76-18,405

PARKER, Ellen Ann, 1935-
VERBAL AND NON-VERBAL INTERACTION
BETWEEN MOTHERS AND YOUNG CHILDREN.

City University of New York, Ph.D., 1976
Speech

VERBAL AND NON-VERBAL INTERACTION BETWEEN MOTHERS AND YOUNG CHILDREN

by

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A dissertation submitted to the Graduate Faculty in Speech and Hearing Sciences in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

1976

This manuscript has been read and accepted for the Graduate Faculty in Speech and Hearing Sciences in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

April 6, 1976
date

Chairman of Examining Committee

April 6, 1976
date

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ACKNOWLEDGMENTS

This dissertation is a manuscript describing an original scholarly research project, which is intended to demonstrate to the doctoral faculty the candidate's readiness to be awarded the degree of Doctor of Philosophy. I wish to take this opportunity to thank those who have made both my academic and professional education the meaningful and worthwhile experience it has been.

To Professor Helen Cairns, I offer my sincerest gratitude for her wisdom, guidance, and encouragement during the preparation of this dissertation. Her ability to share her knowledge and time as well as challenge my thinking towards an ever clearer focus shall always represent the most positive relationship possible between faculty and student.

The guidance and support of Professors Harvey Halpern and Joel Stark as members of my dissertation committee are also noted. Their constructive criticism was always welcome and served to enhance this document.

Special thanks are extended to Reno, David, Peter, and their mothers who allowed me the privilege of pursuing this study within their homes. Without their cooperation and hospitality this research would not have been feasible.

The participation of Sandra Friedman, Brigetta Joachim, and Bobbi Presner is duly noted. The endless hours they spent serving as judges in this study were done in a spirit of amiable cooperation, for which I am deeply grateful. To Joanne Quinoa, a very special thanks is offered for serving as an assistant in timing conversational units from this data. Her insights and intellectual contributions helped in the evolution of this study.

Appreciation and gratitude are expressed particularly to Dr. Jack Tureen, Chairman of the Department of Speech Arts and Sciences, Hofstra University, who consistently provided support and understanding as I pursued the requirements for this degree. Also, I wish to thank all my colleagues at Hofstra University for their continuing encouragement, and my students for their provocative challenges, both in and out of class.

My gratitude is likewise noted to all those who have shared their knowledge and skills with me during my academic career. I am especially grateful to the late Dr. Robert West and to Dr. Oliver Bloodstein of Brooklyn College, whose confidence in my abilities motivated my pursuit of doctoral study.

Finally, I wish to thank my parents for stimulating in me the love of learning. To my father, my warmest appreciation for his patient, meticulous assistance in the preparation of the graphs for this document. To my sons, Daniel

and Alan, for enabling me to at times be a part-time mother, and offering their cooperation and expressions of pride and love, my thanks seem barely adequate. This study could not have become a reality without the patience, encouragement, assistance, humor, and combination of booster and tranquilizer offered with love by my husband, Donald. I am humbly grateful for his devotion.

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INTRODUCTION

Need for Study

The Language Acquisition Device (LAD) proposed by Chomsky, as explanatory of the acquisition of grammar, provided a new framework for studies of normal language development in the 1960s. In Syntactic Structures, Chomsky (1957) had presented a theoretical model of generative grammar, in which the emphasis was placed on the creative aspect of the language user's ability to produce novel sentences. The essence of the proposal was the postulation of a finite set of grammatical rules capable of generating an infinite number of sentences, and assigning a structural description to each. Chomsky pointed out that the child's task in learning language is comparable to the linguist's, in that he has to devise a set of rules capable of both explaining the sample data to which he is exposed and generating new sentences. In "Language and the Mind," Chomsky (1971) specified data defined as "limits on forms of belief system, inductive procedures, other factors" (p. 428) as additional input besides the acoustic stimilus. The system of beliefs, referred to above, included the child's knowledge of grammar at any given time. The output was viewed "as the structural description of a linguistic expression which contains

certain phonetic, semantic, and syntactic information (p. 428).

Based on Syntactic Structures (Chomsky, 1957), the stress in early psycholinguistic studies of language acquisition was placed on inferring a child's developing linguistic competence (his tacit knowledge of language) from his performance (his actual language behavior). In order to collect data in naturalistic settings, researchers taped samples of child language and analyzed them to determine word class distribution, structural forms, and transformational skills. Evidence clearly demonstrated that language was not learned behavior, but emerged as the child tested his hypotheses regarding regularities of language. Early evidence for the existence of generative rules was found. Pivot Grammar (a grammatical description of two-word utterances as consisting of two classes of words combined by specific rules) was proposed as a grammar explanatory of early language development (Brown and Bellugi, 1964, Miller and Ervin, 1963).

