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AN ANALYSIS OF THE SYNTACTIC STRUCTURES
OF CHILDREN WITH DEVIANT ARTICULATION

by

AUDREY SMITH HOFFNUNG

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ABSTRACT

AN ANALYSIS OF THE SYNTACTIC STRUCTURES
OF CHILDREN WITH DEVIANT ARTICULATION

by

Audrey Smith Hoffnung

Adviser: Professor Boyd Sheets

Two groups of subjects, matched for age, sex, socio-economic background, and performance on the Peabody Picture Vocabulary Test were studied. The experimental group, numbering thirty, was composed of children who were enrolled in speech centers in academic settings. The children had severe articulation problems as determined by their performance on the Photo Articulation Test. The children in the control group had normal articulation and were selected from the population of a nursery school. A special syntax test was devised for the negative, Wh interrogative pronoun question, and present progressive-copula. The test was administered to the children to elicit responses, and these responses were recorded and analyzed. It was hypothesized that a relationship exists between phonology and syntax: that children who have defective articulation have defective

syntax. The deviation affects all areas of language performance: comprehension, imitation and production. The results confirmed this hypothesis. The scores of the experimental group were poorer than those of the control group in all Language Performance Tests; e.g., the comprehension scores of the experimental group were lower than those of the control group. The facility with which the control group answered the questions did not allow a definitive conclusion on qualitative differences between the two groups: the tests were too easy for the control group. Based on the findings, it is apparent that further investigation is needed to ascertain the cognitive development and the semantic development of children with deviant articulation in relation to children with normal articulation.

The scores for both groups were better for comprehension than for production and both groups also found the comprehension of the Wh interrogative pronoun question significantly easier than the comprehension of the negative, while the reverse was true for production. The scores of the experimental group for the Test of Negative indicated that comprehension greatly exceeded imitation, which, in turn, slightly exceeded production. Imitation is not considered to be grammatically progressive, but is believed to be an indication of the processes that are occurring in the present stage of syntactic development. No conclusive statement can be made about this finding for the control group, because, again,

the test was too easy. The children in the experimental group used reduced differentiation or non-expansion in the production of syntactic categories, e.g., the verb phrase. There were extensive omissions of the auxiliary "to be" and the copula verb "to be." This phenomenon was similar to the reduced differentiation in categories found in the phonological system of these children. A co-occurrence of specific syntactic features was found. The study indicated that children with deviant articulation have difficulty in the areas of syntax and phonology.

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Introduction

The language performance of children with deviant articulation was examined in this study. For many years, problems of articulation were considered as a completely separate field, independent of syntactic and semantic areas. Gradually it became recognized that a relationship existed between all three aspects of language. Liberman, Cooper, Harris, MacNeilage and Studdert-Kennedy (1964), in their motor theory of speech perception, stated that the articulation of sounds is invaluable in speech perception, implying that a defect in articulation causes a defect in perception. Powers (1957), after observing children with deviant articulation in a clinical setting, noted that children who do not develop sounds at the expected age also show immaturity in the development of grammar. Blumenthal (1966) suggested that the phonetic component is indirectly related to the semantic component and they are related to each other through syntax. Weir (1966, p. 158) hypothesized that the learning of phonology and the learning of syntax were interrelated to a greater extent than it was assumed and Lenneberg (1967, p. 283) suggested that the formal process for syntax and for

perception and production of sounds was the same. The investigator's own observations of speech deviant populations in a number of clinics seem to confirm that a relationship exists among the three elements of grammar. This study attempted to examine the relationship between articulation and language development.

Purpose of the Study

It was the purpose of this study to investigate the relationship between the speech and language development of deviant and normal children and to ascertain whether the performance of language, in response to specific stimuli, would be significantly different for the group with deviant articulation than for the group with normal articulation. It is believed that if there is a deviance, delay or arrest in the development of phonology, there will also be a statistically significant deviance, delay or arrest in the development of syntax; and if there is a dysfunction it will affect all areas of verbal performance--comprehension, imitation and production. Based on the finding of a significant difference, the prediction can be made that an articulation defect of a specific degree signals a specific type of language problem.

Statement of the Problem

A relationship seems to exist between syntactic, semantic, and phonological rules (Menyuk, 1971, p. 214). She

suggested that when there are syntactical problems phonological problems will be found; but the reverse has not been frequently observed. In the investigator's study the language productions of children with phonological problems will be examined. It was felt that by using a matched experimental and control population of sufficient number to offer a high statistical probability level (Cohen, 1969), by quantifying the number of phonological errors of the experimental group, by investigating limited aspects of syntax, and by offering specific verbal and visual stimuli, it would be possible to determine whether a definite relationship exists between articulation defects of a specific degree, and specific aspects of syntactic development. It also calls attention to the type of problem that might be expected so that preventative speech therapy programs can be developed and implemented. Predictions of areas of weakness would provide additional time for the therapist to work with the children. The time element is crucial in the maturation of the language of children. If "foresight diagnosis" could be added to the tools of the diagnostician and therapist, a program of stimulation in specific language areas would supplement the stimulation the child receives in the normal environment. Research is needed in this area to determine the value of any program that is presented.

The organization of generative grammar is divided into three major categories: (1) phonology, (2) semantics, and

(3) syntax with an implied interrelationship between units (Chomsky, 1965, p. 16). Phonological units are the smallest units of morphemes, which are organized into, or categorized according to, grammatical relationships. It seems to be a process of building by steps. It may be theorized that causation is chained--what is wrong at step one will create problems at steps two and three; e.g., the reduction in phonemic categories accounts for the increase in homonyms and paronyms in language, causing a lack of expansion of the semantic category (Jakobson, 1968, p. 36). But, within each language group there are divisions, e.g., voiced and voiceless features for phonology, auxiliary and main verb for the verb phrase in syntax. It may be that whatever causes the difficulty in refinement or differentiation in one of these areas might also cause it in the other area.

Hypotheses

A relationship has been implied between the various aspects of language, therefore it is hypothesized that:

1. A relationship exists between articulation and syntax, i.e., the population scoring the largest number of errors on the articulation test will score the largest number of errors on the syntax test. Since the scores of the population with deviant articulation were poorer on the articulation test than those of the group with normal articulation, it is hypothesized that the scores of the deviant

articulation population will be poorer on the syntax test.

2. Deviation in articulation affects all areas of language performance--comprehension, imitation, and production. The group with deviant articulation will have poorer scores on the tests for comprehension, imitation, and production of language than the group with normal articulation.

CHAPTER II

REVIEW OF THE LITERATURE

Since this study focuses on phonology and different levels of syntax, the review of the literature is limited to the following specific areas: (1) the development of phonology, (2) the development of syntax, specifically auxiliaries, negatives, and interrogatives, and (3) the deviant language of children.

The Development of Phonology: Differentiation and Consistency

In the following discussion, articulation is described in terms of the regularity and consistency of its distinctive features and the differentiation that exists in the development of sounds (Jakobson, 1968). In this study it is hypothesized that there is similarity in the development of articulation and syntax, where features added to gross categories serve to refine and differentiate the categories.

Jakobson, Fant, and Halle (1967, p. 43) maintained that phonemes are composed of a "bundle of distinctive features," and it is these distinctive features that are acquired by the child. Jakobson et al. suggest that phoneme acquisition requires a generalized use of a distinctive feature, i.e., if a feature has been acquired it will be present for all

phonemes that require it.

Leopold (1966) and Lenneberg (1964a) concluded that gross sound categories are developed by the child and then divided and refined as the child incorporates the phonemes into his language. Preston, Yeni-Komishian and Start (1967) discussed this in their study, in which they investigated the Voice Onset Time (VOT) of the unmarked category of voicing (0 to +40 msec.) in a group of English speaking children. VOT is measured in milliseconds and is the time the consonant is released before the onset of voicing. A negative value indicates that voicing was started before the consonant was released. VOT (0 to +40 msec.) produced the unmarked category of voicelessness for the Lebanese children in their investigation. These authors interpreted this as a sign that children start with an unmarked, global category and then, according to the rules of their language, mark, differentiate or refine the items within the category. Chomsky and Halle called the differentiation of sounds of a language a "phonological syntax" (Lenneberg, 1964a, p. 122).

A regularity in development is said to exist, not only for the normal development of sounds but also for the misdevelopment of sounds. Jakobson (1968, p. 51), in discussing different languages used throughout the world, reported an "irreversible solidarity" that governs the development of sounds, e.g., front consonants develop before back consonants, stops occur before fricatives. This developmental

pattern is stable and consistent in all the languages of the world. In 1902, Grammont (1902, p. 62) found that the mis-articulations of a child were not random or incoherent but were produced by a "consistency of deviation" and, therefore, could be explained and understood. The findings of McReynolds and Huston (1971) and Compton (1970) support this viewpoint. McReynolds and Huston noted that when feature errors occurred they were present in each phoneme which required that feature. Compton noted that the substitutions were regular and systematic. It was suggested that mis articulations were not merely motor problems but were possibly due to the inappropriate use of phonemic rules. The severity of the problem of articulation may be directly related to the number of phonological rules that are different in the child's development.

To summarize, the development of phonology is said to entail more than just the motor production of phones (Jakobson, 1968; Lenneberg, 1964b; Leopold, 1966; Preston et al, 1967). It involves the development of phonemes by differentiation and synthesis. On the basis of their experimental observation, McReynolds and Huston (1971) and Compton (1970) stated that articulatory deviances are not random and variant, but are consistent, as though obeying certain definite phonological rules.

The type of articulation errors produced by the children were not detailed in the investigator's study, but it

is believed that similar patterns are operative for phonemic and syntactic development: (1) the lack of syntactic development is systematic, not random, (2) syntactic development occurs as a result of differentiation of categories, (3) an item that is acquired is used in all syntactic structures that require it, and (4) severity of syntactic development is related to the reduced number of syntactic and morpho-phonemic rules used.

The Development of Syntax

In this study the formation and perception of the negative structure (comprehension, imitation and production), the interrogative structure (comprehension and production), and the production of the copula "to be" and the auxiliary "to be" were examined. The studies mentioned in the following discussion offer empirical evidence on the basis of which the children participating in this experiment were compared.

There seems to be wide agreement among the researchers in the field that there is a fixed order of grammatical development, with some variability due to the idiosyncrasies of the child (Brown, Cazden & Bellugi-Klima, 1968; Bloom, 1970; Slobin, 1971; Ervin-Tripp, 1971). Lenneberg (1964b) concluded that a single set of organizing principles exists for language and these principles, or laws, are learned in an orderly fashion. He stated that a child must learn to

abstract the laws before he can apply them.

The Development of Auxiliaries

When studying normal children, Bellugi (1965), Brown, Cazden and Bellugi-Klima (1968), and Klima and Bellugi (1966) compared the children according to their level of linguistic similarity as determined by the mean number of morphemes used, or the mean length of utterance (MLU); a range was given for chronological age (CA). The norms noted were for children with an MLU of 2.75 morphemes and a CA of 22 to 36 months. Only one subject, included in the investigator's study, fell below the upper limit of the CA. This was a 35-month old boy in the experimental group. Each child in the experimental group and the control group produced utterances above the 3.5 morpheme level. Therefore, it was concluded that if a child was above the MLU given, and was within or above the CA range given, and if he fell within the norm, he would be able to form grammatical categories similar to those produced in the above-mentioned studies.

There is a general agreement concerning the findings of Miller and Ervin (1964), Brown, Cazden and Bellugi-Klima (1968), and Menyuk (1969) that by an MLU of 2.75 morphemes, with a CA varying from 22 to 36 months, the copula verb "to be," the auxiliaries "to be," "to do," and Modals "can and will" are used in declarative, negative, and yes/no sentences. The Negative morphemes, "no, not, can't, and don't" are present, as are negative transformations. The auxili-

aries and modals are used in conjunction with the negative morphemes, e.g., "is not, can not." The auxiliaries are not used with regularity if an interrogative pronoun, e.g., "who, what, where, when," is included in the formation of the question; if the interrogative pronoun is present the required inversion for the Wh question may not occur.

At this stage, the children use articles and produce the following inflections (McNeill, 1970, p. 83): present progressive (-ing), irregular past, third person singular (-s), and regular past (-ed) for the verb; and plural and possessive for the noun. Miller and Ervin (1964) observed that a time element existed from the initial production of the form to the time when the form became stable and consistent in verbal output.

The Development of the Negative Structure

Basic processes. Wason (1961) believed that the concept of negation implies an alteration of the concept of affirmation; one must have the concept of affirmation before one can think to the contrary. Wason felt that comprehension of the negative acknowledges a change of meaning from the affirmative. The production of the negative requires the addition of the negative morpheme, e.g., "no" and its placement within the sentence. It may be due to this addition that the child was found to use a simple structure for the negative rather than for the declarative (Bloom, 1970,

p. 165). The evidence Bloom presented suggests that some sort of cognitive limitation in handling structural complexity (such as accompanies sentence negation) underlies the constraint on length of children's utterances. Bloom reasoned that a specific cognitive development precedes the emergence of different syntactic structures because extralinguistic information must be taken into consideration. A cognitive-semantic concept is considered to be connected with the negative and, as a result, the negative element is not merely attached to the sentence but is an intrinsic part of the structure of the sentence. The data indicate that children learn the negative concept of nonexistence and rejection first, and denial later. To support her hypotheses, Bloom (1970, p. 219) offered sentences demonstrating that greater complexity in the sentence structure is present when the simpler concept of "non-existence" is used, and greater simplicity of the sentence structure occurs when the more complex concept of "denial" is used.

The negative items tested in this study required the negative concept of denial, i.e., "Show me the girl who is not reading a book," and "Show me the boy who will not jump." The production aspect of the negative is apparently predicated on the existence of the negative concept and is therefore assumed to require greater cognitive development. Furthermore, the addition of a negative morpheme adds to the length and complexity of the utterance. The scores for

the production of the Negative Test fell below the scores for the production of the Present Progressive-Copula Test.

Comprehension, imitation and production of the negative.

Imitation of the negative was tested in this study. The explanation of imitation of language has resulted in theories that are at opposite poles. Decroly (1934) believed that imitation employs meaning and is not simply a perceptual motor task. Fraser, Bellugi [Klima] and Brown (1963) differed, suggesting that imitation is a perceptual-motor skill and is not dependent upon comprehension. They studied 12 children, CA 37 months to 43 months, by administering a test involving grammatical contrasts, e.g., singular-plurals, present progressive-future. They stated that if imitation (I) were easier than comprehension (C), "speech is a simpler system than reference." If (C) were easier than production (P), then the same number of operations were used for comprehension and for production, but (P) required the additional control of the speech system. Their results supported their hypothesis. They found that (I) was easier than (C) which, in turn, was easier than (P).

In discussing the data of these authors, two factors should be noted:

1. the Stanford-Binet Test norms establishing that for children two digits are recalled at 30 months, three digits at 35 months, and four digits at 54 months. Based merely on these data, the children (CA 37 to 43 months),

in the study of Fraser et al., should have performed poorly on the imitation task, for much of the material exceeded their memory span for non-meaningful items; but they performed well, indicating that they were possibly using the syntactic structure of the sentence as a cue for retention of the sentence (Salzinger, Salzinger & Hobson, 1966). If this were the case, the investigator felt that imitation alone was not being tested.

In a survey of the literature, Miller (1956) found that the capacity of the adult for immediate memory span was seven, plus or minus two. The amount of information received, processed and remembered can be increased by organizing the stimuli so that "chunks" or sequential groups of information are utilized. Menyuk (1969, p. 113) found that sentence length was not significant for a grammatical utterance but was significant for a nongrammatical utterance. Repetition was dependent upon structure. Salzinger et al. (1966) concurred with Menyuk's conclusions. In their study, when 4-6 morphemes were not grammatically structured there was a significant difference in the production of 3-6-year-olds, but when the strings of morphemes were structured there was no significant difference; ". . . repetitions appeared to be a maximum estimate of the children's competence" (Menyuk, 1971, p. 154).

2. The test of Fraser, Bellugi and Brown (1963) required imitation of many inflections; but according to

Brown, Cazden, and Bellugi-Klima (1968), many of the items tested for imitation were already within the production ability of children, though perhaps the production was not stable. Brown and Fraser (1964, p. 76) found that the paired values of the MLU that were imitated and produced were very close; neither was consistently higher. The findings of the investigator's study were in accord with the conclusions of Brown and Fraser.

To summarize, Fraser et al. (1963) maintained that imitation is a perceptual-motor task. Vygotsky (1962), (Ervin, 1964; Ervin-Tripp, 1970) and Lenneberg (1969) disagreed, suggesting that imitation implies the use of phonological, semantic and syntactic rules. Vygotsky (1962, p. 103) stated that imitation occurs only within the limits of the individual's development. Lenneberg (1969) declared that children can only repeat correctly when they have learned the rules of grammar. Lenneberg (1964a) pointed out that a sentence contains a great number of phonological, semantic and syntactic details and "imitation actually implies many grammatical and phonemic rules that can (and must) be applied to both the decoding and encoding of messages." Idiots can be taught to label (Lenneberg, 1964b), if they are able to stand and walk, but imitation of a complex sentence can only be taught if the principle of syntax is present. Ervin-Tripp (1970) added that a child may recognize the semantic implication of the syntactic features of

a statement but not be able to produce the syntactic features spontaneously. Although imitation is not grammatically progressive (Ervin, 1964), imitation is slightly more advanced grammatically than spontaneous production, and comprehension, too, is more advanced than production. The hypothesis of the investigator's study is antithetical to that of Fraser et al. (1963). The investigator believes that the span between imitation and production is small, and that comprehension exceeds both imitation and production.

The Development of the Interrogative Structure

In this study, the examiner noted the performance of the Wh interrogative structure by: (1) questioning the child about a presented picture, and (2) requesting the child to ask a question about the second picture presented. Their responses were analyzed for the use of the wh pronoun and for the structure of the interrogative sentence.

Bellugi (1965) and Brown (1968) investigated the development of the interrogative structure in children. They determined that the noun phrase (NP), and the auxiliary verb, or modal, must be interchanged for correct production of the interrogative sentence. Bellugi found that the auxiliary was not used consistently when the Wh interrogative pronoun was introduced into a sentence. If the auxiliary was present, the obligatory inversion was not regularly performed. Muma (in press) stated that the "co-occurrence"

of different syntactic structures may cause the omission or substitution of one of the structures. McNeill and McNeill (1966c) posited that the absence of the auxiliary and/or its inversion might be due to the limited number of transformations the child can perform at one time. According to Savin and Perchonock (1965), this phenomenon may occur because speech is dependent upon finite memory. It also may be due to the addition of the conceptual semantic difficulties presented by the various Wh interrogative pronouns. This is similar to the statement of explanation concerning the negative.

The Wh question appears to be semantically and conceptually more difficult than the yes/no question. The production of the yes/no question involves the inclusion of an auxiliary, in addition to its inversion. The answer to the yes/no question is either "yes" or "no." The production of the Wh question requires the inclusion of the Wh interrogative pronoun and the auxiliary, in addition to the inversion of the auxiliary and the NP. An extra step is required syntactically, but additional information must also be present to answer the question. One must understand the meaning of the interrogative pronouns--who, what, where, when, why. For example, "who" replaces the subject NP of the sentence and must be replaced by a subject NP. "What" replaces the subject or object NP. To answer a question that employs "when" as the interrogative pronoun, a time concept must be acquired; to answer "why" one must have an idea of causation.

Ervin-Tripp (1970) studied both the comprehension and production of the Wh pronoun in children. There seemed to be a correspondence between the two, although variation occurred in certain instances. For comprehension and production, the apparent order was "yes/no, what, where." "Why" was responded to after 3.2 years and produced at 3.4 years. The largest discrepancy seemed to occur with the "who" pronoun, which was responded to at 2.3 years but was not used in the "who-subject" position until 3.9 years. Generally, the data seem to support Ervin-Tripp's contention that "questions and responses tend to develop contemporaneously" (1970, p. 80), but it should be pointed out that this does not infer correct grammatical production of the entire response sentence. If a totally correct grammatical production is required for the entire utterance of the child, then it cannot be said that comprehension and production have "contemporaneous development." A lag in the development of a totally accurate utterance would be apparent (see Table II, p. 89), probably because of the additional factors required for the production of the sentence (Chomsky, 1964).

Deviant Language of Children

Menyuk's study (1964) investigated the relationship between phonological and syntactical development in children with deviant articulation. She examined the production of ten children with infantile speech (IS), CA 3.0-5.6 years

and listed the restrictions and omissions that occurred in their speech. Menyuk (1964) suggested that the production of the IS groups was not simply delayed in time when compared with the group with normal speech (NS), but was different. The production of the oldest member of the IS group could not be compared to the production of the youngest member of the NS group. The IS group used more transformations and yet more restricted forms, suggesting that there was a qualitative difference rather than merely a quantitative difference in their productions. The greatest number of errors of the IS group involved omission. This was not interpreted as nonexpansion, which could be considered as a more basic development, but rather as a lack of subdivision within the class. The IS children were considered to be "arrested" at this stage of development. It was not merely one of the steps in development as it was for the NS group. Lee's (1966) findings, from her study of Mike, who had deviant articulation, and her observations at the clinic (Lee, 1971), were in agreement with Menyuk's.

Vandemark and Mann (1965), using the structure classification system devised by Templin (1957, p. 160) studied 50 normal children and 50 children with defective articulation in grades 3-6, CA 8.4-13.0 years, and found a significant difference in the structural complexity score but none in the MLU score. Shriner, Halloway and Daniloff (1969) studied the length-complexity index of 30 children with

normal articulation and 30 children with defective articulation, CA 5.11-8.11 years. The functioning of the children with defective articulation was below that of the children with normal articulation. Shriner et al. suggested that a high positive correlation exists between the degree of defective articulation and the degree of syntactic retardation at all age levels. The children with defective articulation were considered to have a depressed degree of expansion but not an alteration of structure.

The researchers studying children with deviant articulation found a lack of class development or a depressed degree of expansion, i.e., at the beginning, children used only an objective NP rather than a nominative NP. The findings were similar but the interpretations different, leaving the subject open to conjecture.

CHAPTER III

METHODOLOGY

Subjects

A total of sixty subjects participated in this study. The number of subjects was determined according to Table 2.4.1 in Cohen (1969, p. 52). For each of the two matching groups $n = 30$ was required for the desired power value of .85, where the strength of the effect size, or phenomena to be studied was .70 at $\alpha = .05$.

Experimental Group

The thirty children of the experimental group (Exp. G.) were selected from a population of children at three speech and hearing centers. Twenty children were from the Speech and Hearing Center at Brooklyn College, Brooklyn, New York; six were from Hofstra University, Hempstead, L.I., New York; and four were from Queens College, Queens, New York.

Inclusion of a given child in the experimental group was predicated, based on the following criteria:

1. having deviant articulation, diagnosed by a speech therapist at a speech and hearing center;
2. scoring over 30 on the Photo Articulation Test (PAT) (Pendergast, 1969);

3. revealing an IQ of 90 or over on the Peabody Picture Vocabulary Test (PPVT) (Dunn, 1965).
4. coming from a monolingual family (English speaking).

Control Group

The thirty children of the control group attended nursery school in Long Island, New York. The children were selected to match the experimental group for sex, age (within six months), IQ (as determined by the standardization of the PPVT), and socio-economic status (as measured by the Hamburger Revised Occupation Scale) (Hamburger, 1958).

One child did not qualify for placement within the control group because of low PPVT scores; seven were not included because the PPVT scores were too high. They could not be matched.

At the initial testing, twenty children who were potential subjects for the experimental group were not included because their PPVT scores were too low. Not all the children eliminated for this reason were recorded from the onset. If this information had been accumulated, the counted number of excluded subjects would have been higher than twenty. This appears to have reference to the conclusions, which will be reported in Chapter V.

A total of 30 matched pairs of children participated in this study. Each group included 11 girls and 19 boys. The experimental group ranged in age from 3.5 to 6.1 years,

with a mean age of 4.66, and a mean IQ of 110.67. The control group ranged in age from 3.7 to 5.8 years, with a mean age of 4.74, and a mean IQ of 109.17.

Testing Materials

A syntax test was devised to measure the language performance of children in four areas: present progressive, copula, negative, and interrogative. A pilot experiment of the syntax test was run on a random population of ten normal children, between the ages of three to six years, to determine whether the instructions were understood, the test pictures were comprehensible and the context was within their experience and judgment. The same visual and verbal stimuli were presented to all subjects. The dependent variable was the language performance of the child. Photographs of pictures that were actually presented to the children are on the pages following the verbal stimuli for each test. The number on the page corresponds to the number of the question in the actual test.

There were three major divisions comprising the administered syntax test:

Test I was formulated to test the production of:

(1) the copular verb "to be," and (2) the auxiliary "to be" in the progressive tense.

Test II was devised to assess the child's performance of the negative construction in three aspects: imitation

(I), comprehension (C), and production (P).

Test III was designed to study two factors of the Wh interrogative sentence: comprehension and production.

Test I - Present Progressive and Copula

Test items. There were ten test items included in Test I. The visual stimuli consisted of ten pages with two colored pictures placed vertically on each page. The examiner described each of the pictures at the top verbally to a given subject, using a simple, active, affirmative, declarative (SAAD) sentence which continued on copula form of "to be," or a present progressive sentence that contained an auxiliary form of "to be." The length of the sentence was from four to eight morphemes. The uniformly administered test consisted of four copula sentences and six present progressive sentences. One use of the plural "are" was included in each group; the remaining sentences required "is."

When the examiner had finished describing the picture at the top of the page, the child was asked to tell the examiner about the picture at the bottom. One sample presentation was given.

Instructions. The verbal instructions were consistent for each child, i.e., "I'm going to show you two pictures. I'll tell you about one. You tell me about the other." For the sample presentation, the examiner pointed to the picture at the top of the page and said, "He is falling."

She then pointed to the picture at the bottom, showing a child digging on the beach, and waited for the child's response. The desired response was, "He is digging."

In the case of thirteen subjects in the control group, it was found necessary to add the additional phrase, "Tell me the whole thing." They had used subjectless sentences for a combined total of forty of their responses.

When the children comprising the experimental group were tested similarly, supplemental phrases were required in 23 cases. "Tell me the whole thing," was necessary in five cases. This yielded a combined total of 10 utterances. But, in addition it was necessary to add verbally, "No, you tell me about this one," to 18 subjects, who had responded to the examiner's verbal stimuli with a combined total of 100 imitations. These subjects had used a complete, partial or inaccurate imitation of the examiner's verbalization.

Format of Test I

a. Sample Presentation

(1) (a) He is falling.

(b) He is digging.

In each instance the sentence under (a) is the examiner's utterance. The sentence under (b) is the desired response from the child.

b. Actual Test

(1) (a) He is a fireman.

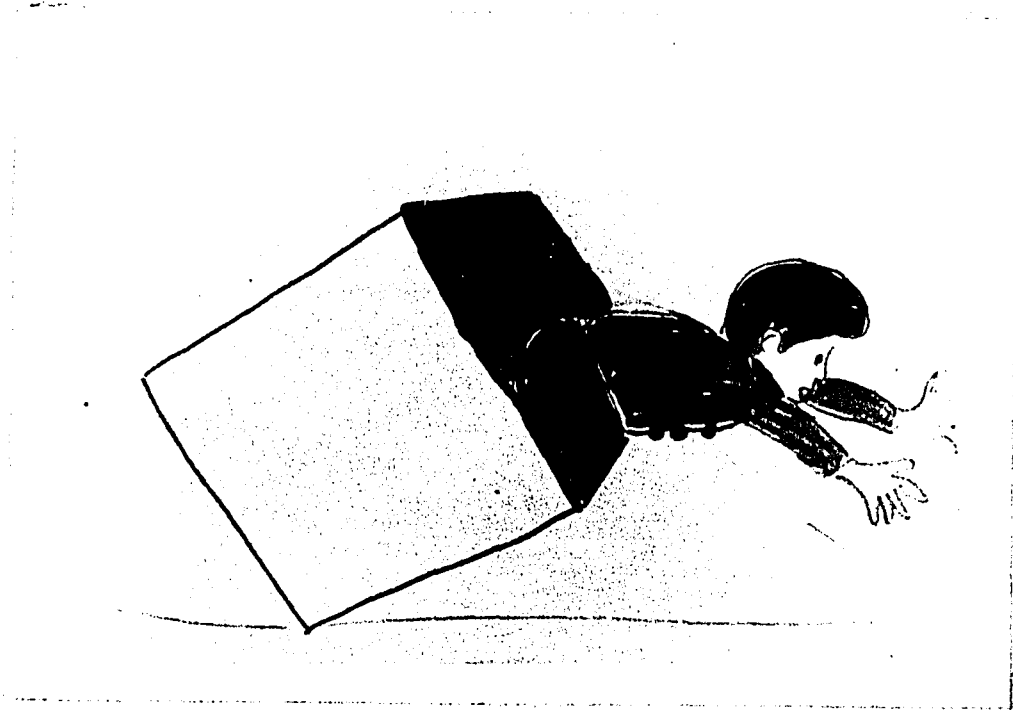
(b) He is a policeman.

- (2) (a) She is giving her mommy a hug.
(b) She is giving her mommy a kiss.
- (3) (a) It is a windy day.
(b) It is a rainy day.
- (4) (a) We are at home.
(b) We are at school.
- (5) (a) They are beating a drum.
(b) They are building a boat.
- (6) (a) She is talking on the phone.
(b) She is riding on the bike.
- (7) (a) He is fishing.
(b) He is sleeping.
- (8) (a) She is in the sandbox.
(b) She is in the bathtub.
- (9) (a) He is pushing the girl.
(b) He is painting the wall.
- (10) (a) He is pulling the sleigh.
(b) He is washing the dog.

