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PARENTS AS TESTERS: MEASURING TODDLERS'  
LANGUAGE COMPREHENSION THROUGH  
PARENT/CHILD INTERACTION

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## ABSTRACT

### PARENTS AS TESTERS: MEASURING TODDLERS' LANGUAGE COMPREHENSION THROUGH PARENT/CHILD INTERACTION

By

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This study examined the effects of three independent variables (parent sex, child sex, and two conditions of parental speech stimuli structure) on a measure of language comprehension of toddlers.

The literature reviewed indicates that the first two years of life are crucial for the development of both aspects of language performance: production and comprehension. Although maturational factors play a major role in this development, variables in the environmental interaction patterns of parent and child influence the quality and quantity of this performance. The production aspects of language acquisition have been a focus of research for a number of years. Attention has turned to the "conservative strategy of language acquisition"--comprehension--only recently. This is partly due to the problems of methodology which relate to measurement of the young child's language comprehension.

The methodology used in this study was based on the rationale that parents of young children can provide speech stimulus statements which enable their children to demonstrate understanding of language. Parents acted as testers under two conditions: in one condition they delivered a preset group of stimulus statements (structured condition) and in the other they selected any stimulus statements to which they thought their child would respond with understanding (unstructured condition).

Child responses to parental speech stimuli were obtained for twenty-four subjects, twelve boys and twelve girls, in the age range of 15 to 25 months. Data was collected on videotape, prepared for coding, and scored according to a language comprehension scale developed in an earlier pilot study. Responses were scored on motor, verbal, and socio-emotional dimensions. The combined motor and verbal scores provided the language comprehension score while the socio-emotional score served as a measure of toddler responsibility level.

Results indicated children scored significantly higher when parents were allowed to select the speech stimulus statements (unstructured condition) than when parents presented a preset group of stimulus statements (structured condition). There were no significant differences between fathers' or mothers' ability to demonstrate their child's

comprehension, no significant differences in boys' and girls' scores, and no significant interactions.

Additional variables of interest were also described and related to the language comprehension score. The socio-emotional score provided a check on the language comprehension score since a high socio-emotional score was a necessary but not sufficient condition for a high language comprehension score. Parental rating of their child's language production was related to the language comprehension scores and parents used longer sentences in the unstructured condition.

The results of the study were discussed in relation to the potential importance of language comprehension for cognitive development and reading, the role of the quality of parental verbal interaction, the importance of teacher observation and stimulation of language comprehension, and the use of the methodology to identify hearing impaired children.

Recommendations for further research were included.

PARENTS AS TESTERS: MEASURING TODDLERS'  
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PARENT/CHILD INTERACTION

By

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## CHAPTER I

### INTRODUCTION

Although it is a truism that the young child's understanding of language begins before he is able to produce speech in quantity or complexity, the development of language comprehension during the first two years of life has not been a major focus of research interest. In addition, the effect of the speech stimuli provided by significant adults in the child's environment on his language comprehension has had little systematic exploration. Friedlander states that the outline of developmental stages of receptive language functioning in young children "is 'terra incognita' in the same sense that early mapmakers assigned the designation 'unknown land' to territories on the globe that had been so inadequately explored it was not possible to offer even a minimally faithful representation. . ." (1970, p. 34-38).

There are a number of reasons why early language comprehension and the effects of the specific language environment have not been studied extensively. One reason is that the influence of present linguistic theory has served to underplay these interests. Linguistic methodology has utilized the young child as an informant from whose

language production underlying language competence could be inferred. Although language performance includes both production and comprehension, the linguists' interest in the "deep structures" of competence has resulted in a methodological approach utilizing analysis of a corpus of speech. Thus, studies of children who have little language production (even though they may have extensive language comprehension) have not been seen as a fruitful area of research.

Also linguistic theory stresses that language competence develops as a result of innate language structuring abilities which emerge as a function of neurophysiological maturation (Chomsky, 1955; Lenneberg, 1967). Since it posits the view that all normal infants develop language competence and universals of grammar almost independently of specific cultural or family influences, the specific language environment of the child has not been seen as an important area of research. Other theorists, however, have spoken to the need for study of these environmental aspects (Friedlander, 1970).

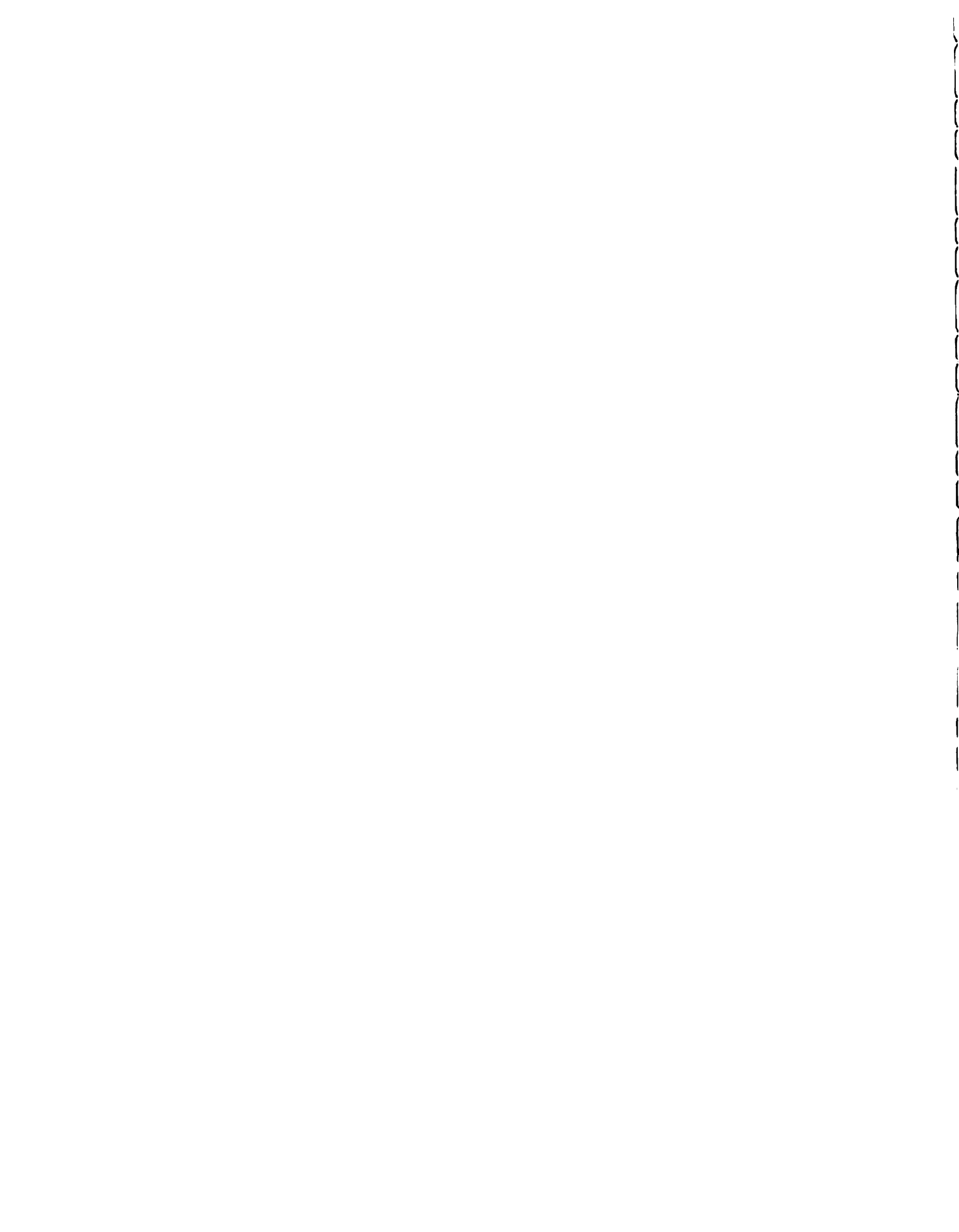
Another reason for the lack of study of language comprehension is that there are many methodological difficulties in measuring language comprehension in the young child. Although developmental infant tests such as the Gesell, Bayley, and Denver have a few items which purport to measure language comprehension, these tests primarily focus on perceptual and motor responses and do not correlate

highly with later language-based intelligence tests. Measures of receptive language such as the Bzoch-League REEL Scale rely primarily on parental report rather than direct observation of child behavior.

Also in the very young child affectivity and cognition are so closely tied that attempts to measure cognitive ability are often hindered by problems related to affectivity. Zigler, et al. (1973) have demonstrated that familiarity with the tester often increases a child's score dramatically.

Another major difficulty in measuring the young child's language behavior lies in the fact that early language learning is closely tied to both the cultural and the idiosyncratic environment provided by particular parents. For example, Roger Brown's study (1965) of the names of objects a child learns indicates that these primarily relate to the meaningful words which the child hears in his home rather than to a certain set of common names which all children learn first.

Recently the development of children's language comprehension has begun to receive increasing attention (Shipley et al. 1969; Nelson, 1973; Garber and Heber, 1973; White and Watts, 1973). These contemporary studies have used sets of standard speech stimuli to explore the child's language comprehension. Although the familiarity of the tester





varied (some studies have utilized the parent as tester), the speech stimulus statements were usually preselected.

If one attempts to systematically explore questions concerning the development of language comprehension in the infant and toddler, however, a set of standard speech stimuli for which responses are expected may not be a sufficient measuring instrument. Young children have had a limited range of contacts with speech stimuli, and because of cultural or idiosyncratic factors related to their language environment, may not have included certain standard words or phrases in their comprehension repertoire.

Thus testing which utilizes speech stimuli from the child's specific language environment and which is conducted by a familiar adult may give a better measure of the child's language comprehension.

Parents have knowledge of their child's environment and the language to which he has been exposed. In addition, they have an affectively meaningful relationship with the child and have developed a pattern of interaction which utilizes the child's responses. Use of the parent as tester should provide a measure of the child's language comprehension which utilizes knowledge of his environment.

If, indeed, language competence and performance develop through language universals that are operative in any culture, the actual words, phrases or sentences used by

the tester are not crucial. What is important is that the tester be able to demonstrate the child's comprehension through selecting speech stimuli to which the child can respond appropriately.

#### Statement of the Problem

This study was designed to make use of parental knowledge in a direct observational setting. It enabled parents to demonstrate their child's language comprehension level. This unstructured situation was paired with a structured set of stimuli to which the parent also attempted to have the child respond.

The purpose of the study was to measure the effects of parental sex, child sex, and two conditions of parental speech stimuli structure on the language comprehension scores of 24 toddlers in the age range of 15 months to 25 months. The independent variables to be investigated were selected from a larger set of variables which were explored during a pilot study with six toddlers. During that study methodology was developed for obtaining a language comprehension score (Sponseller, 1973). This score was then compared across three types of speech stimuli, two degrees of adult familiarity (parent and teacher), and the two adult sexes. Although statistical analysis was not appropriate due to a small number of subjects, descriptive analysis of the data indicated that the parent/teacher variable and two

of the speech stimuli conditions (structured and semi-structured) produced little difference in the children's language comprehension scores. There was evidence of differing effects of child sex, a possible interaction between child sex and parent sex and a possible difference in effect of two of the speech stimuli conditions: the structured and the unstructured.

Whether these differences were due to sampling error because of the small number of subjects or whether they were true differences was not clear. Therefore, the purpose of the present study was to determine the effects of the independent variables of parental sex, child sex, and two degrees of structure on the language comprehension score.