According to McNeill (1970), "sentence-centrism" and the interest in child language reflected the development of transformational grammar. "Not only do children acquire knowledge of sentence structure . . . but virtually anything that occurs in language acquisition depends on prior knowledge of the basic aspects of sentence structures" (p. 2).

The emphasis on language acquisition studies based on parameters other than the sentence resulted from the contribution of Bloom (1970).

Bloom was concerned that Pivot Grammar was too weak to describe competence adequately. She hypothesized that form and function of early language were inseparable. By studying the language transcripts of her subjects in relation to the context in which the utterance was expressed, she demonstrated that both the form and the function of early language are tied to contextual information.

Results indicated that the child's comprehension of grammatical relationships and syntactic structures was tied to the environmental and behavioral contexts in which they were perceived. Semantic features related to developing syntactic structures were expressive of the individual child's experience. Bloom's model of language acquisition postulated that cognition was important in comprehending linguistic input, but did not attempt to explain how the child's previous experience, behavior, and knowledge of the world affected language performance.

The significance of Bloom's work is seen in moving away from the "sentence-centrism" of the research of the 1960s. The earlier emphasis on description of linguistic knowledge had resulted in a focus on acquisition of linguistic competence and failed to account for linguistic

behavior as seen in interaction between adult and child. Data confirmed the importance of syntactic development as the key to language acquisition, but questions remained regarding how the processes of learning and behavior might aid the acquisition of linguistic structure.

In proposing an alternate approach to the study of language as a conceptual and communicative system, Bever (1970) postulated that "the child must simultaneously acquire 'concrete' behavioral systems for actually talking and listening as well as an 'abstract' appreciation of linguistic structure itself' (p. 281). In his review of experimentation on adults' and children's knowledge of basic linguistic capacities, intuitions, and strategies of speech perception, Bever focused on the significance of rules to understand and generate an infinite number of novel utterances. Besides the rules of a grammar he called attention to the increased efficiency of perception and production as a result of behavioral strategies. He concluded that careful exploration of the effects of interaction of listening and prediction of potential adult sentences clearly indicates the grammar is learned in the course of language usage. "The discovery that certain aspects of language are based on mechanisms of perception, learning, and cognition provides us with a new puzzle about how they become intergrated in human communicative behavior" (p. 352).

According to Slobin (1973) the child's task in acquiring a language requires the ability to both understand physical and social events encoded in language as well as to process linguistic information. The development of grammar, therefore, must relate both to the meaning and to the form of spoken language.

> The child, equipped with an inherent definition of the general structure and function of language, goes about finding means for the expressions of those intentions by actively attempting to understand speech. That is to say, he must have preliminary internal structures for the assimilation of both linguistic and non-linguistic input. (p. 208)

Ervin-Tripp (1973) in proposing some strategies of early language learning referred to the prerequisites of language as environmental circumstances, cognitive development, and children's information storage. The ability to orient towards the signal was viewed as a necessary input condition to the acquisition of environmental knowledge. "The recurrence of signals at times of significance to the child, such as feeding, being changed, being held, being stimulated visually, may single out that channel be it sound or gesture, for special attention" (p. 205). Her belief that the co-occurrence of speech with referential events indicates that the language-mastering child must know the referent of a word in order for learning to occur. She stated that there need not be an isomorphic relationship of speech to observable objects, as evidence indicates children's interpretations of speech are more complex and do not

rely solely on the presence of an object. However, she believed a high proportion of verbal utterances "must refer to those relations, concrete objects, and events which are already attended to by the child" (p. 205). Additionally, the language of the environment as a necessary input to the language acquisition process must include recurring but limited vocabulary diversity used in multiple environments.

Goals of Study

This study was viewed as an exploratory inquiry into some ways the child develops understanding and meaningfully interprets the physical and social events in his environment.

The development of a linguistic system requires that the child notes syntactic devices (e.g., word order, structural relations, transformational rules, morphological inflections) which correlate with semantics. However, the acquisition of language must also be accompanied by the acquisition of communicatively effective skills. As Rees (1975) has indicated, communicative competence involves more than the production and comprehension of speech. The present inquiry must then broaden to include the appropriateness of the context, and social and role-playing skills of the speaker and listener. Within this framework, communication cannot be limited to the expression of language, but should also focus on the acquisition of the ability to extract

meaning from the non-verbal communication. Evidence clearly supports the thesis that the domain of non-verbal communication is a significant factor in verbal exchange (Birdwhistell, 1970).

Communicative competence is defined as the ability to express ideas appropriately in social interchange. Coupled with the linguistic skills necessary for verbal interaction, communicative competence implies the ability to influence the behavior of others. Determination of effective communication is observable in the ability of the speaker and listener to share a mutual code system, to extract meaning from each other and from the environment, and to ascribe intentions to the conversational exchange. The development of communicative competence is believed dependent on both the development of the ability to interpret meaning of the physical-social world and the acquisition of understanding of the semantic intentions of the participants. It may be that these abilities arise, in part, from participation in gestural communication.

