Function of Syntactic Structures in Recall of Spoken English by Individuals With Language Deficit.

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FUNCTION OF SYNTACTIC STRUCTURES IN RECALL OF SPOKEN ENGLISH BY INDIVIDUALS WITH LANGUAGE DEFICIT

A Dissertation

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy in

The Department of Speech

by

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B.Sc., University of Western Michigan, 1945
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Doctor of Philosophy, Summer Commencement 1968.

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ABSTRACT

This study is concerned with the problem of whether or not individuals with language deficits attributed to three different etiologies use syntactic forms in a similar way to assist in recall of auditory verbal material beyond their immediate memory span for single words.

Three groups of subjects were selected on the basis of language deficit. Each group was composed of twenty-five individuals chosen from the following populations: (1) aphasics, who had suffered a memory loss for language due to cerebral injury; (2) children, between the ages of two years six months and four years six months, who were acquiring language; and (3) young adults learning English as a non-native language. To be a member of a group, each individual had to be able to repeat two words in sequence in response to auditory verbal stimuli. At the upper limit, the individual's mean sentence length could not exceed five words per five responses of spontaneous spoken language. Those with language deviations caused by hearing loss, mental retardation, or unknown etiology were not included in the study.

Prior to investigating the role of syntax in recall of auditory verbal materials beyond memory span, it was
necessary to establish the limits of memory span for each group. A test to measure auditory memory span was constructed consisting of lexical words arranged in word strings of increasing length, from one word to eight words. Auditory memory span for each subject was established as the last level of successful repetition when presented with ungrammatically sequenced word strings as auditory stimuli.

Sentences used as stimuli for both comprehension and reproduction were constructed, with accompanying illustrations. Each individual was asked to indicate his comprehension of a sentence by pointing to the correct illustration of each sentence presented as auditory stimuli. Sentences were presented for repetition in order of ascending length, from two to three words in length up to fourteen words. Subjects repeated two out of three sentences correctly at every level of length in order to 'pass' a given level. The number of words in the last level of correct repetition was considered to be a subject's score for that syntactic form.

The verbal materials were divided into four categories to facilitate analysis of the obtained data: (1) ungrammatically sequenced words (single words); (2) grammatically sequenced kernel sentences; (3) grammatically sequenced simple transformations; and (4) grammatically sequenced general transformations.
Results of this study indicate that individuals with language deficit due to the three etiologies studied do use syntactic forms to assist in recall beyond auditory memory span for single words. For each group, the kernel form provides a grammatical sequencing that is easier to recall than any of the transformations from a kernel form. Syntactic forms which are transformations from a kernel sentence appear to provide equal assistance in recall beyond auditory memory span for single words.

Comprehension of grammatical forms is an easier task than is verbal reproduction of the same syntactic structures for individuals with language deficit attributed to the three etiologies studied.
CHAPTER I INTRODUCTION

The professional literature contains a considerable number of studies relating to language development in children. Until recent years, attention was focused on the acquisition of phonemes, the development of vocabulary, and the use of grammatical parts of speech. The research tools of phonetic analysis, statistic analysis, and spectographic analysis facilitated observations of these aspects of language development.

Syntax is that aspect of language which relates to the sequencing of words into sentences. The study of syntax has been handicapped by the lack of an orderly way to describe the structure of sentences within the language. Historically, attempts to describe syntactic development have been limited to the use of a few categories of description:

(1) number of words in a sentence
(2) completeness or incompleteness of a sentence
(3) type of sentence: simple, compound, or complex, compound-complex (22)

Recent progress in structural linguistics has provided investigators with a theoretical framework within which to analyze syntactic structure. In 1957, Chomsky (8) described a system of rules for converting one grammatical sentence into another. This system permits a step by step description of the transformation
from the underlying base structure to the sentence as
uttered. Current investigators are hopeful that this
system of explaining derivations will provide new insights
into the syntactic laws of language. Use of this system
may also help in the understanding of acquisition or
dissolution of syntax in those individuals who have
language deficit.

Menyuk (25) has shown that this model of generative
grammar may be used in the description of sentences
occurring in children's grammar. She has also explored
the syntax of children diagnosed as having 'infantile
speech'. It was found that this transformational model
permits description of the infantile speakers' method of
sequencing words.

Statement of the problem The purpose of this study
is to explore the problem of whether individuals with
language deficits of differing etiology use syntactic
forms in a similar way to assist in recall and comprehension
of auditory stimuli beyond their immediate memory span.

This study is delimited to include individuals with
language deficits attributed to three different etiologies:

(1) individuals with aphasia who have suffered a
memory loss for language due to cerebral injury,
(2) children from age two years six months to four
years six months who are acquiring their native
language,
(3) young adults who are learning English as a
second or non-native language.
Those with language deviations caused by hearing loss, mental retardation, or unknown etiology are not included in this study.

It is hypothesized that both the ability to recall and the ability to comprehend verbal auditory stimuli depends in part on the individual's ability to retain sequential verbal material. It is assumed that auditory memory span is one of the factors limiting such retention. The literature contains many studies demonstrating that children have reduced auditory memory span. The literature also contains references to the reduced auditory memory span that occurs with aphasia. It is not known whether a limitation in memory span is concomitant with language deficits of differing etiology.

Recent studies suggest that, in normal adults, sentence structure serves as a 'coding' device to expand the limitations imposed by short-term retention span. Studies also indicate that there is a difference between syntactic forms in facilitation of recall. It is not known whether those individuals with language deficits use syntactic forms to code verbal auditory stimuli that exceed auditory memory span.
REVIEW of the LITERATURE

Memory Span

Memory span as a Psychological construct The first published reference to memory span found in the professional literature was submitted by Jacobs (19) in 1887. Twenty years later, Binet (4) defined auditory memory span as the maximum number of digits retained after a single hearing. Other descriptions arose as a result of the use of different stimuli. The definition of memory span has come to be generally accepted as the ability of an individual to reproduce immediately after one presentation a series of discrete items in their original order (5). Use of such terms as 'critical span', 'transient memory', or 'immediate memory' are common in current professional literature. These terms refer to short-term retention as differentiated from long-term memory storage.

There is some evidence that short-term memory is dependent upon neurophysiologic maturity. Binet (4) and Wechsler (46) included digit span tests in their batteries of intelligence tests. Repeated use of these tests with children has demonstrated that memory span increases with chronological age. Binet (4), Adler (1), and Starr (43) have described memory span for normal children as being three items at age three, four items at age four, with a gradual increase to six items between the ages of nine to twelve.
Memory span also appears to be related to normal central nervous system functioning. Blankenship (5) has discussed the reduced auditory memory span that accompanies mental retardation. Schuell (39:115) has considered the same problem with individuals suffering from aphasia. She noted that "auditory retention span is often reduced to two or three digits, or to meaningful units of three or four words".

It would seem that there is some limitation imposed by the nervous system on the retention of sequential items. However, the concept of memory span is a psychological construct derived from observed behavior rather than a neurological finding. Our lack of knowledge as to how the nervous system codes incoming stimuli makes it difficult to correlate behavioral and neurological data.

Recoding Miller (28) has described 'recoding' as one of the ways an individual has of extending memory span. He asserts that one can "group or organize the input sequence into units or 'chunks' ......, apply a new name to the group, and then remember the new name rather than the input events" (28:105). Miller claims that one of the most common ways of recoding is to translate what is perceived into words, then recall the translation rather than the perception. Smith (42) has demonstrated that the translation from 'input' to 'code' must be nearly
automatic for recoding to be an effective tool.

The concept of recoding has been examined by psychologists. Hall (16) presented pictures and diagrams to 200 children. The children were asked to reproduce each visual stimulus after one presentation. Hall noted that the naming of designs either by the examiner or the children markedly influenced the nature of the reproductions.

Bartlett (3), and Paul (35) studied recall of stories, as did Northway (34), and Wees and Line (47). These investigators were interested in the changes that occur in recollection. They observed that subjects tend to retain the 'themes' as units but are prone to connect these themes in individual verbal style.

Memory span for grammatically sequenced items

Chomsky has described grammar of language as, "a system of rules that determines a certain pairing of sound and meaning. It consists of a syntactic component, a semantic component, and a phonological component" (8:401). Chomsky labelled the phonological (or sound) component as the surface aspect of language. The deeper semantic component depends on the syntactic and phonological rules for its expression. Selection of grammatical units for sequencing is not random. The selection depends upon the rules for sequencing in a given language. Chomsky has derived a linguistic theory which can formally describe the
process by which the surface structure is derived from the base semantic form. This theory has stimulated investigation of the psychological reality of these linguistic constructs.

Miller and Isaard (30) presented for recall four types of word-sequences to normal adults:

(1) those word-strings which retained normal sentence word order, but were semantically nonsense,
(2) those word-strings which retained some semantic relationship but violated syntactic rules,
(3) normal sentences,
(4) randomly sequenced strings of words.

The normal grammatical sentences were the easiest to recall, while the randomly sequenced words were the most difficult. The syntactic structure of the nonsense sentences, and the semantic ties of the ungrammatically sequenced sentences provided about equal assistance in recall.

Miller and Selfridge (31), studied the recall of strings of words arranged in various statistical approximations of English structure. Normal adults were presented word lists, ranging from ten to fifty words in length, for recall. It was found that the closer the word-strings were to normal grammatical sequencing, the greater the number of words retained. Miller's findings have stimulated exploration of differences in facilitation of recall between sentence types.

Mehler (24) chose to explore ease of recall for eight
different sentence types. Each sentence type was presented for repetition five times in succession to normal adult native speakers of English. Mehler counted the errors which occurred after each exposure to the stimulus sentence. The sentence forms presented were the kernel sentence, the negative sentence, the passive sentence, the question sentence, and combinations of these. Results indicated that the kernel sentence is learned with greater facility than any other type.

Savin and Perchonok (38) corroborated Mehler's findings. Using nine different sentence types as stimuli, the experimenters found that more words are recalled correctly within the framework of the kernel sentence than with any other sentence type.

McMahon (23), Wason (44) and Miller (28) used latency of response as an indicator of difficulty in the evaluation of different sentence types. Subjects had greater difficulty in the evaluation of a passive than an active sentence. There was a greater delay produced by the negative sentence than by the affirmative sentence. Also it was found that by summing the response time required for a passive form and for a negative form, the latency of the negative-passive could be predicted.

The assumption might be made that some sentence types are more difficult to evaluate than others, due to syntactic form alone. Further research by Wason (45) indicated that
the semantic content of sentences affected the latency of response. There was less difference in response time between the affirmative and the negative structures when they described exceptional situations.

On the basis of these findings one may assume that for normal adult native speakers of English both semantic and syntactic components assist markedly in the recall of verbal material beyond memory span for single words. Differences between sentence types in facilitating recall would suggest that some forms are easier to evaluate and produce than other structures. The kernel form appears to be the easiest to recall.

Syntactic Development

**Grammatical sequencing in children** Young children show evidence of some patterning, even in two-word combinations. Braine (6) described two-word sequences in the speech of two-year-olds which consisted of a 'pivot' word and an 'open' class. Examples are 'big man', 'big car', 'here doggie', 'here sock'. He classified 'big' and 'here' as pivot words. Miller and Ervin (32) also found in two-year-olds that the position of a word was a significant part of the patterning. A few high frequency words were assigned a position in a sentence. The remainder of the vocabulary was combined with these words.