In addition to the substantive questions related to the independent variables, the reliability and validity of the language comprehension measure was explored. Of special interest was the construct validity of the language comprehension score. If parents and other familiar adults have knowledge of the child's understanding before he can produce much language, they should be able to demonstrate this understanding for an observer in a manner which can be objectively scored and compared across subjects.

#### Significance of the Problem

There is a need for a method of measuring the young child's language comprehension directly during these

earliest linguistic periods of development. As Shipley, et al. state, ". . . we are convinced that there must be techniques for systematic observation. Otherwise, little that is substantive can be added to or subtracted from the linguist's philosophical assertion that linguistic competence is innate" (1959, p. 338).

Direct measurement of the young child's language comprehension might also contribute to the ethological knowledge of the early years. This study was designed as an adaptation of the research model in which natural observation and experimental observation of the same class of behaviors are compared (Ainsworth, 1969; Bowlby, 1969; White, 1970). It combined observation of a semi-naturalistic speech stimulus condition (parents selected "natural" speech stimuli) with an experimentally specified set of speech stimuli (parents delivered "unnatural" speech stimuli) and compared the behavioral responses which occurred in each condition. Further studies using this method may contribute to the systematic collection of knowledge concerning language and cognitive development in the young child.

Another reason why a study of language comprehension in toddlers is useful is that if knowledge of comprehension in normal children can be obtained, the design of methods for enhancing the development of language in children with hearing and/or speech impairment may be aided. Friedlander

states that children who have language disabilities are often not identified early because of the "insidious onset" of speech and hearing disorders, and that a major reason for the lack of early identification is "poorly defined developmental norms" (1971, p. 249-50). Since normal children vary widely in quantity and complexity of language production during the second year of life, the key to determining whether a child has normal capacity for language may be in his language comprehension during that period. Thus, a measure of language comprehension may be needed to chart the "unknown land" between the child's earliest understanding of language and his later language production. Therefore, the need for study of toddler language comprehension and the effects of adult verbal stimuli on the demonstration of the comprehension can be summarized as follows:

1. The study may define a method by which the development of language comprehension can be measured before linguistic production is sufficient to produce a corpus of speech.
2. The study may provide evidence of parental ability to demonstrate children's language comprehension by making use of the receptive language environment provided by the parents. The language comprehension (and possibly the cognitive maturity level) of children of

varying cultural backgrounds and differing age levels could then be measured by this method so that the ethology of infancy could be further explored.

3. The study may provide a method for measuring the language comprehension of children who may have speech or hearing defects thus leading to earlier identification of the problem.

### Hypotheses

The study was designed to test these substantive hypotheses:

- Hypothesis 1: There will be no significant difference in the scores as a function of child sex.
- Hypothesis 2: There will be no significant difference in the scores as a function of parent sex.
- Hypothesis 3: There will be no significant difference in the scores as a function of speech stimulus structure condition.
- Hypothesis 4: There will be no significant interaction effect of parent sex and child sex.
- Hypothesis 5: There will be no significant interaction effect of parent sex and speech stimulus structure condition.
- Hypothesis 6: There will be no significant interaction effect of child sex and speech stimulus structure condition.

### Assumptions and Limitations

These assumptions were recognized in the conduct of this study:

1. The methodology designed in the pilot study could provide a measure of language comprehension.
2. Parents are consciously aware of the language which their child comprehends.

These limitations were noted as restricting generalizations from the findings of this study to the total population:

1. The language comprehension measure is lacking in extensive reliability and validity data. It has not been used with a large number of subjects. Since the presently proposed study has a relatively small number of subjects the external validity and generalizability of the study is limited.
2. The population which comprises the present study is primarily white middle class. The results relate only to that population.
3. Although the procedure by which parents or other familiar adults demonstrate the child's understanding may have promise for children younger than those in the age range of the study, results relate only to that age range.

### Organization of the Study

The remainder of the study is presented in four chapters. Chapter II gives a review of selected related literature. Chapter III details the research design and method of the study. Chapter IV presents an analysis of the data. Discussion and recommendations for future investigations are included in Chapter V.



## CHAPTER II

### REVIEW OF RELATED LITERATURE

The review of literature related to this study on language comprehension is organized into four categories: (1) past and present questions in infant-toddler language research, (2) present knowledge of infant-toddler language acquisition, (3) related areas of research on the receptive language environment, (4) affective dimensions which influence testing the young child.

#### Past and Present Questions in Infant-Toddler Language Research

Beginning in the late 19th century, the study of infant language began to receive attention. Werner Leopold (1971) places the beginnings of exact study of infant language in the mid 19th century due to the influence of Herbart. The major sources of information concerning both language production and comprehension during infancy were longitudinal descriptive studies of individual children's language development. Although many of these idiosyncratic biographies provided descriptive evidence of the emergence of understanding of language in the course of the infant's

development, they have been very difficult to compare since the methods and specific interest of the observers varied greatly. Also, most of them stressed aspects of language production more than language comprehension. Leopold indicates that consecutive systematic studies of individual infant's pre-linguistic and linguistic behavior were made by a number of scientists--a major work of this type was done by Preyer (1882) who wrote a volume on his investigation concerning language development in the first three years of life. Others were Wundt (1900), Stern and Stern (1907), Schleicher (1869) and Gheorgov (1905). During the early 20th century, interest in infant language was evidenced by Lewis (1936), McCarthy (1930), Jespersen (1922) and Gregoire (1937).

Jakobsen (1939) applied a new methodology to child language in the field of phonemics. The method disregarded accidental individual differences in the sequences of sound learning and instead investigated phonemic contrasts. This helped to draw together the divergent records which observers had reported and gave a tool for progress in analysis of phonemics. Werner Leopold's work (1939-1949) investigated bilingualism and linguistic development during the first two years of his daughters' lives using Jakobsen's methodology. His comprehensive work discussed phonemics, morphology and syntax. Lewis' Infant Speech (1936) gave a psychological

explanation of speech development and its relation to total development. Since the twenties, group tests of language have been used extensively with older children (McCarthy, 1930) but this type of testing has not been applicable to infant language analysis.

Psychologists of the behaviorist school have investigated verbal learning in relation to their theoretical view. Little of this research has been directed toward toddler language, with the notable exception of the work of certain Soviet psychologists (1971) who investigated higher order conditioning and the development of the "second signal system." Skinner (1957) postulated a theory of verbal behavior based on S/R theory but Chomsky's (1967) critique of this theory gained wide acceptance.

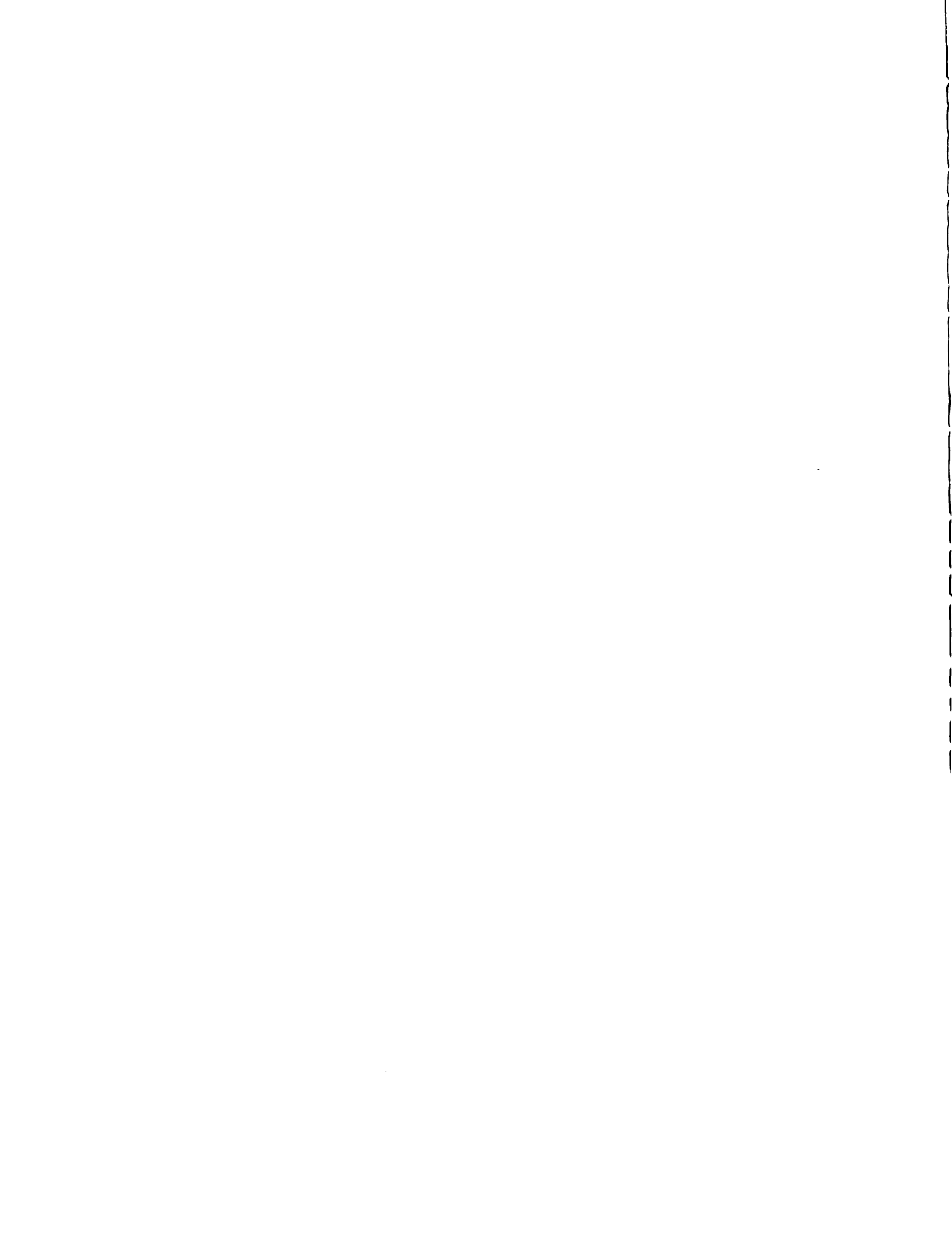
In the 50's new lines of communication began to open between psychologists and linguists and with the rejection of the simple associationist model of language acquisition, research into children's language has developed in new directions. The earlier questions asked by researchers concerning what the specific sequences of development are and how children compared on norms of codified grammar were replaced by the questions of how the child's language and cognitive development are related and "given the way the child speaks, what is his implicit grammar" (Rebelsky, Starr, and Luria, 1967). In attempting to answer the latter

question, the child has been looked upon as an informant whose language the researcher can study in a similar manner to that of persons of other cultures. Menyuk, (1969) however, disagrees with this assumption. While this method has produced some basic breakthroughs in understanding language competence of preschoolers, the method does not readily lend itself to study of children under 18 months of age since their language production does not contain a sufficient corpus of sentences upon which to base a description of generative grammar. Newer physiological methods of assessing infant development may be valuable for use with infants younger than 18 months.

David McNeill states that the major theoretical challenge is that of the "phenomenon of linguistic abstraction" (1970b) since children make use of deep structures very early. This is apparent in the fact that from the first speech, children can communicate meaning. He comments "It is easy to overlook what an astonishing fact that is. But it means that the most abstract part of language, its propositional content, is the first to appear in development" (p. 1086-1087). His words go straight to the heart of the problem in the study of infant language acquisition: what is it about language development which makes possible the ability to communicate meaning "from the first moment of speech?"