Scoring procedure for Test I. The child was given one point for each of the following sentences: (1) if a copula or auxiliary "to be" was included in this response sentence, and (2) if it conformed to the necessary syntax restriction. For example, one point was scored for:

1. They are building a boat.
2. They are building.

TEST I

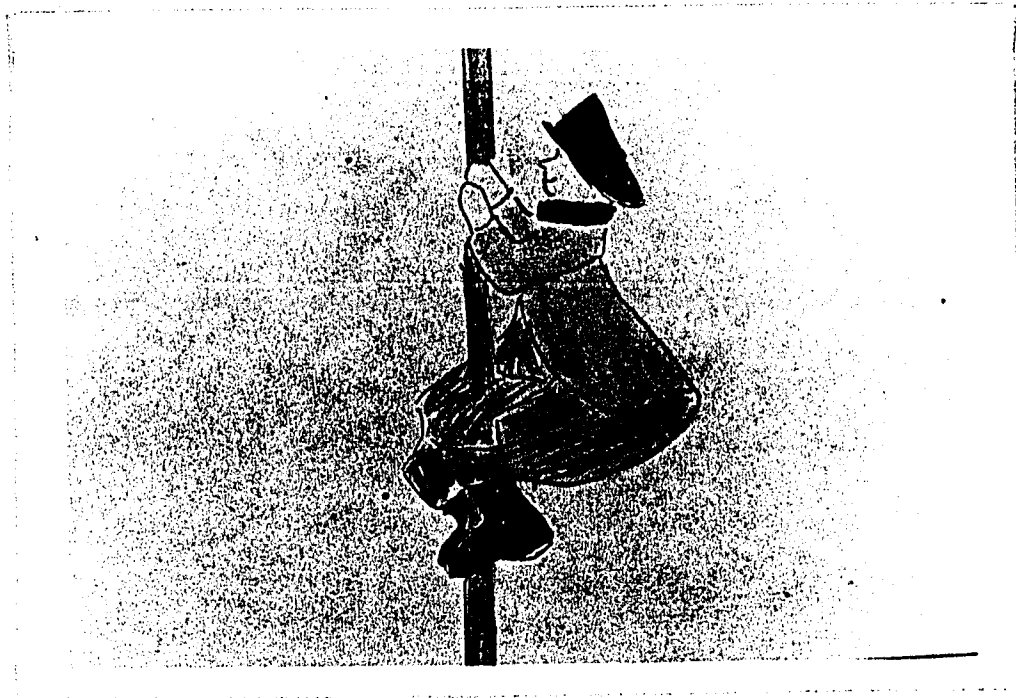


SAMPLE A



SAMPLE B

TEST I

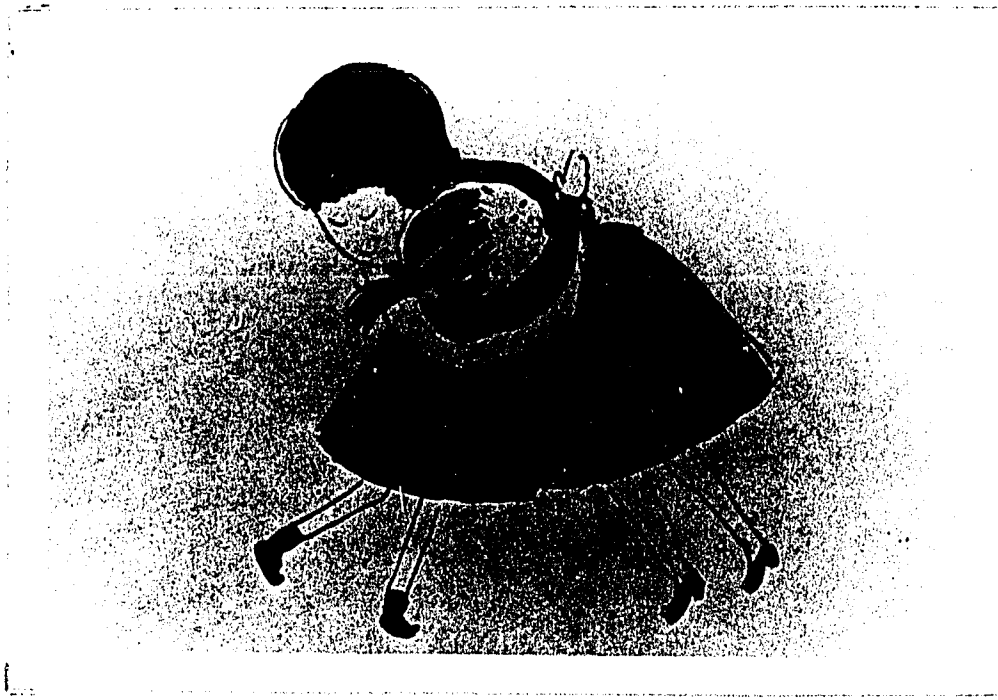


1a



1b

TEST I



2a

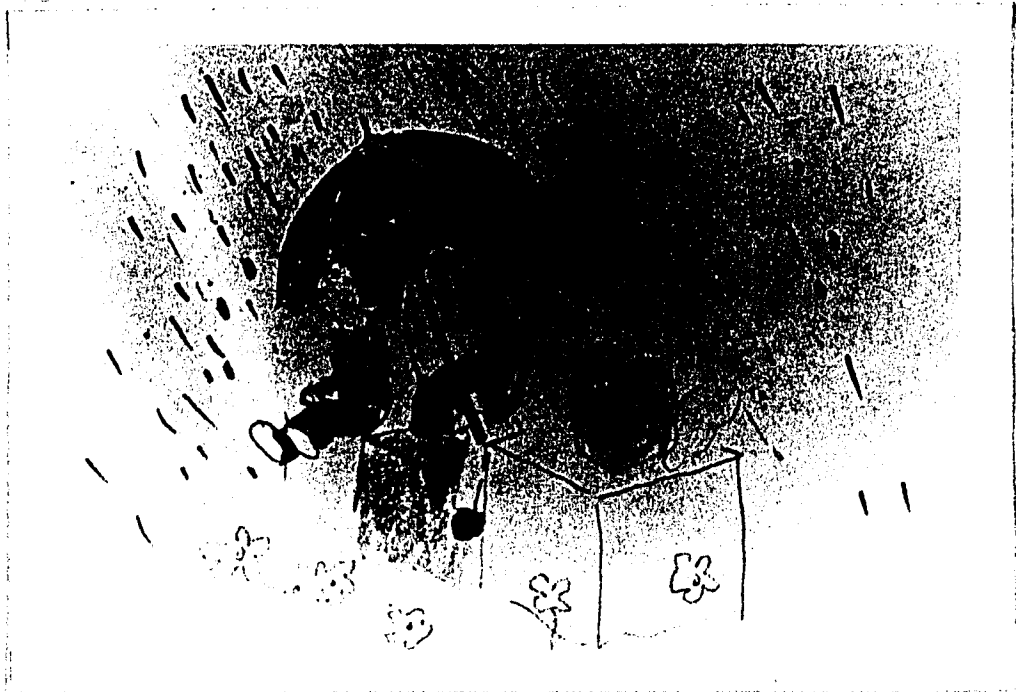


2b

TEST I

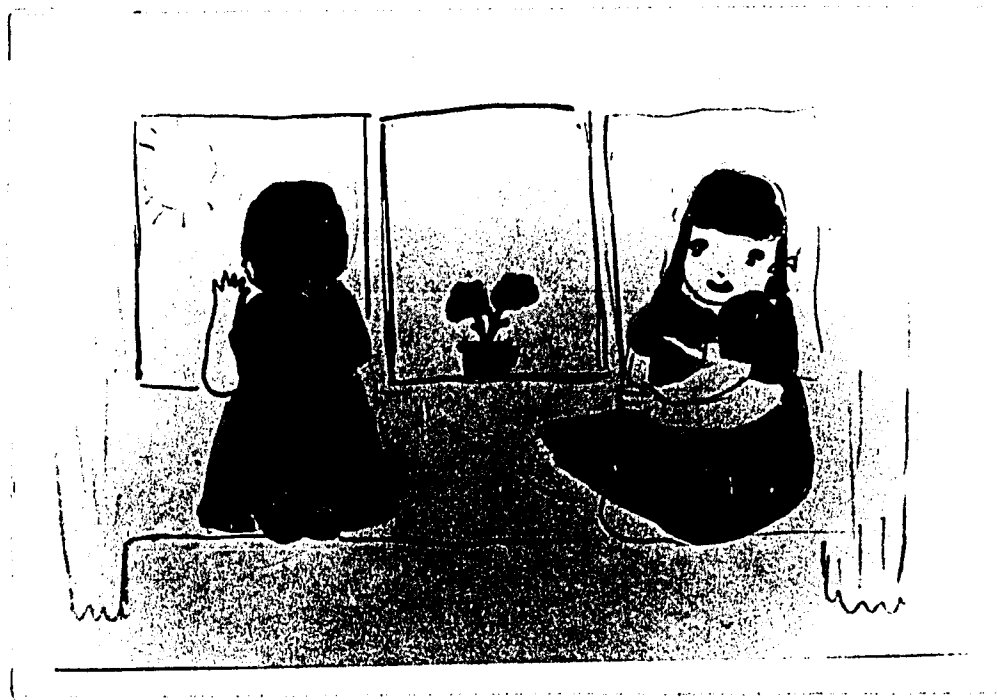


3a

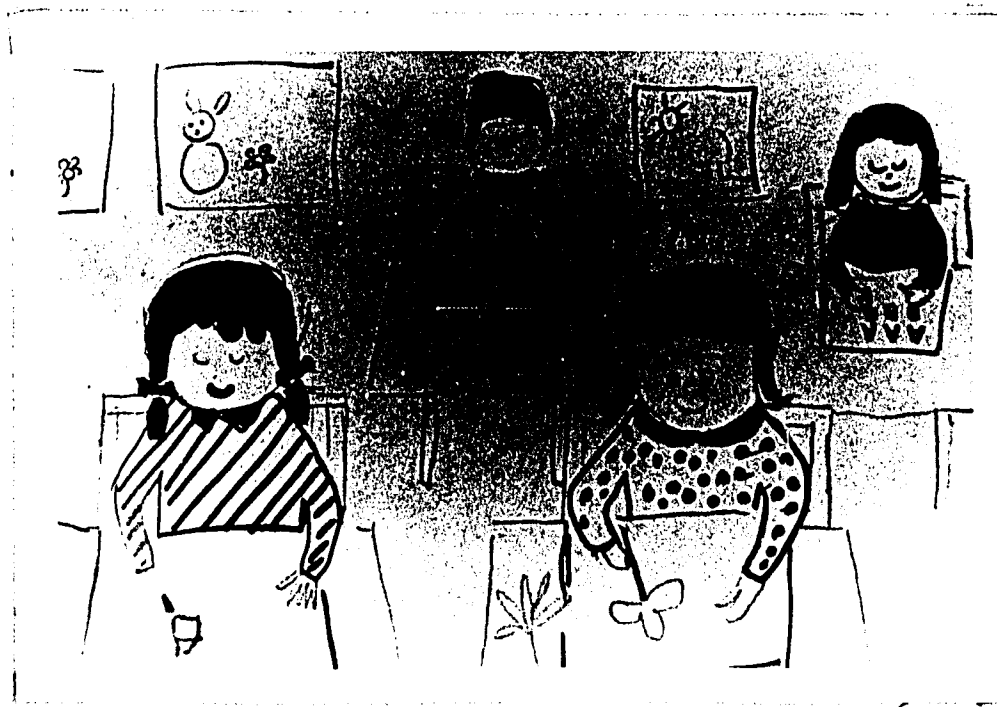


3b

TEST I



4a

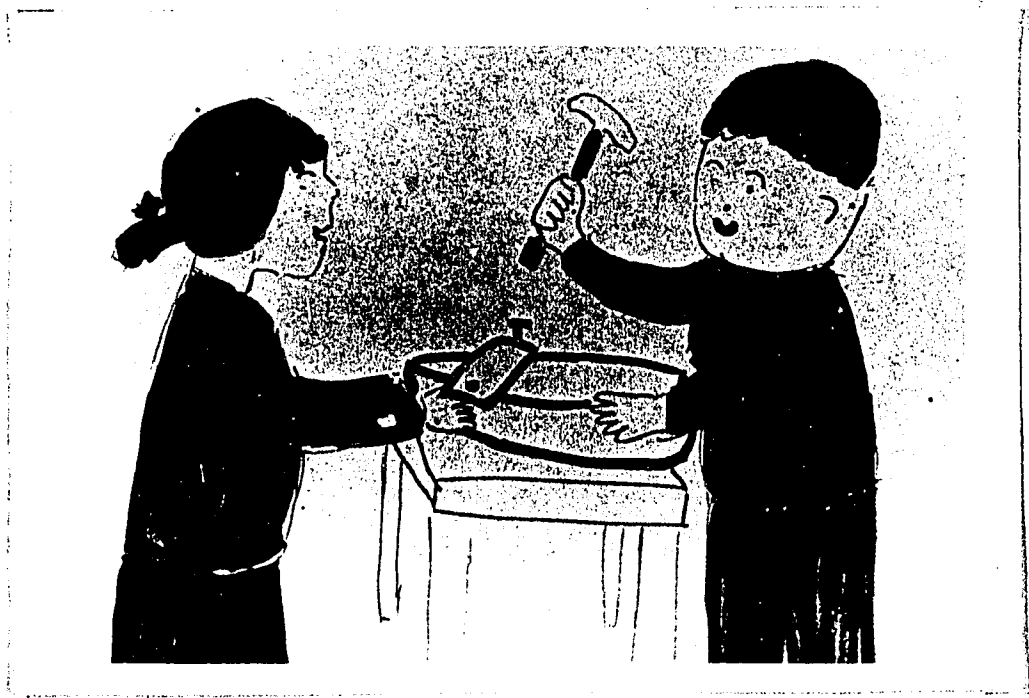


4b

TEST I



5a



5b

TEST I



6a



6b

TEST I

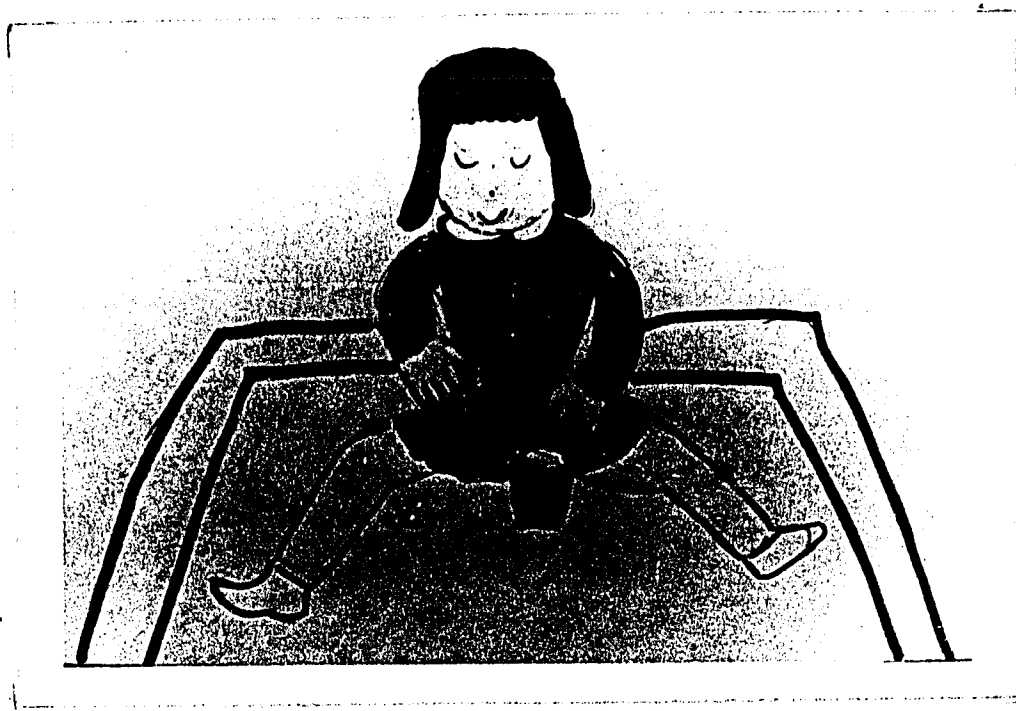


7a

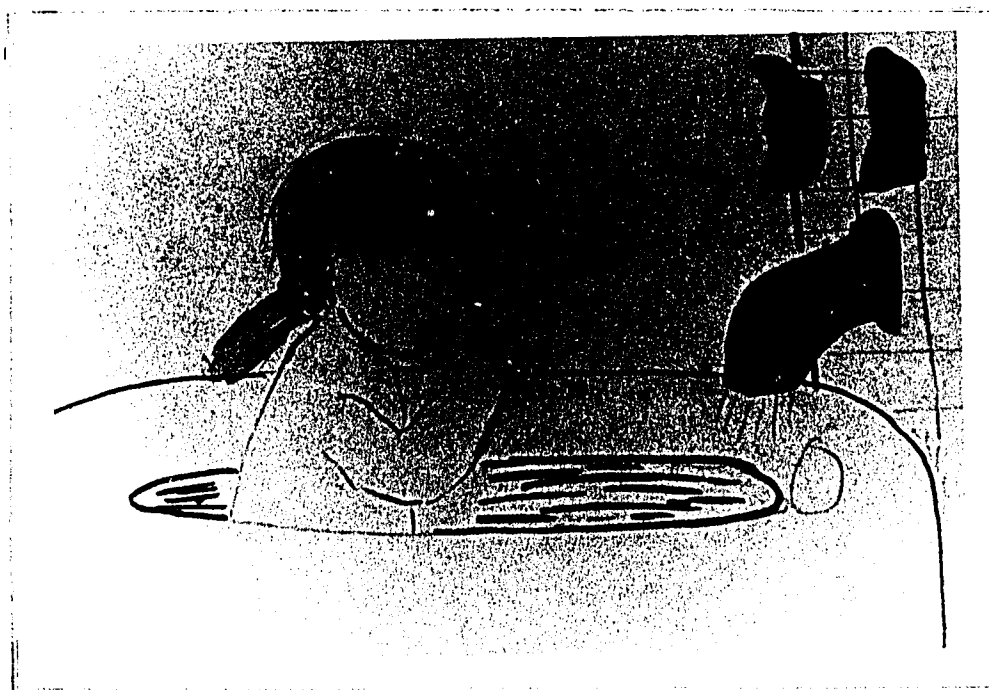


7b

TEST I

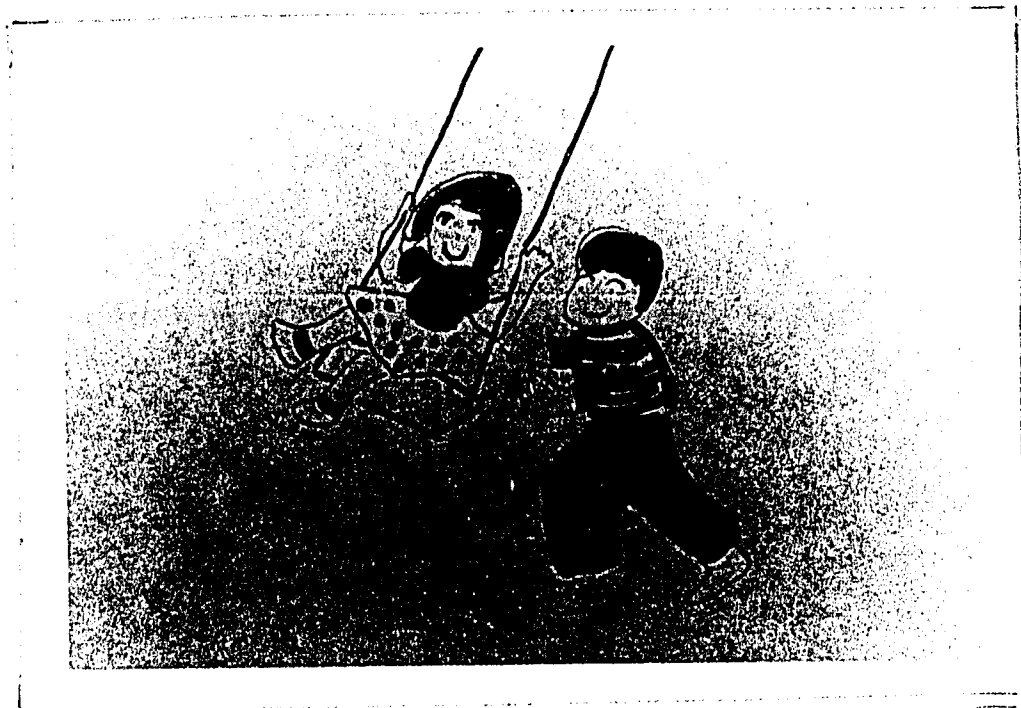


8a



8b

TEST I



9a

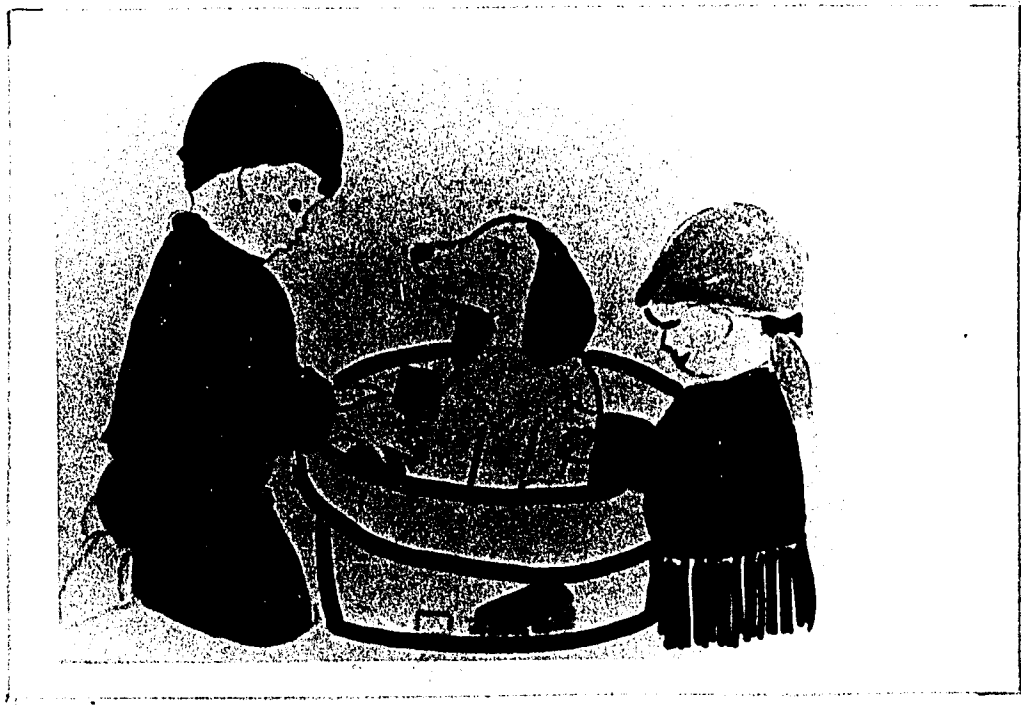


9b

TEST I



10a



10b

3. They are. (Some children did not seem to have the word building in their vocabulary and, after a false start, explained the picture in another way.)

No credit was given for sentences such as the following:

1. They is beating.
2. They beating.
3. He am.

A perfect score for this test was ten.

Test II - Negative Test

Test items. The child's performance of imitation, comprehension, and production of the negative sentence was studied in Test II. The unit was comprised of ten sets of the Negative Test. Each set contained three colored pictures. Two pictures were arranged vertically on the first page; the third picture was placed in the center of the following page. There were two sample presentations. The sentence length for the verbal stimuli was from 4-8 morphemes

Instructions. The instructions given to each child by the examiner for Part (a) (comprehension) of the sample item of Test II were: "I'm going to show you two pictures. I will ask you to point to one picture. For instance, show me, 'They did not get a cupcake'." The examiner then waited for the child to point to the appropriate picture of the two placed before him. If there was no response the request

was made a second time.

The examiner then proceeded to Part (b) (imitation) of the sample presentation of Test II, "Now tell me, 'They did not get a cupcake.' You say that." The examiner waited for the child's imitation of the verbal stimulus. If the child's response was incorrect or if he did not reply, the examiner gave the correct response and went on to the next part. This routine obtained for each part of the test. If the response was incorrect, the examiner gave the correct response and then went on to the next question.

Under Part (c) (production) of Test II, the examiner turned the page to show the third picture. She then asked the question, "'Will they all fit in that little car?' Tell me. Give me a whole sentence; a long answer." If the child merely answered, "No, the examiner asked, "So?" or, "So tell me. . . . They. . . ." If a negative reply was not offered, the examiner supplied the correct answer and went on to the next question.

Format of Test II

a. Sample Presentation

- (1) (a) Show me the picture, "The boy will not go into the water."
- (b) Now tell me about him, "The boy will not go in the water."
- (c) "Will this boy go into the water?"

- (2) (a) Show me the picture, "They did not get a cupcake."
- (b) Now tell me about them, "They did not get a cupcake."
- (c) "Did they all fit in that little car?"

b. Actual Test

- (1) (a) Show me the picture, "She is not drawing the line."
- (b) Now tell me about her, "She is not drawing the line."
- (c) "Is she painting the flowers now?"
- (2) (a) Show me the picture, "They are not running."
- (b) Now tell me about them, "They are not running."
- (c) "Are they eating?"
- (3) (a) Show me the picture, "He will not jump."
- (b) Now tell me about him, "He will not jump."
- (c) "Will he fight?"
- (4) (a) Show me the picture, "She is not reading a book."
- (b) Now tell me about her, "She is not reading a book."
- (c) "Is she flying?"

- (5) (a) Show me the picture, "The boy cannot pick the apples."
(b) Now tell me about him, "The boy cannot pick the apples."
(c) "Can the boy climb the fence?"
- (6) (a) Show me the picture, "The girl did not laugh."
(b) Now tell me about her, "The girl did not laugh."
(c) "Did the girl cry?"
- (7) (a) Show me the picture, "The boy will not blow a horn."
(b) Now tell me about him, "The boy will not blow a horn."
(c) "Will the boy beat the drum?"
- (8) (a) Show me the picture, "The girl did not drink the water."
(b) Now tell me about her, "The girl did not drink the water."
(c) "Did the girl go to school?"
- (9) (a) Show me the picture, "The boy cannot catch the ball."
(b) Now tell me about him, "The boy cannot catch the ball."
(c) "Can the boy move the car?"

- (10) (a) Show me the picture, "They are not pulling the wagon."
(b) Now tell me about them, "They are not pulling the wagon."
(c) "Are they hitting the ball?"

Scoring procedures for Test II. Responses to Part (a) (comprehension) of each set were considered correct if the child pointed to the picture that was represented by the verbal stimulus. For example, in Sample (2) (a), the child was presented with two pictures. In one picture the children were holding cupcakes, in the other picture the children did not have cupcakes. The subject was asked to point to the picture in which the children did not have cupcakes. The subject was correct if he chose the children who were not holding cupcakes. One point was given for each correct identification.

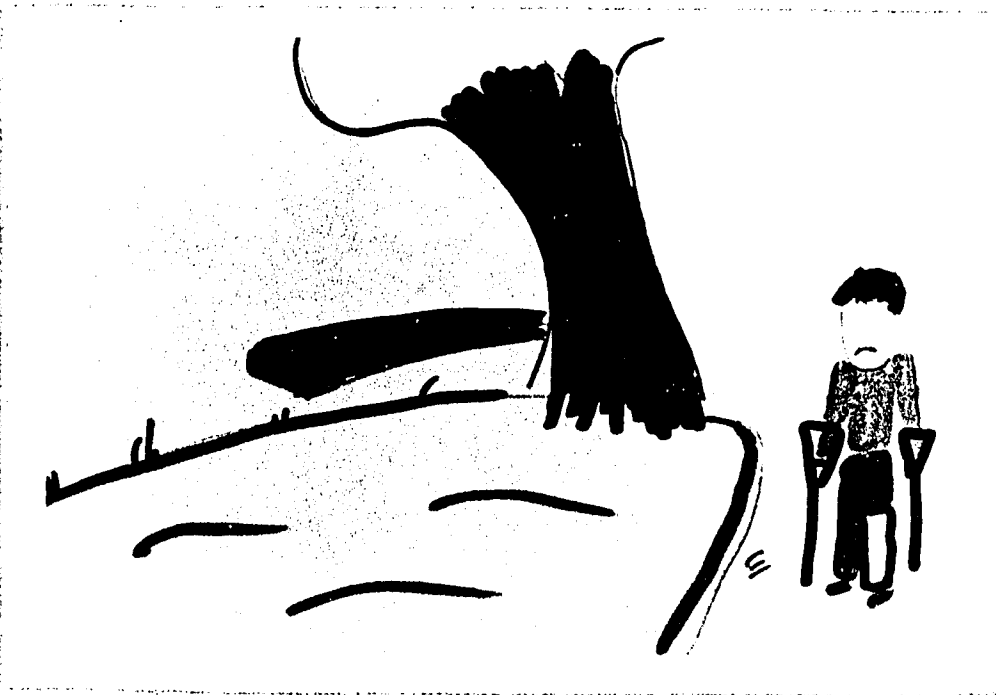
Responses to Part (b) (imitation) of each set were considered correct if an auxiliary or modal, in addition to a negative modal (no, not), was included in the response. One point was given if the response was: (1) an exact imitation of the stimulus sentence; (2) a spontaneous sentence expressing the same meaning as the stimulus sentence; (3) a subjectless sentence, where the subject Noun Phrase (NP) was omitted, but the auxiliary or modal (is, can, shall, may, etc.) in addition to the negative morpheme was included.