Brown and Fraser (7) observed the spontaneous
utterances of children under three years of age and compared these utterances with the children's imitations of model sentences. They found that there is no difference between the mean sentence length for repetitions of model sentences. They also observed that children of two to three years of age 'reduce' sentences in a characteristic fashion. When asked to repeat sentences, children tend to omit function words that carry little information. Children of this age also omit words that have little stress in pronunciation. Two year olds omit grammatical forms in the medial position in sentences, as well as non-referential forms. These children tend to retain words that are referential, that are of information value, and that carry pronunciation emphasis. This produces sentences that are telegraphic in form, such as:

I very tall.
Read book.
I want to see cow.

Brown and Fraser speculated that:

Span limitation is probably the factor compelling children to reduce adult sentences, but it does not of course account for the systematic tendency to drop one sort of morpheme and retain another sort (7:77).

Nice (33) in 1925 described the beginning sentence stage as being characterized by lack of articles, auxiliaries, prepositions, and conjunctions. Hahn (15) and Shire (41) noted that compound and complex sentences begin to appear at two years of age. By the age of four, six to seven per cent of completed sentences are compound or complex sentences.
Menyuk (25) has studied the sentence structure of children with a mean age of three years seven months. She found that children of this age use all the basic sentence types found in adult syntax. They also use structures that are gross approximations of grammatical sentences. With increasing age, these approximations to well-formed structures become less frequent, although they are still present in the speech of six year olds. With increasing age, the child uses a greater variety of sentence types and uses them more frequently. He also reduces the proportion of error forms in his speech. Types of error forms show a developmental pattern of omission, then of substitution, and then of redundancy. There is a peak usage for the different error forms at different ages. Menyuk found that on the whole, when given the memory aid of immediate recall, children from age three to seven are better able to repeat sentences than to use them in their spontaneous speech. For normal children as young as three years of age, sentence length is not a significant factor in repetition. This observation applies to the repetition of sentences from two to nine words in length.

Menyuk (26) also explored the syntactic structures used by children with deviant speech. Ten children were diagnosed as having 'infantile speech'. Menyuk administered speech tests to these children, as well as to ten normal speaking children of the same age, sex, and I.Q.
A generative model of grammar was used as the framework to analyze the types of syntactic structures used by both groups. Those children with infantile speech used significantly more error forms. There was no decrease of error forms with increasing age. In spontaneous speech the type of error most commonly made was omission at the phrase structure level, the transformational level, and the morphological level of grammar. Omission was the characteristic error form in repetition of sentences. Length of sentence significantly affected the correct reproduction of the model sentences. These findings were in contrast to the observations of the normal speaking children.

Syntactic Deficit

Grammatical sequencing in aphasia The neurologist Hughlings Jackson (18) in 1864 was the first to recognize that words were not 'lost' in individuals who have aphasia. He pointed out that words were available to the aphasic patient under certain conditions. This constituted the distinction between 'propositional' speech and emotional or reactive speech. Jackson emphasized that language is not a 'word heap'. He maintained that it is through placing words in context that meaning is gained.

Attempts to describe the language difficulties of aphasia have pointed up the problems of describing normal
language. Each investigator has found it necessary to formulate his own descriptive categories. Much of the early work in aphasia was devoted to correlating 'types' of aphasic difficulties with location of cerebral trauma. Description of aphasic difficulties was usually in terms of cortical area, or sensory modality (39).

Recently, interest in linguistics and psychology has produced new descriptions of aphasia. Syntactic difficulties have been labelled 'agrammatism' by linguists (14). Jakobson (20) has described such difficulties as being a disorder of 'contiguity', or skill in relating words to each other. He considered this a discrete aphasic disorder. Wepman and Jones (48) made a linguistic analysis of the speech of twelve aphasics. They asserted that 'syntactic' aphasia is a specific type of language deviation. This deviation is significantly different from normal speech, and from other types of aphasia. Syntactic aphasia, according to Wepman and Jones, is characterized by the use of few syntactic forms and the over-use of certain classes of 'words'. The classes of words may be nouns or pronouns, pauses or gestures. There is a significant difference between those with normal speech and individuals with syntactic aphasia in their selection of words for the structuring of sentences.

Howes and Geschwind (17) studied the statistical
properties of aphasic language. They found that aphasics vary considerably from normal speakers in vocabulary size. They also vary among themselves in size of vocabulary, with a decreased availability of words over the whole vocabulary range. Howes and Geschwind suggest that "there is no special group with agrammatism". The agrammatic feature of aphasic difficulty may be a measure of the severity of aphasia, rather than a selective loss.

Schuell, Jenkins, and Palermo (40) also maintain that syntactic difficulties accompany depression of other language functions. Errors of sequencing can occur in aphasia on the level of phonemes, phrases, or sentences.

**Grammatical sequencing of English in non-native speakers** There is little in the professional literature describing syntactic acquisition in non-native speakers of English. Pimsleur (36) has described the difficulties of constructing a short reliable test of syntactic usage. Andrade, Hayman, and Johnson (2) have devised a picture test to explore comprehension of Spanish grammatical structure. This technique may prove to be useful in the future in testing passive competency in English. Glicksberg (13) constructed a memory span test to investigate retention span for grammatically sequenced material as a measure of mastery of grammatical structure. A study of foreign students learning English indicated that memory span for sentences increased in length as the ability to
comprehend grammar and meaning improved. These methods of study may prove useful in exploring order of acquisition of syntax.

The traditional technique of translation from the native language has given some information about error forms. Results of such testing have revealed that error forms occur in all sentence types (21). Testing has not clarified the sequence in which sentence forms are learned, nor the order in which they should be presented. Teachers of English to foreigners have depended on their own judgement of the relative ease or difficulty of a structure for the particular student. As Ferguson (10) has said, "Most grading of grammatical structures, even by competent and experienced teachers, has been based on impressionistic judgements".

It has been generally assumed that the grammar of the native language has an effect upon the ease of acquisition of the different syntactic forms. It is also assumed that the student learns what he is taught and that the order of presentation of syntactic forms will affect the acquisition. Accordingly it is contended that the sequence of acquisition of sentence forms will differ among those individuals learning English as a non-native language.
HYPOTHESES

Jakobson (20) has contended that the dissolution of language in aphasia has a regularity. He also suggested that this regularity is comparable to a child's acquisition of language, in reverse. Menyuk (25) has demonstrated the usefulness of Chomsky's model of generative grammar in indicating developmental trends in children's grammar. This model has shown itself capable of contributing to the search for order in acquisition and loss of syntactic structuring. The purpose of this study is to use this model of grammar to explore the use of syntax in those with language deficit of differing etiology.

The hypotheses tested experimentally are listed below in the null form.

Hypotheses one to four may be grouped for consideration as they refer to a comparison between each of the three groups in ability to recall and to repeat grammatically and ungrammatically sequenced verbal material.

Hypothesis 1: There is no difference between each of the three language deprived groups studied in short-term auditory retention span for non-grammatically sequenced items.

Hypothesis 2: There is no difference between each of the three language deprived groups studied in short-term auditory retention span for grammatically sequenced sentences of the kernel type.
Hypothesis 3: There is no difference between each of the three language deprived groups studied in short-term auditory retention span for sentences of the simple transformational type.

Hypothesis 4: There is no difference between each of the three language deprived groups studied in short-term auditory retention span for sentences of the general transformational type.

A further comparison of the three groups in the use of four different types of verbal material for recall and repetition is described in Hypotheses five through seven.

Hypothesis 5: The mean number of words recalled for ungrammatically sequenced verbal material and the mean number of words recalled for grammatically sequenced kernel sentences do not differ significantly for each of the three language deprived groups.

Hypothesis 6: The mean number of words recalled for sentences of the basic kernel type and the mean number of words for simple transformations do not differ significantly for each of the three groups.

Hypothesis 7: The mean number of words recalled for sentences of the kernel type and the mean number of words recalled for general transformations do not differ significantly for each of the three groups.

The eighth and ninth hypotheses compare the three
groups in types of errors that occur during the repetition of the different syntactic structures used in the stimuli.

Hypothesis 8: The type of incorrect responses to syntactically structured stimuli is not related to the etiology of language deficit.

Hypothesis 9: The type of incorrect verbal response to syntactically structured stimuli is not related to the type of syntactic form.

The two final hypotheses are concerned with a comparison between the three groups for comprehension of the different syntactic forms.

Hypothesis 10: There is no difference between the three groups in auditory comprehension of grammatically sequenced verbal material consisting of short sentences containing six words or less, and long sentences containing seven words or more.

Hypothesis 11: There is no difference between the three groups in comprehension of grammatically sequenced auditory verbal material consisting of kernel sentences, simple transformations, and general transformations.

The .01 level of significance is adhered to as a measure of level of confidence for the acceptance or rejection of the hypotheses.
CHAPTER II  PROCEDURE

Selection of subjects

Three groups of individuals with language deficit were selected for study. Each group was composed of twenty-five subjects chosen from the following populations: (1) aphasics, who had suffered loss of memory for language due to cerebral injury; (2) children from ages two years six months to four years six months who were acquiring language; and (3) young adults learning English as a non-native or second language.

Each individual was considered suitable for study if he were able to repeat two or more words in sequence. Darley and Moll (9) have found that the mean sentence length for five year olds is five words per five responses of spoken language. Therefore, at the upper limit, an individual whose mean sentence length exceeded five words was not included in the study. An individual was included only if he were interested and able to cooperate with the testing procedures. Therefore, those with gross sensorimotor handicaps, and those with intellectual deficit were not considered suitable for this study.

Aphasics Fourteen of the aphasics selected were patients at a Veterans' Hospital, and six were residents of nursing homes. Five aphasics were living at home and attending a speech clinic.
The age range for the aphasics was from twenty one years to sixty seven years of age. All the aphasics were male. Five potential members of the group were not included as two were unable to repeat two words in sequence, two exceeded the upper limit of mean sentence length, and one was unintelligible to the examiner.

**Children** The children included in the study were selected from a normal population. They ranged in age from two years six months to four years six months, with a mean age of three years two months. These children were considered to have 'language deficit' as studies have shown that children have not completely acquired adult grammar by age seven (25).

There were sixteen girls and nine boys. Approximately half of the children attended a day care center in a middle class neighborhood, while the remainder were children of friends of the examiner. None had observable physical defects, and none were below average in intelligence according to results of the Peabody Picture Vocabulary test. One child was not included in the childrens' group on the basis of this test, and two were unable to cooperate with the testing procedure.

**Foreigners** The foreign students were members of the Foreign Student program at Louisiana State University. These young adults ranged in age from nineteen to twenty-nine. They were students of levels one and two.
"English for Foreign Students" classes. Twenty-two students were from Latin America with Spanish as their native language. None had noticeable physical defects. According to college entrance examinations, these students were of average and above average intelligence. Only one student who volunteered for testing was not accepted, as his mean sentence length exceeded the upper limit. There were twenty-three males and two females included in this group.

Test Materials

Auditory memory span test for ungrammatically sequenced words One and two-syllable words were randomly selected from Rinsland's Basic Vocabulary for Elementary School Children (37). Only lexical words (noun, verb, adjective, adverb) were chosen for inclusion in the test (12). These lexical words were grouped into word-strings of different lengths. The number of words in each string ranged from one word to eight words. The word-strings were arranged in ascending order, with three strings prepared for each level of length. In order to 'pass' a length level, two out of the three strings at that level had to be repeated correctly. The auditory memory span for each individual was considered to be the last level of successful repetition prior to incorrect repetition of two word-strings at the next level.