The relationship between the prelinguistic and linguistic stages of development have been looked at differently by linguists and by psychologists of various theoretical backgrounds. Linguists tend to see little relationship between the two stages and see the role of early environment as a less crucial factor since almost all children develop language competency. Thus they have concentrated their research on the linguistic level. Social learning and cognitive psychologists, however, have seen the earlier level as being a building stage for the later linguistic stage and see environment factors as bearing a relationship to the infant's language development. Jenkins (1969), discussing the acquisition of language states, "It is obvious that having a psychology of language and having a theory of language development are both intimately related to what one thinks language is" (p. 66).

Linguists make a definite distinction between the definition of linguistic competence, which represents the knowledge a speaker must have to generate the infinite grammatical sentences of his language, and linguistic performance, which is the expression of ability in talking or in listening to speech. That is, performance encompasses both comprehension and production while competence is "an abstraction away from performance" (McNeill, 1966). Psychologists often divide language into two categories--



receptive and expressive--and although this definition seems similar to the linguists' performance definition, receptive language also includes behaviors of the prelinguistic stage. The psycholinguist and the sociolinguist have joined linguistic methodology with concerns related to intra-individual and inter-individual cognitive and social processes. Cazden (1972) differentiates the focus of these two disciplines. Psycholinguistics focuses on the cognitive processes by which sentences are produced and comprehended while sociolinguistics focuses on the distribution of the acts of speaking and listening in the social setting. She indicates that both the early language environment--social, emotional, and cognitive--and the maturational processes of the infant during the first years are important in the development of language competence.

In order to give a comprehensive view of the field, some emphases which vary somewhat from the linguistics's parameters of study will be presented here.

Lewis (1963) states that for a child the earliest utterances have a rudimentary meaning. The auditory and kinesthetic experience of vocalization is embedded in the experience of his bodily conditions in relation to his caretaker. Responses to meaning include early response to the intonational qualities of speech. In his earliest one word speech, he expresses two kinds of meaning: manipulative--

which causes someone to perform tasks for him; and declarative--which arouses an expression of feeling. As he becomes more adept at language it is used to enhance his perceptual and conceptual development, to provide the means for expression of emotion and self awareness, and as a referent to absent objects. It also is used to refer to past and future, and to ask questions about his present world. Thus, Lewis sees the role of language and psychological meaning in interaction from the earliest phases of infant language development.

Soviet psychologists have been concerned with meaning from a different perspective. Elkonin (1971) states that early understanding is based on the rhythmic melodic structure and that the adult's words act as conditional stimuli and provide unconditional reinforcement. Prephonemic speech is not based on phonemes but on intonation, while phonemic speech is a period of rapid increase in the passive vocabulary. He posits sensitive periods for language development and defends Pavlov's viewpoint of the word as "just as real a stimulus as any other." He states, "From the first moment of language mastery a word is perceived by the child first of all in terms of its material, acoustic aspects" (p. 140). Playing with words is a means of mastering the sound and material form and is similar to play with objects. The word is never a neutral stimulus but is rather imbued with meaning



which is derived from its objective qualities. Of course, he also rejects the idea of a special "instinct for language." Discrimination arises not prior to mastery of language but is due to generalization according to learning principles. Soviet psychologists are especially concerned with procedures which relate to the development of inner speech. Luria (1964) lists four roles that speech takes: (1) nominative, (2) semantic, (3) communicatory, (4) regulatory--and has done extensive investigation of the process by which the organizing regulatory role of the "second signal system" becomes internal speech.

Piaget's (1954) observations of his own children during infancy included reports of their language acquisition as it related to the development of representational thought process during the first two years of life. He sees language as one means of representation which, although not essential to thought, facilitates abstraction and gives evidence of the underlying cognitive processes. In an early work he characterized the language of young children as primarily egocentric (1955). Piaget ties language understanding to general cognitive development.

Scientists concerned with language and brain mechanisms (Penfield and Roberts, 1959) have indicated that early language learning is related to the maturation of the

central nervous system. They state, "Thus when the child begins to understand, he is establishing general concept-units in the brain and corresponding word-sound units" (p. 247). According to Penfield and Roberts, there are two mechanisms used in speech: an ideational mechanism and a motor articulation mechanism. Furthermore, ". . . the ideational part of speech . . . depends upon the employment of a certain portion of one hemisphere alone--normally the left hemisphere" (p. 249). The young child is able to utilize the right hemisphere of the brain to relearn language if the left hemisphere is injured but adults do not have this ability.

Kagan (1972) postulates a viewpoint related to maturation of the central nervous system. He discusses a stage of development around nine months in which the infant begins to make hypotheses. Measures of selective attention in which it is believed the infant is trying to build up representations of events, can be used to chart auditory discrimination of speech and may be useful in solving questions concerning how the infant develops understanding of speech before he is able to produce it.

Friedlander (1970) is concerned with the infant's processing of auditory information during the first year. He indicates that infant language listening (that is, receptive language) and the quality of the language environment have not received the attention they need primarily because

of linguists' concentration on speech and grammar. Listening is an indispensable prerequisite for speech and has primacy in infant communication and since understanding is possible without speech (Lenneberg, 1971) it seems possible that the infant possesses an early maturing processing system for acoustic and linguistic inputs and a late maturing processing system for linguistic outputs. According to Friedlander, there are differences between auditory and visual perception in a number of important respects. For one thing, the capacity for listening is paired with the capacity to generate sounds--capacity to generate stimuli in the same modality as reception is always a two-stage perception--discrimination and learning of symbolic significance are both essential for language. In contrast to visual perception, the infant cannot control the repetition of the stimuli--in listening information processing must be accommodated to the speaker and reconstruction of what has been said is a necessity for understanding. Friedlander indicates that trying to gain access to recurrent exposure to auditory stimuli may be a major aspect of infant listening behavior. Moreover, the language environment in which the infant must attempt to perceive the meaning of language is a factor which has not been studied extensively. Infants must learn selective response and the processes of attention to and appraisal of language feedback. He cites evidence

that parents learned the ability to regulate the speech input so the infant could decode it and that they accepted the infant's utterances as signals to go on interacting with the infant and considered him a "satisfactory conversational companion who did not need to speak at length in order to be regarded as a peer" (p. 268). Since neither linguists nor developmental psychologists have focused on the importance of the infant as listener and information processor, Friedlander urges an increased attention to this topic in an attempt to shed light on the processes of comprehension which may be so vital to the development of language competence.

From the linguistic viewpoint the early deep structure is explained as due to an innate human capacity to search for the abstract syntactic, phonological, and semantic rules which are later used to generate speech or to the biological capacities of the organism. Most linguists assume that the universals of language cannot be studied directly but must be studied retrospectively, from analysis of later language production. Other researchers see various possible ways to approach language development through methods which are related to general cognitive and emotional development, through specific measures of maturation of the cortical structures, through the conditioning paradigms and learning theory models or through study of the child's

receptive language. Depending on the basic assumptions underlying the view, theorists then determine what the "permissible puzzles" are for the paradigm to which they ascribe (Kuhn 1970). As Paula Menyuk states, "The important question is, how does one go about determining the validity of any of these assumptions?" (1969, p. 6).

#### Present Knowledge of Infant-Toddler Language Acquisition

Researchers into infant language have usually differentiated two periods: a prelinguistic stage which includes early vocalizations such as crying, cooing, babbling, and imitation (both lallation-self imitation, and echolalia-imitation of others); and a linguistic stage which is marked by the beginnings of meaningful symbolic utterance; that is, the emergence of the first word or sentence. This linguistic stage marks the beginning of syntax, phonology, semantics and the initial generation of a grammar. Although all theorists seem to agree that there are two such distinct periods, they do not necessarily agree as to the exact beginnings of the second stage. Some theorists posit an overlap period in which both linguistic and prelinguistic activity is present. Others see a certain crucial event as the demarcation line. Studies have been concerned primarily with production in both of these stages, and although comprehension has been discussed, it has not been charted systematically.

Evidence Related to  
Language Production

The period between 12-18 months is usually characterized by holophrastic (one word) speech--when the child expresses a complex idea with syntactic meaning. According to McNeill (1970a) this speech has three characteristics: (1) it is linked with action; (2) it is emotional, expressive; (3) although it seems to rest on naming it is often predicative in nature. That is, it is understandable as a sentence because it is often an intrinsic predicate (one in which the subject is understood) and thus can be interpreted by adults as a meaningful sentence. McNeill feels that this type of speech is the most primitive manifestation of a basic grammatical relation and is understandable since predication is an aspect of deep structure. Nelson (1973) states, however, that linguists' attempts to analyze holophrastic speech in terms of adult structures is inappropriate since the beginnings of a process may need to be explained by completely different forms. Imitation continues to develop, however, during this stage and many of the child's words are also "names." Brown (1965) indicates that the sequence in which words are acquired is somewhat dependent on adult naming practices. Adults give names to the child which anticipate the functional structure of the child's world but the child then uses these names in creative ways; whether

the name is used for a specific or general category depends on the child's structuring of the information.

Katz, Baker and MacNamara (1974) have also investigated the processes involved in learning common and proper nouns and indicate that children of 17-24 months first discriminate individuals and then learn their names while for common nouns they learn the class names and don't discriminate individual members.

Although imitation and holophrastic speech continue to occur frequently after 18 months, the child usually develops his first two word sentence about this time. The grammar of the two word sentence has been investigated in detail by Braine (1963), Brown, Cazden, Bellugi-Klima (1969) and Miller and Ervin (1964). These studies all followed a few children through the early stages of development and attempted to describe the linguistic competence of the children and to express the descriptions as generative grammars. The usual pattern by which grammar has been explained at this level is one of a pivot and an open class. Braine (1963) and others state that pivot words are a small class of frequently used words and they always appear in combination with words from the open class. There are usually large numbers of open class words. Brown's recent review of first language learning (1973) gives evidence which indicates that the pivot grammar concept is questionable

since pivots don't always have fixed positions and do sometimes occur together. He believes the pivot-open distinction to be a superficial one and that pivot grammar underestimates the child's knowledge. He indicates that the semantic roles and syntactic relations of Stage 1 (mean length of utterance above 1.0 to 2.0) are the major concern of the "rich interpretation" method of studying first language learning which he advocates. Bloom (1970) and Schlesinger (1971) also indicate the importance of semantic elements and use a "rich interpretation" in analyzing language structure.

McNeill (1970a) states that the early two word sentences also include the first extrinsic predicate (in which the subject is necessary for understanding). The first true sentences have been described as telegraphic, consisting primarily of content words rather than function words, and syntax develops before morphology in English speaking children. In his view the semantic component begins at about eighteen months. Brown's recent work indicates that the semantic component is the most important and that the grammar should be semantically based; that is, there are reasons "for making meaning the only deep structure" (1974, p. 115). He cites Piaget's work as evidence that the intellectual achievements of the first eighteen months are necessary prerequisites for the semantic relationships expressed by word



order in Stage 1. He cites three levels: the sensorimotor pattern of action, representation and thinking of pattern without speaking and finally the expression of the pattern in a sentence. Meanings correspond on the linguistic level to the action level of sensorimotor periods.

Zachry's (1973) study of language and sensorimotor development support this view. He found that language development was related to sensorimotor level. In his comparison of sensorimotor stages and language development he found the receptive language and holophrastic sentences appear before the sensorimotor Stage IV representation but that longer sentences appear only at sensorimotor Stage V.