No credit was given for the following responses:

TEST II



SAMPLE 1a



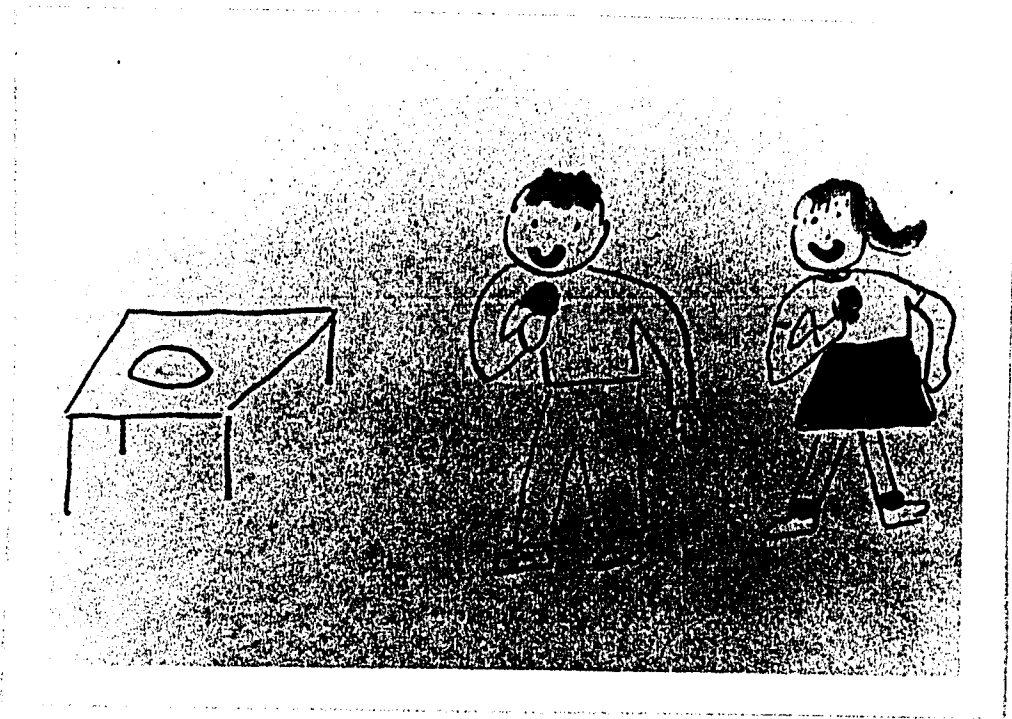
SAMPLE 1b

TEST II

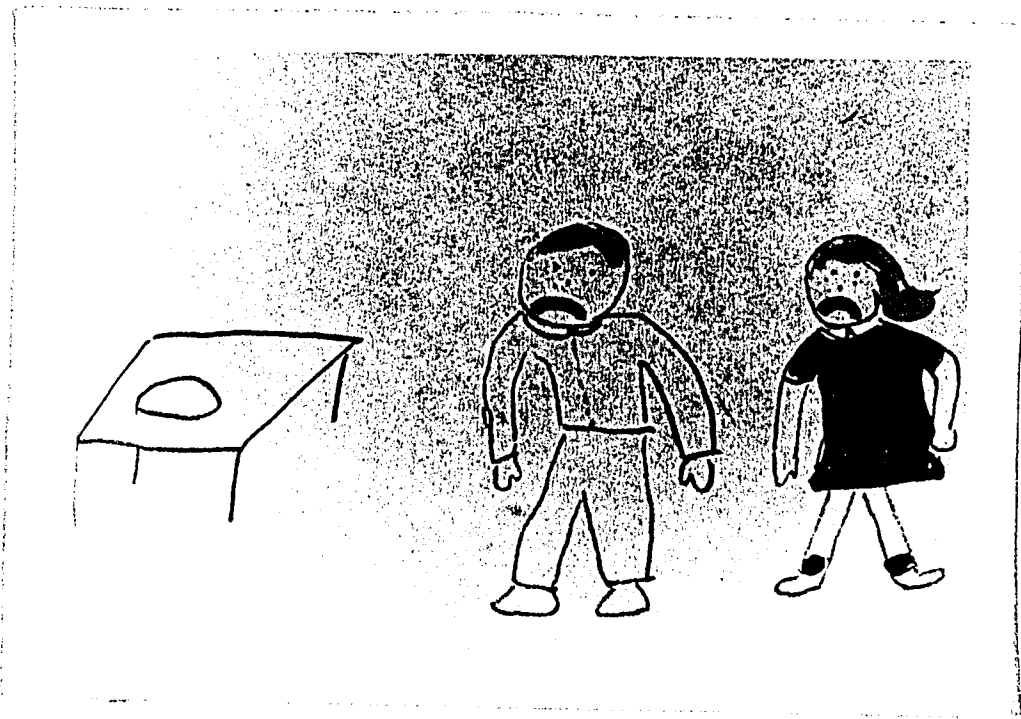


SAMPLE 1c

TEST II

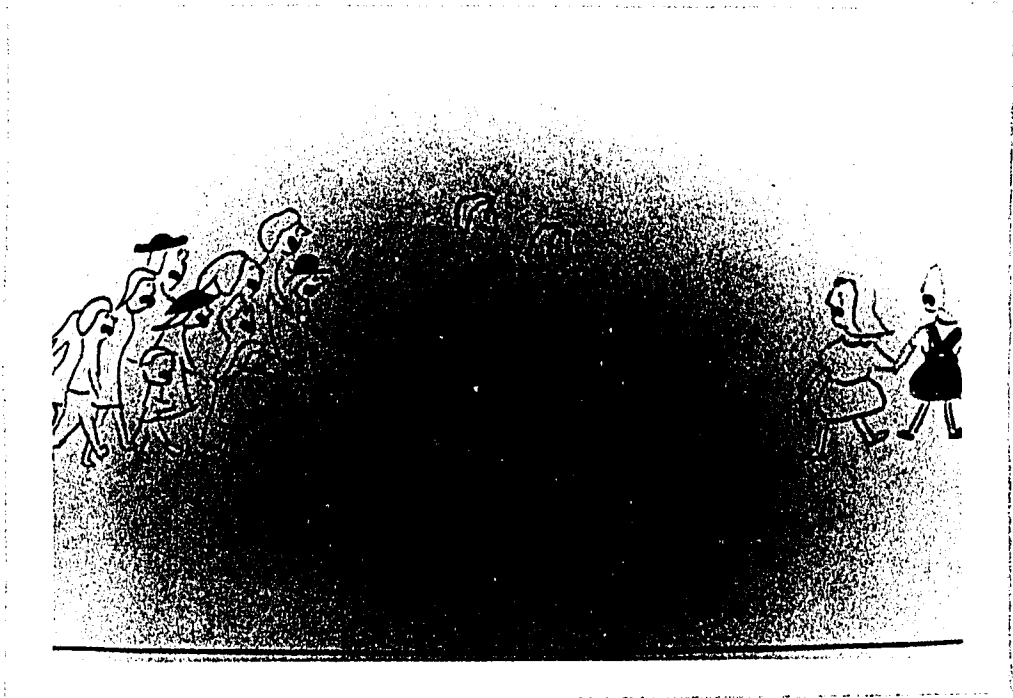


SAMPLE 2a



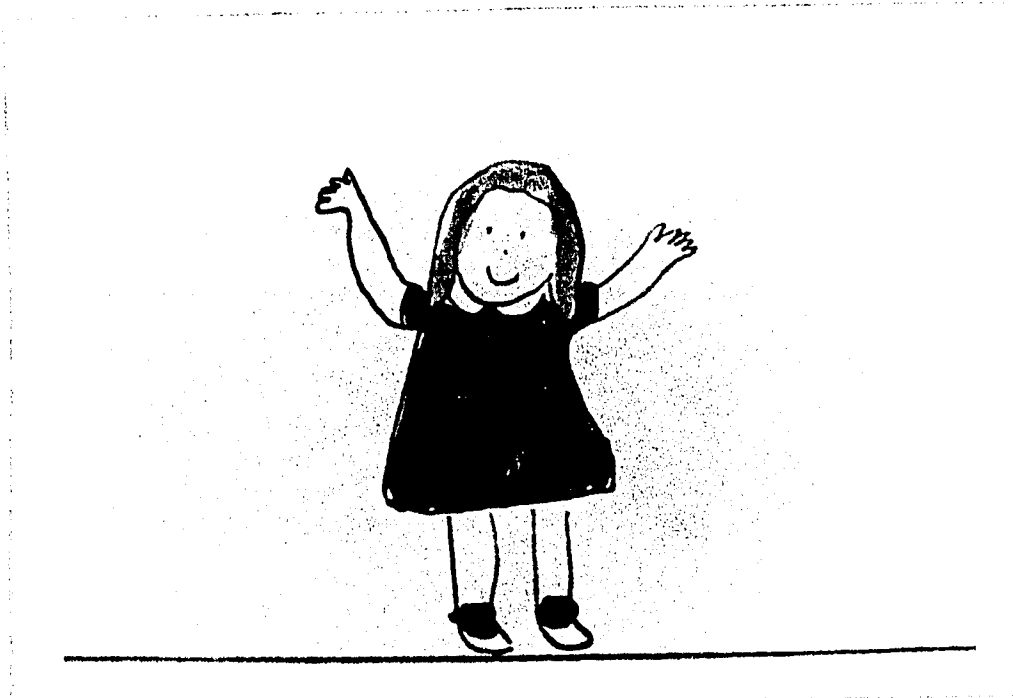
SAMPLE 2b

TEST II



SAMPLE 2c

TEST II

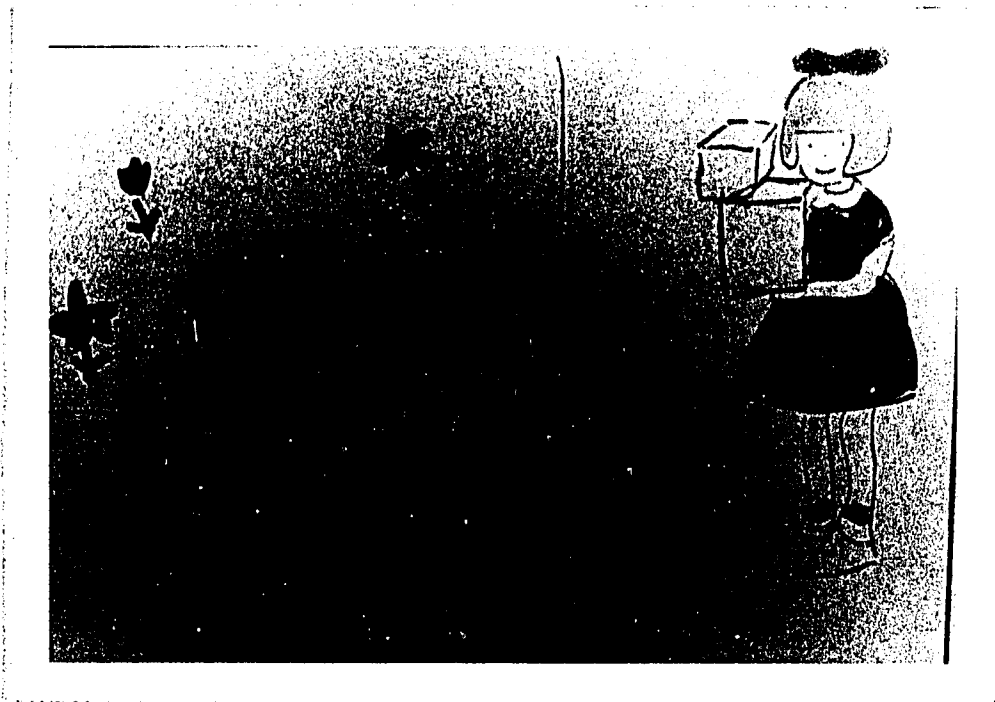


1a



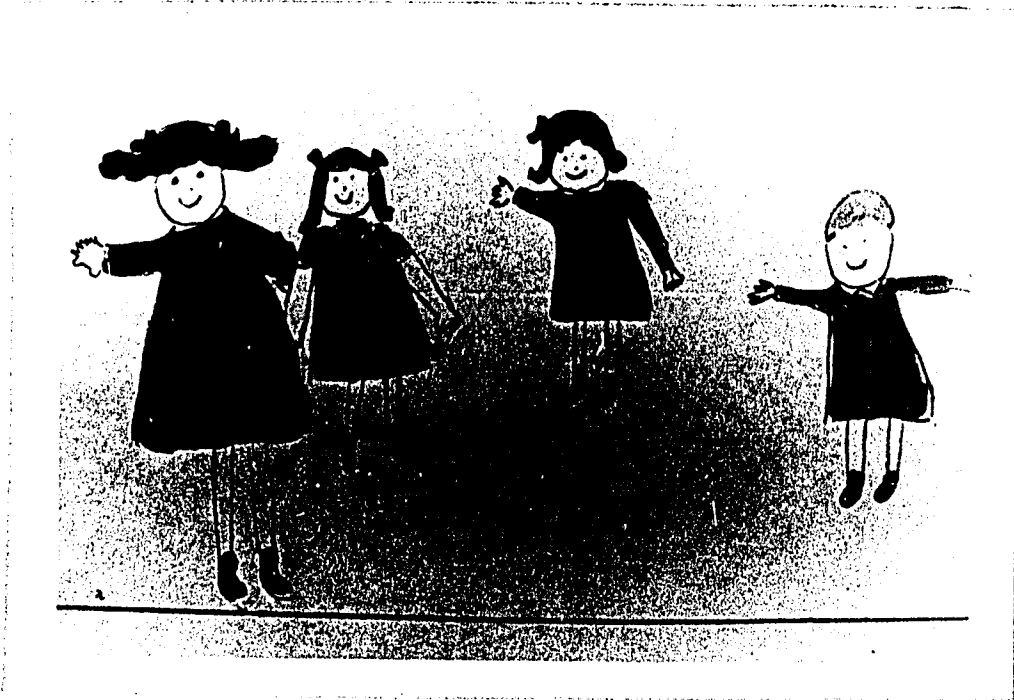
1b

TEST II



1c

TEST II

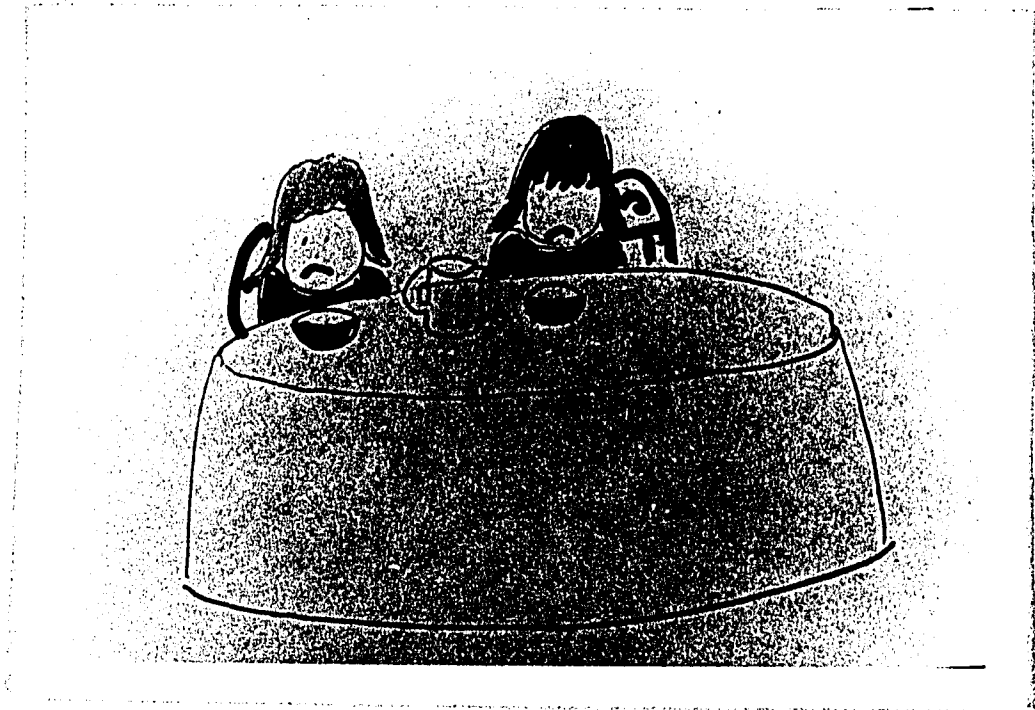


2a



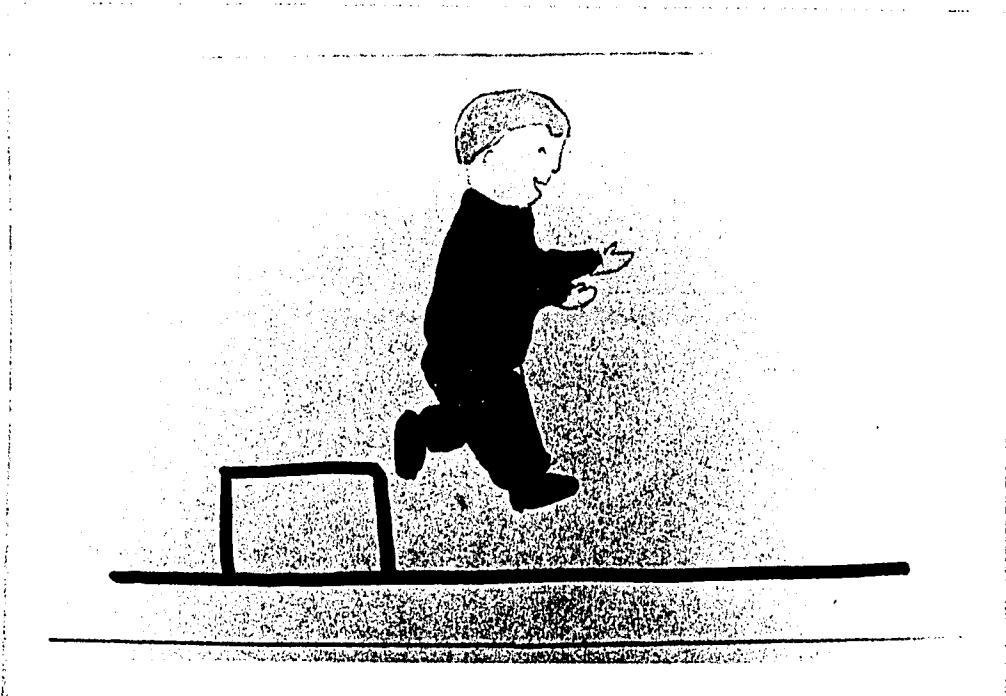
2b

TEST II

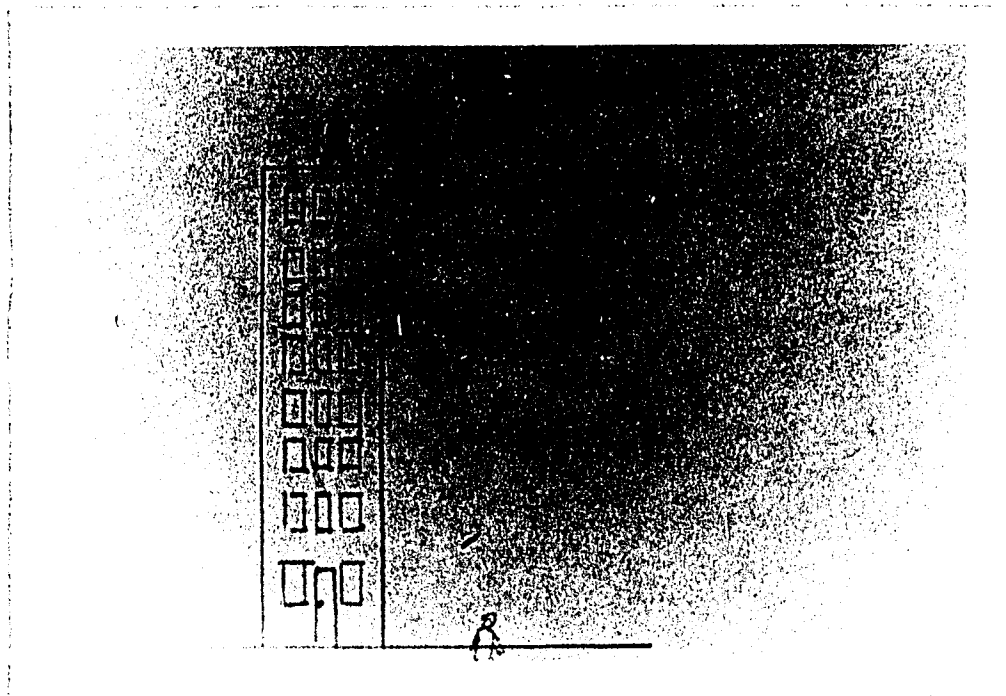


2c

TEST II

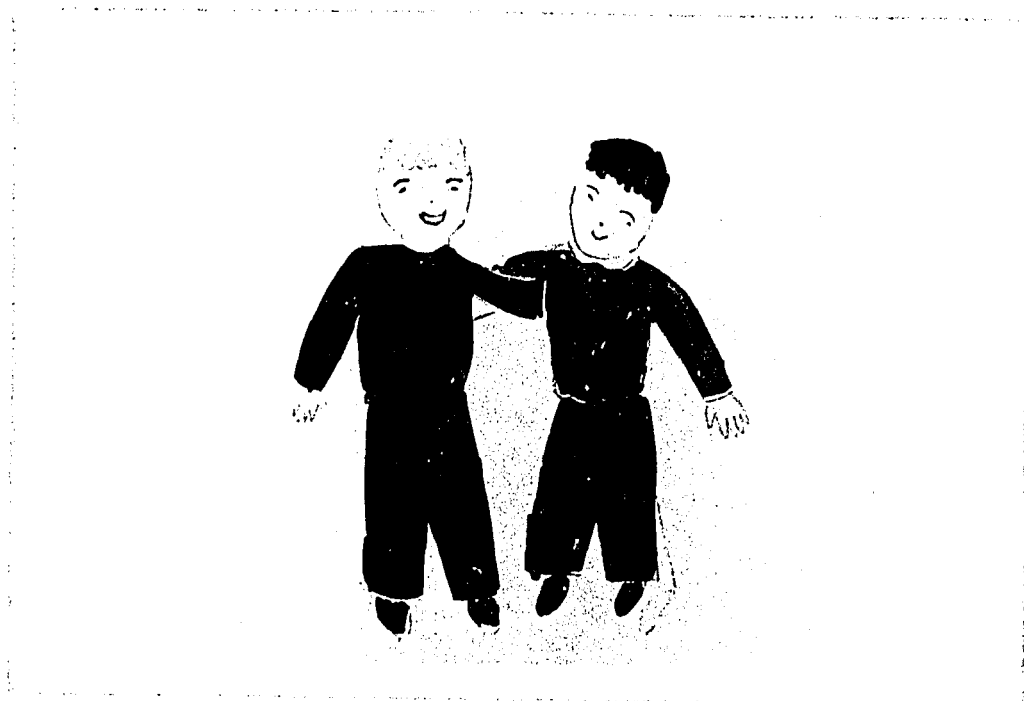


3a



3b

TEST II

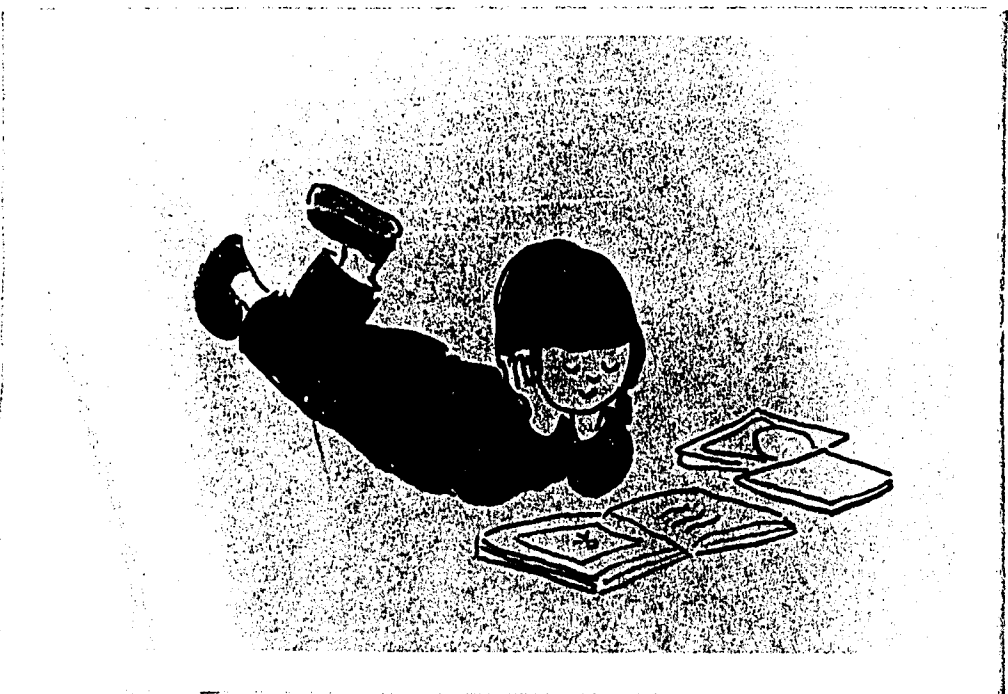


3c

TEST II

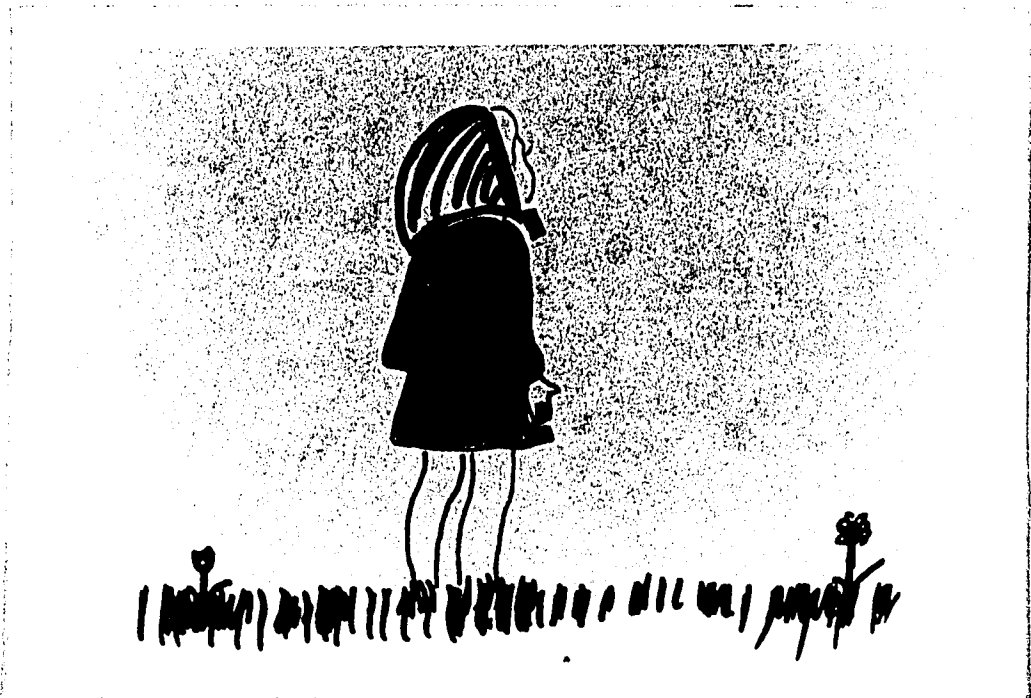


4a



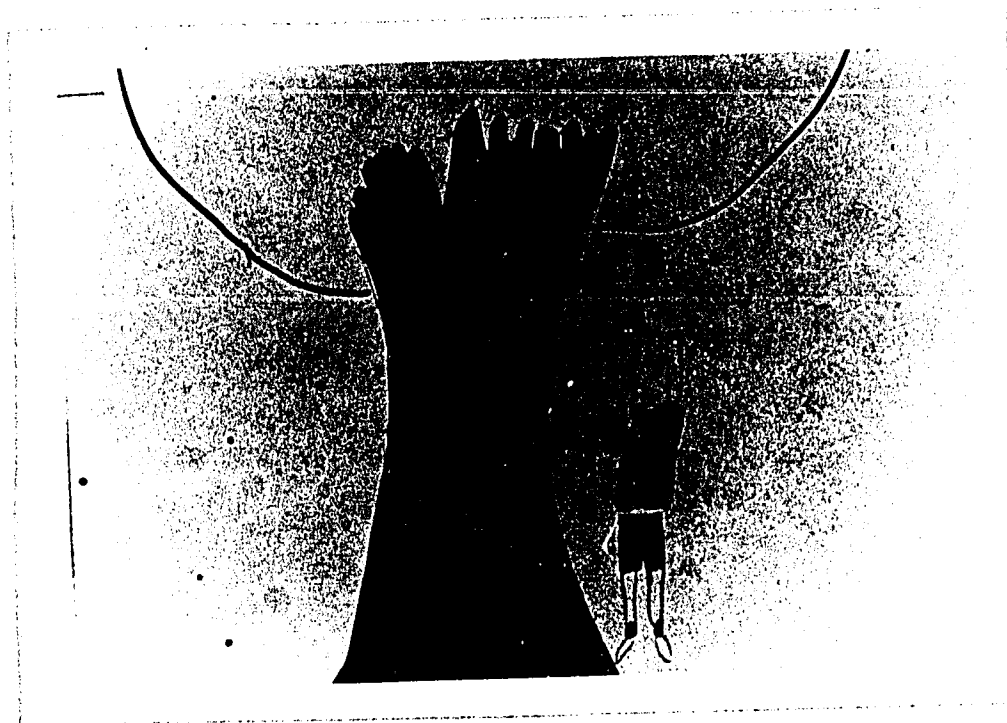
4b

TEST II

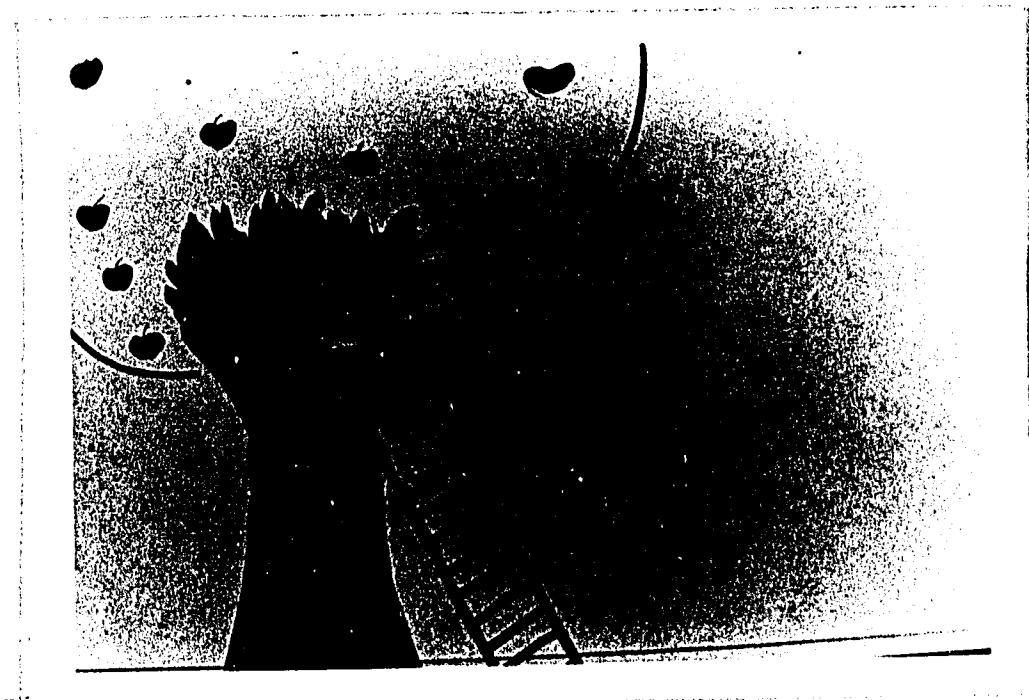


4c

TEST II

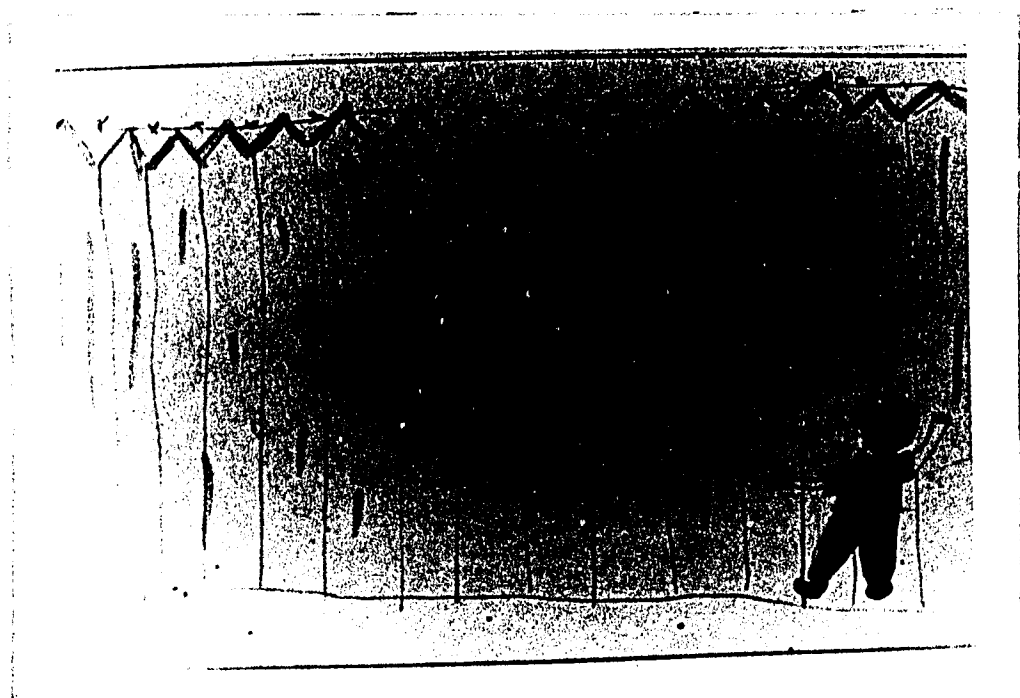


5a



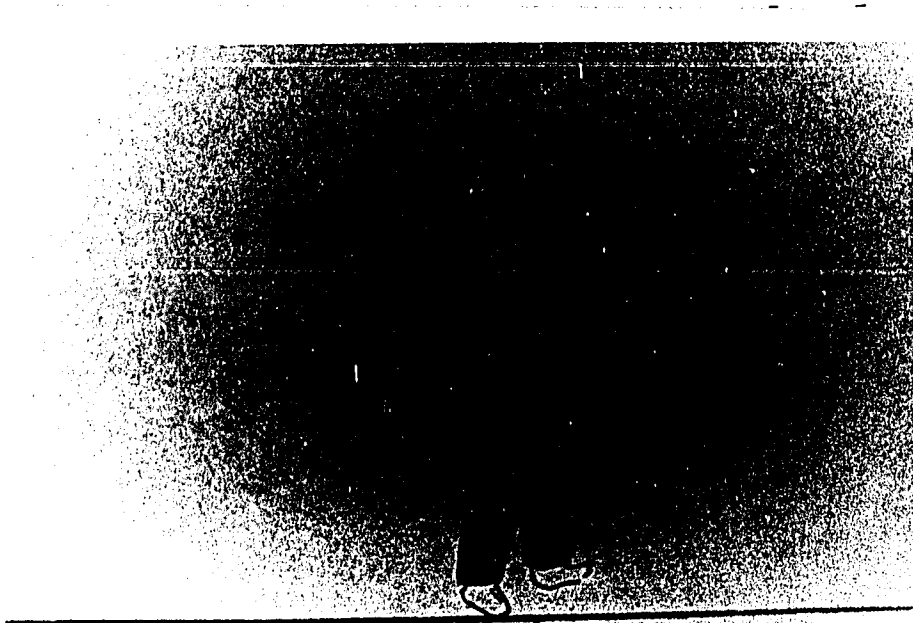
5b

TEST II



5c

TEST II



6a



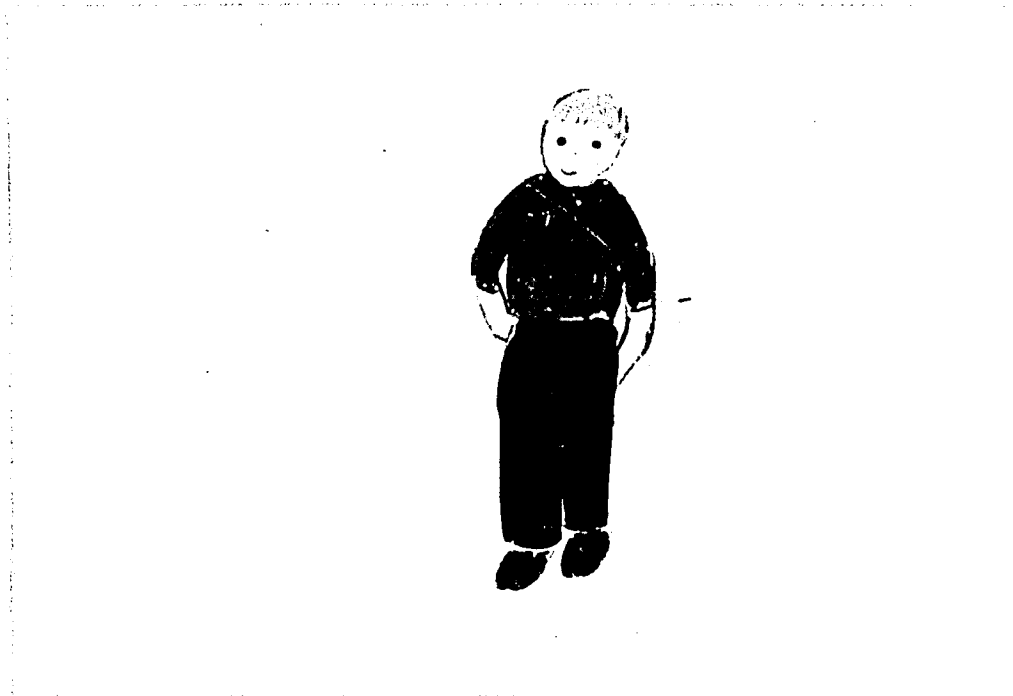
6b

TEST II



6c

TEST II



7a



7b

TEST II



7c

TEST II

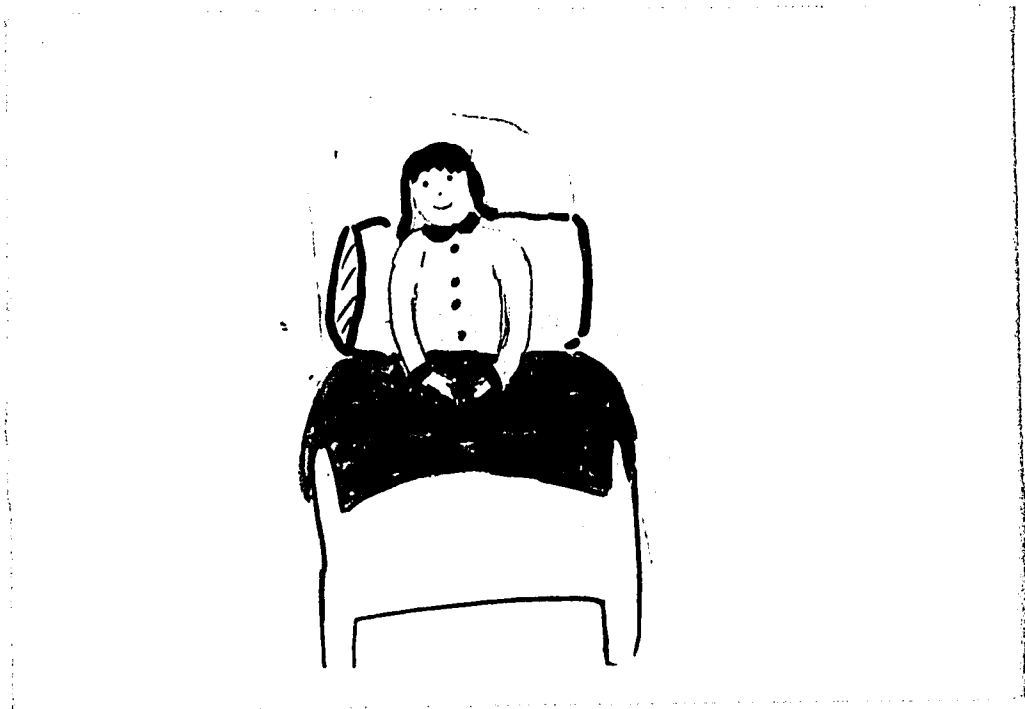


8a



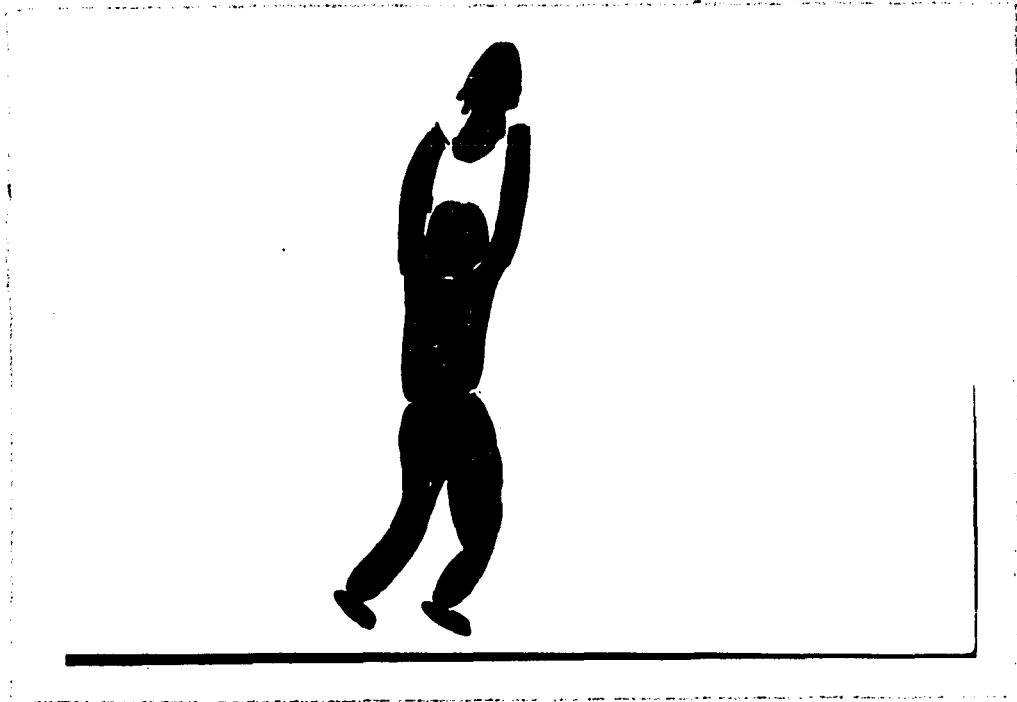
8b

TEST II



8c

TEST II

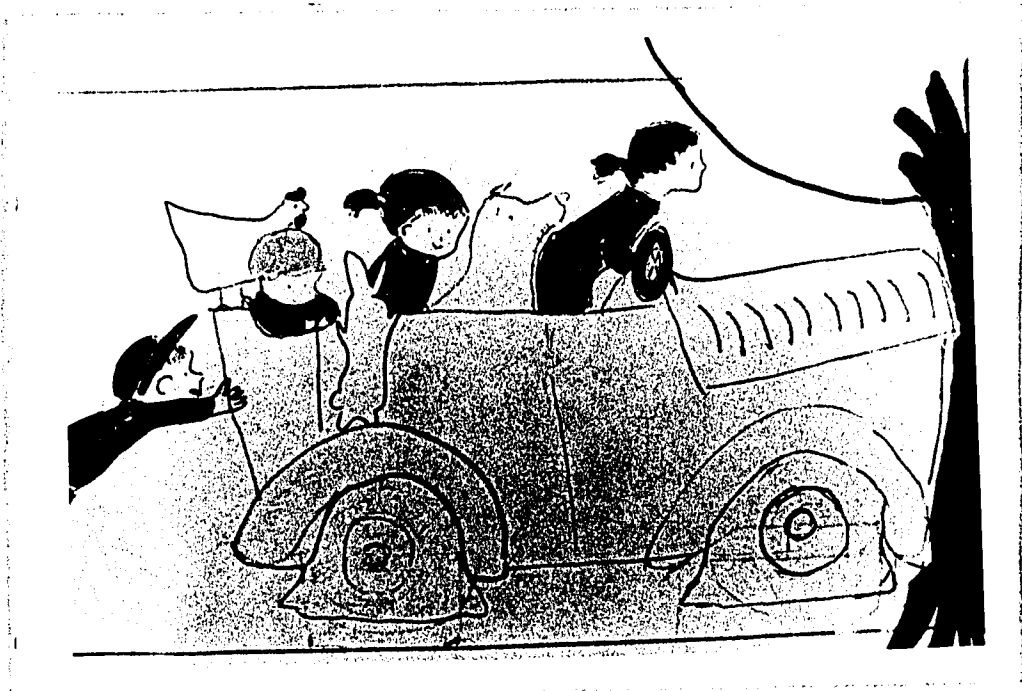


9a



9b

TEST II



TEST II

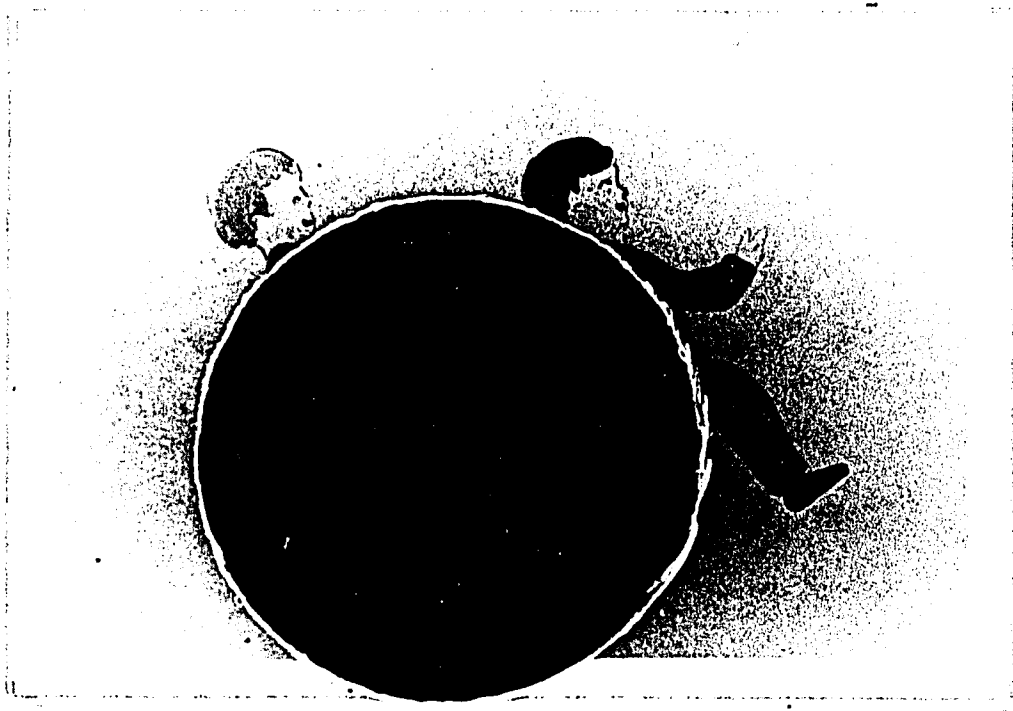


10a



10b

TEST II



10c

(1) if the auxiliary or modal was omitted, e.g., "She no drink, She not drink;" (2) if a double negative was used, e.g., "can't not;" (3) if the child answered the stimulus instead of repeating it, e.g., "because she picking flowers," and (4) if the child said, "I don't know."

Responses to Part (c) (production) of each set were scored as correct, using the same criteria as for Part (b), with the exception that imitations were not accepted as correct answers.

Test III - Question Test

Test items. Ten sets of pictures, each consisting of two colored pictures in vertical arrangement on a page, were presented as visual stimuli for the comprehension and production of the Wh interrogative sentence. The picture at the bottom was covered with a white piece of paper until its presentation was required. Part (a) (comprehension), the picture at the top required that the child answer the question the examiner asked. Part (b) (production) called for the child to ask a question about the picture presented-- the picture at the bottom of the page. As in previous test sections, two sample presentations were made. The length of the sentence also had a range of from 4-8 morphemes.

Instructions. The examiner explained to the child: "I'm going to ask you a question about this one and you ask me a question about that one (examiner pointing). You know