Sentence comprehension test Five hundred and four
sentences were devised to serve as examples of twenty-seven different sentence types. These sentence types were derived from a model of generative grammar as formulated by Chomsky (8). The sentences were representative of syntactic forms found in adult grammar and in the grammar of children as young as three years of age (25).

The sentence structures consisted of a kernel type and twenty-six transformations from the base kernel form. Those sentences derived from a single kernel form were grouped as 'simple' transformations. Sentence types derived from two or more base kernel sentences were classed as general transformations. There were 21 kernel sentences, 288 simple transformations and 195 general transformations. The sentences were arranged in ascending order of length from two to three words to fourteen words in length. For each of the twenty-seven syntactic forms, three sentences were constructed for every length-level wherever possible.

Each sentence was derived from a different base form so as to provide variety in content. Sentence topics chosen centered around subjects thought to be of interest to little children, such as food, home, pets, school, and play. The vocabulary used in the test sentences was limited to words found in the language of elementary school children (37).

One hundred and eight pictures were constructed as
illustrations of the sentences. These pictures were
drawn on nine inch by twelve inch cards, and were brightly
colored to aid visibility. The drawings were arranged in
groups of four for simultaneous viewing. Within each
group of four pictures, a contrast of meaning for the
lexical words was provided. For example, if a man were
shown in one picture in a given activity, other pictures
in the group would illustrate men in different activities.

Sentence repetition test The sentences used in test-
ing the comprehension of various syntactic forms were also
used in testing the repetition of sentence forms.

Nine normal speakers were presented with the test
materials to enable the examiner to reject those test items
that might prove to be too difficult even for the native
speaker of English. Six children from eleven years of age
to thirteen years of age and three young adults served as
subjects. None failed to identify and repeat the different
syntactic structures presented as stimuli, at all length
levels. Their mean auditory memory span for single items
was established at five words.

Methods of Testing

Auditory memory span test The auditory memory span test
was administered prior to the investigation of the role of
syntax as an aid to recall. Each individual was asked to
repeat the test words spoken by the examiner.

Randomly sequenced words were presented in ascending
order from a one-word level to the level of length at which failure occurred. In order to pass at any level, correct repetition of two of the three word-strings was required. Failure level was defined as the incorrect repetition of two word-groups at the same length level. Auditory memory span for each individual was considered to be the number of words in the last level of successful repetition prior to failure.

Word-groups were presented at an average rate of two words per second. Both the presentation and the responses were tape-recorded. A mimeographed form was used at the time of testing to record error responses. These responses were later compared with the tape-recordings.

**Sentence comprehension test** A test of speech reception requires a response from the subject which indicates some judgement as to the significance of what was heard. A sentence of the test was read aloud by the investigator. The subject was asked to respond by indicating the picture which illustrated the sentence. Each group of pictures involved four possible choices.

The sentences were read aloud by the examiner in order of increasing length, at a rate of approximately three words per second. Responses by the subject were recorded on a mimeographed form as correct or incorrect. Correct response to two examples of a sentence type at any given length-level was required to pass that level.
Incorrect responses to two sentences at the same level of length were considered to be 'failure' at that level.

Sentences for an initial practice attempt were spontaneously created by the investigator, and were not a part of the test.

Sentence repetition test At the completion of the comprehension test for each sentence type, the same sentences were again presented. Each subject was asked to repeat what was said immediately after the examiner read the sentence aloud. Responses were recorded as correct or the error response was written on the mimeographed form. Both the presentation and the responses were tape-recorded for later comparison with the written transcript.

Two correct repetitions at each length level were considered to be the memory span for a given syntactic structure. As in the comprehension test sentences were presented at a rate of approximately three words per second. Each sentence was presented once. It was repeated if the subject did not respond or if he requested to hear the sentence again prior to attempting the repetition. At no time were there more than two repetitions of the same sentence.

Treatment of the Data The data obtained were punched on I.B.M. cards for processing at the Louisiana State University Computer Center, and at Ethyl Corporation. Mean scores were derived for each of the three groups
of language deprived individuals for repetition of the four types of verbal materials presented in the stimulus. Analysis of variance between mean scores of the three groups and mean scores of the four types of verbal materials, was used to evaluate the observed differences. Through the use of orthogonal comparisons F scores were derived to determine the significance of any variation. As a further confirmation of observed differences Z scores were derived to test the differences between the means. Hypotheses one through seven were accepted or rejected on the basis of these tests. The hypotheses were rejected only when the observed differences were considered significant at the .01 level of confidence.

The differences between the means of three groups and three sentence types for the occurrence of five types of errors were explored by analysis of variance. F scores were derived, through the use of orthogonal comparisons, to verify any observed differences. Hypotheses eight and nine were accepted or rejected on the basis of these findings.

Hypotheses 10 and 11 are concerned with differences between the three groups in comprehension of the syntactic structures used in the tests. Analysis of variance was employed to evaluate possible differences between the groups in comprehension of short sentences versus long sentences. F scores were derived to test the significance of any
observed differences. Comprehension of the different syntactic forms was explored by the use of analysis of variance, followed by orthogonal comparisons to compute $F$ scores. These hypotheses were accepted or rejected on the basis of the results of these tests.
CHAPTER III RESULTS

Comparisons Between Each of the Three Groups in Repetition Response to Verbal Materials  Table I presents the mean scores obtained by each of the three groups of individuals with language deficit in repetition of the four different types of verbal materials. Inspection of these means suggests a variation between groups in their total mean scores for repetition.

The differences between the means were examined through the use of analysis of variance followed by orthogonal comparisons. These findings are shown in Table II. A significant difference was found between the three groups in mean scores for repetition over the four types of materials. Orthogonal comparisons were conducted, and it was found that there was no difference significant at the .01 level of confidence, between the aphasics and children in total mean scores. The total mean scores of aphasics and children were significantly lower than the means of the foreigners at the .01 level of confidence. To obtain further assurance regarding the probable significance of these differences, another independent test for the difference between means was conducted. A comparison of the means for repetition of single words of foreigners versus aphasics and foreigners versus children yielded Z values of 4.56 and 4.50 respectively. A Z value of 1.28 was found in a comparison of the means for single word repetition of aphasics versus children. These
<table>
<thead>
<tr>
<th>Verbal Materials</th>
<th>Groups</th>
<th>Total Means</th>
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</thead>
<tbody>
<tr>
<td>Aphasics</td>
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<td>7.20</td>
</tr>
<tr>
<td>Children</td>
<td>2</td>
<td>6.24</td>
</tr>
<tr>
<td>Foreigners</td>
<td>3</td>
<td>10.08</td>
</tr>
<tr>
<td>Verbal Materials</td>
<td></td>
<td>7.84</td>
</tr>
<tr>
<td>Kernel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentences</td>
<td>1</td>
<td>7.20</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>6.24</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>10.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.84</td>
</tr>
<tr>
<td>Simple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformations</td>
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<td>6.24</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5.17</td>
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<tr>
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<td></td>
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<td>General</td>
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<td>4.81</td>
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<td></td>
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<td>6.77</td>
</tr>
<tr>
<td>Single</td>
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<td></td>
</tr>
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</tr>
<tr>
<td></td>
<td>3</td>
<td>4.20</td>
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<tr>
<td></td>
<td></td>
<td>3.57</td>
</tr>
<tr>
<td>Total Means</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>1</td>
<td>5.73</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4.91</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>8.09</td>
</tr>
</tbody>
</table>
TABLE II

SUMMARY OF ANALYSIS OF VARIANCE FOR MEANS FOR THREE GROUPS
FOR REPETITION OF FOUR TYPES OF VERBAL MATERIALS

<table>
<thead>
<tr>
<th>Source</th>
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<th>Mean Square</th>
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</thead>
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<td></td>
</tr>
<tr>
<td>Groups</td>
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<td>544.28</td>
<td>272.14</td>
<td>34.09**</td>
</tr>
<tr>
<td>A &amp; C vs F</td>
<td>1</td>
<td>510.20</td>
<td>510.20</td>
<td>63.93**</td>
</tr>
<tr>
<td>A vs C</td>
<td>1</td>
<td>34.08</td>
<td>34.08</td>
<td>4.27*</td>
</tr>
<tr>
<td>Verbal Materials</td>
<td>3</td>
<td>763.33</td>
<td>256.11</td>
<td>32.08**</td>
</tr>
<tr>
<td>S.W. vs others</td>
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<td>717.01</td>
<td>717.01</td>
<td>89.85**</td>
</tr>
<tr>
<td>K vs 2, 3,</td>
<td>1</td>
<td>56.67</td>
<td>56.67</td>
<td>7.10**</td>
</tr>
<tr>
<td>2 vs 3</td>
<td>1</td>
<td>.001</td>
<td>.001</td>
<td>&lt;1</td>
</tr>
<tr>
<td>G x Verb. Mat.</td>
<td>6</td>
<td>98.09</td>
<td>16.35</td>
<td>2.05</td>
</tr>
<tr>
<td>Error</td>
<td>288</td>
<td>2299.27</td>
<td>7.98</td>
<td></td>
</tr>
</tbody>
</table>

A : aphasic group        S.W. : single words
C : children             K. : kernel sentences
F : foreign students     2. : simple sentences
                          3. : general sentences

**p:<01
*p:<05
### TABLE III

**SUMMARY OF Z SCORES FOR THREE GROUPS FOR REPETITION OF FOUR TYPES OF VERBAL MATERIALS**

<table>
<thead>
<tr>
<th>Verbal Materials</th>
<th>A vs C</th>
<th>A vs F</th>
<th>C vs F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Words</td>
<td>1.28</td>
<td>4.56**</td>
<td>4.50**</td>
</tr>
<tr>
<td>Kernel</td>
<td>1.10</td>
<td>3.59**</td>
<td>4.34**</td>
</tr>
<tr>
<td>Simple Transformations</td>
<td>1.20</td>
<td>2.84**</td>
<td>4.54**</td>
</tr>
<tr>
<td>General Transformations</td>
<td>1.35</td>
<td>9.15**</td>
<td>4.40**</td>
</tr>
</tbody>
</table>

** p < .01

A : Aphasics  
C : Children  
F : Foreigners
Z values may be seen in Table III. One may conclude that there is a significant difference, at the .01 level of confidence, between the performance of the foreigners and the other two groups in repetition of ungrammatically sequenced verbal material. It is on the basis of these findings that Hypotheses 1: There is no difference between each of the three language deprived groups studied in short-term auditory retention span for non-grammatically sequenced items must be rejected.

The group means for repetition of grammatically sequenced verbal materials are shown in Table I. Analysis of variance was employed to examine the significance of the numerical differences. These findings may be observed in Table II. A significant difference was found between the three groups in mean scores for repetition over all four types of materials. Orthogonal comparisons revealed that there was no difference between the total mean scores of the aphasics and children, and that these scores were significantly lower than the scores of the foreigners. A further test of the significance of these findings was carried out by the use of a test for the difference between means. The mean scores for repetition of the kernel sentence (7.20 for the aphasics, 6.24 for the children, and 10.08 for the foreigners) were submitted to a test for the difference between means. The resulting Z scores of 3.59 (aphasics versus foreigners), 4.34 (children versus
foreigners) and 1.10 (aphasics versus children) indicate that there was significant difference between the performance of the foreigners and the other two groups, but no difference between the aphasics and children. Therefore Hypothesis 2: that there is no difference between each of the three language deprived groups studied in short-term auditory retention span for grammatically sequenced sentences of the kernel type must be rejected.