Macnamara (1972) stresses that in the young child basic cognitive structures "precede the development of the corresponding linguistic structures," (p. 11) and cites evidence from lexicon, syntax, and phonology to support his view.

Nelson (1973) also stresses the importance of the semantic component in the first words that the child speaks. She indicates that children's first words relate to salient properties of change; that is, they are objects children can act on and which reflect their mode of structuring the world. She states, "it is imperative that one study the child within the context in which he can acquire meaning as well as structure" (p. 2).

The work of deVilliers and Jill (1972) indicate that two and three year olds can judge semantic content of utterances before they discriminate errors in syntactic factors.

The period between 24 and 30 months is marked by an increasing development of the child's grammar. Also phonemic differentiation is becoming more precise and vowel and consonant sounds are being organized into the linguistic system. Usually the child can discriminate phonemic contrasts when he hears them but may not be able to pronounce them the way he hears them. Lennenberg (1967), commenting on the lack of concern for phonetic accuracy in early speech indicates that "what is acquired are patterns and structure, not constituent elements" (p. 281). In his imitation of adults, the child tends to convert adult sentences to his own forms and his self imitation often takes the form of playing with words and sentence patterns. Weir (1962) in her study of the pre-sleep monologues of her child sheds light on the process of the child's perfection of language. She comments, "Just as the pleasure in a joke can be derived from play with words, so does the child enjoy play with words . . . . The pleasure of play is structured so that it serves as a systematic linguistic exercise" (p. 22). She cites three types of linguistic activity related to practice patterns: build-ups, breakdowns and completions.

Slobin (1969) cites evidence of a number of child grammars which have been compiled from a variety of studies



of child language in German, Russian, Finnish, Luo, Samoan and English speaking cultures. The functions of two word sentences in child speech are similar in all of these languages. The functions of utterance are: (1) locate, name, (2) demand, desire, (3) negate, (4) describe event or situation, (5) indicate possession, (6) modify, qualify, (7) question.

The order of the two words in the utterance is generally fixed in all but the Finnish. Other universals he mentions are that the same kinds of elements are missing from child telegraphic speech in all of the languages, and isolation of root forms, usage of inflections, arrangement of sentences in hierarchically organized constituents, and underlying semantic ideas all have similar patterns of occurrence. Although the work on language universals is promising, Slobin points to the need for much data on children's acquisition of various native languages.

#### Evidence Related to Language Comprehension

The study of the young child's comprehension has not been as extensive as the study of production. In recent years, however, attention of a number of researchers has turned to this issue. Studies of infant listening have given indication of the child's ability to discriminate speech at a very early age.

Moffit (1971) studied the ability of infants of 20-24 weeks to discriminate between synthetic speech syllables. Decrement of cardiac rate during familiarization with the stimulus and recovery of response on test trial was the measure of discrimination. Three groups of infants heard different patterns of two speech syllables. Infants in groups which had different syllables used differential responses on the test trial, while infants in the group where syllables were the same did not. Moffit comments "it would appear that infants enter the world with some knowledge of the phonological structure of language already available to them." Obviously, his conclusions might be debated. What seems clear, however, is that even at this early age infants are listening and are able to perform rather fine auditory discriminations.

Kagan (1972) reports an experiment with infants from 5 1/2 to 11 1/2 months of age in which a meaningful speech phrase and a discrepant speech phrase were presented. In the older infants, rather than getting a heart rate decrease which seems to be related to taking in information, a heart rate acceleration occurred. Kagan indicates that about the age of 9 months, the emergence of the new cognitive structure due to cortical maturation is evidenced by this change in heart rate direction.

In adults who are actively thinking about a problem, heart rate increase is recorded, while heart rate decrease

is recorded when they are looking at interesting stimuli. Kagan has found this curvilinear relationship in heart rate over the latter six months of the first year of life. With both meaningful speech and discrepant speech, and with nonsense phrases and different nonsense phrases, the older infant tends to show heart rate increase when presented with the discrepant stimulus. If the stimulus is too discrepant, this does not occur and Kagan feels that this is because the infant cannot perceive the transformation if the stimulus differs too much.

Language comprehension in toddlers has been the topic of a number of recent investigations. Shipley, Smith, and Gleitman (1969) attempted to measure some aspects of comprehension in 18-30 month old children. They gave commands of two types and observed whether or not they were followed. One type of command was well formed by adult standards and one type was presented in typical child grammar forms such as holophrastic and telegraphic types. Also, some had known words and others used nonsense words in the sentences. Analysis of the children's language production level in relation to performance on the comprehension tasks indicated that children understood commands of a level of grammar above that which they were primarily producing. A problem with this study, however, was that any looking or touching response was accepted as evidence of comprehension.

Sokhin, (1971) using children of 1-3.5 years developed a task to measure comprehension for the preposition "on." Grammatically the instruction was always the same, "Put the --- on the ---." In the first series of experiments in which the child was required to put different objects on each other, children in the first group (age 1-2.3) were not able to fulfill the instruction. Children 2-3.3 could respond to the general content correctly; however, they often reversed the objects. Their response related to the perceptual quality of the object--that is, they tended to put the smaller object on top. Sokhin concludes they had not yet abstracted the meaning of the preposition from the objects. Children over three were able to perform the task.

Nelson (1973) also investigated language comprehension in her group of toddlers. Using structured sentences and three level response dimensions she found comprehension at this age level was positively related to all later indices of language production maturity. She speculates that early language comprehension indicates a high level of language production at age 24 and 30 months. She also cites examples of children who speak very few early words who seem to use a "conservative strategy of language acquisition" which results in much early processing but not producing.

As an element of their larger study of competence, White and Watts (1973) assessed the receptive language

development of the children beginning at 12-24 months. One part of the test dealt with understanding of object labels which were familiar to the child and the second part dealt with understanding familiar instructions. These tests were given in the home by the mother. The high-competent children did not differ significantly in the comprehension scores at the early age level but in all cases they obtained higher scores. Significant differences began to occur at about 18 months.

Although the study of comprehension of language is gaining increased attention, effective methodology for measuring comprehension in the age period below 24 months is still sparse. The studies which have been done have raised many provocative questions which need further investigation. Usually studies of comprehension have included only motor responses while studies of production have included only verbal responses as the dependent variable.

The question of the relationship between language and cognitive development is in need of research. As Vygotsky (1961) states, however, "a prelinguistic phase in the development of thought and a preintellectual phase in the development of speech are clearly discernible."

#### Related Areas of Research on the Receptive Language Environment

The receptive language environment has been a focus in some recent investigations, especially in relation to the



adult/child interaction variables and the emotional context of the language environment. Rebelsky and Hanks (1971) conducted one of the few investigations of the verbal interaction of fathers with infants. Ten father/infant pairs were seen every two weeks from the infant's age of two weeks to three months. Twenty-four hour time samples were made which showed that father's verbal interaction was very limited. Mean number of seconds per day was 37.7 and the father who verbalized most with his infant had a mean of 10 minutes, 26 seconds per day. Father's vocalizations tended to decrease with age and some differential interaction with sex of child seemed evident. The researcher's call for more comprehensive investigation of this question, since father's pattern of verbal behavior seems to be very different from mother's (mother's tend to increase with age of infant) but this sample was too small to use as a basis for general conclusions.

Nelson (1973) found no correlation between amount of time spent with the children by fathers and the children's language production.

Turnure, (1971) using body movements of the infant as the measure, found a change in response to mother's voice and distorted voice of mother (obtained by speeding the recording). At nine months the infants showed a significant difference in listening attention, which indicated that they

listened to voice samples with increasing cognitive sophistication.

Friedlander (1971) has devised a method for measuring the infant's listening pattern by using an audio device that can be activated by the child. Various types of tapes which produce redundant/nonredundant stimuli; forward and backward speech; familiar and unfamiliar speakers; flat and bright intonations; loud and soft speech; and many other discriminatory choices when the infant presses the particular knob have enabled him to investigate the types of auditory stimuli which the infant selects for himself at various age levels, and the amount of time which is spent listening to the various stimuli. Usually a choice between two auditory stimuli is given. The machine is placed in the infant's crib and he is free to use it as much or as little as he wishes to. It plays only when the infant is pressing the switch. Infants as young as eight months have been able to selectively choose their listening stimuli. He has recorded some very interesting data on the listening patterns and preferences of the various children. For example, often infants prefer to listen to the simpler stimuli for a while and then later switch to the more complex. One child preferred a stranger's voice in a bright intonation pattern to mother's voice in a flat pattern, until he suddenly seemed to recognize mother's voice in the transformation.

Thereafter he chose the mother's voice consistently. Another fact which has become evident is that the infant will listen to the auditory stimuli for long periods of time. The method opens up many possibilities for research into infant listening which may shed light on some of the crucial processes of receptive language which occur before speech is perfected.

Although much has been written concerning the importance of infancy for social and emotional development, little of the emphasis has gone toward research on the effects of these factors on infant language or the effects of language on these other factors. One recent attempt has been made to relate infant's attention to mother and stranger speech on the basis of the socio economic level of the family. Stephen Tulkin (1971) played a tape of infant's mother and a stranger to ten month old girls. The mother and the stranger (coder) were in the room at the time the passages were played. Thirty middle class and thirty lower class mother/infant pairs were used. As the tapes played, the infant's responses were coded as to verbalizations, smiling, looking at speaker baffle, looking at mother, and looking at coder. Heart rate deceleration and physical activity were also measured. The middle class infants responded differentially to the two stimuli but the lower class infants did not. The most dramatic behaviors in the middle class

infants were looking behaviors--when the mother's voice was heard they looked at her, when the stranger's voice was heard, they looked at the coder. Tulkin indicates that perhaps middle class mothers have engaged in more distinctive verbal interaction with their infants.

Mother/child interaction has been studied by a number of investigators. Different patterns of interaction have been related to class differences, amount of child initiation and response and to mother's personal "style."

Hess and Shipman's (1965) early study of lower and middle class mother/child verbal interaction is an example of this type of research. When mothers were asked to teach their children how to perform tasks they varied in the verbal style which they used, with middle class mothers providing more specificity of direction.

Garber and Heber (1973) reported interaction results from their training research program for children of retarded mothers. They indicate that the experimental children who had received stimulation from other adults during the first two years of life had greater ability to imitate and to comprehend at all age levels after three. The first statistically significant differences begin to appear at age 18 months on the Gesell Language Scale. They state "some of the most significant differences in the Experimental and Control children are reflected in the research measures of language performance" (p. 8).

The linguistic interaction patterns between the retarded mothers and their children indicated that the mothers' linguistic and regulatory behaviors influenced the processes which facilitated or limited cognitive development.

An interesting result of study of later mother/child linguistic interaction was that the Experimental Dyads transmitted more information, not because of the mother's imitation but because of the child's. Garber and Heber state that the mothers of each group were similar but that the Experimental children structured the situation so that a more sophisticated interaction pattern resulted. They posit that the intervention of other adults influenced the quality of the Experimental child's behavior which then changed the pattern of mother/child interaction.

White and Watts (1973), in their study of competence in the earliest years of life, also speak to the mother/child interaction effects on language. They indicate that one of the choices mothers make during the period of 10-18 months of their child's life is related to how much they will "feed the growth of language" (p. 239). Some provide effective input which utilizes the child's interests, others provide input which is less effective, and some show minimal attention to the language interest of their child. The high competent child's language superiority begins to be evident at 18 months.