what a question is, for example, "Where are you going? What are you doing? That's a question, OK?"

The first sample question asked in Part (a) (comprehension) was, "Why is he getting out of bed?" The examiner then waited for the child's response. The white paper was then lifted for presentation of Part (b) (production) of the test. The child was requested to ask a question about the picture at the bottom of the page, e.g., "Now you ask me a question about this (examiner pointing to the stimulus picture). If no response was offered, the child was prompted with the initial word of the desired response. If the child then gave a declarative sentence as a reply the desired answer was supplied without comment by the examiner and the next sample was presented.

Format of Test III

a. Sample Presentation

(1) (a) Why is he getting out of bed?

(b) Now you ask me a question.

Desired Response (DR):

(Why is he running to school?)

(2) (a) Why is the dog scratching his foot?

(b) Now you ask me a question.

DR:

(Why is the dog eating candy?)

b. Actual Test

(1) (a) Why is she happy?

(b) DR:

(Why is she crying?)

(2) (a) What are they carrying?

(b) Now your turn, you ask me a question.

DR:

(What are they pulling?)

(3) (a) Who is reaching for the candy?

(b) Now your turn, you ask me a question.

DR:

(Who is flying the kite?)

(4) (a) Where are the children?

(b) Now your turn, you ask me a question.

DR:

(Where are the cats?)

(5) (a) What is she baking?

(b) Now your turn, you ask me a question.

DR:

(What is she eating?)

(6) (a) Why did he hit the boy?

(b) Now your turn, you ask me a question.

DR:

(Why did he throw the ball?)

(7) (a) When will she hop?

(b) Now your turn, you ask me a question.

DR:

(When will she jump?)

(8) (a) Where are they hiding?

(b) Now your turn, you ask me a question.

DR:

(Where are they going?)

(9) (a) Who climbed the fence?

(b) Now your turn, you ask me a question.

DR:

(Who broke the box?)

(10) (a) Whose house is this?

(b) Now your turn, you ask me a question.

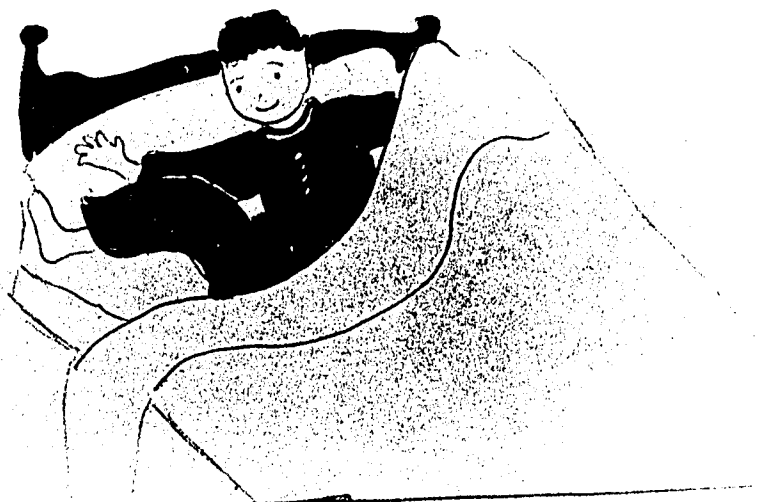
DR:

(Whose dog is this?)

Scoring procedures for Test III. The answers to Part (a) were scored as correct if the child indicated comprehension of the sentence. For example, to the question, "Why is he getting out of bed?" the children frequently responded: "Cause he's late for school," "To go to school," "Because he has to eat breakfast," "He be late for school?"

The answers to Part (b) were credited if the following factors were present: (1) if a Wh pronoun, an auxiliary or modal, and a subject NP were present; and, (2) if the auxiliary or modal and the subject NP were inverted. The