Table I shows the mean scores obtained by the three groups of individuals with language deficit for repetition of the four types of verbal materials. The numerical differences between the means were examined by the use of analysis of variance, followed by orthogonal comparisons. A significant difference was found between the three groups in mean scores over all four types of materials. Results of orthogonal comparisons showed that there was no difference between the children and aphasics in total mean scores, but that their total mean scores were significantly lower than the mean scores of the foreigners. These findings may be seen in Table II.

The three group mean scores for repetition of simple transformations were also examined through the use of an independent test for the difference between means. Table III shows these findings. Z scores were derived of 1.20 in a comparison between aphasics and children, 2.84 for aphasics
versus foreigners, and 4.54 for children versus foreigners, which indicates a significant difference between the group mean scores for aphasics and foreigners, and children and foreigners. No difference was found between mean scores for aphasics and children. One may conclude that Hypothesis 3: there is no difference between each of the three language deprived groups studied in short-term auditory retention span for sentences of the simple transformational type must be rejected.

The group means for repetition of grammatically sequenced verbal materials are shown in Table I. Some variation may be seen in these numerical scores. The means for all the groups were examined through the use of analysis of variance, followed by orthogonal comparisons. The difference was significant between the three groups in mean scores for repetition over the four types of materials. Individual comparisons through the use of orthogonal comparisons indicated that there was no significant difference between the means of the aphasics and children, and that they achieved lower scores than did the foreigners in repetition of all four types of verbal materials. Comparisons of the difference between the mean scores for repetition of general transformations produced the following Z scores shown in Table III: 1.35 (aphasics versus children), 9.15 (aphasics versus foreigners), and 4.40 (children versus foreigners).
These scores indicate that there is a significant difference between the means of the foreigners and the other two groups, although no difference was found between aphasics and children, in repetition scores for general transformations. Therefore Hypothesis 4: that there is no difference between each of the three language deprived groups studied in short-term auditory retention span for grammatically sequenced sentences of the general transformational type must be rejected.

A significant difference was found for repetition responses over all verbal materials, as is shown by an F value of 32.08.

A comparison of the three groups in mean scores for repetition of single words versus mean scores for repetition of grammatically sequenced words may be seen in the summary of analysis of variance presented in Table II. Orthogonal comparison of the total mean scores for single words versus the grammatically sequenced materials indicates that there is a highly significant difference between them, as shown by an F value of 89.85.

Tests for the difference between means of single words versus kernel sentences for each group were carried out which may be observed in Table IV. The following Z scores were derived: 6.27 (single words vs. kernel sentences, aphaaic group); 5.57 (single words vs. kernel sentences, children), and 11.13 (single words vs. kernel sentences,
**TABLE IV**

**SUMMARY OF Z SCORES FOR REPETITION OF THREE TYPES OF VERBAL MATERIALS**

_for Three Groups_

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aphasics</td>
<td>6.27**</td>
<td>1.17</td>
<td>3.37**</td>
</tr>
<tr>
<td></td>
<td>Children</td>
<td>5.57**</td>
<td>4.02**</td>
<td>3.15**</td>
</tr>
<tr>
<td></td>
<td>Foreigners</td>
<td>11.13**</td>
<td>2.73**</td>
<td>5.31**</td>
</tr>
</tbody>
</table>

**p : <.01**

**p : <.05**
foreigners). These differences are significant at the .01 level of confidence. On the basis of these findings, Hypothesis 5: that the mean number of words recalled for ungrammatically sequenced material and the mean number of words recalled for grammatically sequenced kernel sentences do not differ significantly for each of the three language deprived groups must be rejected.

Group mean scores for repetition of the kernel sentences, and for repetition of simple transformations, may be seen in Table I. Inspection of Table II reveals that, in a comparison of mean scores obtained for repetition of kernel sentences versus the other two sentence types, an F value of 7.10 indicates a significant difference at the .01 level of confidence.

Z scores were derived in comparisons of the difference between the means for repetition of kernel sentences and repetition of simple sentences for each of the groups, which may be seen in Table IV. The aphasic group comparison produced a Z score of 1.17; the children's group comparison produced a score of 4.02; and the foreign group comparison between means revealed a Z score of 2.73. This indicates that no significant difference was found within the aphasic group, and that differences between means were significant for the children and foreigners. On the basis of these findings Hypothesis 6: that the mean number of words...
recalled for sentences of the basic kernel type and the mean number of words recalled for simple transformations do not differ significantly for the three groups must be rejected. The null hypothesis was rejected on the basis of the results observed in the performance of the children and foreigners.

Group mean scores for repetition of the kernel sentence and for repetition of general transformations may be seen in Table I. Table II shows an F value of 7.10 which indicates that the significance of the differences found between repetition of the kernel sentence and the other two sentence-types is at the .01 level of confidence. Comparisons within each group of subjects for kernel sentence repetition scores and general transformation repetition scores produced the following Z scores: 3.37 for the aphasics; 3.15 for the children, and 5.31 for the foreigners. On the basis of these findings one may conclude that the differences between the means within each group are significant. Therefore Hypothesis 7: that the mean number of words recalled for sentences of the kernel type and the mean number of words recalled in general transformations do not differ significantly for each of the three groups must be rejected.

A further analysis of the data was made in which comparisons between mean scores for repetition of simple and general transformations were made for each group. No difference was found in repetition scores between these two
sentence types for any of the groups.

Relationship of Types of Errors to Three Groups and Three Sentence Types  Errors occurred during the repetition of the verbal materials used in the stimuli. These errors were grouped into five categories for consideration.

Error type 1: substitution of grammatically correct sentence for the verbal form presented in the stimulus;

Error type 2: substitution of a grammatically incorrect form for the verbal form presented in the stimulus;

Error type 3: omission of a part of the verbal stimulus during repetition;

Error type 4: addition to the verbal form presented in the stimulus;

Error type 5: inversion of phrase sequence but with correct recall of grammatical form and vocabulary.

The mean scores for the occurrence of the five types of errors among the three groups may be seen in Table V.

To determine the significance of the numerical differences which may be noted by inspection of the table, analysis of variance and orthogonal comparisons were computed. Results of these findings are shown in Table VI. To simplify consideration of the data presented in Table VI, F values which are significant at the .01 level of significance are indicated by means of two asterisks.

Each error type will be discussed in relation to its occurrence among the three groups, and among the three sentence types.
### TABLE V

SUMMARY OF MEANS FOR ERROR TYPES OCCURRING IN REPETITION OF GRAMMATICALLY SEQUENCED VERBAL MATERIALS AMONG THREE GROUPS.

<table>
<thead>
<tr>
<th>Correct</th>
<th>Incorrect</th>
<th>Total Means</th>
</tr>
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<tbody>
<tr>
<td>Gram.</td>
<td>Gram.</td>
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</tr>
<tr>
<td>Subst.</td>
<td>Subst.</td>
<td>Omission</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Addition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Groups</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Groups</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Total</th>
<th>Mean</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aphasics</td>
<td>30.32</td>
<td>14.32</td>
<td>64.12</td>
<td>8.08</td>
<td>1.60</td>
</tr>
<tr>
<td>Children</td>
<td>25.04</td>
<td>14.64</td>
<td>71.60</td>
<td>7.40</td>
<td>2.20</td>
</tr>
<tr>
<td>Foreigners</td>
<td>37.72</td>
<td>34.12</td>
<td>40.28</td>
<td>8.32</td>
<td>1.64</td>
</tr>
</tbody>
</table>

| Total Mean Errors | 31.03 | 20.96 | 58.69 | 7.93 | 1.81 |
TABLE VI

SUMMARY OF ANALYSIS OF VARIANCE BETWEEN THREE GROUPS AND
THREE SENTENCE TYPES FOR FIVE TYPES OF ERRORS

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<th>Error Types</th>
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<th>F</th>
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<td>Groups</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; C vs. F</td>
<td>2</td>
<td>11.70</td>
<td>13.19**</td>
<td>21.74</td>
<td>28.34**</td>
<td></td>
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<tr>
<td>A vs. C</td>
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<td>25.28**</td>
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<td>56.58**</td>
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<td>Sentence Types</td>
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<tr>
<td>K vs. 2, 3</td>
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<td>11.43</td>
<td>12.88**</td>
<td>5.04</td>
<td>6.58**</td>
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</tr>
<tr>
<td>2 vs. 3</td>
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<td>25.77**</td>
<td>9.74</td>
<td>12.69**</td>
<td></td>
</tr>
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<td>G X S</td>
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<td>3.15*</td>
<td>1.33</td>
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<td>.76</td>
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</table>

** significant at the .01 level of confidence
* significant at the .05 level of confidence

A : Aphasics
C : Children
F : Foreigners
K : Kernel Sentences
2 : Simple Transformations
3 : General Transformations
<table>
<thead>
<tr>
<th>Error Types</th>
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<th>3 MS</th>
<th>F</th>
<th>4 MS</th>
<th>F</th>
<th>5 MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>224</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>2</td>
<td></td>
<td>29.55</td>
<td></td>
<td>17.88**</td>
<td></td>
<td>.36</td>
<td>1.92</td>
</tr>
<tr>
<td></td>
<td>A &amp; C vs. F</td>
<td>1</td>
<td>54.53</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A vs. C</td>
<td>1</td>
<td>4.56</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentence</td>
<td>2</td>
<td></td>
<td>.83</td>
<td>1</td>
<td>.21</td>
<td>1.12</td>
<td>.02</td>
<td>1</td>
</tr>
<tr>
<td>Types</td>
<td>2 vs. 3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>G X S</td>
<td>4</td>
<td>.36</td>
<td>1</td>
<td>.34</td>
<td>1.78</td>
<td>.01</td>
<td>1</td>
</tr>
<tr>
<td>Error</td>
<td>216</td>
<td></td>
<td>1.65</td>
<td></td>
<td>.18</td>
<td></td>
<td>.03</td>
<td></td>
</tr>
</tbody>
</table>

** significant at the .01 level of confidence
* significant at the .05 level of confidence

A : Aphasics
C : Children
F : Foreigners
K : Kernel Sentences
2 : Simple Transformations
3 : General Transformations
Error type 1: substitution of a grammatically correct form for the verbal form presented in the stimulus. A significant difference between the three groups was found in the frequency of occurrence of error type 1. The results of orthogonal comparisons between the three groups indicate that there is a highly significant difference between the foreigners and the other two groups in frequency of occurrence of error type 1. An F value of $25.28 > 6.76$ shows this difference to be significant at the .01 level of confidence. An F value of $1.08 < 3.89$ indicates that there is no significant difference between the children and aphasics in frequency of occurrence of error type 1.

The mean scores of occurrence of this type of error during repetition of each of the three sentence forms may be seen in Table VII. Table VI shows that over all sentences mean differences noted may be considered to be significant at the .01 level of confidence, with an F value of $12.88$. Orthogonal comparison of the kernel sentence versus the other two in occurrence of error type 1 indicates a significant difference. An F value of $25.77$ shows that this difference is at the .01 level of significance. No difference was found between the simple and generalized sentences in occurrence of this error type during repetition of the three sentence forms. The differences which are significant at the .01 level of significance are designated
### TABLE VII
SUMMARY OF MEANS FOR GROUPS BY SENTENCE TYPES FOR ERROR TYPE 1

<table>
<thead>
<tr>
<th>Sentence Type</th>
<th>Aphasics</th>
<th>Groups</th>
<th>Foreigners</th>
<th>Means Sentence Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel</td>
<td>1.40</td>
<td>1.32</td>
<td>2.68</td>
<td>1.8</td>
</tr>
<tr>
<td>Simple</td>
<td>1.15</td>
<td>.95</td>
<td>1.27</td>
<td>1.12</td>
</tr>
<tr>
<td>General</td>
<td>1.07</td>
<td>.86</td>
<td>1.43</td>
<td>1.12</td>
</tr>
<tr>
<td><strong>Means - Groups</strong></td>
<td><strong>1.21</strong></td>
<td><strong>1.05</strong></td>
<td><strong>1.80</strong></td>
<td></td>
</tr>
</tbody>
</table>
as such by two asterisks shown in Table VI. An interaction significant at the .05 level may be noted in Table VI. The foreigners had more errors of this type than the other two groups, and they had more errors of this type on the kernel sentence than on any other sentence type.