Tulkin and Kagan (1972) studied mother/child interaction in the first year of life and found that total interaction was greater in middle class but this was attributed to a subgroup of middle class mothers who were highly verbal. Many lower class mothers felt it was not important to speak to their child until he began to speak.

Clarke-Stewart, (1973) in a study of characteristics of interactions between mothers and infants 9-18 months of age indicates that the single maternal variable most highly related to children's competence was verbal stimulation. Non responsive maternal speech was not related, however; that is, mere quantity of auditory stimulation was not sufficient for developing competency.

Tizard, et al. (1972) have indicated that in children in residential institutions the quality rather than quantity of adult verbal interaction is significant. In these children a significant correlation was found between language comprehension scores and quality of talk directed to the child.

Nelson, (1970) also describes an interaction process between parental selection mechanisms and child processing mechanisms. She states that the parent selects the parts of the world which the child contacts. There is wide variation among parents in what they select as appropriate. The child also selects from this world what he will incorporate into his own conceptual and linguistic framework.

In analyzing both spontaneous and invoked instances of imitation, Nelson reports that ability to imitate on a directed test at 21 months was positively related to language development but that spontaneous imitation at 24 months was negatively related to language progress. The implications of these results are not clear, but indicate the possibility of a "critical age" for spontaneous imitation.

The particular strategies used by adults and children in the language acquisition process have been studied by a number of investigators. One was that of Brown and Bellugi (1970) which indicated that there are three processes at work in the child's acquisition of syntax: (1) imitation and reduction by the child; (2) imitation with expansion by the parents; (3) induction of the latent structure by the child.

Cazden (1972) reports that in her study of expansion and extension which involved tutors who gave one or the other responses exclusively, semantic extensions were slightly more helpful in increasing child language development than grammatical expansions. She posits a number of reasons for these results: one is that the extensions provided richer verbal stimuli; secondly, the expansions might have misinterpreted the child's meaning; and thirdly, the expansions might have depressed attention since they were less novel. However, she also states that the very isolation of the expansion and the extension elements may have been crucial since

in actual adult/child linguistic interaction expansions and extensions are both included in adult response patterns.

Slobin (1971), reviewing the role of imitation agrees with this conclusion. In his reanalysis of the imitation research results, he describes specific roles for imitation and expansion at various developmental age levels. Often adults imitate what the child says in what he calls "expansion questions" which appear to be a communication check. He indicates that children often repeat the adult's expansion by adding one new element and thus the expansions help to stretch the child's capacities at a certain critical age. Thus there may be a critical time when expansions are helpful even though the evidence does not indicate they are essential. This view tends to support Nelson's evidence of a critical age for spontaneous imitation.

Another variable which has been studied is the way in which the verbal stimuli that the adult uses is modified when speaking to a child. For example, Snow (1972) compared repetitions in speech of adults when talking to two year olds and ten year olds. Both mothers of the children and other adults talked more, simplified more and repeated more for younger children. Mean length of utterance was shorter when the two year olds were addressed. Both Shipley et al. (1969 and Nelson's (1973) studies of comprehension indicate that even in the age range of 13-24 months, children respond



more readily to sentences longer than those they use. Mothers in Nelson's study had a mean length of utterance to their children of 3.24 at a time when the children spoke only single words. This contrasted with their speech to adults which showed mean length of utterance of 6.72.

An interesting study by Shatz and Gelman (1973) indicates that four year old children modified their length of utterance when speaking to two year olds. Although they averaged 5.95 mean length of utterance to parents and peers they averaged a 4.7 to younger siblings and 4.1 to younger non-siblings.

Many studies of language production have measured their relationship with the sex of the child. McCarthy (1954) indicates that these studies show girls to be higher in language production at early age levels. In studies of language comprehension the relationship of sex to comprehension has often not been reported.

#### Affective Dimensions Which Influence Testing the Young Child

Researchers have struggled with problems of the affective state in the young child which often makes testing of cognitive or linguistic competence difficult. Zigler, Akelson, and Seitz (1973) have demonstrated that the performance of low income and minority children is affected by familiarity of the tester. They demonstrated that a retest

within one or two weeks in which the experimenter was familiar or interacted to gain familiarity before the test resulted in significant gains for disadvantaged children. They suggested that tests "should be administered by an E with whom the child is familiar and toward whom he has positive feelings" (p. 301).

Testers of infants and toddlers have long recognized this factor and often have the parent present during the testing session (Frankenburg, et al., 1973). Also reliance on parental report presumably corrects for the child's failure to perform in an unfamiliar setting (Bzoch and League, 1973). Sometimes the mother has been used as the tester (Shipley, et al., 1969; White and Watts, 1973) and she delivers prearranged stimuli or the observer records mother/child natural verbal interaction and analyzes this (Brown et al., 1969). When the testing is done in the home, however, other variability is increased. White and Watts (1973) mention noise level and confusion in the home or interference by siblings as examples of confounding variables.

Affective variables related to the child's developmental level are also noted. White and Watts (1973) indicate that between 15-20 months many children are gaining increased autonomy and discovering the word "no." They may also be especially uncooperative in the presence of strangers. The interest span of children of this age level is also likely

to be very short and this must be considered in the design of testing of children in this age range.

Therefore, intermittent changes in the affective state of children may greatly affect their performance on any measure of their ability.

Researchers concerned primarily with early infancy have concluded that a measure of infant state is essential because state changes within the individual infant will influence the behavioral results. Also results must be comparable across subjects. Therefore, they have developed state scales which give a rating of the infant's level. Infant state can range from deep sleep to active crying. Infants are rated on this dimension when the experimental procedure is about to begin and throughout the experiment. An example of a state scale is that of Brackbill and Fitzgerald (1969). Some type of state measure seems to be needed to provide comparability across subjects and to evaluate responsivity across the experimental session. Toddler state has sometimes been assessed by these measures, but no specific measure for monitoring toddlers state has been developed.

#### Implications for this Study

This review of selected research has a number of implications for this study:

1. It demonstrates that although the language production of the young child has been investigated extensively language comprehension has not been regarded as a separate area of important research until very recently. Nelson, (1973) after reporting that her comprehension measures were the best predictors of later language maturity, states "It indicates the probable importance of covert language processing prior to language production as an organizing factor and emphasizes the need for further study in this area" (p. 79). The present study focused on language comprehension and measured it in a systematic manner.

2. Although mother/child interaction has been the focus of a number of studies, evidence of the effects of father's verbalizations and father/child interaction is very sparse. Therefore the question of differential effects of father's verbalizations or father/child interaction is an important one. For example, since fathers generally spend less time with the child, does this mean that they will have little knowledge of what their children comprehend? The present study compared mothers' and fathers' ability to demonstrate their children's language comprehension.

3. Since early language production and comprehension occur during the sensorimotor period when action on objects is evidence of the child's construction of meaning, linguistic constructions are based on sensorimotor

intelligence. Language comprehension can be demonstrated by both verbal and motor responses of the child. Past studies have not combined these response dimensions. The present study utilizes both the motor and verbal responses in the language comprehension measure.

4. Evidence from past research with very young children indicates that the affective dimension should be considered in the situation. The present study controlled for this dimension by including a measure of toddler responsivity to the task--the socio-emotional score.

5. Although measures of spontaneous child language production indicate a wide variety of content areas and a wide variety of parental selection strategies, no comparable comprehension measure has been used which allows for idiosyncratic parent/child patterns or language to be measured. The present study compared a structured "universal" type of test with an unstructured idiosyncratic condition that utilized parental selection strategies and parental knowledge of child understanding.

## CHAPTER III

### RESEARCH DESIGN AND METHOD

The research design and method are described in this part of the study of toddler language comprehension.

#### Design

The study was a crossed 2 x 2 x 2 design, with subjects nested within the independent variable of sex. All subjects received all treatment combinations. The order of administration of the combinations was randomized independently for each subject. A schematic design of the study is shown in Figure 1.

#### Method

The procedures followed involved identification of subjects and setting, preparation of general plan of the study, collection of data and treatment of data.

#### Preparation of the Instrument

The instrument and methodology were designed initially for the pilot study. For use in the present study, the semi-structured condition was omitted; thus, only two conditions of structure were presented to each child. The



responses dimensions were coded directly into the scoring categories, 0-3, but there were no changes in the dimensions and no changes in the scoring scale. Directions to parents were not changed except that the parental reinforcement statements were broadened to allow brief comments naturally used with the child. Instruments and rationale for the scoring scale are shown in Appendix C.

### Subjects and Setting

Twenty-four children, 12 boys and 12 girls, were used in this study. Mean age of girls was 20.3 months and of boys was 20.2 months. Girls' ages ranged from 15.1 to 24.8 months; boys; from 15.9 to 24.6. Parents were area residents who volunteered to participate in the study. They were primarily students and/or faculty of Oakland University. Income level of parents ranged from lower middle to upper and the parents were probably above average in language skills as compared to the general population.

The setting was a room in the Oakland University Toddler Program which was familiar to parents and children.

### General Plan of the Study

Each child came to the Toddler setting accompanied by both parents. When they arrived, they were told the order of their sessions with the child. The parent who was not with the child waited in a closed room at the opposite end of the building from the experimental setting. Speech



stimuli of two degrees of structure were delivered to each child by each parent in separate 5 minute sessions. Sessions were video-taped. A random selection of all possible permutations of order of speech stimuli conditions and speakers was used. The total session for each child was approximately twenty-five minutes.

Speech stimulus conditions were:

1. 5 minutes of structured stimuli--adult delivered a set of prearranged instructions to child pertaining to fixed set of tasks. The method and rationale for the structured stimulus condition was adapted from the work of Shipley et al., in which designated speech stimuli of holophrastic, telegraphic and well formed types are used. The stimuli using the preposition "on" are related to Sokhin's work, in order to determine if the sequence will be understood as well as the individual words in the stimulus statement.

Thus, the structured condition was designed so that the same speech stimuli concerning specific tasks were given to the child by each parent. Both speech stimuli and tasks were held constant across adult speakers.

2. Five minutes of unstructured stimuli--adult gave any speech stimuli he or she felt the child

understood and would respond to in play. The method and rationale for the unstructured speech stimulus condition was based on "naive" or "common sense" psychology (Heider, 1958). Parents usually agree that it is natural for children to know or understand many things before they are able to talk about them. Thus speech stimuli were provided by different adult speakers who themselves determined the language which the child would be likely to understand and the tasks which would be appropriate to demonstrate understanding. Under this condition both speech stimuli and tasks differed across adult speakers.

All directions were on 4 x 6 cards. In order to be sure the directions were clear to the adult, the child played in the room for a few minutes while the adult read the instructions on the card and experimenter answered any questions. When the adult thought she/he was ready, the taping began. Toys for the structured segment were familiar toys from the room which were placed in a basket near a table. For the unstructured condition any toys in the room could be used; however, no materials of any kind had to be used if the parent did not choose to use any.

Child and parent began session seated at a small table. At the start of each speech stimulus sequence the

parent put the toys to be used on the table. The adult was instructed to use no gestures while offering speech stimuli. Parents were told to reinforce child responses with a smile or any brief comment which was natural for them to use with their child. The parent delivered one stimulus then paused slightly before repeating that stimulus or going on to the next one. No stimulus was to be given more than two times. The two conditions of speech stimuli were presented in a prearranged random order. Instructions and speech stimuli are listed in Appendix A.