TEST III



SAMPLE 1a

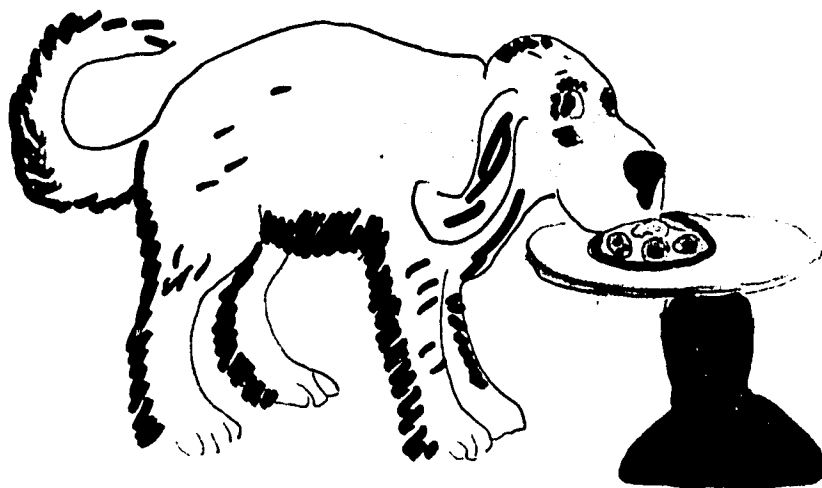


SAMPLE 1b

TEST III



SAMPLE 2a



SAMPLE 2b

TEST III

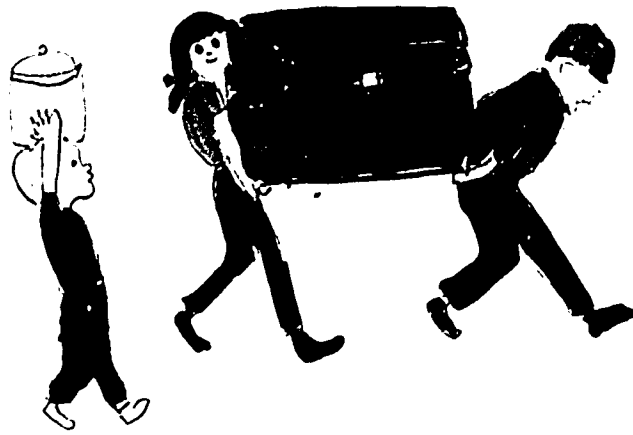


1a

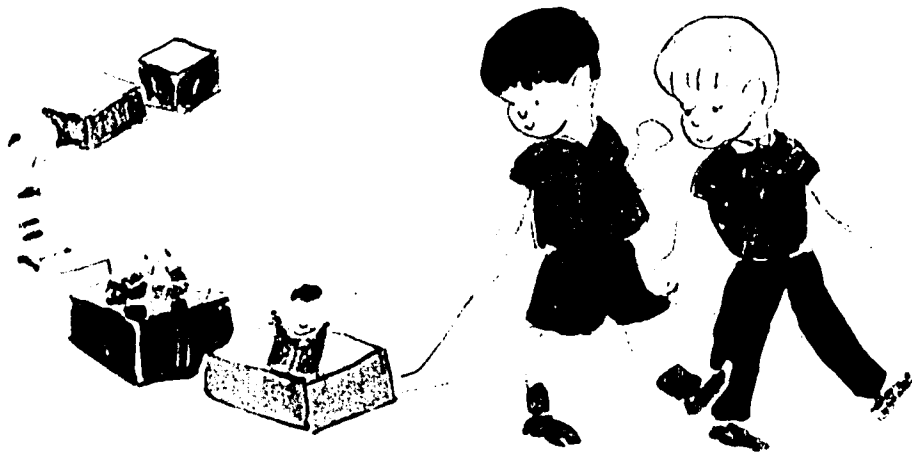


1b

TEST III

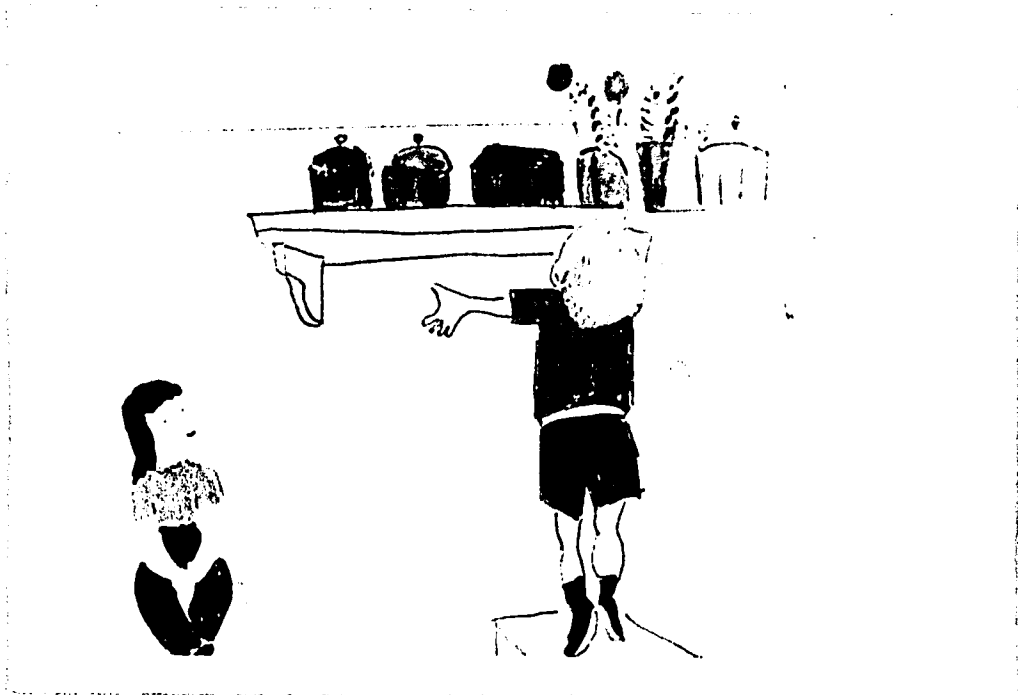


2a



2b

TEST III



3a

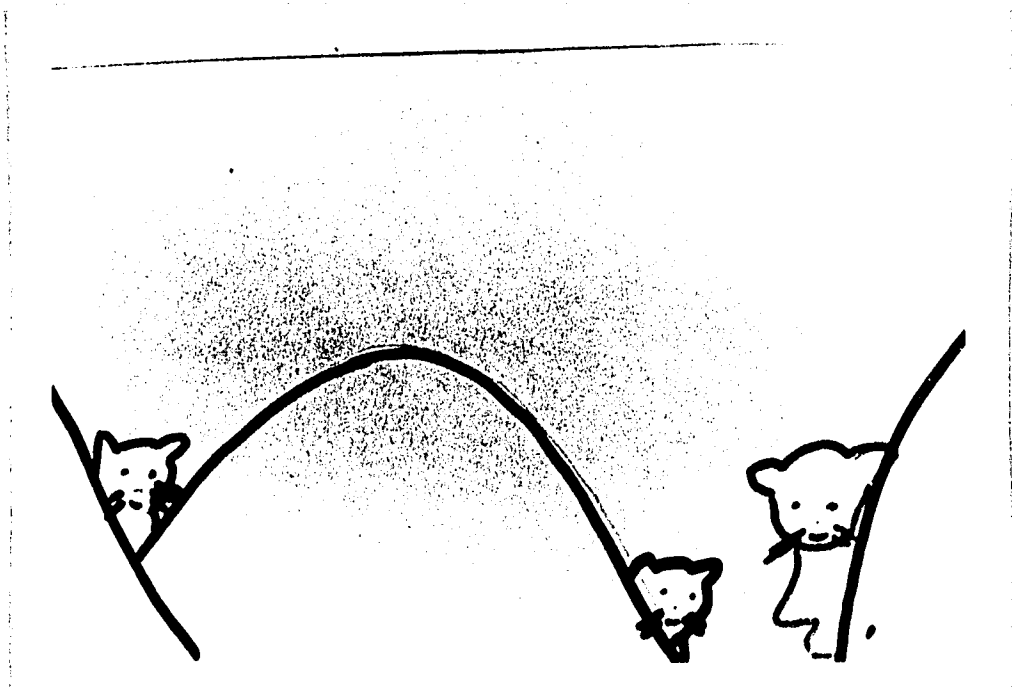


3b

TEST III

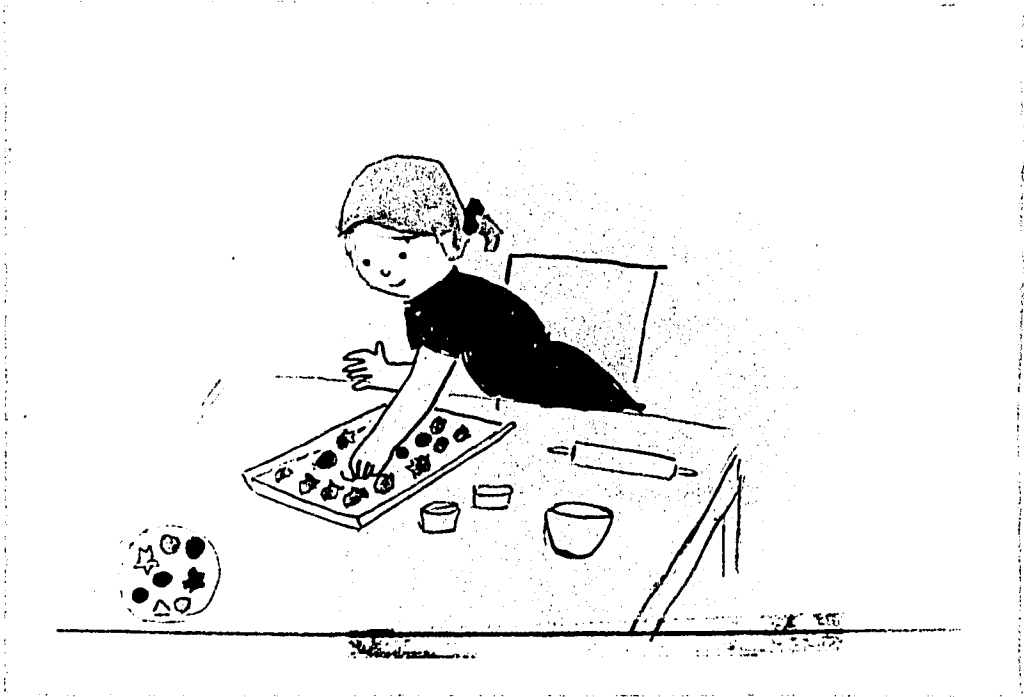


4a



4b

TEST III



5a

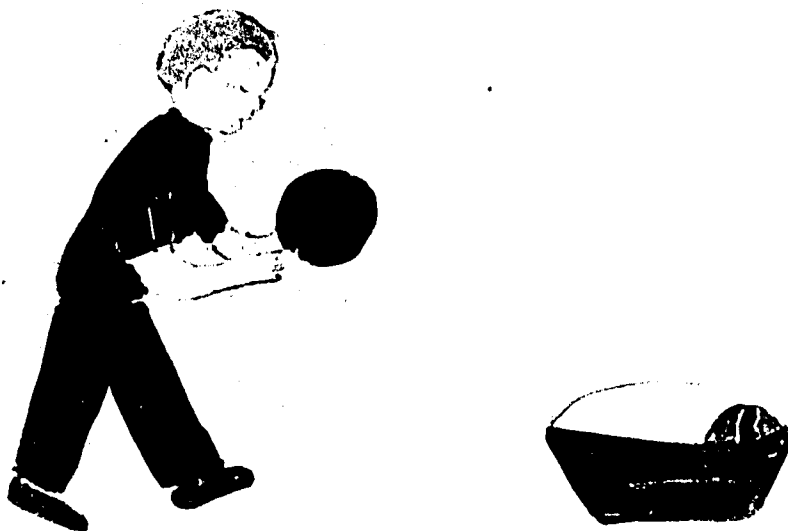


5b

TEST III

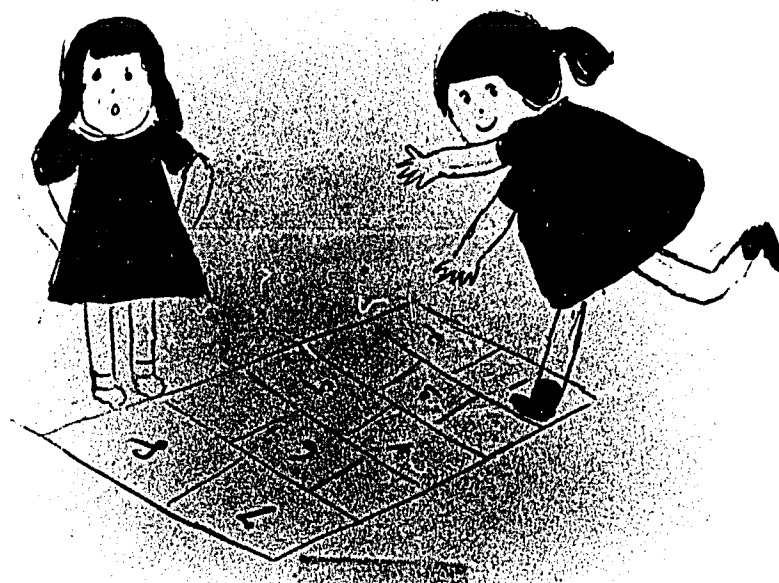


6a



6b

TEST III

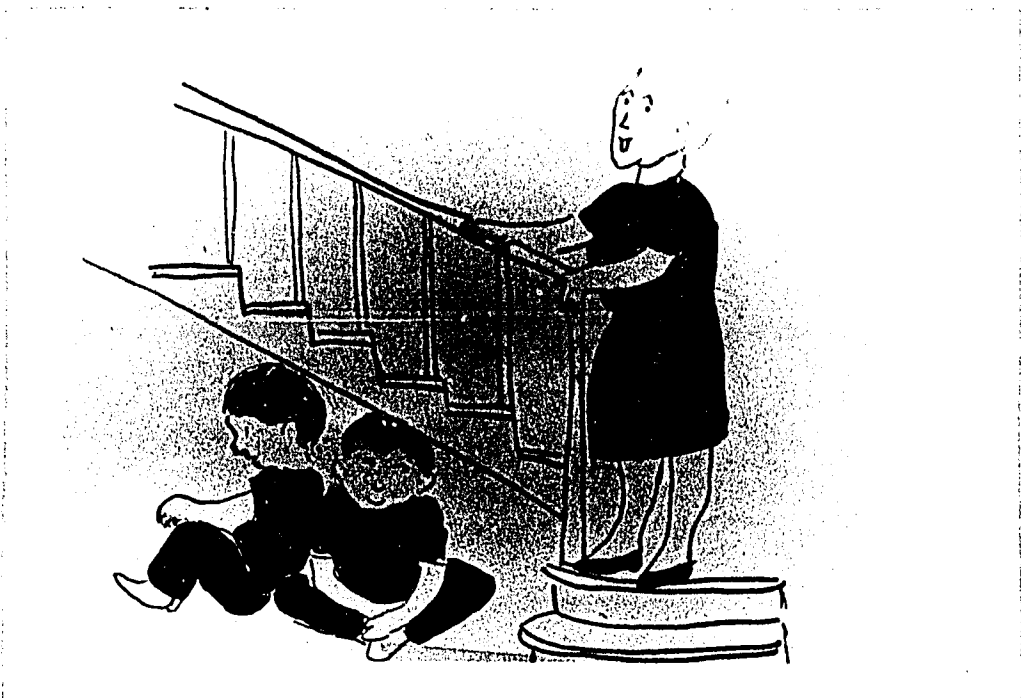


7a

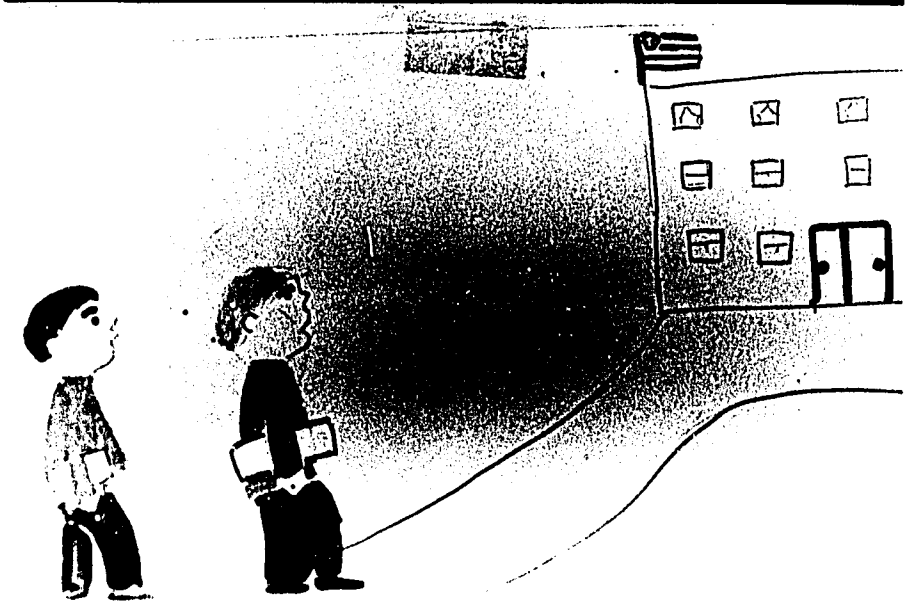


7b

TEST III



8a



8b

TEST III

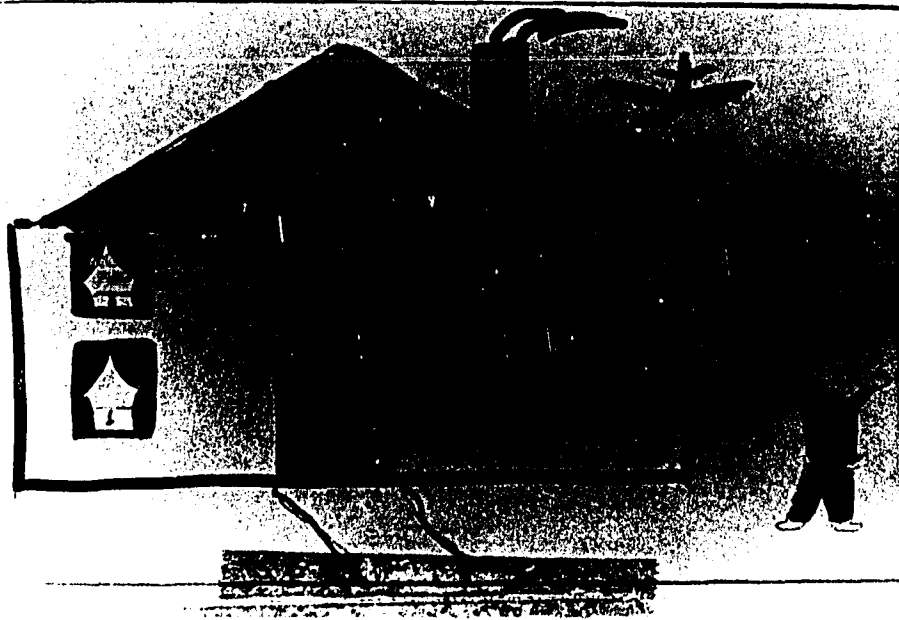


9a



9b

TEST III



10a



10b

children were not required to use the stimulus Wh pronoun of the Q in their response. For example, the desired "response question" for question (2) (b) was "What are they pulling?" However, one child responded, "Why are they pulling a box?" Since a Wh pronoun "why," an auxiliary "are" and a subject NP "they" were present and properly inverted, the sentence was scored as correct.

Experimental Procedures

Two sessions, and sometimes three, were required to complete the PAT, PPVT, and the Syntax Test. The Syntax Test was always completed in one session.

The three main tests comprising the Syntax Test were presented in random order. This procedure was introduced to minimize the influence that a particular order might have on the results.

The Syntax Test was administered in a small, quiet room. The walls were white and bare, except for three brightly colored flowers taped to the wall near the child. A white stuffed dog with a pink bow was in evidence on the table, hopefully to add a feeling of warmth to an otherwise stark environment. A microphone was attached to a Martel Tape Recorder, model 301, which was taped to the table. The child was given a handful of M & M candies after each test was completed, which he ate while the examiner was getting the next set of pictures ready. This positive reinforcer was given to aid the continued cooperation of the child.

CHAPTER IV

TREATMENT OF DATA AND DISCUSSION OF RESULTS

The investigator performed a total of eight experiments. The experiments were designed to either compare the differences between the experimental group (children with deviant articulation) and the control group (children with normal articulation) with respect to their performance on the language tests or to study the differences within each group with respect to their performance on the language test, as it was affected by age or sex. The result of each experiment was evaluated by analysis of variance. All were multi-factor experiments with repeated measures on the same element (Winer, 1962, pp. 298-337). A .05 level of significance was used for considering the results due to a non-chance factor. The factors, statistical analysis and tables depicting significant differences found as a result of the experiments are discussed on the following pages.

Experiment I

For Experiment I, it is apparent that the Group Factor (G) (experimental and control), the Language Performance Factor (LP) (comprehension and production), the Types of Syntax Factor (TS) (negative and question), and the

interactions of G x LP (Edwards, 1966, p. 183) and LP X TS were significant at the .001 level (see Table I). The Question Test, or factor in this study, unless otherwise specified, always refers to questions initiated by a Wh interrogative pronoun, e.g., Who, Whose, Why, What, When, Where.

The Type of Syntax Test as applied to Experiment I was identical in all experiments, except Experiment III. In Experiment III, the Type of Syntax Test involved only the production of the Test of Present Progressive-Copula, the Test of the Negative and the Test of the Wh Question. There was no comprehension test administered for the Test of Present Progressive-Copula in the entire set of tests. Therefore, the Test of Present Progressive-Copula could not be included when the Language Performance Factor (comprehension and production) was evaluated.

The Group Factor was statistically significant at the .001 level ($F = 11.97$; $df = 1,58$) indicating that there was a difference between the functioning of the experimental and control groups on the performance of the Syntax Test. The scores of the deviant group were always lower than the scores of the normal group. In this study, higher scores always indicated fewer errors produced by the subjects, and lower scores signified a greater number of errors produced by the subjects.

The Language Performance Factor was significant

interactions of G x LP (Edwards, 1966, p. 183) and LP X TS were significant at the .001 level (see Table I). The Question Test, or factor in this study, unless otherwise specified, always refers to questions initiated by a Wh interrogative pronoun, e.g., Who, Whose, Why, What, When, Where.

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The Group Factor was significant at the .001 level ($F = 11.1$) indicating that there was a difference between the experimental and control groups on the performance of the Syntax Test. The scores of the deviant group were always lower than the scores of the normal group. In this study, higher scores always indicated fewer errors produced by the subjects, and lower scores signified a greater number of errors produced by the subjects.

The Language Performance Factor was significant

TABLE I
SUMMARY OF ANALYSIS OF VARIANCE - EXPERIMENT I

| Source of Variation | SS | df | MS | F |
|---|----------------|------------|--------|-----------|
| <u>Between subjects</u> | <u>1091.18</u> | <u>59</u> | | |
| Groups (G) | 640.26 | 1 | 640.26 | 82.36*** |
| Subj w. groups [error (G)] | 450.92 | 58 | 7.77 | |
| <u>Within subjects</u> | <u>1432.17</u> | <u>180</u> | | |
| Language Performance (LP) | 595.35 | 1 | 595.35 | 192.28*** |
| G X LP | 232.07 | 1 | 232.07 | 75.10*** |
| LP X subj w. groups [error (LP)] | 179.58 | 58 | 3.10 | |
| Types of Syntax (TS) | 41.66 | 1 | 41.66 | 15.53*** |
| G X TS | 3.76 | 1 | 3.76 | 1.40 |
| TS X subj w. groups [error (TS)] | 155.58 | 58 | 2.68 | |
| LP X TS | 112.07 | 1 | 112.07 | 59.13*** |
| G X LP X TS | 2.18 | 1 | 2.18 | 1.15 |
| LP X TS X subj w. groups [error (LP X TS)] | 109.92 | 58 | 1.90 | |

***Significant at the .001 level.

($F = 11.97$; $df = 1,58$; $p < .001$) (see Table I). The comprehension scores were always higher than the performance scores.

The significant interaction of Groups X Language Performance ($F = 11.97$; $df = 1,58$; $p < .001$) indicates that although the comprehension score is higher for each group, the difference between the group increases for production (see Figure 1). There was a difference of 78 points between

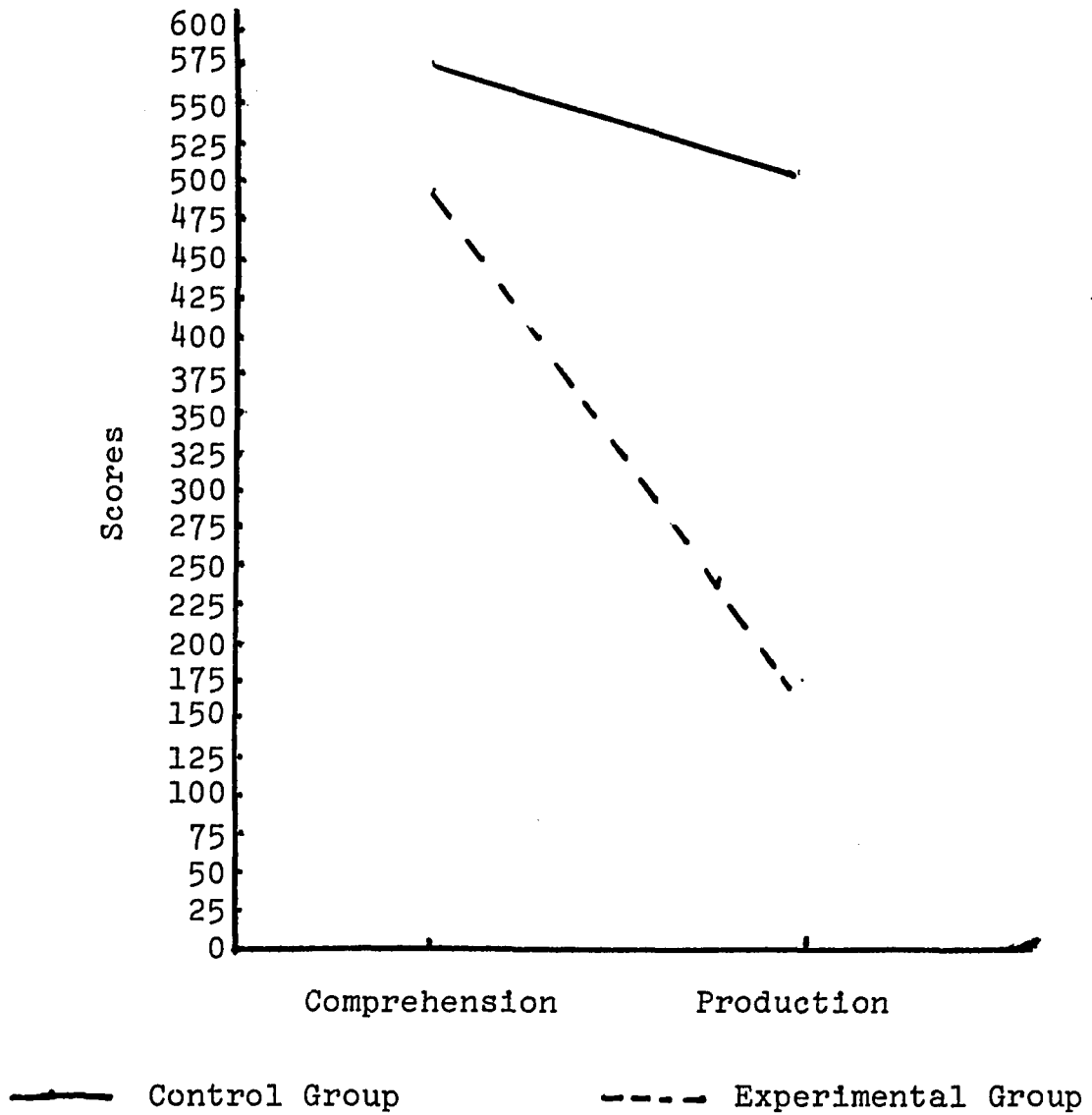


FIGURE 1

DIFFERENCE BETWEEN SCORES OF PRODUCTION AND COMPREHENSION
OF THE EXPERIMENTAL AND CONTROL GROUPS ON ALL TESTS

the two groups for comprehension, but a difference of 314 points between them for production (see Table II). One result should be mentioned because of its possible effect on the interpretation of these data; that is, the control group scored 575 out of a possible 600 points for comprehension. Fourteen children in the control group scored correctly on all twenty answers; only four in the experimental group achieved this level of accuracy. Therefore, this may not reflect a qualitative difference between the two groups. If the comprehension section of the test had been more difficult for the control group, the interactions that are presently significant may not have been significant, although the significant difference of the main factors would remain unchanged.

There was a statistically significant difference in Type of Syntax ($F = 11.97$; $df = 1,58$; $p < .001$) (see Figure 2). The interaction between G X TS was not significant, indicating that both groups followed the same pattern in performance, although the scores for the two groups were not comparable. The interaction between Language Performance and Types of Syntax was significant ($F = 11.97$; $df = 1,58$; $p < .001$). The scores on the Tests of Question and Negative were not equal. The significant interaction between Language Performance and Types of Syntax was characterized by a pattern in which there were lower (poorer) comprehension scores for the negative and higher (better)

TABLE II
 SCORES OF COMPREHENSION AND PRODUCTION OF CONTROL AND
 EXPERIMENTAL GROUPS - EXPERIMENT I

| Group | Scores of Language Performance | | | | | | Difference between Comprehension and Production | | |
|------------------------------|--------------------------------|----------|-------|------------|----------|-------|---|----------|-------|
| | Comprehension | | | Production | | | Negative | Question | Total |
| | Negative | Question | Total | Negative | Question | Total | | | |
| Control | 286 | 289 | 575 | 286 | 218 | 504 | 0 | 71 | 71 |
| Experimental | 234 | 263 | 497 | 127 | 63 | 190 | 107 | 200 | 307 |
| Difference between scores | 52 | 36 | 78 | 159 | 155 | 314 | | | |

comprehension scores for the question for both groups. This was coupled with higher production scores for the Negative Test and lower production scores for the Question Test for both groups (see Figure 2). The cross-over pattern in Figure 2 display significant interaction.

Experiment II

For Experiment II, the Group Factor (G) was composed of the experimental and control groups; the Levels of Negative Factor (LN) consisted of imitation (LNi), comprehension (LNc) and production (LNp) of the negative. The Group Factor was significant at the .001 level ($F = 11.97$, $df = 1,58$), the Levels of Negative and the interaction of Groups X Levels of Negative were significant at the .001 level ($F = 7.31$; $df = 2,116$) (see Table III).

The significant Group Factor indicates that there was a difference between the performance of the two groups on the test administered. There also was a difference between their performance of the Levels of the Negative Factor. The experimental group scored highest on the comprehension part of the test, lower on the imitation part of the test and lowest on the production part of the test. The interaction of Groups X Levels of Negative emphasizes the fact that the control group did not show a statistical difference in their performance on the three tests (see Figure 3). It should be pointed out that the control group scored a

TABLE III
SUMMARY OF ANALYSIS OF VARIANCE - EXPERIMENT II

| Source of Variation | SS | df | MS | F |
|-------------------------------------|----------------|------------|--------|----------|
| <u>Between subjects</u> | <u>1148.06</u> | <u>59</u> | | |
| Groups (G) | 684.45 | 1 | 684.45 | 85.66*** |
| Subj w. groups [error (G)] | 463.61 | 58 | 7.99 | |
| <u>Within subjects</u> | <u>441.33</u> | <u>120</u> | | |
| Levels of Negative (LN) | 107.14 | 2 | 53.57 | 27.47*** |
| G X LN | 108.63 | 2 | 54.31 | 27.85*** |
| LN X subj w. groups [error (LN)] | 225.58 | 116 | 1.94 | |

***Significant at the .001 level.

total of 286 points for comprehension, 287 for imitation and 286 for production out of a possible 300 for each part of the test (see Table IV). Thirteen children in the control group had all three parts of the test correct (comprehension, imitation and production), making a total of 64 tests correct. None of the children in the experimental group scored correctly on all three parts, and only a total of eleven individual parts were completely correct (comprehension (7), imitation (2), and production (2)).