Error type 2: substitution of a grammatically incorrect form for the verbal form presented in the stimulus. One may observe in Table VIII that there appears to be variation among the groups in occurrence of type 2 errors. This difference between the means was examined through the use of analysis of variance, and orthogonal comparisons. An F ratio of 56.58 indicates a highly significant difference between the mean of the foreigners and the means of the other two groups for this type of error. The difference between the means for type 2 errors in children and aphasics is not significant as the computed F value is less than one. Table VI shows these findings.

Inspection of Table VIII for differences between sentence types in mean occurrence of type 2 errors indicates that more of these errors occurred in the repetition of kernel sentences. This difference is significant at the .01 level of confidence, as shown in Table VI by an F value of 12.69. The difference between means for type 2 errors in repetition of simple and generalized transformations is not significant.
TABLE VIII

SUMMARY OF MEANS FOR GROUPS BY SENTENCE TYPES FOR ERROR TYPES 2-5

<table>
<thead>
<tr>
<th>Group</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aphasics</td>
<td>.57</td>
<td>2.29</td>
<td>.46</td>
<td>.07</td>
</tr>
<tr>
<td>Children</td>
<td>.62</td>
<td>2.69</td>
<td>.22</td>
<td>.09</td>
</tr>
<tr>
<td>Foreigners</td>
<td>1.53</td>
<td>1.42</td>
<td>.31</td>
<td>.06</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sentence Types</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel</td>
<td>1.20</td>
<td>2.00</td>
<td>.32</td>
<td>.08</td>
</tr>
<tr>
<td>Simple</td>
<td>.80</td>
<td>2.17</td>
<td>.34</td>
<td>.05</td>
</tr>
<tr>
<td>General</td>
<td>.71</td>
<td>2.19</td>
<td>.24</td>
<td>.08</td>
</tr>
</tbody>
</table>
as the computed value of F is less than one.

**Error type 3: omission of a part of the verbal stimulus during repetition** Means for each group for occurrence of omissions during repetition may be seen in Table VIII. Table VI shows an F value of 32.98 which was derived by the use of orthogonal comparison of the mean of the foreigners and the means for the other two groups. This indicates a significant difference at the .01 level of confidence. The foreigners had lower scores than the aphasics and the children. An F value of 2.77 derived from comparisons of the aphasics and children does not indicate a significant difference between the two groups.

**Error type 4: addition to the verbal form presented in the stimulus** The mean scores for occurrence of this error type may be seen in Table VIII. Analysis of the significance of any differences between the mean scores for groups or sentence types is reported in Table VI. No significant differences were found.

**Error type 5: inversion of phrase sequence but with correct recall of grammatical form and vocabulary** Inspection of the means in Table VIII for this type of error suggests no significant difference between the groups or the sentence types. It may be seen in Table VI that results of analysis of variance confirm this observation.

On the basis of the findings for error types 1, 2, and 3, as noted in Table VI, Hypothesis 8: that the type of
incorrect verbal response to syntactically structured stimuli is not related to the etiology of language deficit must be rejected.

On this basis also Hypothesis 9: that the type of incorrect verbal response to syntactically structured stimuli is not related to the type of syntactic form must be rejected.

Errors found in repetition of the different syntactic structures occurred throughout the testing, as well as at 'failure' level. Analysis of these errors indicates that there was a difference between the groups in frequency of occurrence of error types. One might anticipate that the group that achieved the best mean score for repetition would have the fewest errors. The foreigners were superior to the other two groups in repetition of the four types of verbal materials. However, they also made more errors than either of the other two groups. One may speculate that they attempted to repeat the stimuli even when correct recall was doubtful. Errors of substitution were more frequent in repetition of the kernel sentence, for which they achieved the best repetition score.

Comparisons Between Each of the Three Groups in Comprehension of Sentence Forms Comprehension of the different syntactic forms was explored by asking each subject to respond to sentences of increasing length by indicating the appropriate illustration. All sentences used as stimuli for repetition
were also presented as stimuli in the comprehension test.

The total mean scores for each of the three language deprived groups may be seen in Table IX. The significance of observed differences between means was examined by the use of analysis of variance. Inspection of Table X indicates that the observed difference is only significant at the .05 level of confidence, not at the .01 level, as a derived F value of 3.29 is smaller than 4.75.

A comparison was made of comprehension of short sentences of six words or less versus long sentences of seven words up to fourteen words. Mean scores may be seen in Table IX. Observed differences were significant only at the .01 level of confidence. Analysis of the data by use of analysis of variance may be seen in Table X. No significant differences were found between the means of short sentences and the means of long sentences, as the obtained F value is less than one.

Therefore, Hypothesis 10: that there is no difference between the three groups in auditory comprehension of grammatically sequenced verbal material consisting of short sentences containing six words or less, and long sentences containing seven words or more is not rejected.

Mean differences between the three groups in comprehension of the kernel sentences, simple transformations, and general transformations may be observed in Table XI. Results of analysis of variance, shown in Table XII support this
TABLE IX
SUMMARY OF MEAN SCORES OF THREE GROUPS AND TWO SENTENCE LENGTHS FOR COMPREHENSION OF DIFFERENT SYNTACTIC STRUCTURES

<table>
<thead>
<tr>
<th>Sentences</th>
<th>Aphasics</th>
<th>Children</th>
<th>Foreigners</th>
<th>Total Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Sentences</td>
<td>.92</td>
<td>.97</td>
<td>.98</td>
<td>.95</td>
</tr>
<tr>
<td>Long Sentences</td>
<td>.94</td>
<td>.95</td>
<td>.98</td>
<td>.96</td>
</tr>
<tr>
<td>Total Mean Groups</td>
<td>.93</td>
<td>.95</td>
<td>.98</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE X

**SUMMARY OF ANALYSIS OF VARIANCE**

**FOR MEANS OF THREE GROUPS AND TWO SENTENCE LENGTHS**

**FOR COMPREHENSION OF DIFFERENT SYNTACTIC FORMS**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>149</td>
<td>3.45</td>
<td>3.29*</td>
</tr>
<tr>
<td>Groups</td>
<td>2</td>
<td>3.45</td>
<td>3.29*</td>
</tr>
<tr>
<td>Sentences</td>
<td>1</td>
<td>.002</td>
<td>&lt;1</td>
</tr>
<tr>
<td>G X S</td>
<td>2</td>
<td>.002</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Error</td>
<td>144</td>
<td>.01</td>
<td></td>
</tr>
</tbody>
</table>

**p : <.01**

**p : <.05**
TABLE XI

SUMMARY OF MEAN SCORES OF THREE GROUPS AND THREE SENTENCE TYPES FOR COMPREHENSION OF DIFFERENT SYNTACTIC STRUCTURES.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Aphasic</th>
<th>Children</th>
<th>Foreigners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sentences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kernel</td>
<td>.94</td>
<td>.95</td>
<td>.99</td>
</tr>
<tr>
<td>Simple</td>
<td>.93</td>
<td>.94</td>
<td>.98</td>
</tr>
<tr>
<td>General</td>
<td>.94</td>
<td>.97</td>
<td>.99</td>
</tr>
<tr>
<td>Total Means</td>
<td>.94</td>
<td>.96</td>
<td>.99</td>
</tr>
</tbody>
</table>
### TABLE XII

**SUMMARY OF ANALYSIS OF VARIANCE**

*FOR MEANS OF THREE GROUPS AND THREE SENTENCE TYPES FOR COMPREHENSION DEFFERENT SYNTACTIC FORMS*

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>2</td>
<td>.055</td>
<td>4.44*</td>
</tr>
<tr>
<td>Sentences</td>
<td>2</td>
<td>.007</td>
<td>1</td>
</tr>
<tr>
<td>G X S</td>
<td>4</td>
<td>.0009</td>
<td>1</td>
</tr>
<tr>
<td>Error</td>
<td>216</td>
<td>.012</td>
<td></td>
</tr>
</tbody>
</table>

** p < .01
* p < .05
observation of the lack of significant difference between means of groups and between means of sentence types. However, a difference was found between the means of the three groups which was significant at the .05 level, with the foreigners receiving higher mean scores. An F value of 3.29 may be seen in Table X.

On the basis of these findings Hypothesis 11: that there is no significant difference between the three groups in comprehension of grammatically sequenced auditory verbal material consisting of kernel sentences, simple transformations and general transformations is not rejected. The observed differences between the mean scores for comprehension of the three sentence types, which may be seen in Table XI, were significant only at the .05 level of confidence. The foreigners received higher mean scores for comprehension of all the sentences. No difference was found between sentence types.

It was assumed by the examiner that as sentence length increased a limit of auditory memory span for comprehension would be established. This threshold was not found. No significant difference was found between comprehension of short sentences and comprehension of sentences up to fourteen words in length. These results indicate that, when given the memory aid of pictorial referents, retention span for comprehension markedly exceeds retention span for repetition for those individuals with language deficit.
CHAPTER IV

SUMMARY AND CONCLUSIONS

This study is concerned with the problem of whether or not individuals with language deficits attributed to different etiologies use syntactic forms in a similar way to assist in recall of auditory verbal material beyond their immediate memory span for single words.

It is hypothesized that both the ability to recall and the ability to comprehend verbal auditory stimuli depend in part upon the individual's ability to retain sequential verbal material. It is assumed that auditory memory span is one of the factors limiting such retention.

Previous studies have shown that, in the normal adult, one of the ways of expanding the limitations of memory span for recall of sequentially ordered verbal material is by the use of syntax. It has been demonstrated that more words are retained when presented for repetition within a grammatically sequenced frame than when presented in random sequence. Syntactic forms appear to vary in the assistance they provide in coding auditory verbal materials for retention, as studies show that more words can be retained for repetition within the frame of the kernel sentence than for any other sentence type.

It is not known whether syntax serves to code auditory verbal stimuli beyond immediate memory span for those
individuals with language deficit. It is not known whether methods of coding auditory verbal stimuli for comprehension may be different from methods used in retention for reproduction of syntactic forms. If those with language deficit can use syntax to assist in recall beyond memory span, syntactic forms may vary in the assistance they provide in coding sequentially ordered verbal materials.

Three groups of subjects were selected on the basis of etiology of language deficit. Each group was composed of twenty-five individuals chosen from the following populations: (1) aphasics, who had suffered a memory loss for language due to cerebral injury; (2) children, between the ages of two years six months and four years six months, who were acquiring language; and (3) young adults learning English as a non-native language. Those with language deviations caused by hearing loss, mental retardation, or unknown etiology were not included in the study.