After the sessions each parent separately filled out a rating of the child's production. This rating was based on six dimensions of language production. The rating form is in Appendix B.

#### Collection of Data

The data were collected on videotape using the Sony AV-3400 camera and video recorder. The videotaping was done from a partially enclosed structure which was unobstrusive for parent and child.

Child responses were scored on three dimensions across all conditions. These dimensions were social-emotional, motor, and verbal responses. Motor and verbal responses were combined to form the language comprehension score while the socio-emotional score served as a measure of toddler responsivity level.

### Preparing Data for Analysis

Preparation consisted of 2 steps--first it was necessary to determine the units of stimuli in the unstructured condition which could be considered comparable to that of the structured stimuli. Secondly, training for coding according to the language scoring scale and actually coding the responses was accomplished. Three coders were used for reliability data. Sample coding forms are shown in Appendix D.

Determining the stimulus units for the unstructured condition and obtaining reliability across coders.--In order to gain comparability across the stimulus conditions, the structured stimulus condition was used as the standard. Only statements written in the instructions for structured were considered "countable." That is, a side comment to the experimenter, a child behavior management statement ("Come sit down") or an adult reinforcement ("Okay") or thinking out loud ("Oh, I forgot that one") were not considered countable.

For the unstructured condition, all adult speech stimuli were first transcribed. Then each stimulus was categorized as "countable" or "noncountable" according to the above criteria. Only stimuli which were task related questions, commands, suggestions, etc., were considered "countable." A zero was recorded on the stimulus list to

indicate a "noncountable" statement, so that the record shows when a speech stimulus was omitted.

The number of speech stimuli which were used for the structured condition ranged from 30-40 since all structured stimulus statements were counted. (The number varied depending on how many were repeated.) In the unstructured condition, the first 40 countable stimuli were used. To get reliability, twenty-five randomly selected adult speech stimuli from six different segments of the unstructured condition were categorized as "countable" or "non-countable" by the coders. All reliability percentages are based on number agreed upon divided by total possible number of agreements. Coder reliability on countability averaged 95.6 percent.

Coding the response dimension and obtaining reliability across coders.--Reliability on the coding of response dimensions was gained in the following manner. Training of coders was done using practice tapes from the pilot study. Coders watched and discussed these segments to gain consensus on questions. Then three segments each of structured and unstructured stimuli were selected randomly from the total body of stimulus groups in this study. These segments were used for estimating reliability of coding of all three response dimensions. Socio-emotional, verbal, and motor reliability were obtained separately. Average reliability was as follows:

Socio-emotional - 93.5  
 Motor - 93.2  
 Verbal - 94.3

Table 1 gives intercoder reliability.

TABLE 1.--Intercoder Reliability.

Coder	Countability	Socio-Emotional	Verbal	Motor
A/B	96	93	94.4	94.9
A/C	97	95.8	93.5	92.6
B/C	94	91.7	94.9	92.1

Final Procedures for  
 Collection of Data

After reliability levels were established, the coders then observed each segment of tape. The socio-emotional scores were obtained for all segments, then the verbal scores, and finally the motor scores.

The language comprehension score is composed of the combined verbal and motor scores. After each response dimension was scored separately, the verbal and motor scores were then combined to obtain a language comprehension score. Since a slight variation in number of speech stimuli in each condition occurred (for example, some adults repeated more of the stimulus statements than others), the data were transferred into mean scores. Mean scores were used as the basic data for analysis. The mean language comprehension scores

for each condition are shown in Table 2. Individual scores are shown in Table 9, Appendix E.

TABLE 2.--Mean Language Comprehension Scores.

	$\bar{X}_{S1}$	$\bar{X}_{S2}$	$\bar{X}_S$
$\bar{X}_{C1}$	2.67	3.07	2.87
$\bar{X}_{C2}$	2.5	3.11	2.81
$\bar{X}_C$	2.59	3.09	2.84
	$\bar{X}_{P1}$	$\bar{X}_{P2}$	$\bar{X}_P$
$\bar{X}_{C1}$	2.93	2.81	2.87
$\bar{X}_{C2}$	2.79	2.82	2.81
$\bar{X}_C$	2.86	2.82	2.84

#### Treatment of the Data

A three way analysis of variance (ANOVA) mixed model, crossed and nested, was planned for testing all hypotheses. The language comprehension score was the basic data in the ANOVA. Assumptions for this model are independence, normality, equal variance and random sampling.

Since the four possible orderings of speech stimulus conditions were randomly assigned on the basis of all possible permutations, this model seemed appropriate, if the assumption of homogeneity could be met. Unequal correlation

among levels of the repeated treatment conditions is often a problem in this design. If the correlations were unequal then the planned ANOVA analysis would not have been appropriate (Kirk, 1968, p. 247-248, 256-262).

Therefore, pairwise correlations were computed for the six conditions to determine if the assumption of equal variance among conditions was met. The correlations were within a fifteen point range, indicating the assumption was met. Therefore analysis could proceed as planned. The correlations are listed in Table 3.

TABLE 3.--Correlation (r) of Pairwise Conditions.

Pair	$\underline{r}$
$P_1S_1/P_1S_2$	.754
$P_1S_1/P_2S_1$	.877
$P_1S_1/P_2S_2$	.802
$P_1S_2/P_2S_1$	.813
$P_1S_2/P_2S_2$	.733
$P_2S_1/P_2S_2$	.793

The level of significance for the statistical tests was set at  $p < .05$ . Test statistics were appropriate F ratios using error terms as denominators. Decisions rules were based on  $F_{1, 22}$ .



Relationship of Other Variables of Interest to the Language Comprehension Score

Although no formal hypothesis concerning the effect of other variables on the language comprehension score was posited, a description of the relationship of these variables to the score was planned.

Relationship of language comprehension score to the socio-emotional score.--The socio-emotional dimension was not appropriate for inclusion in the language comprehension score, but was used as a measure of the child's responsivity level at the time of the testing. Since 2.0 would be a chance mean score and would indicate an "approach" to the task no more than half the time, 2.5 was selected as an arbitrary score indicating a greater than chance level of approach. It was postulated that if the socio-emotional score fell below 2.0, the language comprehension score's validity would be questioned, since it indicated the child was not in an approach mood during the session. In the pilot study, none of the children scored below the 2.5 level. In this study, the relationship of the socio-emotional score to the language comprehension score was to be described. The mean socio-emotional scores are shown in Table 4.

Relationship of language comprehension score to the parental rating of language production.--Also, as one measure

TABLE 4.--Mean Socio-emotional Scores.

	$\bar{X}_{P1}$	$\bar{X}_{P2}$	$\bar{X}_P$
$\bar{X}_{C1}$	2.81	2.74	2.78
$\bar{X}_{C2}$	2.65	2.71	2.68
$\bar{X}_C$	2.73	2.73	2.73
	$\bar{X}_{S1}$	$\bar{X}_{S2}$	$\bar{X}_S$
$\bar{X}_{C1}$	2.65	2.91	2.78
$\bar{X}_{C2}$	2.6	2.76	2.68
$\bar{X}_C$	2.62	2.83	2.73

of validity, the parental ratings of their children on six possible dimensions of language production were to be correlated with the language comprehension score. The method of scoring these ratings is described in Appendix B.

Relationship of the language comprehension score and the adult mean length of utterance.--Since the adult has the opportunity to select appropriate speech stimuli for the unstructured condition but must use the set stimulus statements in the structured condition a question of interest was whether the mean length of utterance would be longer in the unstructured condition and, if so, how that related to the language comprehension score in the unstructured condition. Therefore the mean length of utterance of adults in the

unstructured condition was obtained. Reliability between coders was 92.3 percent agreement.

Relationship of the language comprehension score to the verbal/motor proportion of the score. Since both the verbal and motor responses were included in the language comprehension score, the question of how much each response dimension contributed to that score was of interest. Therefore, the percentage of total score which was due to the verbal dimension was computed so that this relationship could be explored.

Relationship of the language comprehension score to the child's imitative responses. Since studies of spontaneous imitation suggested that this variable might relate to the language acquisition process, the number of imitative responses (Scored 2 in the verbal response scale) were counted for each child to determine whether the quality of response related to the language comprehension score.

## CHAPTER IV

### ANALYSIS OF THE DATA

The planned ANOVA analysis was appropriate since the assumptions necessary for that model had been met. The results for each of the hypotheses are discussed with complete data indicated in Table 5.

#### Hypotheses

##### Hypothesis One

There was no significant difference in the scores as a function of child sex. The F ratio for this variable was .044. Inspection of the data indicates that the variation within each sex was high with scores ranging from 1.412 to 4.825 for boys and from 1.626 to 4.65 for girls. This within sex variation contributed to the non significant between sex variation. The pilot study results which showed a slight difference in favor of boys was probably due to sampling error.

##### Hypothesis Two

There was no significant difference in the scores as a function of parental sex. The F ratio for this variable was .375. Fathers and mothers did not differ in ability to

demonstrate their child's language comprehension. This finding is similar to that of the pilot study.

### Hypothesis Three

There was a significant difference in the scores as a function of speech stimulus structure condition. The F ratio was 44.378 which was significant at  $p < .001$ ,  $F_1, 22$ . The data indicates that children scored consistently higher in the unstructured condition in which parents selected the stimulus statements than in the structured condition where they presented preset statements. This finding is consistent with the pilot study results.

### Hypothesis Four, Five and Six

There were no significant interactions among the independent variables. Although the pilot study indicated a potential parent/child sex interaction, this was not evident in this study.

### Relationship of Other Variables of Interest to the Language Comprehension Score

The description of the relationship of the other variables of interest is as follows.

#### Socio-emotional Score

Correlation of the socio-emotional score with the language comprehension score was moderate with  $r = .48$ .

TABLE 5.--Analysis of Variance for Effects of Child Sex,  
Parent Sex, Structure Condition, and of Inter-  
actions on Language Comprehension Score.

Source	df	SS	MS	F
C child sex	1	.105	.105	.044
P parent sex	1	.045	.045	.375
S Str. vs. Unstr.	1	5.991	5.991	44.378*
CP	1	.12	.120	1.000
CS	1	.289	.289	2.141
PS	1	.091	.091	.551
CPS	1	.016	.016	.097
R:C	22	52.442	2.384	
RP:C	22	2.639	.120	
RS:C	22	2.966	.135	
RPS:C	22	3.62	.165	

\*p < .001.

When the data is recorded on an expectancy table (Table 6) the relationship pattern reveals that the language comprehension scores of children who were above 2.5 on the socio-emotional score are distributed widely. Of those who scored low in language comprehension, four were also low in socio-emotional while no children were low in socio-emotional who scored high in language comprehension.

Scores fell into three quadrants:

High Socio-emotional/High Language Comprehension: 9 children.

High Socio-emotional/Low Language Comprehension: 11 children.

Low Socio-emotional/Low Language Comprehension: 4 children.

Low Socio-emotional/High Language Comprehension: 0 children.

A high language comprehension score was always related to a high socio-emotional score but a high socio-emotional score also occurred frequently with a low language comprehension score. The mean socio-emotional score was higher for the unstructured condition than the structured but similar for both parents and both child sexes.

#### Parental Rating of Language Production

Parental rating of the child's language production was correlated with the language comprehension score with  $r = .662$ . Thus parents' knowledge of the child's language

TABLE 6.--Relationship of Language Comprehension Score and Socio-emotional Score.