Experiment III

For Experiment III, the Group Factor (G) was composed of the experimental and control groups; the Type of Syntax

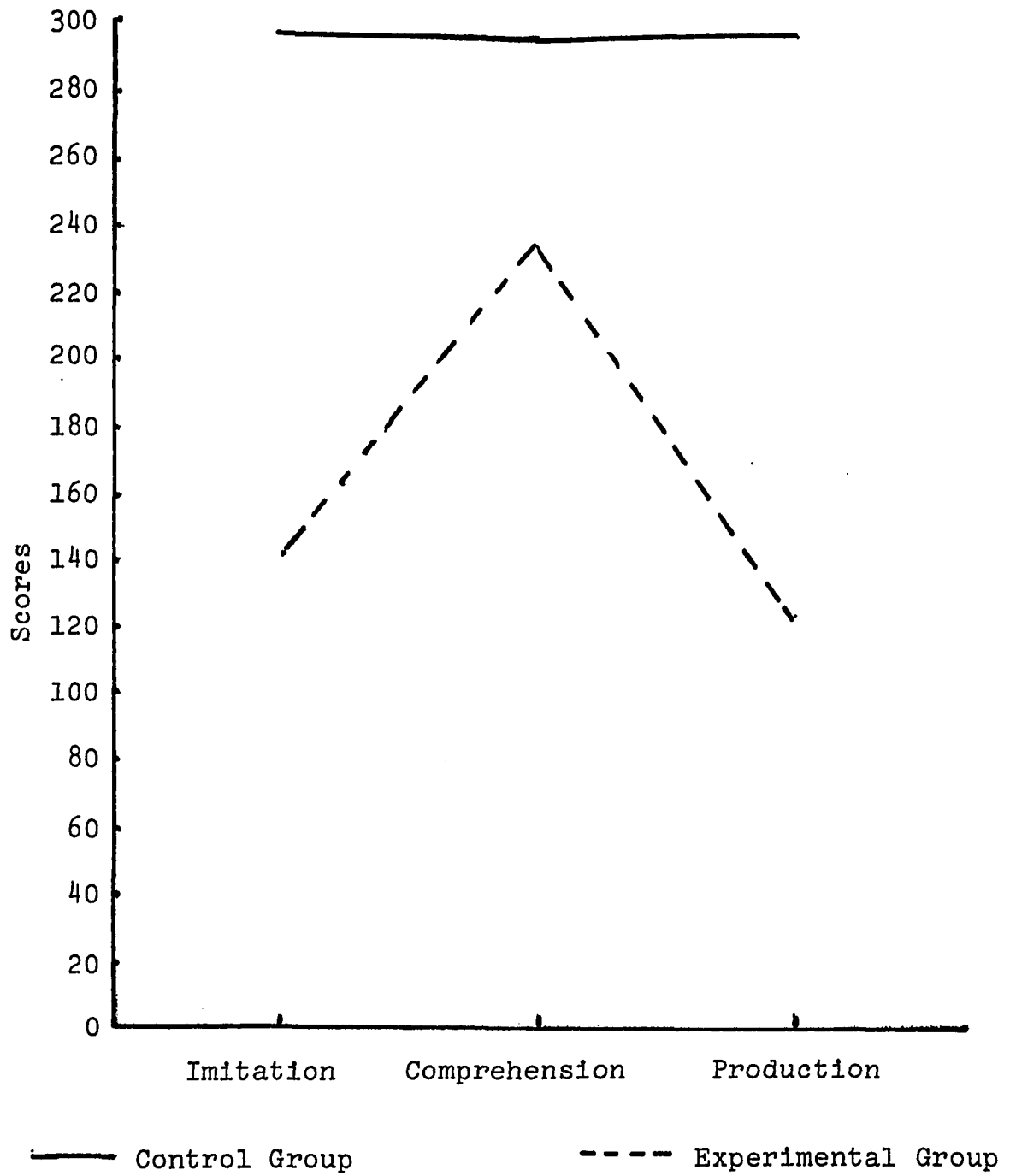


FIGURE 3

DIFFERENCE IN PERFORMANCE OF THE EXPERIMENTAL AND CONTROL GROUPS ON THE LEVELS OF NEGATIVE - EXPERIMENT II

TABLE IV

SCORES OF EXPERIMENTAL AND CONTROL GROUPS ON THE LEVELS OF NEGATIVE
(IMITATION, COMPREHENSION AND PRODUCTION) - EXPERIMENT II

| Group | Levels of Negative | | | | | |
|---------------------------------|--------------------|---|---------------|--|------------|--|
| | Imitation | Difference between Scores Imitation- Comprehension | Comprehension | Difference between Scores Comprehension- Production | Production | Difference between Scores Production- Imitation |
| Experimental | 141 | 93 | 234 | 107 | 127 | 14 |
| Control | 287 | 1 | 286 | 0 | 286 | 1 |
| Difference between scores | 146 | | 52 | | 159 | |

Factor (TS) consisted of the production of the Tests of Present Progressive-Copula, Negative and Question. The Group Factor ($F = 11.97$; $df = 1,58$) and the Type of Syntax Factor ($F = 7.31$; $df = 2,116$) were both significant at the .001 level (see Table V). There was a significant difference between the scores of the experimental group and those of the control group in the production of the Test of the Present Progressive-Copula, the Test of Negative and the Test of Question; but there was a similarity between the levels of difficulty, of the tests for the two groups. For each group (see Table VI) the highest score was received for the Negative:

TABLE V
SUMMARY OF ANALYSIS OF VARIANCE - EXPERIMENT III

| Source of Variation | SS | df | MS | F |
|-------------------------------------|----------------|------------|---------|----------|
| <u>Between subjects</u> | <u>1904.95</u> | <u>59</u> | | |
| Groups (G) | 1140.05 | 1 | 1140.05 | 85.53*** |
| Subj w. groups [error (G)] | 772.90 | 58 | 13.33 | |
| <u>Within subjects</u> | <u>516.00</u> | <u>120</u> | | |
| Types of Syntax (TS) | 164.80 | 2 | 82.40 | 27.55*** |
| G X TS | 3.73 | 2 | 1.85 | .62 |
| TS X subj w. groups [error (TS)] | 347.47 | 116 | 2.99 | |

***Significant at the .001 level.

TABLE VI
 SCORES OF CONTROL AND EXPERIMENTAL GROUPS ON TESTS OF
 PRESENT PROGRESSIVE-COPULA, NEGATIVE AND
 QUESTION - EXPERIMENT III

| Group | Restricted Present Progressive- Copula | Not Restricted Present Progressive- Copula | Negative | Question |
|---------------------------------|---|--|----------|----------|
| Control | 264 | 293 | 286 | 218 |
| Experimental | 125 | 137 | 127 | 63 |
| Difference between scores | 139 | 156 | 159 | 155 |

286 for the control group and 127 for the experimental group; the next highest test score received was for the Present Progressive-Copula Test: 264 for the control group and 125 for the experimental group; the lowest score recorded was for the production of the Question Test: 218 for the control group and 63 for the experimental group.

The method of scoring might have aided in producing this hierarchy because, for a response to be scored as correct for the Present Progressive-Copula Test, the auxiliary or main verb "to be" had to be included and conformity to syntax restrictions had to be adhered to (as indicated in Chapter III, p. 26). The negative production (Chapter III, p. 42) was scored as correct if an auxiliary or modal, in

addition to a negative modal, was included in the sentence but syntax restrictions, such as subject-verb agreement, were not required (see Table VI). If the restriction requirements had not been enforced for the Test of Present Progressive-Copula, this test would have been the easiest for each group, with the control group scoring 293 points and the experimental group scoring 137 points. The level of difficulty of the Present Progressive-Copula, Negative and Question Tests then would have been from the easiest to the most difficult, respectively.

Experiment IV

For Experiment IV, the Group Factor, which utilized sub-groups of the experimental group, compared the ten youngest children (CA 3.5-4.4) in the experimental group with the ten oldest children (CA 5.1-6.1) in the same group; the Language Performance Factor consisted of comprehension and production of the test items; and the Type of Syntax Factor was composed of the negative and interrogative structures. The Group Factor was significant at the .05 level ($F = 4.41$; $df = 1,18$) (see Table VII). There was a statistically significant difference in the functioning of the oldest and youngest children in the experimental group. It should be noted that for each test the scores of the oldest group were higher than the scores for the youngest group (see Table VIII).

TABLE VII
ANALYSIS OF VARIANCE SUMMARY TABLE - EXPERIMENT IV

| Source of Variation | SS | df | MS | F |
|--|---------------|-----------|--------|-----------|
| <u>Between subjects</u> | <u>245.49</u> | <u>19</u> | | |
| Groups (G) | 52.82 | 1 | 52.82 | 4.9* |
| Subj w. groups [error (G)] | 192.67 | 18 | 10.70 | |
| <u>Within subjects</u> | <u>748.50</u> | <u>60</u> | | |
| Language Performance (LP) | 535.62 | 1 | 535.62 | 154.80*** |
| G X LP | 2.10 | 1 | 2.10 | |
| LP X subj w. groups [error (LP)] | 62.28 | 18 | 3.46 | |
| Types of Syntax (TS) | .02 | 1 | .02 | |
| G X TS | 1.50 | 1 | 1.50 | |
| TS X subj w. groups [error (TS)] | 43.48 | 18 | 2.42 | |
| LP X TS | 46.50 | 1 | 46.50 | 15.92*** |
| G X LP X TS | 4.53 | 1 | 4.53 | 1.55 |
| LP X subj w. groups [error (LP X TS)] | 57.47 | 18 | 2.92 | |

*Significant at the .05 level.

***Significant at the .001 level.

There was a significant difference in the Language Performance Factor ($F = 15.38$; $df = 1,18$) at the .001 level (see Table VII). This difference should be compared with the findings in Experiment VI, in which the groups consisted of the youngest children in the control group and the oldest children in the experimental group (Table XII, p. 108). The comprehension scores of the experimental group (youngest and

TABLE VIII

SCORES OF THE YOUNGEST AND OLDEST CHILDREN IN THE
EXPERIMENTAL GROUP - EXPERIMENT IV

| Group | Comprehension Scores | | | Production Scores | | | Difference between Comprehension and Production Scores | | |
|------------------------------|----------------------|----------|-------|-------------------|----------|-------|--|----------|-------|
| | Negative | Question | Total | Negative | Question | Total | Negative | Question | Total |
| Experimental Oldest | 81 | 94 | 175 | 43 | 35 | 78 | 38 | 59 | 97 |
| Experimental Youngest | 66 | 83 | 149 | 31 | 8 | 39 | 35 | 75 | 110 |
| Difference between scores | 15 | 11 | 26 | 12 | 27 | 39 | | | |

oldest) exceeded the production scores on both Negative and Question Tests for a combined total of 207 points (see Table VIII). This is obvious, as indicated in the last column of Table VIII and Table XII.

The difference in performance of each group was similar for the Negative and Question Tests Type of Syntax Factor (see Figure 4). The interaction of Language Performance X Type of Syntax was significant at the .001 level ($F = 15.38$; $df = 1,18$). This interaction presented the same cross-over pattern as the interaction of LP X TS did in Experiment I (see Figure 2, p. 90). The pattern for each sub-group followed the pattern of the major experiment, i.e., Experiment I, in which the comprehension of the negative was more difficult than the comprehension of the question; the reverse was true for production. The question was more difficult to produce than was the negative.

Experiment V

For Experiment V, the Group Factor, which utilized subgroups of the control group, compared the ten youngest children in the control group (Cy) with the ten oldest children in this group (Co) (see Table IX). The Language Performance Factor consisted of comprehension and production of the test items, and the Type of Syntax Factor was composed of the negative and interrogative structures.

The Group Factor was not significant. This may have

TABLE IX
SUMMARY OF ANALYSIS OF VARIANCE
FOR EXPERIMENT V

| Source of Variation | SS | df | MS | F |
|---|---------------|-----------|-------|---------|
| <u>Between subjects</u> | <u>95.75</u> | <u>19</u> | | |
| Groups (G) | 11.25 | 1 | 11.25 | 2.40 |
| Subj w. groups [error (G)] | 84.50 | 18 | 4.69 | |
| <u>Within subjects</u> | <u>233.00</u> | <u>60</u> | | |
| Language Performance (LP) | 36.45 | 1 | 36.45 | 12.48** |
| G X LP | 4.05 | 1 | 4.05 | 1.39 |
| LP X subj w. groups [error (LP)] | 52.50 | 18 | 2.92 | |
| Types of Syntax (TS) | 28.80 | 1 | 28.80 | 13.85** |
| G X TS | 1.80 | 1 | 1.80 | |
| TS X subj w. groups [error (TS)] | 37.40 | 18 | 2.08 | |
| LP X TS | 28.80 | 1 | 28.80 | 12.52** |
| G X LP X TS | 1.80 | 1 | 1.80 | .79 |
| LP X TS subj w. groups [error (LP X TS)] | 41.40 | 18 | 2.30 | |

**Significant at the .01 level.

been due to the facility with which the younger children in the control group performed on the Tests of Negative and Question (see Table X).

The Language Performance Factor, the Type of Syntax Factor, and the interaction of Language Performance X Type of Syntax Factor ($F = 8.29$; $df = 1,18$) were significant at the .01 level. For both the youngest and the oldest children in the control group, the production of the negative

TABLE X
 SCORES OF YOUNGEST AND OLDEST CHILDREN IN THE
 CONTROL GROUP - EXPERIMENT V

| Group | Comprehension Scores | | | Production Scores | | | Difference between Comprehension and Production Scores | | |
|------------------------------|----------------------|----------|-------|-------------------|----------|-------|--|----------|-------|
| | Negative | Question | Total | Negative | Question | Total | Negative | Question | Total |
| Control Oldest | 97 | 97 | 194 | 97 | 79 | 176 | 0 | 18 | 18 |
| Control Youngest | 94 | 94 | 188 | 91 | 61 | 152 | 3 | 33 | 36 |
| Difference between scores | 3 | 3 | 6 | 6 | 18 | 24 | | | |

was better than the production of the question. The scores for comprehension for both the negative and question were close to the maximum scores that could be achieved. They scored 97 points out of 100 (see Figure 5).

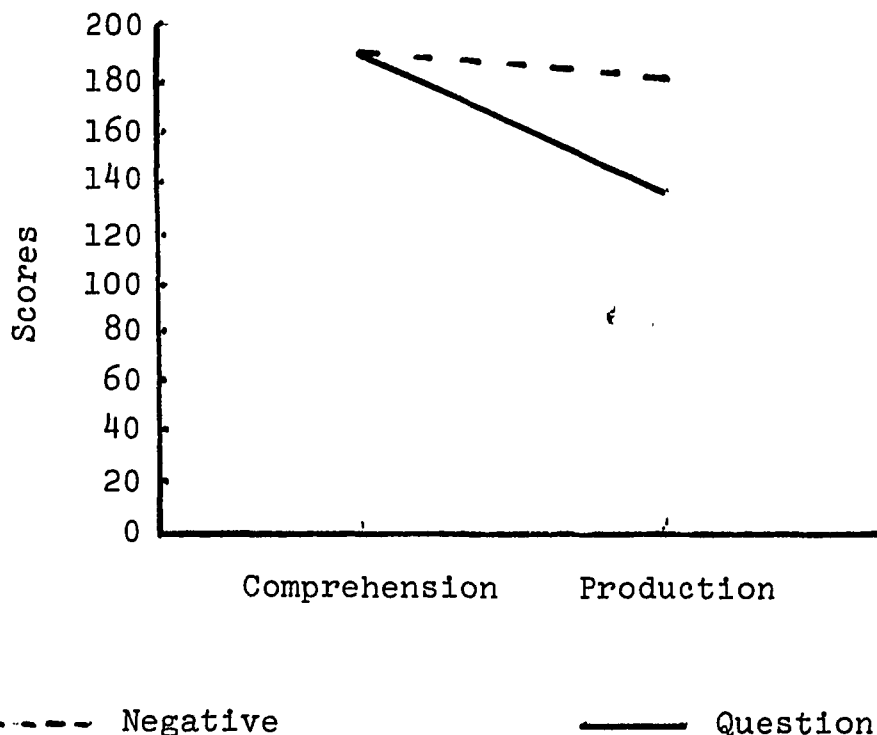


FIGURE 5

DIFFERENCE BETWEEN SCORES OF COMPREHENSION AND PRODUCTION ON THE TESTS OF NEGATIVE AND QUESTION OF THE YOUNGEST AND OLDEST CHILDREN IN THE CONTROL GROUP - EXPERIMENT V

The subjects in Experiment V were not matched to the subjects in Experiment IV. The scores of the matched subjects also were analyzed. Although the matched subjects were closely related in age, they were not the ten youngest in the group. The age range for the matched group was from 3.7 to 5.0 years, as opposed to 3.7 to 4.6 years for the

unmatched control group of Experiment V. The factors that were statistically significant for the unmatched control group were statistically significant for the matched control group, so that no further analysis seemed to be necessary (see Table IX).

Experiment VI

For Experiment VI, the Group Factor consisted of the ten youngest children in the control group (Cy) (CA 3.7-4.6 years) and the ten oldest children in the experimental group (Eo) (CA 5.1-6.1 years) (see Table XI). The Group Factor was significant at the .01 level ($F = 8.29$, $df = 1,18$). The youngest children in the control group achieved higher (better) scores on each aspect of the Tests of Negative and Question than did the oldest children in the experimental group. The Language Performance Factor consisted of comprehension and production of the test items, and the Type of Syntax Factor was composed of the negative and interrogative structures.

The interaction of Groups X Language Performance was significant at the .01 level ($F = 8.29$; $df = 1,18$) (see Table XI). There was a greater difference between the two groups in the production scores (74 points) than in the comprehension scores (13 points) (see Figure 6). The youngest in the control group received 94 out of a possible 100 points for the comprehension of the Test of Negative and

TABLE XI
SUMMARY OF ANALYSIS OF VARIANCE - EXPERIMENT VI

| Source of Variation | SS | df | MS | F |
|---|---------------|-----------|--------|----------|
| <u>Between subjects</u> | <u>298.64</u> | <u>19</u> | | |
| Groups (G) | 130.61 | 1 | 130.61 | 13.98** |
| Subj w. groups [error (G)] | 168.03 | 18 | 9.34 | |
| <u>Within subjects</u> | <u>512.75</u> | <u>60</u> | | |
| Language Performance (LP) | 221.12 | 1 | 221.12 | 44.14*** |
| G X LP | 46.51 | 1 | 46.51 | 9.28** |
| LP X subj w. groups [error (LP)] | 90.09 | 18 | 5.01 | |
| Types of Syntax (TS) | 7.82 | 1 | 7.82 | 3.51 |
| G X TS | 15.31 | 1 | 15.31 | 6.87* |
| TS X subj w. groups [error (TS)] | 40.15 | 18 | 2.23 | |
| LP X TS | 32.50 | 1 | 32.50 | 10.13** |
| G X LP X TS | 1.52 | 1 | 1.52 | .41 |
| LP X TS subj w. groups [error (LP X TS)] | 57.73 | 18 | 3.21 | |

*Significant at the .05 level.

**Significant at the .01 level.

***Significant at the .001 level.

the Test of Question. The oldest of the experimental group received 94 out of a possible 100 points for the comprehension of the Question Test and received 81 out of possible 100 points for comprehension of the Negative Test.

The youngest children in the control group achieved a score of 91 out of a possible 100 points in the production of the Negative Test. One-half of the children scored the

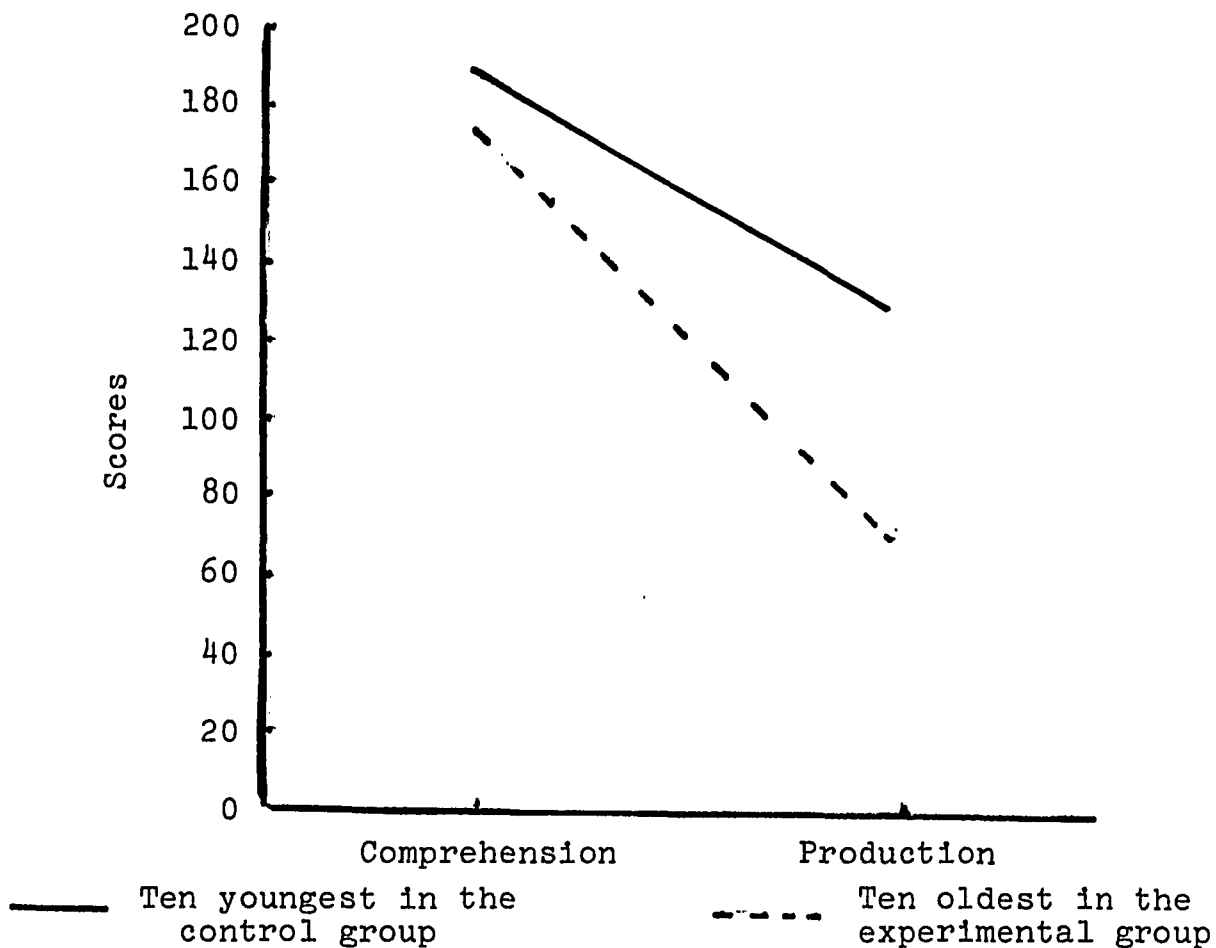


FIGURE 6

DIFFERENCE BETWEEN SCORES OF COMPREHENSION AND PRODUCTION OF THE YOUNGEST CHILDREN IN THE CONTROL GROUP AND THE OLDEST CHILDREN IN THE EXPERIMENTAL GROUP - EXPERIMENT VI

maximum number of points. The oldest children in the experimental group achieved a score of 43 out of a possible 100 points. Only one child in the experimental group scored the maximum number of points. From these data, it seems that the youngest children in the control group (CA 3.7 to 4.6 years) can comprehend and produce the negative structure.

The production of the interrogative structure proved to

TABLE XII

SCORES OF THE YOUNGEST CHILDREN IN THE CONTROL GROUP AND THE
OLDEST CHILDREN IN THE EXPERIMENTAL GROUP - EXPERIMENT VI

| Group | Comprehension Scores | | | Production Scores | | | Difference between Comprehension and Production Scores | | |
|------------------------------|----------------------|----------|-------|-------------------|----------|-------|--|----------|-------|
| | Negative | Question | Total | Negative | Question | Total | Negative | Question | Total |
| Control Youngest | 94 | 94 | 188 | 91 | 61 | 152 | 3 | 33 | 36 |
| Experimental Oldest | 81 | 94 | 175 | 43 | 35 | 78 | 38 | 59 | 97 |
| Difference between scores | 13 | 0 | 13 | 48 | 26 | 74 | | | |

be more difficult, i.e., the youngest children in the control group achieved a score of 61 out of a possible 100 points and the oldest children in the experimental group achieved a score of 35 out of a possible 100 points. There was a minimum of seven months to a maximum difference of thirty months between the children in the two groups. The youngest children in the control group, who are from seven to thirty months younger than the oldest children in the experimental group, surpassed them on every test.

The interaction of Language Performance X Type of Syntax also was statistically significant at the .01 level ($F = 8.29$; $df = 1,18$) (see Table XI). For each group the scores were lower for the comprehension of the negative than for the comprehension of the question, but were higher for the production of the negative than for the production of the question. The pattern was similar to the pattern presented in Figure 4, p. 101.

Experiment VII

For Experiment VII, the Group Factor was composed of ten girls (Eg) and ten boys (Eb) of the experimental group. The children were matched for age. The Language Performance Factor consisted of comprehension and production of the test items, and the Type of Syntax Factor was composed of the negative and interrogative structures. The Group Factor was statistically significant at the .05 level (see Table XIII).

TABLE XIII
SUMMARY OF ANALYSIS OF VARIANCE - EXPERIMENT VII

| Source of Variation | SS | df | MS | F |
|---|---------------|-----------|--------|-----------|
| <u>Between subjects</u> | <u>173.75</u> | <u>19</u> | | |
| Groups (G) | 39.20 | 1 | 39.20 | 5.24* |
| Subj w. groups [error (G)] | 134.55 | 18 | 7.48 | |
| <u>Within subjects</u> | <u>755.00</u> | <u>60</u> | | |
| Language Performance (LP) | 510.05 | 1 | 510.05 | 167.22*** |
| G X LP | 5.00 | 1 | 5.00 | 1.63 |
| LP X subj w. groups [error (LP)] | 54.95 | 18 | 3.05 | |
| Types of Syntax (TS) | 14.45 | 1 | 14.45 | 4.01 |
| G X TS | .80 | 1 | .80 | |
| TS X subj w. groups [error (TS)] | 64.75 | 18 | 3.60 | |
| LP X TS | 42.05 | 1 | 42.05 | 12.01** |
| G X LP X TS | 0.00 | 1 | 0.00 | .00 |
| LP X TS subj w. groups [error (LP X TS)] | 62.95 | 18 | 3.50 | |

*Significant at the .05 level.

**Significant at the .01 level.

***Significant at the .001 level.

The scores of the girls on each test were higher (better) than the scores of the boys (see Table XIV).

The Language Performance variable ratio of $F = 167.22$ greatly exceeded the .001 level of significance ($F = 15.38$; $df = 1,18$) (see Table XIII). The total production score of the girls was one-half of the comprehension score (91:182).

TABLE XIV

SCORES OF LANGUAGE PERFORMANCE OF GIRLS AND BOYS
IN THE EXPERIMENTAL GROUP - EXPERIMENT VII

| Group | Language Performance | | | | | | Difference between Comprehension and Production Scores | | |
|------------------------------|----------------------|----------|-------|-------------------|----------|-------|--|----------|-------|
| | Comprehension Scores | | | Production Scores | | | Negative | Question | Total |
| | Negative | Question | Total | Negative | Question | Total | | | |
| Experimental Girls | 89 | 93 | 182 | 58 | 33 | 91 | 31 | 60 | 91 |
| Experimental Boys | 78 | 86 | 164 | 37 | 16 | 53 | 41 | 70 | 111 |
| Difference between scores | 11 | 7 | 18 | 21 | 17 | 38 | | | |

The total production score of the boys was one-third of the comprehension score (53:164). There was a considerable difference between the comprehension and production scores of each group.

The interaction of Language Performance X Type of Syntax was significant at the .01 level ($F = 8.29$; $df = 1,18$). Here, again, the comprehension of the negative was more difficult than the comprehension of the question, while the production of the question was more difficult than the production of the negative. The pattern was similar to the pattern presented in Figure 4, p. 101.

Experiment VIII

Experiment VIII varied from Experiment VII in only one dimension. In Experiment VIII, the Group Factor consisted of girls and boys who were a sub-group of the control group. The children selected were matched in age, IQ, sex, and socio-economic status with the children studied in Experiment VII. In Experiment VIII there was no significant difference in the Group Factor (see Table XV). The almost maximum scores of 94, 95 and 96 out of 100, which were achieved by most of the control group again may be the cause of the lack of a significant difference. This factor revealed a significant difference of .05 in Experiment VII.

There was a statistically significant difference in the Language Performance Factor (comprehension and production) at the .01 level ($F = 8.29$; $df = 1,18$). This finding

TABLE XV
SUMMARY OF ANALYSIS OF VARIANCE - EXPERIMENT VIII

| Source of Variation | SS | df | MS | F |
|---|---------------|-----------|-------|--------|
| <u>Between subjects</u> | <u>66.45</u> | <u>19</u> | | |
| Groups (G) | 1.25 | 1 | 1.25 | .35 |
| Subj w. groups [error (G)] | 65.20 | 18 | 3.62 | |
| <u>Within subjects</u> | <u>170.50</u> | <u>60</u> | | |
| Language Performance (LP) | 18.05 | 1 | 18.05 | 9.30** |
| G X LP | 2.45 | 1 | 2.45 | 1.26 |
| LP X subj w. groups [error (LP)] | 35.00 | 18 | 1.94 | |
| Types of Syntax (TS) | 18.05 | 1 | 18.05 | 8.55** |
| G X TS | 2.45 | 1 | 2.45 | 1.16 |
| TS X subj w. groups [error (TS)] | 38.00 | 18 | 2.11 | |
| LP X TS | 18.05 | 1 | 18.05 | 8.72** |
| G X LP X TS | 1.25 | 1 | 1.25 | .60 |
| LP X TS subj w. groups [error (LP X TS)] | 37.20 | 18 | 2.07 | |

**Significant at the .01 level.

of $F = 9.30$ (see Table XV) was considerably smaller than the $F = 167.22$ of the Language Performance Factor of Experiment VII (see Table XIII, p. 111). The scores for the production of the question lagged behind the scores for the production of the question (see Table XVI). The scores of both groups were better for the comprehension of the question than were the scores for the production of the question; the girls' scores were 95:70 for comprehension and production,

TABLE XVI
 LANGUAGE PERFORMANCE OF GIRLS AND BOYS IN THE
 CONTROL GROUP - EXPERIMENT VII

| Group | Language Performance | | | | | |
|------------------------------|----------------------|----------|-------|-------------------|----------|-------|
| | Comprehension Scores | | | Production Scores | | |
| | Negative | Question | Total | Negative | Question | Total |
| Control Girls | 96 | 95 | 191 | 95 | 70 | 165 |
| Control Boys | 94 | 95 | 189 | 95 | 82 | 177 |
| Difference between scores | 2 | 0 | 2 | 0 | 12 | 12 |

respectively, and the boys' scores were 95:82 respectively.

There was a significant difference for the Type of Syntax Factor at the .01 level ($F = 8.29$; $df = 1,18$), for Experiment VIII. The scores for comprehension of the negative and question were almost equal, with only a one-point difference in favor of the Question Test (see Table XVI). The scores for the production of the negative were better than the scores for the production of the question, i.e., the girls' scores were 95:70 for production of the negative and question, respectively, and the boys' scores were 95:82, respectively.

The interaction of the Language Performance X Type of Syntax was statistically significant at the .01 level ($F = 8.29$; $df = 1,18$). The scores for comprehension and production of the Negative Test and comprehension of the Question Test were equal, 190 out of a possible 200 points, while the score for the production of the Question Test was lower, 152 out of a possible 200 points (see Table XVI). Here again, the Negative Test appeared to be too simple for the control group, for twelve of the twenty children received a maximum score for comprehension. The pattern is similar to the pattern presented in Figure 5, p. 104.