To be a member of a group, each individual had to be able to repeat two words in sequence in response to auditory verbal stimuli. At the upper limit, the individual's mean sentence length could not exceed five words per five responses of spoken language. Only those individuals who were interested and who were able to follow the test procedures were included in the study.
Prior to investigating the role of syntax in recall of auditory verbal materials beyond memory span, it was necessary to establish the limits of memory span for each group. A test to measure auditory memory span for single words was constructed. Lexical words, selected from a children's vocabulary, were arranged in word-strings of increasing length ranging from one word to eight words in length. Three word-strings at each level of length were prepared to serve as stimuli. Each subject was asked to repeat the word-strings beginning at the lowest level and ascending to his upper limit of correct repetition. Failure level was reached when a subject was unable to repeat correctly two of the three word-strings at a given level. The auditory memory span for each subject was considered to be the number of words in the last level of successful repetition, prior to 'failure' level.

To explore the possibility of differences between retention for comprehension and retention for reproduction, a sentence comprehension test was constructed. Five hundred and four sentences were constructed to serve as examples of the twenty-seven different sentence types used as stimuli. These sentences were arranged in ascending order of length, from two to three words in length up to fourteen to fifteen words in length. Three sentences were constructed for each length-level, wherever possible. Pictures were drawn and colored to illustrate the syntactic
structures presented in the stimulus. The pictures were arranged in groups of four for simultaneous viewing (see Appendix).

The sentences were read aloud by the examiner in order of increasing length and a subject was asked to indicate the correct illustration of the sentence. Correct responses to two sentences at any given length-level were required to pass that level.

The sentences used in the comprehension test also served as stimuli in the sentence repetition test. Each subject was asked to repeat the syntactic form presented orally by the examiner. The sentences were presented in order of increasing length, and responses were recorded as correct, or the error form transcribed on a mimeographed form. The presentation and the responses were tape-recorded for comparison with the written transcription.

The verbal materials offered as stimuli were divided into four categories to facilitate analysis of the obtained data. These groupings were: (1) single words; (2) kernel sentences; (3) simple transformations; and (4) general transformations. To assist in the orderly exploration of the problems of this study, eleven hypotheses were devised and stated in the null form. The hypotheses were rejected only when the observed differences were significant at the .01 level of confidence.
Hypotheses one to four may be grouped for consideration as they refer to a comparison between each of the three groups in ability to recall and repeat grammatically and ungrammatically sequenced verbal material.

Hypothesis 1: that there is no difference between each of the three language deprived groups studied in short-term auditory retention span for non-grammatically sequenced items is rejected. No difference was found between the aphasics and children in mean scores for repetition of single words. The foreigners had significantly higher mean scores than the aphasics or children.

Hypothesis 2: that there is no difference between each of the three language deprived groups studied in short-term auditory retention span for grammatically sequenced sentences of the kernel type is rejected. The foreigners had a significantly higher mean score for repetition of the kernel sentence than either of the other two groups. The aphasics and children did not differ significantly in mean scores for repetition of the kernel sentence.

Hypothesis 3: that there is no difference between each of the three language deprived groups studied in short-term auditory retention span for sentences of the simple transformational type is rejected. The foreigners had significantly higher mean scores than the other two groups. Also, a difference was found between the aphasics and children in
mean scores for repetition of simple sentences.

Hypothesis 4: that there is no difference between each of the three language deprived groups studied in short-term auditory retention span for sentences of the general transformational type is rejected. No significant difference was found between the mean scores of the aphasics and children. The foreigners achieved significantly higher mean scores than the other two groups.

Results of the data indicate that the foreigners selected for this study were superior to the aphasics and children in reproduction of the four types of verbal materials presented as stimuli.

Hypothesis 5: that the mean number of words recalled for ungrammatically sequenced verbal material and the mean number of words in grammatically sequenced kernel sentences do not differ significantly for each of the three language deprived groups is rejected. A significant difference was found between mean scores for repetition of single words versus mean scores for repetition of the kernel sentences for each of the groups. Each group had a higher mean score for repetition of ungrammatically sequenced words.

Hypothesis 6: that the mean number of words recalled for sentences of the kernel type and the mean number of words for simple transformations do not differ significantly for each of the groups is rejected. There was a significant
difference found for the children and foreigners in mean scores for repetition of the kernel type sentence and mean scores for repetition of simple transformations. No difference was found for the aphasics in repetition of these two sentence-types. The children and foreigners achieved a higher mean score for reproduction of the kernel sentence than for reproduction of simple transformations.

Hypothesis 7: that the mean number of words recalled for sentences of the kernel type and the mean number in general transformations do not differ significantly for each of the groups is rejected. A significant difference was found between the mean scores for repetition of the kernel sentence versus mean scores for repetition of general transformations, for each of the groups. Each group achieved a higher mean score in reproduction of the kernel sentence than in reproduction of generalized transformations.

A further analysis of the data was made in which comparisons between mean scores for repetition of simple and general transformations were made for all groups. No difference was found in total mean repetition scores between these two sentence types.

The eighth and ninth hypotheses are concerned with comparisons between the three groups in types of errors that occurred during repetition of the syntactic structures used in the stimuli.
Hypothesis 8: that the type of incorrect responses to syntactically structured stimuli is not related to the etiology of language deficit is rejected. Foreigners had significantly more errors of substitution than did the aphasics and children. The aphasics and children, in contradistinction, had more errors of omission than did the foreigners.

Hypothesis 9: that the type of incorrect verbal response to syntactically structured stimuli is not related to the type of syntactic form is rejected. Errors of substitution were made significantly more often during repetition of the kernel sentence than during repetition of the simple and general transformations.

Hypothesis 10: that there is no difference between the three groups in auditory comprehension of grammatically sequenced verbal material consisting of short sentences containing six words or less, and long sentences containing seven words or more is not rejected. No significant difference was found between the means for short sentences versus the means for long sentences, and no significant difference was found between the three groups in comprehension of the different syntactic forms used as stimuli.

Hypothesis 11: that there is no difference between the three groups in auditory comprehension of grammatically sequenced verbal material consisting of kernel sentences, simple transformations and general transformations is not
rejected. No significant differences were found between the three groups in comprehension of any of the sentence types.
Discussion

Memory span for single items was found to be similarly reduced in aphasics and children, with mean scores of 3.20 and 3.40 respectively. There is evidence that auditory memory span for single items is dependent upon neurophysiologic maturity \((5, 7, 11)\). Memory span for single items also appears to be related to central nervous system functioning \((5, 39, 19)\). One may surmise that the superior scores of the foreigners in the single word test may be due to maturity, and to normal cerebral functioning. However, it may be noted that the mean auditory memory span score for the foreigners was less than the normative data reported for children between the ages of nine to twelve \((5)\). This is consistent with Glicksberg's \((13)\) findings with adult foreign students. As knowledge of the language increases, memory span for single English words appears to approach memory span scores for words in the native language.

Interpretation of the data in this study leads to the conclusion that individuals with language deficit due to the three etiologies selected do use syntactic structure to assist in recall of auditory verbal material beyond auditory memory span for single items. Evidence provided by comparisons of the three groups in repetition of single
words versus grammatically sequenced material indicates that each group recalled approximately twice the number of words within a grammatical frame.

The data provide evidence that the number of words which can be recalled within a grammatical frame is affected by the type of syntactic structure. Individuals with language deficit can more easily reproduce kernel sentences than reproduce other syntactic forms. This is also true for normal adult native-speakers of English, according to Mehler (24) and others (38).

Foreigners achieved significantly higher scores than did the aphasics and children in repetition of all syntactic forms. The repetition performance of the aphasics and children tends to confirm the linguistic similarity between the two groups which Jakobson (20) has observed. It may be that the greater reduction of memory span found in these two groups similarly affects the ways in which syntactic forms are used for repetition, as omission was found to be the most frequent error form among the children and aphasics. Brown and Fraser (7) have suggested that span limitation may be the factor compelling reduction of sentence length in the speech of little children.

No differences were found between the three groups in comprehension of syntactic forms used in the stimulus. Results of this study suggest that the coding of syntactic
stimuli for understanding of general significance may be different from the coding that occurs in recall of sentences for repetition. The lack of difference in comprehension of short versus long sentences for the three groups indicates that retention span for comprehension was not exceeded by sentences up to fourteen words in length. Possibly the redundancy of the longer sentences permitted recoding of the syntactic stimuli into units within memory span. The support of visual materials may also have assisted in recoding for comprehension. Accurate reproduction of sentence forms requires attention to grammatical details which may not be needed in comprehension of sentences.
General Conclusions

On the basis of the results of this study the following conclusions appear warranted:

1. Individuals with language deficit attributed to the three etiologies studied use syntactic forms to assist in recall of verbal materials which extend beyond auditory memory span for single items. This generalization appears to be true both for repetition of auditory verbal materials and for comprehension of auditory verbal materials.

2. Individuals with language deficit have limitations of memory span for single English words. The extent of the limitation appears to be dependent upon the etiology of the language deficit.

3. Individuals with language deficit attributed to the three different etiologies studied respond to differences in syntactic forms in a similar way. For each group, the kernel form provides a grammatical sequencing that is easier to recall than any of the transformations from a kernel form. Syntactic forms which are transformations from a kernel sentence appear to provide equal assistance in recall beyond auditory memory span for single words.

4. Individuals with language deficit attributed to the three etiologies studied find, for recall beyond memory span for single words, that comprehension of grammatical forms is an easier task than reproduction of the same syntactic structures.
BIBLIOGRAPHY


Single Words

(1) happy fence kick

(2) glass, listen walk, bath mirror, clouds

(3) fire, lady, gas train, dream, come
   bird, clean, swing

(4) big, wagon, tired, hat sing, bed, boy, wait
   watch, wood, drive, climb

(5) drink, go, swim, wind, letter
   fire, cage, cake, play, duck
   sky, book, hurt, laugh, chair

(6) truck, lake, like, stick, toys, friend
   have, fish, apple, pool, dinner, little
   black, milk, girl, water, dog, cook

(7) car, baby, tree, floor, brush, mother, bone
   children, sun, match, store, hungry, nest, sweep
   cow, dish, coffee, park, cry, sit, night

(8) eggs, track, throw, snow, plant, tall, ladder, eat
   paint, pretty, white, moon, cat, write, ball, man
   snow, string, boat, shoe, sleeps, boots, summer, father
Kernel Sentences

C

2-3  He hits.
4-5  The girl sits down.
6-7  The dog picked up a stick.
8-9  The dog eats meat. The cat drinks milk.
10-11 The girl has a book. She looks at the pictures.
12-13 The man walks down the steps. The boy picks up the truck.
14-15 The boy caught some fish. He cooked the fish. The dog watched the boy.

Ka

2-3  She paints.
4-5  The dog stands up.
6-7  The girl looks at the baby.
8-9  She has a mirror. She sees the hat.
10-11 A boy throws the ball. A friend hits the ball.
12-13 The boy climbs up the ladder. The girl stands near the tree.
14-15 The dog watches the girl. He waits for her. The girl paints a picture.

Kb

2-3  He runs.
4-5  The boy drinks water.
6-7  The mother looks at the children.
8-9  She has a brush. He has a truck.
10-11 The bird sings a song. The bird likes the sun.
12-13 The girl puts on the shoes. The mother puts on the hat.
14-15 The boy makes a fire. He cooks the fish. The wind blows the smoke.
Passive

C

2-3 Fish are cooked.
4-5 The dog was brushed.
6-7 Flowers were picked by the boy.
8-9 The carriage was being pushed by the girl.
10-11 The window has been opened. The baby is being rocked.
12-13 Clothes were dried by the sun. They were blown by the wind.
14-15 The girl was followed by the dog. The wagon was pulled by the boy.

la

2-3 Flowers are watered.
4-5 The cat was chased.
6-7 Trees were cut by the boy.
8-9 The garden is being watered by the girl.
10-11 The fish has been caught. The fire has been started.
12-13 Water was carried by the children. Cars were washed by the boys.
14-15 The house was painted by the man. The painter was watched by the children.

lb

2-3 Windows are closed.
4-5 The curtain is blown.
6-7 Dinner was eaten by the family.
8-9 The chair has been broken by the lady.
10-11 Some wood has been cut. The supper is being cooked.
12-13 Kites are flown by the children. They are held by the string.
14-15 The baby was rocked by the mother. The child was dressed by the girl.
Tr-2 Negation

2-3
4-5 Birds are not flying.
6-7 The cat will not drink milk.
8-9 The man is not walking in the sun.
10-11 The chair is not high. The baby is not happy.
12-13 The lady is not cutting grass. The boy is not sitting down.
14-15 The children are not watching the boat. The boat is not coming to shore.