Socio- Emotional Score	Language Comprehension Score									
	7-7.9	8-8.9	9-8.9	10-10.9	11-11.9	12-12.9	13-13.9	14-14.9	15-15.9	16-16.9
3-3.24							1			1
2.75-2.99		1111	11				1	11		11
2.5-2.74		11	1	1	1	1		1		
2.25-2.49	1			1						
2-2.24		1		1						
1.75-1.99										

production and their ability to demonstrate the child's language comprehension were related. Inspection of the data on Table 7 indicates that there was a strong relationship between the measures for children who were at a high level on the language comprehension score. Scores of children who were in the intermediate range in comprehension were less related to parental ratings of their language production. In general, parent rating of language production for those children tended to be higher than the language comprehension score might predict.



TABLE 7.--Relationship of Language Comprehension Score and Parental Rating of Language Production.

Parental Rating of Language Production	7-7.9	8-8.9	9-9.9	10-10.9	11-11.9	12-12.9	13-13.9	14-14.9	15-15.9	16-16.9
50-59.9		1		1						
40-49.9		1		1						111
30-39.9		1	1	1		1	11	111		
20-29.9		1	1		1					
10-19.9	1	111	1							

Table 10, Appendix E, gives the comparative data of the language comprehension score, socio-emotional score and parent language production rating.

#### Adult Mean Length of Utterance

The adult mean length of utterance for the unstructured condition was 5.34 as compared to the mean length of utterance standard structured condition of 3.45. Correlation of mean length of utterance and score on unstructured was  $r = .565$ , indicating a moderate relationship. Table 11, Appendix E gives unstructured language comprehension score and mean length of utterance for unstructured condition.

Verbal/Motor Proportion of  
the Score

In general, the verbal proportion of the language comprehension score increased as the language score increased. The correlation is  $r = .79$ . For language comprehension scores in the range of 7-9.9, the mean percent of the score due to verbal responses was 20% while in the range of scores above 13, the mean percent due to the verbal responses was 40%. With all children the motor response accounts for more than half of the total score. The range was from 10.6% to 43.7% of the score being due to the verbal response dimension. Individual percentages are reported in Table 12, Appendix E, while Table 8 gives frequency.

TABLE 8.--Percent of Language Comprehension Score Due to Verbal Response Dimension.

Percent of Scores Due to Verbal Response		
Language Comprehension Scores	0-25.9%	25-49.9%
16-18.9		11
13-15.9		11111
10-12.9	1	11111
7-9.9	11111 11111	11

Child's Spontaneous  
Imitative Responses

The range of the number of spontaneous imitative responses made by children was from 0 to 41 (out of a possible 240-250 responses) with the mean being 9.83. Correlation between the number of imitative responses and the language comprehension score was  $r = .61$ . Data indicate a low level of spontaneous imitation in the experimental setting for all children. Table 12, Appendix E, indicates the number of spontaneous imitations of each child. Only two children had more than 20 imitative responses.

## CHAPTER V

### DISCUSSION

The conclusions and generalizations of the study are discussed in this section and recommendations are given for further research.

#### Conclusions and Generalizations

##### Child Sex Differences

The data did not provide evidence that the language comprehension of boys and girls of toddler age level differed. The research literature on language acquisition indicates that girls have usually scored higher than boys and conclusions usually state that girls' language development is superior. Most of the studies which have compared sex differences in language development have used measures of language production rather than language comprehension. It is probable that boys and girls do not differ in the "conservative strategy" of comprehension but that they do differ in production. It is also possible that the ability of the parents to know what speech stimuli would be salient for their boys made it more likely that the boys would respond at a high level. For example, the speech stimulus

statements provided by parents of motorically active boys often required large muscle responses from the child.

It may be that comprehension is the crucial dimension which underlies later language and cognitive ability and therefore it is an important measure in young children of both sexes.

### Parent Sex Differences

The data provided evidence that fathers and mothers were equally able to demonstrate their toddler's language comprehension. Since fathers generally spend less time with their children, the importance of the quality of interaction rather than quantity of interaction gains support. Recent evidence by White and Watts (1973) that mothers of highly competent children do not necessarily spend long periods of time with them is also in agreement with this finding as are other studies of verbal quality of interaction reported in the research literature review. There are a number of interesting questions raised by this finding. Is it true only of this population? The majority of fathers in this study were highly verbal and appeared very much at ease when required to be alone with their child. It is possible that working class fathers would be less able to demonstrate their child's knowledge if they did not see their fathering role as one of interaction with their children at this early age level.

Does this finding lend support to working mothers? If quality of interaction rather than quantity is sufficient for the development of the competent child and if fathers know and can demonstrate their children's ability to understand, it is possible that the mother/child relationship will not suffer if the mother is not always present. In fact, verbal interaction with a number of different adults (for example, in a child care center) may stimulate rather than retard the child's language comprehension.

Speech Stimulus Structure  
Condition Differences

The data did provide evidence that allowing parent testers to select the stimulus to which the child responded resulted in a higher level of demonstrated comprehension.

Because the unstructured condition resulted in higher language comprehension scores and also higher socio-emotional scores, allowing parents to select the stimuli may be a sufficient method by which to measure toddlers' language comprehension. That is, a structured set of stimuli may not be necessary.

Also, because parents select the appropriate stimuli based on their knowledge of the child's environmental experiences, the method may be a type of "culture fair" test. As long as the adult can provide stimuli to which the child

can respond, the exact nature of the adult stimuli is not crucial. Thus the child's understanding of the language of his particular idiosyncratic environment can be measured. This issue is an important one which might be explored further since it raises the question: Can working class parents demonstrate their children's language comprehension as well as middle class parents can? Although they may utilize what some theorists would call a "private language" or a "restricted code" (Bernstein, 1962) the child's understanding of that code might be excellent.

#### Interaction of Parent Sex and Child Sex

Although the pilot study suggested a possible interaction effect of parent sex and child sex (children performed better with opposite sex parents) the present study did not support this. Thus, this study does not give support to the theoretical literature which stresses the importance of differential effects of same sex and opposite sex parent/child relationships. At least in relation to language comprehension, these differential effects are not evident.

#### Further Discussion

A number of questions which go beyond the data but which have implications for education are of interest.

Perhaps teachers' ability to demonstrate that they can give appropriate speech stimuli to children needs

further exploration. How long must a teacher know a child before being able to demonstrate that child's language comprehension through the method presented here? In the pilot study the toddler program teachers, who had known the children about three months, were equally able to demonstrate the children's comprehension. It is possible that language production is the major source by which children's comprehension is judged. Also, perhaps the teacher's ability to communicate meaning to children could be measured by this method.

Another question which might be explored is this: What implications do the language comprehension findings have for reading? Often the key to reading ability is seen primarily to be in enhancing the child's language production. Although production is very important, it may be that early language comprehension is even more vital for reading. The awareness of the importance of language comprehension by the teacher might result in the development of methods utilizing the child's comprehension of his idiosyncratic language as well as the standard language of the culture. At least this awareness might make the teacher a better observer of the child's language comprehension level.

In addition, this study has implications for measuring language comprehension of older children. The methods might be utilized with children who show little language



production at age levels above the toddler age, thus aiding in the diagnosis of children with hearing impairment or language disability. Often concern is expressed by teachers and parents when a child of three or four has little language production. This concern is sometimes expressed by statements that the child has "no language." This study indicates that language comprehension could be measured in these children to determine whether the child's receptive language (comprehension) ability was normal even though expressive language (production) was delayed. This type of measure could aid in identifying children who had some type of impairment of the processing system of linguistic inputs.

Discussion of Other Variables Related to the Language Comprehension Score

The socio-emotional score provided a measure of the child's state at time of testing. Descriptive analysis of the data indicated that a high socio-emotional score was always related to high language comprehension scores but high socio-emotional scores were also evident in the majority of low language comprehension scores. The socio-emotional score did provide a check on the validity of the language comprehension score, since a high score is a necessary but not sufficient condition for a high language comprehension score. For those children with low language

comprehension scores and low socio-emotional scores, the question could be raised concerning the validity of their language comprehension score.

For those children who scored high in language comprehension, parental rating of their language production was highly related. Parents' rating of language production for those children scoring low on language comprehension was more varied. Half were highly related and half were not. A number of reasons for this might be explored. One is that parents' production rating might be accurate but that those children who scored low on comprehension but high on production did not perform at the highest level of their possible comprehension. Another is that the children were producing language primarily in an imitative manner and the comprehension measure indicated that much of the verbalization was not of high semantic level.

The parents in this study used longer sentences in the unstructured condition. Since earlier studies indicate that children respond better to utterances longer than those they are able to produce, this finding is in agreement with these reports. The children had higher language comprehension scores in the unstructured condition when the parents' utterances were longer.

The proportion of the language comprehension score which was composed of the verbal dimension increased as the language comprehension score got higher. This indicates

that as the children's comprehension increased, their language production also increased. As children proceed through the sensorimotor period, the verbal proportion seems to become a larger part of the score but even for the highest scoring children it is still less than half. Since the proportion of verbal and motor score was not constant, a motor response score only or a verbal response score only would not give as complete an assessment of language comprehension as the language comprehension score.

Total spontaneous imitative responses were low and children varied greatly in the number of spontaneous imitative responses they produced. Spontaneous imitation was related to the language comprehension score, but primarily because of the high language comprehension scores and high level of imitation of just two children.

#### Recommendations for Further Study

The discussion of conclusions and generalization has pointed out a number of possible questions for further study. An assumption on which this study was based was that the methodology developed was appropriate for investigating language comprehension in toddlers. This study indicates support for this methodology, especially in relation to its reliability and validity. Further replication with differing populations is needed. Therefore the following recommendations for further study are suggested:

The study should be replicated with parents of other than white middle class backgrounds to determine whether the knowledge of their children's language comprehension and ability to demonstrate this comprehension is limited to this population or whether all parents possess this ability.

The study should be replicated with children of the age range ten months to fifteen months to determine whether language comprehension of this age level can also be measured by this method.

The study should be replicated with children of the age range 2 1/2 to 5 whose language production is low to determine the level of their language comprehension.

This study should be replicated with fathers of different races and of several income levels to determine whether children's language comprehension scores would differ.

This study should be replicated with mothers of different races and of several income levels to determine whether children's language comprehension scores would differ.

A study should be done comparing children's scores with parent testers who select the appropriate stimuli based on their knowledge of their children's environment and the children's comprehension in the school setting with teachers selecting the stimuli.

The method should be utilized in the home setting so that language comprehension scores in the natural home environment could be compared to those obtained in the semi-natural environment used in the present study.

Additional long range recommendations for study are also suggested:

Follow up data on the children in this study should be obtained so that the predictive validity of the language comprehension score for later language ability could be determined.

A longitudinal study beginning with children of six months of age should be implemented. Parents would select the appropriate stimuli at two month intervals up through their child's second birthday. Data could be recorded for both child's language comprehension and language production to determine the patterns of interaction at these age levels.

As an addition to quantitative analysis of the data, the following recommendation is suggested:

Qualitative analysis of the adults' stimulus statements should be undertaken to determine whether fathers and mothers and parents of boys and girls differ in the content and grammatical type of stimuli that they select. Although this question was not dealt with in this study, inspection of the original data indicates that there may be some issues of interest in a qualitative analysis to determine

what factors contributed to the parental selection strategies.