Summary

Experiments I, II and III each contained thirty subjects in the control group and thirty subjects in the

experimental group. Experiments IV, V, VI, VII, and VIII contained ten subjects in each group. The latter groups were sub-groups of the experimental group and the control group.

The Group Factor (G)

(1) Sample size $n = 30$. There was a statistically significant difference at the .001 level of confidence for the Group Factor in Experiments I, II, and III. There was a significant difference between the scores of the children with deviant articulation and the children with normal articulation. The children with normal articulation had higher (better) scores on each test that was administered than the children with deviant articulation. The range of F scores for these Experiments was in the 80's (see Table I, p. 86; Table III, p. 92; and Table V, p. 95), when only an F score of 11.9 was required for the .001 level of significance.

(2) Sample size $n = 10$. The Group Factor was statistically significant at the .01 level only for Experiment VI (youngest in the control group vs. oldest in the experimental group). The youngest children in the control group had higher scores than the oldest children in the experimental group, the greatest difference being in the production aspect.

The Group Factor was statistically significant at the .05 level for Experiment IV (the ten youngest and the ten oldest in the experimental group), and for Experiment VII

(girl vs. boy sub-group of the experimental group). In Experiment IV, the scores of the oldest children were always higher than the scores of the youngest children (see Table VIII, p. 99). In Experiment VII, the scores of the girls in the experimental group were always higher than those of the boys in the experimental group (see Table XIV, p. 111). In Experiment VIII, there is a non-statistical reversal; the score of the boys in the control group was 12 points higher for the production of the question than the score of the girls in that group. The girls and boys scored equally well on the production of the negative.

The Language Performance Factor (LP)

The Language Performance Factor was significant at the .01 level for each experiment in which the factor was present:

(1) $n = 30$ in Experiment I

(2) $n = 10$ in Experiments IV, V, VI, VII, and VIII

Comprehension scores were always higher than production scores. There seemed to be an extreme difference in the LP factor (comprehension and production) when the experimental group was involved (see, e.g., Table I, p. 86; Table VII, p. 98; and Table XIII, p. 110) and when the interrogative structure was employed (see Table II, p. 89; Table VIII, p. 99; and Table XIV, p. 111). The F scores ranged above 150.00 when only an F score of 15.38 was required at the .001 level of significance.

The Type of Syntax Factor (TS)

(1) Sample size $n = 30$. There was a statistically significant difference at the .001 level for Experiments I, II, and III. The level of difficulty for production of the different grammatical structures was Present Progressive-Copula, Negative and Question.

(2) Sample size $n = 10$. There was a statistically significant difference at the .01 level for Experiment V (youngest and oldest children in the control group) and Experiment VIII (girl vs. boy in the control group). The production of the Negative Test was higher than the production of the Question Test. For Experiments IV, VI, and VII (see Table VIII, p. 99; Table XII, p. 108; and Table XIV, p. 111, respectively) a trend in this direction may be perceived, though statistical significance was not achieved.

The Interaction of Groups X Language Performance (G X LP)

(1) Sample size $n = 30$. This interaction was significant at the .001 level of confidence for Experiment I.

(2) Sample size $n = 10$. There was a significant difference, at the .01 level of confidence for Experiment VI, which compared the ten youngest children in the control group with the ten oldest in the experimental group.

Comprehension was better than production in both studies; the difference in production between the experimental and control groups increased.

The Interaction of Groups X Type
of Syntax (G X TS)

The interaction of Groups X Type of Syntax was statistically significant at the .001 level of confidence for Experiment II (which analyzed the various levels of the Negative), and at the .05 level of confidence for Experiment VI, which studied the youngest of the control group and the oldest of the experimental group. For the experimental group in Experiment II, comprehension was 93 points better than imitation, which, in turn, was 14 points better than production; for the control group, imitation exceeded comprehension and production by one point (see Table IV, p. 94). For Experiment VI (see Table V, p. 95) comprehension of the negative, for the control group, was equal to comprehension of the question.

These interactions may have been significant for both experiments because the tests offered may not have been difficult enough for the control group.

The Interaction of Language Performance X
Type of Syntax (LP X TS)

The interaction of LP X TS was significant for each test in which Language Performance was included, i.e., Experiments I, IV, V, VI, VII, and VIII.

The items in the Negative Test were more difficult to understand but easier to produce than the items in the Question Test. The items in the Question Test were easier to understand but more difficult to produce than the items in

the Negative Test.

The Interaction of Groups X Language
Performance X Type of Syntax

This triple factor was not significant for any of the experiments.

CHAPTER V

SUMMARY, CONCLUSIONS AND IMPLICATIONS

Summary

In this chapter are considered: (1) the summary of the major findings (auxiliaries, negatives and interrogatives), (2) the conclusions, and (3) the implications for supporting and developing theories and for further research.

Experiment I involved three main factors: (1) the experimental group and the control group, (2) the Language Performance (comprehension and production) of these groups and (3) the Type of Syntax (negative and question). Experiment II was concerned with the same Group Factor but investigated the Levels of the Negative (imitation, comprehension, and production). Experiment III worked with the same Group Factor but tested only the production aspects of Types of Syntax, which included a test for Present Progressive-Copula, in addition to the Negative Test and Question Test. Rather than discuss each experiment as a separate entity, each will be covered as it pertains to the topics explored in this chapter.

In each of these experiments, the control group always scored higher than the experimental group, the comprehension scores were higher than the production scores for each group

in each experiment, and the statistically significant Type of Syntax Factor indicated that there was a difference in the performance of the different syntactic structures tested.

A limitation of the tests for the Group Factor should be noted, i.e., the tests were too easy for the control group (Table II, p. 89). As noted in Chapter IV, the scores of the control group always surpassed those of the experimental group and also the control group achieved close to the maximum score for comprehension of the negative and question, and for production of the negative. This prevented definitive conclusions as to whether the differences that occurred were of a quantitative nature solely, or whether there were qualitative differences as well.

When discussing comprehension, Piaget (1963, p. 208) hypothesized that ". . . verbal forms always evolve more slowly than actual understanding." Fraser, Bellugi and Brown (1963) studied normal children, Lovell and Dixon (1967) studied mentally retarded children, and each group found that comprehension precedes production. The general feeling in the literature and in this study is that children appear to understand an aspect of language before they formulate it spontaneously. A t test for the comprehension of the negative was performed with the raw scores for the ten youngest children of both the experimental and control groups. The results were found to be not significant. Two of the children in the experimental group received a maximum

score on the Negative Test with scores ranging from 2-10. Five of the children in the control group received a maximum score, with scores ranging from 8-10. The inference again seems to be that the test was too simple for the congroup. It should be noted however, that Lovell, Hoyle and Siddall (1968) did not find a significant difference in the comprehension scores of their experimental group (only delayed language) and their control group. They used the test of Fraser et al.

The results of the Type of Syntax Factor will be examined a little more closely so that the differences in performance between the negative and the question may be noted.

An analysis of the production of the "to be" as an auxiliary and as a copula verb will be made first in the summary mainly for the reason that, production of the negative and question, in many instances, is based directly on their formation.

Findings: Auxiliaries

The production of the Tests of Present Progressive-Copula, Negative, and Question were examined in Experiment III. Only totally correct sentences were accepted for scoring for the Test of Present Progressive-Copula. Thus, not only was it essential that the auxiliary or copula be present, but the subject NP's had to be included and the subject-verb agreement and case agreement of subject pronouns could not be restricted. The schwa was accepted as

"is" on the basis of two premises: (1) the schwa may be a place marker for "is," i.e., it may represent the "to be" auxiliary (Bloom, 1970, pp. 74-75), and (2) the schwa may be the formation of "is" when there is distortion or omission of the required phones. The totally correct scoring was not required for the production of the negative. This will be discussed later on in this chapter.

The ten sentences of the Test of Present Progressive-Copula contained four copula and six auxiliary "to be" forms. An "absent auxiliary or omitted copula" syndrome seemed to be in operation for the experimental group. The auxiliary was omitted in a ratio of 90-3, and the copula was omitted in a ratio of 48-7 times for the experimental group and the control group, respectively. This is in accord with the findings for the production of the question (see Table XIX, p. 138).

The differentiation of the "to be" form seems to create a great deal of difficulty in the production of the language. What causes the weakness of the "to be" form? Stewart (1970) considered that when a simplified form of the language is used to increase the facility in learning a new language, the "zero copula" ("He old"), "zero possessives" ("My fahver frien'") and undifferentiated pronouns ("Him know we," "Him know us") are found. Ferguson (1971) found that speakers in his study rated the sentence without the copula easier to understand; if people tried to simplify their language

they omitted the copula.

The auxiliary verb may result in a redundancy or in the addition of a cue for a time factor (continuing activity) that is not needed to understand or to convey thoughts. If the child is only capable of organizing a designated number of morphemes or a specific number of chunks of information in sequence then he may choose to omit the morphemes that offer the least amount of information. Brown and Fraser (1964, p. 76) noted that if the MLU is below 3.2 morphemes the "to be" will be dropped.

For many children in this study a process of selective delay or selective lack of differentiation seemed to occur. Each child in this study produced a MLU above the level (3.2 morphemes) believed to be present when the average child incorporates "to be" into his sentence structure. The children in the experimental group used a greater number of morphemes than 3.2 when producing a spontaneous utterance; yet many omitted the "to be." The following are examples of the utterances of the experimental group:

Subject 1 - Boy, CA 5.4 years

1. It a rainy day.
2. They going to school.
3. because they not gonna get a cupcake.
4. He washing dog.

Subject 2 - Girl, CA 3.1 years

1. can't climb over the fence.
2. They not running.
3. I don't know why.
4. Her cry.

Subject 3 - Girl, CA 5.1

1. because him happy
2. You gonna give me a lot?
3. He painting.
4. When her must jump?
5. and kisses her mommy.
6. She is taking a bath.

One fact which gives credence to the belief that differentiation may be emerging along with all the omissions is that the experimental group produced 52 copulas and 89 "to be" auxiliaries in their answers to Test I (Present-Progressive-Copula Test), e.g., the ten oldest children in the experimental group scored 54 on the Test of Present Progressive-Copula while the ten youngest children in this group scored 28. There were two children in the oldest group and one child in the youngest group who scored zero. The statistically significant difference at the .05 level for the oldest and youngest children of the experimental group (Experiment IV) does provide evidence that, for some children, this aspect of language development is advancing slowly. Further study of other syntactic structures is needed, for this finding differs from Menyuk's (1970) who wrote that children with deviant articulation do not exhibit any significant new structures over a period of three years. A longitudinal study of a number of children with deviant articulation would be of tremendous help in determining the pattern and rate of development.

The experimental group used the unmarked pronoun a greater number of times than did the control group. The

control group always used the marked nominative pronouns where required. The experimental group used the unmarked pronouns (he > him, she > her, they > them, I > me) for a total of 37 times in the Test of Present Progressive-Copula (see List of Sentence, p. 125). It is possible that the use of the unmarked pronouns designates a new category that is being used but has not been differentiated as yet. Its use does seem to be an advance over the stage where the verb phrase dominated.

The children in the experimental group present many problems: (1) they have reduced intelligibility of the phones that are uttered and combined, (2) they apparently have a reduced number of lexical items from which to choose when forming the desired structured sentence, and (3) they have a lower comprehension score than the control group. With handicaps, it seems logical that, when forming a sentence, the child would first include the items that would allow him to communicate with the greatest efficiency and then add subtle peripheral items.

Clarapede (1917, pp. 361-363) stated that "Categories must be formulated in connection with the intellectual development of the child himself." Additional attention should be focused on this area to determine just how wide the comprehension gap is between the experimental and control groups.

Findings: Negative

Comprehension of the negative. The comprehension of the Negative Test items was more difficult than the comprehension of the Question Test items for all subjects. The fact that the negative is more difficult to understand than the affirmative has been documented in the literature (see Chapter II, p. 6). No studies comparing the comprehension of the negative to the comprehension of the question have been found.

Concerning the comprehension of the negative, Smoke (1932) established that a negative instance of any given concept is more difficult to understand and use than a positive instance. Hovland and Weiss (1953) found that it was more difficult to formulate concepts from negative instances alone than from positive instance alone. Wason (1959) conducted a number of experiments involving the negative; he found that the mean response time (MRT) (12.58 sec.) and the number of errors (8) for comprehension of the true negative were longer than the MRT (8.99 sec.) and the number of errors (4) for the comprehension of the true affirmative. Wason (1961) experimented with verification (subject responding "true" or "false") and construction (subject responding with an appropriate answer to make the statement "true" or "false") of affirmative positive and negative statements. There was a statistically significant difference of .001 for both errors and MRT for verification and

construction of affirmative and negative sentences. Wason (1965) found that when nonsense syllables were used it takes longer to respond to a negative statement than to an affirmative one, even when the amount of information is equated. Miller and McKean (1964) noted that it took longer to perform negative transformations than those involving SAAD (simple, active, affirmative, and declarative).

Wason hypothesized a number of explanations for the difficulty encountered with negative reception and production. The first is that the use of negative information may require additional processes because one must start with a store of positive information that is used as standard, "It is not good to know what something is not unless that helps to eliminate possibilities about what it is." An affirmative statement involves no inversion of any kind, whereas the true negative involves a single inversion. It involves thinking to the contrary. He hypothesized that a pre-existing set may exist for positive information, which is used as standard. Second, he said that a person may perceive in a true affirmative way rather than in a false affirmative or true negative way. Geach (1958) stated that the negative cannot be derived from sense experience. It is impossible to distinguish assertion from negation without knowing which one corresponds to "true" and which one to "false."

Third, Wason suggested that there may be an emotional response to the negative. The "yes" is permissive, the

"no" is prohibitive. This was suggested by the abnormally long latencies found in the negative and by the blocking that was reported by many students. Negative responses were related to inhibitory processes or to the correction of a mistaken impression. The emotional factor also was found in studies of the production of the negative by Wason and Jones (1963) and in the study of the Hebrew language by Eiferman (1961).

In summary, the results produced by this study suggest cognitive dependence, where affirmation or existence must be established before the opposition of the negative or the non-existent can be comprehended. The additional operations required to process the added information increases the complexity of the sentence, possibly causing an increase in the number of errors in the Test of the Negative. The inhibitory emotional factor of the negative, too, may have a direct affect on the performance of the subject.

Imitation and production of the negative. The Levels of Negative (comprehension, imitation, and production) was significant for the experimental group but not for the control group. As previously noted, it is possible that the negative tasks were too easy for the children in the control group; e.g., only two out of the 30 children in the experimental group achieved a maximum score on the production of the Negative Test, 22 of the 30 children in the control group scored a maximum score on the production of the

Negative Test. The literature concerning normal children placed the production of the negative at approximately 36 months. All children in the control group exceeded this C. A. In addition, meaning and/or syntax most likely combined the morphemes of the test items into units of information (Salzinger, et al., 1966) which would aid imitation, so that one required factor--memory span--was probably easily within their ability.

Despite the similarity of scores of the children in the control group, qualitative differences were perceived for imitation and production.

1. Control group

a. There was a greater number of changes of the modal and auxiliary from the verbal stimuli presented for the imitative aspect than for the spontaneous production aspect (see Tables XVII and XVIII).

b. There was a greater variety of changes for imitation than for production, e.g., if the verbal stimulus or imitation was, "The boy cannot pick the apple," the answer might be, "(He can't), (He didn't), (He did not), (He doesn't), (He couldn't), (He isn't) pick(ing) the apples."

Perhaps the number and variety of modals and auxiliaries increased because the children were not taxed with the creative formation of the cognitive, semantic and syntactic composition of the answer. They were freed from some responsibilities and so were able to select more advanced lexical and syntactical constructions. There was a

TABLE XVII

CHANGES OF MODALS AND AUXILIARIES FROM THE VERBAL STIMULI
PRESENTED BY THE EXAMINER FOR THE TESTS OF IMITATION
AND PRODUCTION OF THE NEGATIVE - EXPERIMENT II

| Group | | Different Changes | Number of Changes |
|--------------|------------|----------------------|----------------------|
| Experimental | Imitation | 28 | 73 |
| | Production | 20 | 63 |
| Control | Imitation | 49 | 124 |
| | Production | 37 | 104 |

TABLE XVIII

FORMS AND FREQUENCY OF THE MODALS AND AUXILIARIES
PRODUCED - EXPERIMENT II

| Group | Do | Is | Can't | Won't | Wouldn't | Couldn't | Could Not |
|--------------|------------|----|-------|-------|----------|----------|--------------|
| Experimental | Imitation | | | | | | |
| | 10 | 18 | 27 | 16 | 1 | 0 | 0 |
| Control | Production | | | | | | |
| | 11 | 11 | 26 | 13 | 0 | 0 | 1 |
| Control | Imitation | | | | | | |
| | 31 | 47 | 22 | 7 | 7 | 3 | 0 |
| Control | Production | | | | | | |
| | 29 | 60 | 24 | 13 | 7 | 4 | 0 |

broader range of modals used and a larger number of combinations of items.

c. "Can't" and "won't" were used fewer times in imitation (29) than in spontaneous production (37). "Can't" and "won't" are believed to be single memorized negative morphemes that do not truly include a modal, in addition to a negative (Brown et al., 1968). They are considered easier to form than, e.g., "didn't, did not, doesn't, are not, etc."

d. The use of the forms of "to be" increased from forty-seven in imitation to sixty in spontaneous production, with "He's not," or "She's not" accounting for the majority of the answers; though "isn't, is not," and "aren't" also were present, but to a lesser degree (see p. 135).

e. The use of the forms of "do" remained constant for imitation and production, with the use of "didn't," "doesn't," "don't," "did not," "does not" increasing in difficulty in this order.

2. Experimental group

a. The experimental group, too, underwent a greater number of changes of the modals and auxiliaries, from the verbal stimuli presented, for the imitative aspect than for the spontaneous production aspect (see Table XVII).

b. The experimental group also produced a greater variety of changes for imitation than for production. There were some differences between the experimental and the

control group (see item d).

c. "Can't" and "won't" accounted for over one-half of the responses.

d. The use of "to be" forms diminished from imitation to spontaneous production in the ratio of 18-11. This may be compared with the rise of the "be" form in the control group from 47 to 60.

The experimental group experienced more difficulty with the "to be" form than the control group. Imitation seemed to reduce the need for original syntactic creation and allowed the production of difficult forms, i.e., "to be" for the experimental group. "To be" was produced by the control group in spontaneous production; therefore, they used the imitation situation to form a different variety of structures (see Table XVII).

The small 14-point difference between imitation and production for the experimental group, when compared with the 107-point difference between comprehension and production, might be an indication that successful imitation may occur (1) when a category is in the process of developing (see Table IV, p. 94). Consider the examples of Subject No. 3, on page 126, Items 3 and 6, where the auxiliary verb was produced in one sentence and omitted in the other, or (2) when a category that is imitated is used in spontaneous speech in the immediate future (Slobin, 1968, pp. 437-443). If this follows then imitation might be used to alert the

therapist about the dynamics of the child's functioning. Imitation was not found to be grammatically progressive; there was not a vast difference between imitation and production. This is in agreement with Brown and Bellugi (1964) and Ervin (1964).

Lovell et al. (1968) worked with children with delayed language (without defective articulation) and produced similar results in comprehension and imitation. They found that "the mean score for comprehension was greater than for imitation" at the .01 level of significance (p. 48). The reverse was true for children with normal articulation. This cannot be substantiated in the investigator's study.

Perhaps, for imitation the child "stretched his capacities to the limit" (Slobin, 1968), for imitation revealed more accuracy than production, and a greater number and variety of morphemes were used with imitation than with spontaneous production.

Another item of interest was the hierarchy that existed within the auxiliaries and modals. Some auxiliaries and modals were used only by children who had high scores on the Negative Tests. Other modals or auxiliaries were used by children who had high or low scores. For instance, for imitation, "aren't" was used if the score was 8+ (eight or higher); "would" and "wasn't" were used if the score was 9+; for spontaneous production, "isn't" was used if the score was 7+. Other modals or auxiliaries were used if the score

was low (fewer correct); for imitation, "can't, they're, and she's" were used if the child scored 1+; for spontaneous production, "can't" was used with a score of +1, but "they're" was used only with a score of 5+. This seems to be similar to the factor of "cooccurrence" which was noted by Muma (in press).

To summarize, the results of the investigator's study for the experimental group do not correspond to the findings of Fraser et al. (1963). In the investigator's study, the experimental group's comprehension exceeded imitation by 93 points which, in turn, exceeded production by 14 points. A greater variety of forms was used for imitation than for spontaneous production, and "cooccurrence" was noted for many items.

Findings: Questions

Comprehension of the question. The scores for comprehension of the Question were higher (better) for each group than the scores for the comprehension of the negative; conversely the scores for the production of the question were lower than the scores for the production of the negative.

The interrogative pronouns included in this study were: who, what, where, when, why, and whose. Various authors have noted in their studies that the comprehension of these pronouns appears to be within the ability of a child of 36 months of age. Brown et al. (1968) found that children of CA, 18-21 months, responded to the interrogative pronouns,

"who" and "what (with a NP)." Ervin-Tripp (1970) discovered that "what" and "where" were understood by children at 1.9 years, "whose" and "who" at 2.3 and "what do" (requiring a verb reply) at 2.6. "Why" was heard as "what" until 3.2 years. "When" and "how" increased in usage over "what" (nominal) and "where" (locative) after 3.1 years. Piaget (1963, p. 233) listed "why" as appearing around 3.0 years but noted that Stern suggested "why" appears at 2.10 years and is preceded in development by "what is" and "when."

The order of comprehension just listed conforms to Piaget's (1963, p. 235) theory that question of place and name are distinguished before 3.0 years, and question of cause and time from 3.7 to 8. Before 3.7 years "why" is found to be more affectual than intellectual, and related to psychological intention rather than to causation.

An examination of the data for certain questions supports the findings of Piaget that place and name appear before cause and time (see Table XIX). There seems to be discrepancy in scores, which will be discussed in this chapter.

"What" questions - questions 2 and 5. Question 2 ("What are they carrying?") and Question 5 ("What is she baking?") employ the Wh interrogative pronoun "what." The difference in the scores between Questions 2 and 5 for the experimental group may not indicate a lack of understanding of the interrogative pronoun "what" but rather a paucity or lack of semantic choices to express the object of their

TABLE XIX
 ERRORS OCCURRING IN THE COMPREHENSION OF THE QUESTION

| Question Number | Interrogative Pronouns Used as Verbal Stimuli | Errors | |
|-----------------|---|--------------------|---------------|
| | | Experimental Group | Control Group |
| 8 | where | 0 | 0 |
| 4 | where | 2 | 1 |
| 5 | what | 2 | 1 |
| 2 | what | 6 | 1 |
| 3 | who | 2 | 0 |
| 9 | who | 0 | 0 |
| 10 | whose | 1 | 0 |
| 1 | why | 1 | 0 |
| 6 | why | 11 | 3 |
| 7 | when | 12 | 5 |

perception (see Table XIX). For Question 5, the experimental group and the control group jointly employed seven different vocabulary words to answer the question: experimental group, e.g., cookie(s) (2), cake (4), candy (2), cupcake (2), pie (1); control group, e.g., cookie(s) (17), candy (5), cake (4), food (2), pie (1). There seemed to be homogeneity in the selection of the lexicon. No child pointed as a response.

For Question 2, 22 children in the experimental group used twelve different vocabulary words to label the item being carried by children in the picture, e.g., "a suitcase,

a case" (6), "a box, a big box" (4), "a trunk" (2), "a treasure" (2) etc. There were six children who indicated "I don't know" or gave no reply, and there were two children who pointed. Items were offered that appeared to be "manufactured." These will be discussed later on in this chapter. The control group also seemed to lack homogeneity in lexical choices. Only one child pointed, while the other 29 subjects used 14 different vocabulary words to express the object that the children were carrying, e.g., "a treasure chest, a chest" (7), "a treasure" (4), "a suitcase, a case" (2), "a box, a big box" (4), "a trunk" (2), "gold" (1), "luggage" (1) etc.

Apparently the acquisition of the concept "what" requiring a NP answer is not at the root of the errors that occurred. Although cursory examination reveals that both questions require a NP as a response, the familiarity of the vocabulary required for the two questions, in terms of experience and past usage, is vastly different. The ability to answer the questions seemed to relate to the variety of lexical items at the children's command. That the control group succeeded with only one use of "I don't know" and no contrived or "manufactured" terms seem to bear out the initial tangential findings that children with deviant articulation seem to have greater difficulty than normal children with development or differentiation of the lexical items of language. Items considered to be "manufactured" were: "a

thing" (1), "a truck" (1), "a chair" (1), and "a garbage pail" (1). They seem to indicate the child's groping for words to express the referent before him. The answers the children gave cannot be attributed to a misunderstanding of the interrogative pronoun, for they did not answer "who" or "when" or "where" or "why," but attempted to ferret out the elusive noun. The children seemed to select items that they have seen carried, which might explain the garbage pail and truck, if a toy is what they had in mind. An extreme explanation would be that the truck they associated with the picture was a large one, which is used for carrying items, thus associating the event with the referent. The word "truck" also is similar phonetically to the word "trunk," which might be the reason for the confusion in recall or in production.

"Why" question - questions 1 and 6. Question 1 ("Why is she happy?") and Question 6 ("Why did he hit the boy?") involve the use of the interrogative pronoun "why." There was only one error for Question 1 (see Table XIX); but, 14 total errors were recorded for Question 6, i.e., 11 for the experimental group and 3 for the control group. The stimulus picture for Question 1 depicts a happy child about to blow out the candles on a birthday cake, which is placed prominently before her (see Plate 3, p. 93). The cause of her happiness is apparent immediately. The stimulus picture for Question 6 includes two boys fighting in the

foreground. A broken bat, which was meant to present the immediate causation to the children, was placed at the lower right in an obscure position (see Plate 3, p. 93). Although each lexical item and the syntactic structure may have been understood, the total sentence may not have been answered because of the children's inability to explain the cause of the action presented.

In each group the reason given the greatest number of times as the cause of the fighting was an aggressive act by one of the boys--a direct act on the person. This occurred nine times for the control group and seven times for the experimental group. An example of the verbal responses of the children follows:

| | |
|---------------------|---|
| Control group: | "cause he hit him back" "because he hitted him before" "because he hit the other boy" |
| Experimental group: | "cause he hit this boy first" "he did hit boy back" "hit the boy" |

The second reason expressed by each group was emotional or attitudinal causation. This was expressed five times for each group:

| | |
|---------------------|--|
| Control group: | "because he was mad" "because he's angry" "because they don't like each other" |
| Experimental group: | "cause they mad" "cause he mad on him" "cause him mad, cause him angry" |

The third reason, expressed four times by the experimental group and five times by the control group, was a verbal expression of the "cause" portrayed in the picture. It

was caused by a direct act on an external object:

| | |
|---------------------|--|
| Control group: | "cause he broke the bat" (3) "I don't know . . . the bat broke" |
| Experimental group: | "cause he broke him bat" ". . . and he broke a baseball bat" "hit the boy . . . bat break" |

There were five non-causal answers (experimental group--2; control group--3) that merely restated the action occurring, e.g., "They're fighting."

The difference between the two groups seems to lie not in the type of cognitive responses--no answer presented a different type of reasoning; but rather in the number of children in the experimental group who answered "I don't know" (11), offered no reply (7), offered merely the causal words "because" (1) and "cause" (1), or offered an irrelevant reply (1). This, of course, reduced the number of correct responses.

The criteria for the comprehension scores were not based on the accuracy of the children's productive syntactic ability, but rather on the verbalization (or gesturing) of concepts or ideas that might be interpreted as indicating an understanding of the question. The difference might lie in the development of cognition, if the "I don't know" is attributed to delayed cognitive development. Again, it might be due to a limited lexicon.

"When" question - question 7. In Question 7 ("When will she hop?") the "when" interrogative pronoun is

encountered. There were twelve errors for the experimental group and five for the control group. The same pattern is present for both groups (see Table XIX).

Parallel development seems to occur for the two groups, with the difference in the speed of maturation (see Table XX). The use of "where" (place concept) was substituted for the use of "when" (time concept) three times for the experimental group and once for the control group for a 3-1 ratio. The experimental group used "I don't know" "no reply" nine times; the control group used these phrases four times, resulting in a ratio of 3-1.3. One other factor must be taken into account when discussing Question 7 and that is the experience, or lack of it, with the rules for playing a game. This will be reviewed when the production of the question is considered.

TABLE XX

TYPE OF ERRORS FOR THE "WHEN" INTERROGATIVE PRONOUN

| No. of Errors Experimental Group | Type of Errors | No. of Errors Control Group |
|--|------------------------------|--------------------------------|
| 3 | When (time) Where (place) | 1 |
| 8 | Response: "I don't know" | 4 |
| <u>1</u> | No response | <u>0</u> |
| 12 | | 5 |

"Where" question - question 8. For Question 8 ("Where are they hiding?") similar patterns were employed for both groups, with each group using the locative adverb or designative adverb, in addition to a noun. A larger number of the children in the experimental group pointed to or used the locative adverb only, while a larger number of the children in the control group used a prepositional phrase or a sentence rather than merely the simple locative adverb.

