocabulary learning program.

4. The subject has been provided with a systematic format for learning new vocabulary to which he can apply the learning of new word meanings.

5. The subject uses his new vocabulary to provide him with references on which to build new vocabulary.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this investigation was to assess the Sort-Teach-Test-Sort Technique of teaching English vocabulary to non-native English speakers. Learning curves were plotted to graphically represent learning and retention tests were given at specific intervals following instruction. Specifically, the following questions were posed at the outset of this study:

1. What do the resultant learning curves look like for ten sessions of instruction with the Sort-Teach-Sort Technique?
2. Is there evidence of transfer of learning from session to session?
3. Is there a statistically significant difference in the number of words learned in session one as compared to session eleven?
4. What is the percentage of retention two weeks and five weeks after the last instructional session for the "maybe" and "no" words?
5. Is there a statistically significant difference in the number of correct "maybe" and correct "no" words on Retention Test One?

6. Is there a statistically significant difference in the number of "maybe" words correct and the number of "no" words correct on Retention Test Two?
7. Is there a statistically significant difference between the scores from Retention Test One and Retention Test Two?

Ten adult non-native English speakers were administered the Sort-Teach-Test-Sort Technique for teaching English vocabulary for eleven sessions over a period of one month. Each subject worked individually and at his own pace. Each set of words to be learned were divided into high probability and low probability packets according to the subject's previous knowledge. The words classified by the subject as "maybe" known and "unknown" were then taught according to the prescribed methodology. The number of total words learned per session were recorded for each subject. A test of retention was given two weeks and five weeks following the last instructional sessions.

The Lawshe-Baker Nomograph was used to assess differences between percentage scores on Retention Test One and Two. A t-test for Matched Samples was applied to assess the differences between the number of correct "maybe" and "no" words for Retention Tests One and Two. Finally, learning curves were plotted for each subject representing total number of words learned per session.

CONCLUSIONS

The above statistical analysis was interpreted as follows:

1. Concerning the resultant learning curves representing words learned per session:
 - A. The majority of learning curves reflected a pattern of consistently rising scores from session one to eleven.
 - B. There was only a slight variability of values throughout the majority of the learning curves. In general the curves showed steadily increasing values with little deviation from the pattern.
 - C. There was some plateau of responses noted, however, the majority of the subjects still exhibited rising curves at the end of the eleven sessions.
2. A transfer of learning was indicated for all ten learning curves as shown by increasing numbers of words learned per session for all subjects.
3. Concerning the statistical analysis of the ten learning curves:
 - A. Statistical analysis revealed a statistically significant increase in the number of words learned in session eleven as compared to session one.

- B. Each subject learned on the average of 27 words per each 30 minute instructional session.
4. Concerning the percentage of retention for "maybe" known words and "no" unknown words:
- A. The percentage of correct "maybe" words ranged from 72% - 92% on Retention Test One and 80% - 100% on Retention Test Two.
 - B. The percentage of correct "no" words ranged from 60% - 72% on Retention Test One and from 64% - 96% on Retention Test Two.
5. Concerning the difference between the number of correct "maybe" known words and "no" unknown words on Retention Test One:
- A. There was a statistically significant difference between the "maybe" known words and the "no" unknown words scored as correct.
 - B. There was a statistically significant greater number of correct high-probability words ("maybe" known words) than low probability words ("no" unknown words).
6. Concerning the difference between the number of correct "maybe" known words and "no" unknown words on Retention Test Two:

- A. There was a statistically significant difference between the correct "maybe" known words and the correct "no" unknown words.
 - B. There was a statistically significant greater number of correct high-probability words ("maybe" known words) than low probability words ("no" unknown words).
7. Concerning the relationship of scores on Retention Test One and Retention Test Two:
- A. There was no statistically significant difference in the percentage of correct "maybe" known words on Retention Test Two as compared to Retention Test One for six of the nine subjects.
 - B. There was a statistically significant increase in the percentage of correct "maybe" known words on Retention Test Two as compared to Retention Test One for three of the nine subjects.
 - C. There was no statistically significant difference in the percentage of correct "no" unknown words on Retention Test Two as compared to Retention Test One for seven of the nine subjects.

- D. There was a statistically significant increase in the percentage of correct "no" unknown words on Retention Test Two as compared to Retention Test One for two of the nine subjects.

IMPLICATIONS FOR FURTHER RESEARCH

Inspection of the results of this study finds several manipulable variables which warrant further study. Follow-up studies might include:

1. Application of the Sort-Teach-Test-Sort Technique with varying ages, from school children to adults.
2. Application of the Sort-Teach-Test-Sort Technique utilizing group instructional sessions.
3. An investigation to determine the effects of different base languages on learning curves and retention of English vocabulary.
4. An investigation to discover learning rate and retention with words of less frequent occurrence in English.
5. An investigation to discover the nature of learning curves over a longer period of instructional sessions.
6. An investigation to evaluate retention after intervals as long as six weeks to one year.

In addition to the manipulation of variables, the Sort-Teach-Test-Sort Technique lends itself to a wider range of

study. The underlying principles of this technique (see Chapter II) are principles of learning which have reference to not only the teaching of English vocabulary words, but to many teaching tasks.

The flexibility of the methodology of the Sort-Teach-Test-Sort Technique is limited only to the imagination of the instructor. A classroom teacher, for instance, may utilize the concept of high-probability, low-probability learning material and the methodology of the Sort-Teach-Test-Sort Technique to teach color concepts, geometrical shapes, geographical skills, phonics and multiplication tables.

The speech clinician may use the Sort-Teach-Test-Sort methodology to elicit responses from aphasic and apraxic patients by categorizing stimulus words into high-probability of response and low-probability of response categories. He may also utilize this technique with certain aspects of a phonetic context approach to articulation therapy; that is, dividing a battery of words with the target phoneme into categories of production "correctness".

APPENDIX

SAMPLE RECORDING SHEET

Name _____ Session _____
 Date _____ Packet _____

| Yes | Maybe | No |
|-----------|-----------|-----------|
| 1. _____ | 1. _____ | 1. _____ |
| 2. _____ | 2. _____ | 2. _____ |
| 3. _____ | 3. _____ | 3. _____ |
| 4. _____ | 4. _____ | 4. _____ |
| 5. _____ | 5. _____ | 5. _____ |
| 6. _____ | 6. _____ | 6. _____ |
| 7. _____ | 7. _____ | 7. _____ |
| 8. _____ | 8. _____ | 8. _____ |
| 9. _____ | 9. _____ | 9. _____ |
| 10. _____ | 10. _____ | 10. _____ |
| 11. _____ | 11. _____ | 11. _____ |
| 12. _____ | 12. _____ | 12. _____ |
| 13. _____ | 13. _____ | 13. _____ |
| 14. _____ | 14. _____ | 14. _____ |
| 15. _____ | 15. _____ | 15. _____ |
| 16. _____ | 16. _____ | 16. _____ |
| 17. _____ | 17. _____ | 17. _____ |
| 18. _____ | 18. _____ | 18. _____ |
| 19. _____ | 19. _____ | 19. _____ |
| 20. _____ | 20. _____ | 20. _____ |

Number of words from maybe to yes _____

Number of words from no to yes _____

Total number of words learned _____

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