2a

2-3
4-5 Baby is not sleeping.
6-7 The boy will not look outside.
8-9 The mother is not working in the garden.
10-11 The sun is not shining. The weather is not good.
12-13 The dog is not running away. He is not leaving the man.
14-15 The boys have not caught a fish. The children have not made a fire.

2b

2-3
4-5 They are not outside.
6-7 He is not driving the car.
8-9 The cat is not outside in the sun.
10-11 The windows are not closed. The cat is not sleeping.
12-13 The lady is not standing up. She is not in the house.
14-15 The girl is not holding the baby. The girl is not playing the piano.
Question

2-3 Is mother cooking?
4-5 Is mother picking flowers?
6-7 Is the boy opening the present?
8-9 Is the man fishing? Will he catch one?
10-11 Are the children watching TV? Are they on the floor?
12-13 Has the mother brought a cake? Will the boy light the candles?
14-15 Are the children looking for the mother? Will the mother give them a flower?

3a

2-3 Is it snowing?
4-5 Is the cat sleeping?
6-7 Will the dog eat the bone?
8-9 Are the children walking? Are they wearing hats?
10-11 Have the children brought presents? Will they like the cake?
12-13 Are the children watching the snow? Will the mother close the door?
14-15 Is there a boat in the water? Is there a bird sitting in the tree?

3b

2-3 Is it winter?
4-5 Is there a party?
6-7 Will the dog follow the mother?
8-9 Is the sun shining? Are the children outside?
10-11 Are the children holding balloons? Will they eat some cake?
12-13 Is the cat climbing the tree? Is the bird watching the cat?
14-15 Is the fish swimming in the bowl? Is the cat sleeping near the fish?
He's drinking.
She's opened the window.
The boy's waving at the train.
Wind's blowing the trees. The leaves'll fall off.
The girl'll light the fire. The boy's carrying the wood.
The train's coming down the track.
The engineer'll stop at the station.
The man's filling the car with gas.

He's climbing
He's pulling the rope.
The mother's picking up the toys.
The cow's drinking water. The horse's thirsty too.
The cat's chasing the bird. The bird's watching the cat.
The girl's hanging up the clothes. The boy's putting away the books.
The farmer's bring food to the cows.

She's sleeping.
He's climbing the ladder.
The girl's hanging up the clothes.
The man's chopping wood. He's making a fire.
The farmer's driving the tractor. The boy's driving the truck.
The girl's sitting on the bed. She'll be getting up for breakfast.
The man's brought the boat to the shore.
He's carrying the fish to the fire.
Inversion

2–3  Now he cries.
4–5  Now the man eats.
6–7  Soon she will pick some flowers.
8–9  At last the birds are building a nest.
10–11  Now the girl is sleeping.  Soon she will wake up.
12–13  At last the summer has come.  Now the mother can sit outside.
14–15  At last the wind blows the clouds.  Soon the rain will water the flowers.

5a

2–3  Now he runs.
4–5  Now the dog sits.
6–7  Soon he will see the bone.
8–9  Soon the cat will be climbing the tree.
10–11  Now the baby is crying.  Soon the mother will come.
12–13  At last the father is home.  Now they can eat the dinner.
14–15  At last the birds build a nest.  Soon the birds will lay the eggs.

5b

2–3  Now he sits.
4–5  Now the baby sleeps.
6–7  Now he reaches for the brush.
8–9  Now the dog is running after the boy.
10–11  Now the children are swimming.  Soon they will go in.
12–13  At last the man is coming.  Now he can fix the car.
14–15  At last the man started the boat.  Soon the man will cross the lake.
Relative Question (who, where, why, what, plus)

2-3 Who is climbing?
4-5 Where is the chair?
6-7 Which dog is chasing the boy?
8-9 Why is the cat climbing up the tree?
10-11 Why is the girl crying? What has lost a wheel?
12-13 Who is barking at the man? Who is sitting on the beach?
14-15 Why is the girl holding the baby? Why is the dish on the table?

6a

2-3 Who is crying?
4-5 Where is the baby?
6-7 Which man is holding the boat?
8-9 Why are the children standing by the tree?
10-11 Where is the bird standing? Why is the cat sleeping?
12-13 Who is looking in the window? Who is looking at the girl?
14-15 Why is the dog watching the cat? Where are the birds building a nest?

6b

2-3 Who is running?
4-5 Where is the sun?
6-7 Which birds are near the tree?
8-9 Why does the bird stay on the chair?
10-11 Why is the door open? Which cat will come in?
12-13 Who is swimming in the water? Who is waiting for a fish?
14-15 Why is the man waving his hand? Why is the dog holding the bone?
Tr-7    Imperative

C

2-3     Find the dog.
4-5     Point to the ball.
6-7     You must look at the stars.
8-9     Show me the house.  Show me the smoke.
10-11   You will find the birds.  Please point to the sun.
12-13   You are to find the boats.  You will point to the flag.
14-15   You will now point to the table.  You will now point to the cat.

7a

2-3     Find a bridge.
4-5     Point to the chair.
6-7     You must point to the car.
8-9     Point to the water.  Point to the fish.
10-11   Please point to the fence.  You must find the gate.
12-13   You must point to the baby.  You must point to the mother.
14-15   You must now look for the pencil.  You will now point to the picture.

7b

2-3     Find the coat.
4-5     Point to the airplane.
6-7     You must look at the cat.
8-9     Point to the chimneys.  Show me the path.
10-11   You must find the clothes.  Please point to the dress.
12-13   You must point to the scissors.  You will show me the letter.
14-15   You will now look for the girl.  You will now point to the window.
Pronominalization (N Abstract - There)

2-3 There are trees.
4-5 There is a moon.
6-7 There are a lot of clouds.
8-9 There is a pole. There is a flag.
10-11 There are lots of clocks. There are numbers on clocks.
12-13 There is snow on the house. There is smoke from the chimney.
14-15 There is a bowl on the table. There are some flowers in the bowl.

8a

2-3 There is night.
4-5 There is a lake.
6-7 There are a lot of stars.
8-9 There is a hat. There is a broom.
10-11 There are lots of boats. There are lots of trees.
12-13 There are papers on the desk. There are pictures on the wall.
14-15 There are some flowers in the garden. There is a dog near the flowers.

8b

2-3 There is rain.
4-5 There is a house.
6-7 There are a lot of boys.
8-9 There is a table. There is a lamp.
10-11 There are a lot of swings. There are lots of children.
12-13 There is sun in the sky. There are birds in the sky.
14-15 There is a light near the house. There is a car near the walk.
Separation

Blow it out.
He throws it up.
The girl puts the hat on.
The man will drink all the milk up.
Mother wipes the milk up. The cat knocked it over.
The wind blew the plant over. The man will pick it up.
The mother puts all the dishes up. The man sweeps all the dirt up.

Wipe it up.
She cleans it up.
She will hang the coat up.
The dog will eat all the food up.
He takes the dog out. He pulls the dog along.
The boy throws the ball up. The girl will throw it down.
Mother hangs the clothes on the line. The wind is blowing the clothes away.

Sweep it out.
He drinks it up.
The man holds his hat on.
The girl knocked the plant off the balcony.
He took the coat off. She will put it away.
The wind blows the match out. The girl blows the candle out.
The girls dress all the dolls up. The boys put all the books away.
He has got bones.  
The lady has got a dog.  
He has got paper. She has got pencils.  
The boys have got hats. The girls have got boots.  
The girl has got some dolls. The dolls have got a bed.  
The girl has got on a coat. The boy has got a coat too.

He has got books.  
The girl has got some flowers.  
He has got boots. She has got beads.  
The teacher has got pencils. The dress has got pockets.  
The dog has got a house. The house has got a door.  
The mother has got on a hat. The baby has got a hat too.

She has got boots.  
The lady has got a hat.  
She has got dolls. She has got cats.  
He has got a boat. The boat has got sails.  
The boy has got a bike. The girl has got a wagon.  
The lady has got on some beads. The dog has got on a collar.
He is running.
The dog is walking.
The man is opening the window.
The mother has put flowers in the bowl.
He has brought a book. She is carrying the cake.
The man has parked the car. He is walking to the house.
She is pouring a glass of water. The girl is waiting for the cake.

He is sitting.
The girl is crying.
The lady has opened the door.
He is painting a picture of the baby.
He has found a bone. He is following the man.
The mother has baked a cake. The girl is opening the presents.
The boy is standing near the piano. The baby is waving to the cat.

He is crawling.
The sun is shining.
The girl is pouring the milk.
The boy has found birds at the window.
The baby is sitting down. He is watching the cat.
The man is playing the piano. The boy is listening to him.
The mother is sitting on the bed. The baby is crawling on the floor.
She does run.
The boy does swim.
The boy does carry the ball.
The boy does run. The girl does too.
The lady did feel cold. She does wear a coat.
The dog does chew the bone. He did dig up the bone.
The girl does hang up her clothes. The cat does look out the window.

He does write.
The girl does sit.
The girl does have a doll.
The boy does swim. The dog does too.
The cat does chase birds. The birds do get away.
The house does have a door. It does have a chimney too.
The girl did pick up the doll. She does hold it in her arms.

She does sit.
The dog does swim.
The dog does have a collar.
The cat does sleep. The dog does bark.
He does throw the ball. The girl does catch it.
The dog does have a house. He does stay in the yard.
The mother did close up the yard. The dog does stay outside the fence.
Possessive

C

2-3 See mother's hat.
4-5 It is mother's book.
6-7 The man takes the girl's book.
8-9 He gets the girl's hat from the water.
10-11 The boy's shirt is torn. He holds his sister's hand.
12-13 The girl's dog waits for her. She gives the man her book.
14-15 The baby's ball rolled down the stairs. The children play with the baby's ball.

13a

2-3 See baby's bed.
4-5 The chair is mother's.
6-7 The cat eats the dog's bone.
8-9 The boy's dog is running to the house.
10-11 He is painting mother's picture. He brought his own paints.
12-13 The baby drives his brother's car.
The girl brings the baby's bottle.
14-15 The boy is washing his father's car.
He washes the car at his grandmother's.

13b

2-3 See mother's chair.
4-5 The girl's dog sits.
6-7 He runs to his friend's house.
8-9 The boy's mother is sitting in the chair.
10-11 The boy's cat is sleeping. The bird's cage is empty.
12-13 The cat is near the dog's house. The dog's house has a chimney.
14-15 The baby's bed is in the hall. The mother is cleaning the baby's room.
Tr-14 Reflexive

C

2-3 She dresses herself.
4-5 The boy washes himself.
6-7 He sees himself in the mirror.
8-9 The boy is pushing himself in the boat.
10-11 The baby has hurt himself. He cut himself with glass.
12-13 Birds sun themselves in the cage. They feed themselves from the dish.
14-15 The girl dressed herself for the party. She looks at herself in the mirror.