Control group: "They're under the steps."
 "Underneath the stairs."
 "They're hiding under the stairs."
 "Under the stairs"

Experimental group: "Right by the steps."
 "Next to the steps."
 "Under stairs."
 "Under there."
 "There."
 "Here."

"Who" question - question 9. For Question 9 ("Who climbed the fence?"), a larger number of children in the experimental group pointed than did those in the control group, 9-6, respectively; a fewer number of children in the experimental group used a combination of the determiner or designative adjective, in addition to a noun, or an adjective and a noun, than did the Control Group, 14-22, respectively; a larger number of the children in the experimental group used the single pronoun as their answer, e.g., "him," than did the control group, 7-0, respectively.

For both groups there was a homogeneity of responses in the answers to Questions 8 and 9. The answers offered were

duplications in vocabulary chosen, but the syntactic aspect was not expanded as frequently by the experimental group. The questions using "where" and "who" were responded to by gestures, by many subjects of both groups, whereas "what" was responded to by verbal NP answer by all but three subjects.

To summarize, one or a number of reasons might account for the difficulties encountered by the children in this study. There seems to be a greater number of errors when: (1) independent thought is required (compare Questions 1 and 6); (2) the nonverbal response is not appropriate (compare Questions 2, 8 and 9), and (3) the selection of vocabulary is difficult. When the vocabulary involved was limited in variety and was within the grasp of the child, there was greater accuracy of response to superficially similar questions. The question now to be asked is, "Are these three reasons distinctly different?" It seems that additional testing of vocabulary and non-verbal tests of concept formation might aid in determining causal relationships.

Production of the question. For an answer in the production part of the Question Test to receive complete credit (scored correctly), a Wh interrogative pronoun, an auxiliary, modal or required verb and the auxiliary-subject inversion must be present. If these three elements were present the answers were considered correct, even though restricted forms occurred, such as the lack of agreement of

subject and auxiliary, e.g., "He do," or the use of incorrect pronoun case, e.g., "Him is. . . ." A separate record was kept of responses that were totally correct, that is, responses that adhered to all restrictions (see Table XXI). If the restricted forms had been counted the number of correct responses scored would have decreased.

TABLE XXI
COMPARISON OF THE NUMBER AND PER CENT CORRECT FOR
SENTENCES WHERE RESTRICTED FORMS
WERE/WERE NOT COUNTED

| Group | Restricted Forms | | | |
|--------------|------------------|----|-----------------|----|
| | Not counted | | Counted | |
| | Scored Correct | | Totally Correct | |
| | No. | % | No. | % |
| Experimental | 63 | 21 | 42 | 14 |
| Control | 218 | 73 | 203 | 67 |

There were only three spontaneous yes/no questions in the entire group of responses: two for the control group, and one for the experimental group. These were counted as correct. No child in the experimental group received a maximum score on the production of the Test of Questions; 11 children in the control group did achieve a maximum score on this test.

An analysis of the type and frequency of errors is listed in Table XXII.

TABLE XXII
 VARIETY AND FREQUENCY OF ERRORS IN THE PRODUCTION
 ASPECT OF THE QUESTION TEST

| Group | 1 | 2 | | | 3 | | 4 | 5 | 6 |
|--------------|---|-------|-----------------------------|--------|-------|--|-------------------------|----------------------|---------|
| | No. Correct if Wh Pronoun Had Been Included | Modal | Omission of Auxiliary | Copula | Total | Auxiliary Present, Not Inverted | Declarative Sentence | Answered Question | Omitted |
| Experimental | 16 | 15 | 76 | 16 | 107 | 6 | 31 | 24 | 23 |
| Control | 56 | 1 | 2 | 0 | 3 | 2 | 14 | 8 | 0 |

The sentences that were considered for inclusion in the first column were all preceded by a Wh interrogative prompting from the examiner, for if no response was forthcoming from the child, the examiner prompted the child by giving him the first word of the desired sentence, which, of course, was the interrogative pronoun, e.g., (examiner: "You ask me a question . . . Where . . .") "is the dog?" (child's response) ("You ask me a question . . . Whose . . .") "dog is that?" The large number of omissions of the Wh interrogative pronouns may be due to this factor in testing. For some children this might have eased the production, since this was one morpheme they did not have to control creatively. Yet only 6 children in the experimental group (a total of 16 responses) utilized this aid, in contrast to 14 children in the control group (a total of 56 responses). If the 56 were added to the 218 correct responses in the control group, the number scored as correct would be 274, whereas if 16 were added to the score of the experimental group, the number scored as correct would be only 79.

With regard to the interrogative pronouns, both groups performed in another interesting manner. (The use of the various interrogative pronouns will be discussed before Columns 2-6, in Table XXII, are analyzed.) There were many children who, when presented with the stimulus pronoun, chose to use a different pronoun to initiate their response, e.g., the examiner said, "You ask me a question . . .

what . . ." The child's response was, "Why is she drinking?" "Why" was used in place of "what."

The question format for this test presented "why," "what," "where," and "who" twice for a set; the total number of times each pronoun was presented was sixty for each group. "When" and "whose" were each presented once in the production set for a total number of thirty times each for each group. Table XXIII indicates the number of times a child used the interrogative pronoun functionally in a sentence. In this instance the sentence was not always grammatically correct.

Do these findings in any way contradict those of Stern who reported that "what is" and "when" occur earlier than "why?" The use of "why" might be explained by Piaget's (1963, p. 216) theory of "precausality" where the child "conceives the world as more logical than it really is." Piaget stated that between three and seven years, "why" is a question used for every purpose. These earlier "whys" seek intention behind action or event. The types of questions correspond to the principal categories of the child's thought. These categories will therefore have an intentionalist origin, i.e., ". . . they will arise from conscious realization of psychological operations relative to intentions and not from a mere observation of the world given in perception" (p. 236). The child demands a reason for everything indiscriminately. As this "precausality" phase fades,

TABLE XXIII
 QUANTITATIVE ANALYSIS OF THE USE OF
 VARIOUS INTERROGATIVE PRONOUNS

| Group | Why | Who | What | Where | When | Whose | How Come | How | That's Why |
|--------------|-----|-----|------|-------|------|-------|-------------|-----|---------------|
| Experimental | 53 | 32 | 23 | 18 | 10 | 1 | 0 | 1 | 0 |
| Control | 85 | 30 | 36 | 27 | 20 | 10 | 8 | 0 | 3 |

the use of the indiscriminate "why" is less frequent. The "why" becomes specialized later, at about seven to eight years.

Twenty-seven children in the control group collectively used 85 "whys" in their responses to the 10 production interrogative tasks presented. Twenty-one children in the experimental group collectively used 53 "whys" in the productive interrogative tasks (see Table XXII). Table XXIV lists the number of "why" interrogative pronouns used in response to each question of the production aspect of the Question Test.

"What" question - questions 2 and 5. The target production response for Question 2 was, "What are they pulling?"; for Question 5 it was, "What is she eating?" Each required a nominal, non-animate object response. Two types of "what" questions are considered by various researchers in the field: one type of "what" question requires a nominal, non-animate object response, and the other requires a verb. The former "what" is acquired by the time the child reaches 2.5 years and the latter "what" is acquired later (Ervin-Trip, 1970).

While forming their "response question" with the "why" interrogative pronoun for Questions 2 and 5, the children complied with the examiner's request to ask a question and, in addition, answered the "what" question. Many of the children followed this procedure in answering the production

TABLE XXIV
NUMBER OF "WHY" PRONOUNS USED TO REPLACE THE
STIMULUS PRONOUN FOR EACH QUESTION

| Group | Number of "Why" Pronouns Used for Each Question | | | | | | | | | | | Total Number of "Why" Pronouns Used |
|--------------|--|----|---|---|---|----|----|---|---|---|----|--|
| | # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| Experimental | | 14 | 7 | 3 | 2 | 6 | 14 | 1 | 1 | 3 | 2 | 53 |
| Control | | 20 | 8 | 7 | 3 | 10 | 20 | 1 | 4 | 6 | 6 | 85 |

part of the Question Test. The term "response question" is used here as the question used by the children to answer this part of the Question Test. The answer to Question 2 might be "that," "a toy," "a train," "a box," "a wagon," etc. Children in each group utilized the object response but included a "question of intention" as their response. One of the children in the control group used a question of causation, which is a later stage in the development of questions (Piaget, 1963). This sentence was produced by a girl, C. A. 5.3, who used "why" for nine of the ten responses to the interrogative production test. (See Question 2, item 4, control group.)

The following sentences are a list of response questions produced by the experimental and control groups. Each sentence asks a question (as was requested of the child), but includes the answer to the question within their response question.

Desired "Response Question" to Question 2:
 "What are they pulling?"

Child's Actual Response:

QUESTION 2

| <u>Experimental Group</u> | <u>Control Group</u> |
|---|--|
| 1. Why he carry a trunk? | 1. Why are they pulling that? |
| 2. Why him pulling a wagon? | 2. Why are they pulling toys? |
| 3. Why him pulling boxes? | 3. Why are they pulling a box? |
| 4. Why are they . . . playing with a toy? | 4. Why is the train made of all boxes? |

The responses given by the child are actually longer than they would have been if the Wh interrogative pronoun of the verbal stimulus had been imitated.

When answering Question 5, a number of children (control group--2, experimental group--3) produced the pattern of answering a "what" question while producing a "why" response question.

Desired "Response Question" for Question 5:
"What is she eating?"

Child's Actual Response:

QUESTION 5

| <u>Experimental Group</u> | <u>Control Group</u> |
|-----------------------------|----------------------------------|
| 1. Why she drink the milk? | 1. Why is she going on a picnic? |
| 2. Why him eating sandwich? | 2. Why is she eating her food? |

Some children merely replaced the "what" with "why" and did not answer the question.

| | |
|--------------------------|-------------------------|
| 3. Why she eating? | 3. Why is she drinking? |
| 4. Why do he's drinking? | 4. Why is she eating? |

"Who" questions - questions 3 and 9. The "why" interrogative pronoun was substituted for the "who" interrogative pronoun for a total of six to thirteen times for the experimental group and the control group, respectively: three to seven times for Question 3, and three to six times for Question 9. Again, many children responded by answering the "who" question while producing a "why" question. The

children used the "why" questions to inquire about intention (past and present) or motivation. Only two subjects used the "why" to inquire about causation. (See Question 3, item 3, control group.)

Desired "Response Question" to Question 3:
"Who is flying the kite?"

Child's Actual Response:

QUESTION 3

Experimental Group

1. Why is he flying a kite?

Control Group

1. Why is he flying a kite?
2. Why is he holding a kite?
3. Why is he doing that?

Desired "Response Question" for Question 9:
"Who broke the box?" or "Who is breaking the box?"

Child's Actual Response:

QUESTION 9

Experimental Group

1. Who was . . . Why he's jump on that . . . what-ever you call it?
2. Why he broke it?
3. Why did the fence fall down?

Control Group

1. Why is the boy stepping in the box?
2. Why did he break that?
3. Why is this broken?

"Where" question - questions 4 and 8. The "where" interrogative pronoun was rather resistant to replacement. Replacement occurred three to seven times for the experimental group and the control group, respectively; two to three times for Question 4, and one to four times for Question 8.

Here again some of the children included the answer to the unasked question while producing the "why" question.

Desired "Response Question" to Question 4:
"Where are the cats?"

Child's Actual Response:

QUESTION 4

| <u>Experimental Group</u> | <u>Control Group</u> |
|----------------------------------|----------------------------------|
| 1. Why the cats hiding up there? | 1. Why are they standing there? |
| 2. Why are they hiding? | 2. Why is the cat over the hill? |

Desired "Response Question" for Question 8:
"Where are they going?"

Child's Actual Response:

QUESTION 8

| <u>Experimental Group</u> | <u>Control Group</u> |
|---|---|
| 1. What . . . why are they standing in one place? | 1. Why are they not going into the house? |

"Whose" question - question 10. The "why" interrogative pronoun was substituted for the "whose" interrogative pronoun two to six times for the experimental group and the control group, respectively. The pattern of answering the question, asked by the interrogative pronoun of the stimulus question, was broken. This pattern had been used in previous questions where the interrogative pronouns "what, where, and who" were present. Though Question 10 did not create difficulty in the comprehension task, the children

did not include the necessary semantic and syntactic markings that designate the possessive pronoun when answering the question. For example, the answer might have been, "Why is he the man's dog?" This is a difficult syntactical construction for a child. All the answers to Question 10 produced by the children referred to some action or manner of the dog. Some examples of sentences where the "why interrogative pronoun was substituted for the "whose" interrogative pronoun follow.

Desired "Response Question" for Question 10:
"Whose dog is this?"

Child's Actual Response:

QUESTION 10

| <u>Experimental Group</u> | <u>Control Group</u> |
|------------------------------|--|
| 1. Why him looking that way? | 1. Why he can't find the house? |
| 2. Why is he looking at us? | 2. Why is the dog sticking his tongue out? |
| | 3. Why is he standing? |
| | 4. Why is he barking? |

"When" question - question 7. Question 7 was the most resistant to the "why" intrusion: one to one for both the experimental group and the control group. The "why" question questioned intention, and ignored the concept of time inherent in the use of "when." Two examples are listed below.

Desired "Response Question" for Question 7:
 "When will she jump?"

Child's Actual Response:

QUESTION 7

| <u>Experimental Group</u> | <u>Control Group</u> |
|-----------------------------|-----------------------------|
| 1. Why is her jumping rope? | 1. Why are they doing that? |

The largest number of errors for comprehension of a question were recorded for Question 7: twelve to five for the experimental group and the control group, respectively. Many of the children may not have had experience in playing games and may not have understood the rules of a game. This might account for some of the errors in the comprehension of Question 7, but the deviation from the patterns of the other "whys" presented leads one to wonder whether this might be due to a cognitive immaturity in the concept of time.

The use of "How Come." The "How Come" interrogative pronoun was never used by the experimental group but was used eight times by the control group (see Table XXIII, p. 150). "How come" is considered an advanced interrogative pronoun and is given a score of 4 points in Lee's Developmental Sentence Scoring Test (1971). The children who used "How Come" were all over 4.7 years of age, had an M. A. (as scored by the Peabody Picture Vocabulary Test) of 5.7 years, or over, and scored 24 on the production aspect of

this Syntax Test. Only two children in the experimental group scored higher than 24 on this test.

Discussion of questions. There were similarities and differences, both qualitative and quantitative, between the two groups. However, the difference in quality has greater intangibility. It may be perceived in the scores obtained by noting the number of times the children in the experimental group resorted to Omissions (O), or Declarative Sentences (D.S.), or Answered Questions (A.Q.) for the Question Test-Production Part: seventy-eight times for the experimental group as compared to twenty-two times for the control group (see Table XXII; Columns 2, 4, 5, 6; p. 147). No child in the control group omitted an answer. If it is reasoned that the child from the experimental group was fearful, was plagued with a history of failure and did not attempt a difficult feat, it might possibly account for the 11 children who omitted responses; but, of the 11 children who omitted the answer ('response question'), 7 also answered questions instead of asking them, 6 children used declarative sentences in place of questions, and 5 did both. Only 3 children made errors that were of the "omitted response" type solely. None of the 19 children who used one or a combination of errors (Omission, Declarative Sentences, or Answered Question), scored above 4 on the production of questions.

On the other hand, some of the children with extreme

production errors for the Question Test revealed minor errors in comprehension, i.e., two of the children in the experimental group achieved a maximum comprehension score and a zero production score; two of the children of the control group achieved a maximum comprehension score and scored just one point for the production of a question.

When the youngest and the oldest child in each group were compared (Experiments IV and V), the Group Factor was significant only for the experimental group. (It is believed that the test was too easy for the control group.) There was a difference of 27 points between the scores of the youngest and oldest children in the experimental group for the production answers of the Question Test. There was a reduction in the number of D. S., A. Q., and O that were used for the Wh question answer: 14-3 for D. S., 13-2 for A. Q., and 11-6 for the O, for the youngest and oldest children in the experimental groups, respectively. A control group with younger children must be tested so that the full extent of the comprehension and production of younger children can be recorded.

Conclusions

1. For Experiments I, II, III, in which the entire experimental group and the control group were involved, there was always a significant difference between the two groups. The children with deviant articulation always performed in

a less adequate manner than did the control group.

2. There was a significant difference between comprehension and production for each group in Experiments I through VIII, comprehension always surpassing production. There was a great difference between the comprehension and production scores of the experimental group, as evidenced by the high significant difference of the Language Performance aspect of the Syntax Test (see Table VII, p. 98). The comprehension score of the experimental group was slightly lower than that of the control group.

3. The comprehension of the Wh interrogative pronoun question was easier than comprehension of the negative statement, but the reverse was true for production.

4. Comparison of comprehension, imitation and production of the negative

a. The results of the Levels of Negative Experiment (Experiment II) for the experimental group were significantly different from the results for the control group. For the experimental group, comprehension exceeded imitation which, in turn, was slightly in advance of spontaneous production. This differed from the findings reported by other authors (Fraser, Bellugi & Brown, 1963), whose subjects were children with normal speech and accorded with the results of a later study whose subjects were language delayed children (Lovell & Siddall, 1968).

b. The lack of significant differences in the tests of children in the control group for imitation, comprehension

and spontaneous production of the negative (Experiment II) and for the ten youngest and ten oldest in the control group (Experiment V) may have been due directly to the content of the test. The facility with which all the children in the control group handled the different levels of the negative test suggest that the test was too easy for them. It is not possible at this time to posit the order of language acquisition for each level of language for the child with normal articulation.

5. The scores of the oldest children in the experimental group were significantly higher than the scores of the youngest children in the experimental group (Experiment IV), indicating an improvement in the performance (comprehension and production) of language (see Table VIII, p. 99).

It was not possible to determine whether there were significant changes in the control group, because the scores of the youngest members in this group were too high (Experiment V, see Table X, p. 103).

6. The scores of the girls in the experimental group (Experiment VII) significantly exceeded those of the boys in this group. This supports the finding of McCarthy (1954, p. 551) and Poole (1934) that the scores of the girls are slightly better than the scores of the boys in all language areas studied. The degree of difficulty for each set, or pattern of performance, was maintained.

No significant difference was found between the girls and the boys in the control group (Experiment VIII).

7. The production of the experimental group seemed to be hampered by the observable and easily quantifiable, selective language non-expansion phenomena. (See p. 170.)

If difficulty exists with phonology, corresponding difficulty will exist with syntax. Pervasiveness of specific problems can be found in all language modalities. The absence of auxiliaries and copulas was the most prominent phenomenon to be noted. Other identifiable, but less obvious patterns beyond the pure syntactic level, were:

(1) the use of declarative sentences, answered questions or total omissions to replace the desired interrogative response, and (2) the number of children who were excluded from the study because of a poor vocabulary score.

Implications for Theory Building and Future Research

Relationship

Weir (1966, p. 158) hypothesized that the learning of phonology and the learning of syntax were related to a greater extent than had been assumed. The results of the investigator's study seem to support this hypothesis. The children with a delayed pattern for the development of phonology presented a delayed and perhaps selective pattern of development for syntax. That this also may be true for semantics was discovered inadvertently when so many of the potential subjects for the experimental group had to be

eliminated because their scores on the Peabody Picture Vocabulary Test were not high enough. This accidental finding adds credibility to the suggestion of Liberman et al. (1964) that the articulation of sounds is invaluable in speech perception, implying that a defect in articulation causes a defect in perception. The phonetic component indeed seems to be related to the semantic component and they both seem to be related to syntax as suggested by Blumenthal (1966).

Differentiation of Categories

Differentiation of categories seems to exist in the development of phonology, where gross patterns are divided and refined (Jakobson, 1968), and in the development of syntax, where similar processes are active. However, this statement cannot be made for the area of semantics until further research has been completed.

The presence or absence of differentiation of syntax was discernible in the analysis of the Present Progressive-Copula Test, where it was observed: (1) in the presence or absence of the auxiliary in the presence of a main verb, and in the presence or absence of the copula verb; (2) in the presence or absence of the nominative NP category, and (3) in the use of marked or unmarked pronouns.

In the Test of Negatives and Questions, differentiation was noted in the number and variety of modals and auxiliaries used; in addition, lack of differentiation was noted

in the Test of Questions, based on the number of Omitted Responses, Declarative Sentences and Answered Questions used, in addition to the "omission" of modals, auxiliaries and copula verbs.

Lenneberg (1967, p. 283) stated, "It is reasonable to assume that the formal processes that regulate the perception and production of sounds are essentially the same as those that enter into syntax." The children in the experimental group in this study were limited in their differentiation of phonemes, and the results of this study indicated that they also were limited in their differentiation of syntactic categories. Further study is needed in order to specify the kind or type of articulation defect that is correlated with a syntactic defect. The investigator's study considered quantity only.

Another area that might be interesting to explore is the "co-occurrence" of specific distinctive features and specific syntactic structures. "Co-occurrence" was observed in this study in the use of specific modals and in obtaining a specific syntactic score. This term is similar in concept to the Developmental Milestones in Motor and Language Development established by Lenneberg (1967, p. 128).

Cognition

Recent articles place increasing emphasis on cognitive or conceptual function. Bloom (1970, p. 228) contended that there is an ". . . assumption of prior cognitive development

underlying the emergence of different syntactic structures." Slobin (1966a) suggested that the development of linguistic universals is based on cognitive processes. Bever (1970) elaborated this thought, suggesting that the concept of a noun, for example, may be a cognitive universal rather than a linguistic universal.

According to McNeill (1970), linguistic development cannot be more advanced than cognitive development. The results of the investigator's study supported this assumption. The comprehension scores for each test and for each individual in this study were always higher (better) than the production scores.

This was most certainly true for the children with deviant articulation (experimental group). Moreover, it should be noted that their comprehension on the Syntax Test was not equal to that of the children in the control group. Nineteen children in the control group received a maximum score for comprehension of the Negative Test and 23 children in the control group received a maximum score for comprehension of the Question Test. Only seven children in the experimental group received a maximum score for the comprehension of the Negative Test and twelve children in the experimental group received a maximum score for the comprehension of the Question Test. The comprehension of the children in the experimental group was better (307 points higher, see Table II, p. 89) than the production

level as evidenced by the high significant difference for Language Performance (comprehension and production) where only the experimental group was considered (see Table VII, p. 98, $p < .001$, $F = 154.80$, and Table XIII, p. 110, $p < .001$, $F = 167.22$). As noted previously, based on the results of this test, it was impossible to determine whether such a great difference occurs for the normal child.

How can this discrepancy between comprehension and production be accounted for? Fodor and Garrett (1966, p. 151) suggested that "recognition of a sentence does not involve the same operations employed in its grammatical production." This is similar to comprehension and production grammar (Menyuk, 1970) or passive and active grammar (Ervin, 1963). Because of the disparity between the comprehension and production scores of the experimental group, the data of the investigator's study seemed to support these statements; and yet exactly what is comprehended must be taken into account. Chomsky (1967b, p. 88) maintained that a "filtering device" may be used that operates on the deep structures and "throws out everything except the main items." A detailed investigation is necessary to determine whether the children in each group utilize the entire syntactic structure as an aid in comprehension or whether the content words alone are sufficient for apparent comprehension of an item. A child may perceive only the major stressed lexical items and the syntactic structures that he uses, e.g.,

"Show me the picture . . . 'They are not running'," could be understood if only the negative morpheme and the VP were attended to, e.g., ". . . not running." The child may or may not perceive the entire syntactic structure. If comprehension of the major lexical items and undifferentiated structures is inadequate, the child may be operating with a reduced number of cues for comprehension. For production, for example, the experimental group may have produced almost exactly what they had perceived. This also was suggested by Klima and Bellugi (1966). They hypothesized that the grammar of the child can probably be determined more accurately by noting his ability to comprehend rather than his ability to produce; they suggested that when he appears to comprehend syntactic characteristics not within his capacity to utter, it may be due not to a "rich grammar coupled with a poorer production device, but rather to a limited grammar coupled with a liberal perceptual device that sifts out or by passes unfamiliar material" (p. 183).

Two factors supported this contention: (1) the great number of children who were not included in the study because they did not score 90 or over on the PPVT, and (2) the increase in the score of the oldest children in the experimental group for both comprehension and production (Experiment IV). It is suggested that the higher scores might be due to a cognitive factor combined with an increase in the children's ability to manipulate morphemes.

The children now recognized that a question was required of them and were able to comply by producing one. They reduced the number of Declarative Sentences, Answered Questions and Omissions and added a number of copulas, auxiliary verbs and modals, thus increasing the score. Exactly what is comprehended by these children (and normal children) is an important area for study.

It is also possible that the children perceived the stimulus completely and accurately. The child may comprehend the entire sentence, e.g., "The boy will not blow a horn," but may not be in control of the added items that facilitate production. Thus, the child is aware of items that he does not now use, but will use soon. This might account for the comprehension score being higher than the production score and the imitation score being higher than the production score.

A study of interrogative and negative structures might be devised where one set of questions contains only content words in telegraphic style, and the other set of questions includes well-constructed grammatical sentences. Any differences found in the responses of the children will help to determine whether the omission of non-essential words facilitates or inhibits comprehension of the structure?

Deviation

Pervasiveness. Schuell, Jenkins, & Jimenez-Pabon (1967,

p. 104) hypothesized that when a loss or a disruption of language occurs in aphasia, the difficulty will not be limited to only one area, e.g., comprehension, but will be pervasive over all aspects of language and will be orderly and predictable. This was apparent in the investigator's study, for lags occurred in each area studied, i.e., comprehension, imitation and production.

Systematization. The deviations that were present in the experimental group seemed to be systematic: no child presented a problem in sequencing, and no child included an auxiliary or modal while omitting the "ing" inflection that marks tense for the present progressive. This systematization of syntax, in the presence of deviation, is similar to the "consistency of deviation" (Grammont, 1902, p. 20) where the "effects of chance" do not play a part in articulatory deviation.

Quantitative and/or Qualitative Differences

The question as to whether the deviance found in children with delayed language is solely quantitative or quantitative and qualitative has been subject to considerable discussion (Menyuk, 1964; Lee, 1966). A specific difference has been noted in the performance of the children in the experimental group. Their performance has been quantified and statistically analyzed (Table I, p. 86). The question of a difference in quality must be decided by

similar methods. The statistically significant difference in the performance of the oldest and youngest children in the experimental group suggests that the development of language is continuous, even though it is slow. In many instances, the development follows the patterns set by normal children. Similar patterns were noted for both groups in a number of instances: (1) comprehension was better than production; (2) comprehension of the negative was more difficult than comprehension of the Wh Question; (3) production of the Wh Question was harder than the production of the negative; (4) there were similar trends for answering the Test of Questions (see Table VI, p. 96; Table XX, p. 143; and Table XXII, p. 147) and again (5) there were many similar trends for imitation and production (see Table XVII, p. 132).

The question as to whether certain patterns do not follow the normal pattern of development but are "selectively delayed or selectively utilized" should be investigated. The occurrence of "selective delay or selective utilization" of structures was suggested by the greater production level of "can't" and "won't" by the experimental group as compared to the control group, and by the limited use of "is" and "do" by the experimental group. The experimental group used the "is" form a greater number of times in imitation and fewer times in spontaneous production than did the control group. It also was suggested by a larger MLU

than expected for the experimental group when compared with the limited expansion of its VP.

Inconclusive differences were found for: (1) the Language Performance Factor, where comprehension greatly exceeded production for the experimental group, and (2) the hierarchial patterns of comprehension, imitation and production. These two factors could not be measured for the control group.

To ascertain whether these factors and others occur in the acquisition of language by normal children, research should be initiated with younger children as subjects of the control group so that early patterns of development can be identified and quantified.

Ideally, the same experimental group should be tested every six months to observe which items are developed, which ones continue to be selectively delayed, and which items are then used as substitutions for the omitted forms. The ideal study would be an evaluation of a group of children, continuing over a number of years. The spontaneous utterances of the children would be recorded and analyzed, and a carefully controlled program would be devised for the presentation of stimuli, and the recording, scoring and analyzing of the elicited responses.

Causation

There is a significant difference between the Language Performance of the children with deviant articulation and

those with normal speech. The question occurs as to the causation of this phenomenon. Since complete articulation is not acquired before the initial utilization of syntax (or semantics), and since a delay was found in all language modalities tested, it is suggested that a common causation is present which affects all areas of language. Studies should be made concerning the development of concepts, the exact type and degree of articulation deviation that would signal syntactic deviation, auditory discrimination, short-term memory span, perhaps even degree of tactile sensitivity of the child, always comparing the deviant to the normal.

Prediction

On the basis of the patterns of language development observed in this study of children with deviant articulation some problem areas have been outlined, facilitating anticipation of the kind and degree of rehabilitative aid children with defects in articulation require.

Clinically, developing a definite hierarchy for syntactic development from the study of the norm is a valuable tool to the speech therapist. Developing ways to predict deficiencies in deviant children early enough to establish "preventive" speech therapy is definite progress. It must still be determined whether it is of greater advantage to teach each feature--phonological and syntactic or to emphasize the development of perception and cognition. If possible, those children who have received therapy should be

compared statistically with those who have not, and the progress of children receiving therapy should be analyzed and quantified to determine whether they should be taught at all. In the experimental group, gross categories were developed, and these categories are very slow to be refined. The question is how slowly? Will these children reach maximum development if they are not aided by speech therapy, and will they reach maximum development at all. What type of articulation difference signals the predictable occurrence of syntactic deviation. Or, is it the number of deviances that is important rather than type? There are still many questions to be answered and many areas to be explored.

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