It is further recommended that the suggested investigations should be pursued in a systematic manner. The method of multiple working hypotheses could be utilized to insure a systematic pursuit of the questions of interest and thus a contribution to the ethology of young children might be made.

## APPENDICES

APPENDIX A  
SPEECH STIMULI



## APPENDIX A

### SPEECH STIMULI

#### General Instructions for all conditions

1. If ball, car, doll or other objects are thrown or removed from table, go get them before offering next speech stimulus.
2. If ball, car, doll, or other objects are too far from child but he reaches for them, you should push them into his arm's range.
3. If child leaves table, go and bring him back.

#### Structured condition

Materials - ball, doll, car, (cup is also on the table)

Instructions: Please deliver these statements, words, or questions to your child as they are written here. Pause slightly after each of them to give your child a chance to respond. If child makes no response to a statement you may repeat it one time. (No more than a total of 2 times.) Do not use gestures. Child responses are to be reinforced with a smile or any brief comment which is natural for you to use with your child (such as "uhhuh," "okay," "good," etc.)

"Ball"	"Throw me the ball"
"Car"	"Make the car go"
"Dolly"	"Give dolly a kiss"
"Where ball?"	"Let me throw the ball"
"Where car"	"Let me make the car go"
"Where dolly?"	"Let me give dolly a kiss"
"Where's the ball?"	"Put the dolly on the car"
"Where's the car?"	"Put the ball on the car"
"Where's the dolly?"	
"Throw ball"	
"Go car"	
"Kiss dolly"	

#### Unstructured condition

Materials: No special ones - anything in room can be used, or no materials at all.

Instructions: You probably know some things that your child understands. Try to get him to demonstrate some of these. You may say whatever you wish, but must not demonstrate what to do. Pause after each statement or question to give your child a chance to respond. Do not repeat any statement or question more than two times, but continue to talk to the child during the session.

APPENDIX B  
PARENTAL RATING FORM AND  
SCORING METHOD

APPENDIX B

PARENTAL RATING OF CHILD'S LANGUAGE PRODUCTION

Child's Name \_\_\_\_\_ Birthday \_\_\_\_\_

Which type of speech has your child primarily used in the last 2 weeks? (Put (3) for often, (2) occasionally, (1) seldom; put 0 by any not used at all.)

1. Babbling (includes individual or joined sounds, long strings of sounds with the intonation of regular sentences, playing with sounds, repetition of noises, etc.)  
\_\_\_\_\_

Give an example \_\_\_\_\_

2. Imitation (repeats words or phrases immediately after hearing them) \_\_\_\_\_

Give example \_\_\_\_\_

3. Naming (gives names of objects) \_\_\_\_\_

Give example \_\_\_\_\_

4. One word sentences (says words that convey a complete thought such as "cookie" for "give me a cookie") \_\_\_\_\_

Give an example \_\_\_\_\_

5. Two or three word sentences (conveys a complete thought but leaves out less essential words, such as "Daddy go car" or "my doggie") \_\_\_\_\_

Give an example \_\_\_\_\_

6. Complete sentences (with all parts of speech, grammar not necessarily correct, such as "My feets is cold." or "Give me my doggie.") \_\_\_\_\_

Give example \_\_\_\_\_

7. Other \_\_\_\_\_

Give an example \_\_\_\_\_

METHOD OF SCORING THE  
PARENTAL RATING FORM

The production rating score was derived in the following manner.

Type of speech was rated in ascending order of development and this score was multiplied by parents' rating of 1, 2, or 3. For example:

	<u>Score</u>	<u>Parent Rating</u>	<u>Total</u>
Babbling	(1)	3	3
Imitation	(2)	2	4
Naming	(3)	3	9
Holophrastic Utterances	(4)	2	8
Telegraphic Utterances	(5)	1	5
Well formed Utterances	(6)	0	<u>0</u>
			29

APPENDIX C

RESPONSE CODING DIMENSIONS AND  
SCORING PROCEDURES

APPENDIX C

RESPONSE CODING DIMENSIONS AND SCORING PROCEDURES

<u>Response dimensions</u> for coding were as follows:		Scoring
A. Socio-emotional	I. Approach (smile, laugh, coming into setting)	3
	II. Neutral	2
	III. Avoidance (cry, frown, withdrawal from setting)	1
B. Verbal:	I. No response	0
	II. Irrelevant verbal response	1
	III. Response incorporating stimulus	
	a. repetition with reduction	2
	b. repetition complete	2
	c. repetition of some words imbedded in new sequence	3
	IV. Response relevant to stimulus but entirely novel	3
	V. Response requesting repeat of stimulus	1
	VI. Negative response	1
C. Motor:	I. No response	0
	II. Orientation response (only)	
	a. to named object	2/3
	b. to other object	1
	c. to adult	1
	III. Points to, reaches for, touches object	
	a. to named	2/3
	b. with other	1
	c. to adult	1
	IV. Performs stimulus (named) action	
	a. with object	3
	b. with other objects	2

	Scoring
V. Performs other (unnamed) action	
a. with named object	2
b. with other object	1
VI. Performs action irrelevant, completely novel or with objects not in stimulus sequence	1

Scoring was determined by the following rationale:

Socio-

emotional: the scale is ordered from least cooperative

(avoidance 1) to the most cooperative (approach 3)

Verbal:

no response is scored 0, any verbal response (even though irrelevant or negative) is scored 1, and a response of repetition with no novel verbalization is scored a 2 since this response is relevant to the stimulus statement but requires less complexity of response. Both an entirely novel relevant statement and a novel statement which incorporates a small part of the stimulus statement are scored as 3's. It is sometimes difficult to differentiate those two categories and they also seemed to show equal levels of comprehension. The relevant incorrect response is scored 2 since that response reflects a possible lack of total comprehension.

Motor:

Only those motor responses which are complete and correct are scored 3. Complete incorrect responses and incomplete correct responses (that is, where either stimulus action or stimulus object were



correct) are scored 2. All other motor responses are scored 1 and no response is 0. In the case of holophrastic stimuli, orientation is scored 3, since looking at the object can be considered a complete correct response. On "where" questions, pointing or touching the object is scored 3 since that type of response is complete and correct. If either orientation or touching are responses to more complex stimulus statements, they are scored as 2's since these less complex responses are then incomplete.

Although all the different responses that a child makes to a stimulus are coded, for the scoring purposes, only the highest order response is used.

After each response is scored, the points obtained for each response are summed to obtain the subjects' raw score on each of the scales. This is then divided by number of countable stimuli and a mean score is obtained.

APPENDIX D

SAMPLE CODING AND SCORING FORMS







APPENDIX E

TABLES

## APPENDIX E

## TABLES

TABLE 9.--Language Comprehension Scores.

Child	Parent 1 (Mother)		Parent 2 (Father)		Lang. Comp. Score
	Struct. 1 (St.)	Struct. 2 (Un. St.)	Struct. 1	Struct. 2	Totals
A	1.633	2.325	2.057	2.475	8.490
B	2.029	2.275	1.718	2.750	8.772
C	2.971	3.500	2.242	2.600	11.313
D	2.939	3.650	2.765	3.225	12.579
E	3.367	3.175	3.360	3.919	13.821
F	2.656	2.350	2.075	2.925	10.006
G	2.000	2.200	1.639	2.75	8.589
H	2.154	3.000	1.789	2.575	9.518
I	2.484	2.550	3.029	1.700	9.763
J	3.880	4.650	4.038	4.175	16.743
K	3.840	3.625	3.031	3.975	14.471
L	3.360	3.625	3.121	3.575	13.681
Total Girls	33.313	36.925	30.864	36.644	
M	1.412	3.225	1.486	2.625	8.748
N	2.438	2.350	2.108	2.725	9.621
O	2.323	3.675	2.364	2.100	10.462
P	1.703	1.950	2.000	2.600	8.253
Q	2.000	2.625	2.093	3.350	10.068
R	2.156	2.275	1.778	2.407	8.616
S	1.892	2.275	1.938	2.325	8.430
T	3.143	4.550	3.310	3.900	14.903
U	2.300	1.850	1.459	2.25	7.859
V	4.000	4.300	3.857	4.825	16.982
W	3.167	3.600	3.313	4.125	14.205
X	3.467	4.278	4.276	4.400	16.421
Total Boys	30.001	36.953	29.982	37.632	
TOTALS	63.314	73.878	60.846	74.276	272.314

TABLE 10.--Individual Language Comprehension Scores, Parent Language Production Rating, Socio-emotional Scores.

Child	Child's Language Comprehension Score	Parent Language Production Rating $r = .662$	Socio-emotional $r = .48$
A	8.490	59.5	2.675
B	8.772	31.5	2.922
C	11.313	22.5	2.598
D	12.579	48.5	2.717
E	13.821	40.0	2.973
F	10.006	34.5	2.097
G	8.589	12	2.860
H	9.518	12.5	2.955
I	9.763	31	2.902
J	16.743	59.0	2.914
K	14.471	49.5	2.719
L	13.681	48.5	3.0
M	8.748	45.0	2.166
N	9.621	26	2.715
O	10.462	51	2.613
P	8.253	11.5	2.798
Q	10.068	44	2.480
R	8.616	23	2.540
S	8.43	12.5	2.847
T	14.903	42.5	2.911
U	7.859	14.0	2.285
V	16.982	54.5	3.0
W	14.205	42.0	2.910
X	16.421	52	2.903



TABLE 11.--Unstructured Language Comprehension and MLU-  
Unstructured Condition.\*

Child	Mean LC Score-Unstructured	MLU-Unstructured
A	2.4	6.75
B	2.513	4.975
C	3.05	6.075
D	3.438	6.288
E	3.547	6.125
F	2.638	5.238
G	2.475	5.175
H	2.788	5.05
I	2.125	5.463
J	4.413	5.163
K	3.8	5.65
L	3.6	4.975
M	2.925	4.525
N	2.538	6.013
O	2.888	4.35
P	2.275	4.35
Q	2.988	4.213
R	2.341	4.325
S	2.3	5.15
T	4.225	4.963
U	2.05	4.45
V	4.563	5.513
W	3.863	6.488
X	4.339	6.875

\* $r = .565$ .

TABLE 12.--Percent of Language Comprehension Score Due to Verbal Response Score.\*

Child	LC Score	Percent Verbal
A	8.490	17.8
B	8.772	34.3
C	11.313	31.5
D	12.579	31.7
E	13.821	27.2
F	10.006	33.8
G	8.589	13.9
H	9.518	14.8
I	9.763	21.1
J	16.743	42.6
K	14.471	38.1
L	13.681	27.6
M	8.748	24.8
N	9.621	16.5
O	10.462	27.4
P	8.253	15.3
Q	10.068	23.1
R	8.616	23.6
S	8.43	10.6
T	14.903	36.7
U	7.859	26.9
V	16.982	43.7
W	14.205	30.5
X	16.421	39.8

\*r = .79

TABLE 13.--Relationship of Number of Imitative Responses to  
Language Comprehension Score. \*

Child	LC Score	No. of Im. Resp.
A	8.490	3
B	8.772	14
C	11.313	19
D	12.579	25
E	13.821	5
F	10.006	8
G	8.589	0
H	9.518	1
I	9.763	2
J	16.743	17
K	14.471	14
L	13.681	0
M	8.748	10
N	9.621	2
O	10.462	12
P	8.253	0
Q	10.068	13
R	8.616	7
S	8.43	2
T	14.903	11
U	7.859	3
V	16.982	15
W	14.205	14
X	16.421	41

\*r = .61

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