14a

2-3 He hurt himself.
4-5 The cat licks herself.
6-7 The mother pours herself some coffee.
8-9 The girl has rolled herself in the blanket.
10-11 The dog is drying himself. He is warming himself too.
12-13 The boy gets himself an apple. The girl gets herself some milk.
14-15 The boy rests himself on the branch. He has pulled himself up the rope.

14b

2-3 She sees herself.
4-5 The dog scratches himself.
6-7 He warms himself by the fire.
8-9 The dog is rolling himself in the dirt.
10-11 The girl is washing herself. She washes herself with soap.
12-13 The dog gets himself a bone. The cat gets herself some milk.
14-15 The boy washes himself in the bath. He has dirtied himself in the mud.
The boy runs and he kicks.
He throws the ball, and she catches it.
The dog watches the mother, and he waits for her.
The man sits in the boat, and he waits for the fish.
The cow is standing at the gate, and she is waiting to come in.

He is tired and he sleeps.
She has a horse, and she rides it.
The boy gets a ladder, and he climbs the fence.
The man sits down on the chair, and he reads the book.
The children are outside in the sun, and they are playing in the sand.

She looks out and she waves.
He picks an apple, and he eats it.
The children sit at the table, and they drink milk.
The lady walks on the beach, and she looks at the children.
The baby sits on the floor, and she plays with the cow and horse.
Tr-16  Conjunction plus deletion

C

2-3 4-5
6-7 She wears a dress and hat.
8-9 The mother sees the boy and the dog.
10-11 The girl has a coat and a hat and boots.
12-13 The airplane flies over the boats and the children and the beach.
14-15 The mother puts the glasses and plates and spoons and forks on the table.

16a

2-3 4-5
6-7 He has a boat and airplane.
8-9 The girl carries the plates and the spoons.
10-11 The boy wears a hat and shirt and pants.
12-13 The dog is following the girl and the mother and the baby.
14-15 The girl sees the children and the boats and the water and the sand.

16b

2-3 4-5
6-7 Mother has a cat and bird.
8-9 The wind blows the leaves and the rain.
10-11 She has a ball and a pail and a hat.
12-13 The cat and the bird are watching the mother and the girl.
14-15 The boy brings the baby and the wagon and the dog and the bags.
Conditional

2-3
4-5
6-7 She looks out if she wants.
8-9 He will drive the car if he can.
10-11 The children climb over the fence if they want to.
12-13 The dog will have a bath if he gets in the tub.
14-15 The baby swims if the sun is shining and if the mother will help him.

17a

2-3
4-5
6-7 He comes if she pulls him.
8-9 He sits on the table if he can.
10-11 The girl will wash the dog if he is dirty.
12-13 The children will ride the horse if they climb over the fence.
14-15 The girl sees the dog with the collar if she looks out the window.

17b

2-3
4-5
6-7 The man waves if she looks.
8-9 He will ride the horse if he can.
10-11 The cat goes under the table if she is afraid.
12-13 The cat will have the milk if the boy calls the dog.
14-15 The dog will have the milk if he waits until she fills the dish.
He saw the lake so he jumped in.
The birds saw the house so they made a nest.
The boy saw a fish in the water so he caught it.
The boy saw the horse in the field so he climbed over the fence.

She sees the sun so she gets up.
The dog saw the boy so he ran to him.
The girl sees the horse so she runs over to the fence.
The boy saw the boat so he waved to the man in the boat.

The baby saw the mother so he laughed.
The cat saw a bird so she climbed the tree.
The farmer thinks the sun is hot so he wears a hat.
The mother heard the baby in the bed so she came to get him.
Causal

2-3  Birds fly because they are happy.
4-5  The boy is eating because he is hungry.
6-7  The girl is painting a picture because she has paints.
8-9  The mother puts flowers in the bowl because she likes them.
10-11 The dog is waiting at the door because the boy has gone to school.
12-13 The girl is crying because she is hurt.
14-15 The bird sings in the tree because he is happy.
19a  The mother pours water in the glass because the boy is thirsty.
19b  The girl is walking down the road because she is taking the baby home.

2-3  He swims because he likes water.
4-5  The girl is crying because she is hurt.
6-7  The bird sings in the tree because he is happy.
8-9  The mother pours water in the glass because the boy is thirsty.
10-11 The girl is walking down the road because she is taking the baby home.
14-15 The girl is pulling the baby on the wagon because the baby likes it.

19a  Rain falls because the clouds come.
19b  The flag is flying because the wind blows.
2-3  The dog is watching the girl because he loves her.
4-5  The lady drives the car because she is going to the store.
6-7  The girl is pulling the baby on the wagon because the baby likes it.
Pronoun and Conjunction

2-3
4-5
6-7 The dog looked and he barked.
8-9 The dog is hungry, and he is begging.
10-11 The dog looked for the bone, and he found it.
12-13 The cat was sitting by the fire, and she was watching it.
14-15 The man was sitting in the chair, and he was looking at the book.

20a

2-3
4-5
6-7 The girl sits and she paints.
8-9 The girl is hurt, and she is crying.
10-11 The family is cold, and they stay by the fire.
12-13 The man is working in the garden, and he wears a hat.
14-15 The cat was waiting in the tree, and she was looking at the bird.

20b

2-3
4-5
6-7 The bird stands and he sings.
8-9 The girl was hungry, and she is eating.
10-11 The boy stands behind the man, and he watches him.
12-13 The teacher talked to the boy, and she looked at the book.
14-15 The girl was sitting at her desk, and she was waiting for the teacher.
See little birds.
The little dog sleeps.
The boy opens the big book.
The little boy is chasing the white horse.
The mother is putting pretty flowers in the big bowl.
The big fence is high, and the white horse wants to jump.
The man under the big tree waits for the girl on the little horse.

See pretty flowers.
The white horse runs.
The dog sees the big bird.
The pretty butterflies are flying outside the window.
The little boy is wearing big boots and a hat.
The tired man and the small horse are watching the little birds.
The boy is looking for pictures of the pretty butterflies in the big book.

See big butterflies.
The little birds look.
The girl rides the little horse.
The tall man is standing outside the fence.
The three birds are trying to catch the little fish.
The old man is watching the big bird and the black dog.
The big bird is waiting for the dog and the man to go away.
Relative Clause

2-3
4-5
6-7 He sees dogs that are running.
8-9 The dog watches the man who is sitting.
10-11 The mother washed the dishes which were left from dinner.
12-13 The boy plays with his brother who is riding in the wagon.
14-15 The boy reaches for an apple which is in a bowl on the table.

22a

2-3
4-5
6-7 He wears boots which are big.
8-9 The boy watches the children who are climbing.
10-11 The mother watched the wind which was blowing the leaves.
12-13 The boy looks at the clock which is hanging on the wall.
14-15 The man is building a boat which is big enough for all the children.

22b

2-3
4-5
6-7 She sees birds that are flying.
8-9 The boy pulls the wagon which is heavy.
10-11 The children opened the door which the man had closed.
12-13 The girl plays with the baby who is sitting on the floor.
14-15 The children are waiting for the man who is sleeping and wearing a hat.
Tr-23  Complement (Infinitival, participal, deletion)

C

2-3  He likes swimming.
4-5  He likes climbing ladders.
6-7  The dog wants to get out.
8-9  The mother likes to watch the boy climbing.
10-11 The birds try to watch the cat climbing the tree.
12-13 The boys like to jump in the pool and make a splash.
14-15 The boy wants to climb up the ladder to the top of the tree.

23a

2-3  She likes running.
4-5  He wants to swim.
6-7  The boy likes to paint pictures.
8-9  The dog likes to watch the boy eating.
10-11 The girl likes sitting with her feet in the water.
12-13 The mother likes to sit and watch the boy paint a picture.
14-15 The birds like to sit on top of the house and watch the children.

23b

2-3  He likes eating.
4-5  He likes climbing ropes.
6-7  The baby tries to get away.
8-9  The boy likes to swing on the rope.
10-11 The boy tries to paint a picture of a house.
12-13 The cat tries to climb the tree to get to the birds.
14-15 The girls like to play with the ball and throw it in the pool.
She likes to drink the milk.
He likes to try to catch a fish.
She tries to clean the floor to make them clean.
The father had to take the car to get to the river.
The children went to find the father to tell him to come to eat.

She likes to sweep the room.
She wants to read to learn about horses.
She wants to learn to sew to make a dress.
The mother wants to get the boy ready to go to school.
The girl looks out the window to try to call the children to come.

He likes to look at birds.
He wants to try to get the ball.
He tries to pick up the toys to clean up.
The girls want to get the food to put in a basket.
The dog is waiting to see the bone he will get from the basket.
He thinks about painting.
The mother does all the washing.
The boy reads about going fishing and hunting.
The girl thinks about eating ice cream and drinking coke.
The dog thinks about running and barking and chasing all the cats.
The mother does the cooking and the sweeping and the cleaning and the washing.

She thinks about swinging.
The dog does all the barking.
The man does the painting and the cleaning.
The father thinks about sailing in a boat and fishing.
The baby thinks about getting up and running and finding the mother.
The boy thinks about being a cowboy and riding horses and having a gun.

He dreams about barking.
The cat thinks about climbing trees.
The cowboy does the riding and the shooting.
The mother thinks about sitting down and reading and resting.
The mother does all the planting and the weeding in the garden.
The girl thinks about playing outside and picking flowers and swinging in the swing.
Nominal Compound

2-3 The baby doll sleeps.
4-5 The boy sees the Christmas tree.
6-7 The girl pours tea from the teapot.
8-9 The dog looks at the baby in the baby bed.
10-11 The boy wears a cowboy hat, and he wears some cowboy boots too.
12-13 The baby birds call for the mother, and the mother bird looks for a worm.

26a

2-3 The baby rabbit looks.
4-5 The man has a paint brush.
6-7 The children get toys from the toy box.
8-9 The baby looks at the ducks in the duck pond.
10-11 She has a baby carriage, and the baby doll rides in it.
12-13 The mother is making a birthday cake, and the girl brings a birthday present.

26b

2-3 The baby birds cry.
4-5 The children ride the fire truck.
6-7 The girl brings sugar in a sugar bowl.
8-9 The dog has a dog house in the front yard.
10-11 The girl has a birthday party, and she wears a party dress.
12-13 The girl has on a bathing suit, and she gets into the swimming pool.
VITA

Margaret McCurdy Neely was born in Halifax, Nova Scotia in 1924 and educated at Trafalgar School for Girls in Montreal, Quebec. She graduated from the University of Western Michigan in 1945, with a Bachelor of Science degree in Speech Pathology, and returned to Canada to work for the Department of Veterans Affairs as a Speech Pathologist.

The writer received a Master of Science degree in Speech Pathology from Tulane University in 1960. She was director of the Speech Therapy Department at Dominican College in New Orleans until 1962, when she returned to graduate school at Louisiana State University. She received a doctor of Philosophy degree in the area of Speech in August, 1968. She is currently the director of the Baton Rouge Speech and Hearing Foundation.
EXAMINATION AND THESIS REPORT

Candidate: Margaret McCurdy Neely

Major Field: Speech

Title of Thesis: FUNCTION OF SYNTACTIC STRUCTURES IN RECALL OF SPOKEN ENGLISH BY INDIVIDUALS WITH LANGUAGE DEFICIT

Approved:

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Major Professor and Chairman

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Dean of the Graduate School

EXAMINING COMMITTEE:

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Date of Examination:

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