Recent investigators have explored the functions of language, the "communicative intentions" (Dore, 1975, p. 37). Bruner (1975) in a report of beginning research into the uses of language stated his philosophy that critical to the understanding of how language is acquired is the understanding of the uses of language. He believes that

the acquisition of the structure of language functions as an instrument for regulating joint activity and joint attention. Therefore, he states, the initial uses of language must be understood in order to understand the acquisition process.

> Whatever the grammatical structure of the utterance, it is encoding a convention of request that the speaker must understand in some simpler, Non-Linguistic way before he is likely to comprehend or to use such utterances appropriately. (p. 3)

The purpose of this study was to identify the possible relationship between gestures and verbalizations in the development of communicative competence. Specifically, what does the mother do in the process of communicative exchange to assist the child in acquiring meaning about the world and to understand the intentions of the speaker?

It was hypothesized that adults contribute to communicative exchange with young children through gestural behavior. By pointing to objects, touching objects or people, emphasizing pantomimic and facial gestures, adults attempt to interpret the meaning of the physical-social environment. As the child becomes increasingly competent linguistically, the need for tangible reference to the environment is expected to decrease proportionally. To assess this hypothesis, verbal and non-verbal interaction was studied over a four-month period to determine if there was a quantitative and qualitative change in the nature of

dyad interaction. If, as believed, adults would use less directive gestural cues in communication over time, this change should also be reflected in expansion of the children's effectiveness in communicating through the linguistic mode.

A direct result of increased linguistic competence is anticipated in an increased length of the Conversational Unit--CU (a linguistic exchange of information regarding a single topic, uninterrupted by intrusion of another topic). Additionally, it was anticipated that gestural support of the CU would decrease over time.

CHAPTER I

REVIEW OF THE LITERATURE

Students of child language have frequently commented that gestural expression occurs prior to verbalization, or simultaneously with verbalization in young children. Stern (1971) referred in 1930 to an early diarist's observations, "Today he stood in the middle of the room and said as he pointed . . ." (p. 46). Tiedeman (1971) in 1927 referred to observation of his son's language acquisition, stating: "Whenver he met with anything novel or strange he would point his finger at it to call other people's attention to it" (p. 14). McCarthy (1965) reported that the concept of verbal language emerging from gesture was a widely accepted belief. More recently, Church (1965) observed that during the second half of the first year, children communicate wants by concrete re-enactment, e.g., extending their arms to communicate a desire to be picked up. Ervin-Tripp (1973) indicated that a listener may rely on non-linguistic cues (although not exclusively gestural) without fully processing a sentence. Not withstanding these observations, a paucity of information exists regarding what, if any, significance gestural communication plays in language acquisition.

Nature of Communicative Competence

In order to assess systematically the role of gesture in language acquisition, it is believed necessary to evaluate gesture in relation to communication. Communication is not limited to the linguistic system alone. The ability to exchange meaningful information effectively would also include the use of gestural and paralinguistic communication (Rees, 1975).

The development of communicative competence is believed to depend on conceptual development and the ability to express intentions. Focusing on how meaning is developed, MacNamara (1972) suggested a perceptual basis for its acquisition. He observed that children initially rely on perceptual cues to distinguish objects from the physical environment, and that this discrimination would precede naming of these entities. This viewpoint, however, would appear to preclude a child's ability to use words for which no concrete stimulus has previously been presented. A reliance solely on perceptual cues to extract meaning from the environment fails to explain the acquisition of non-concrete syntactic relationships expressive of meaning relationships.

Ervin-Tripp (1973) noted that gestural and paralinguistic discriminations occur prior to the use of identifiable words. She believes that these discriminations provide the basis for a child to discriminate the intentions

of the speaker. This writer is in agreement with these observations and believes it necessary to investigate how gesture is used to extract meaning.

Olson (1970) viewed the acquisition of semantics as based on the language user's knowledge of the world.

> Semantic theory necessarily involves the language user's non-linguistic knowledge by showing that choice of words in an utterance is a function of neither syntactic nor semantic restrictions, narrowly defined, but of the speaker's knowledge of referents. (p. 258)

Another view of the development of communicative skills can be found in the theoretical construct of the speech act (Searle, 1969). According to Searle, speech acts can be defined in the following manner:

> . . . acts such as making statements, giving commands, asking questions, making demands, and more abstractly acts such as referring and predicting . . . . (p. 16)

Further, he divided these acts into (1) the proposition, which refers to the information contained in the utterance, and (2) the illocutionary force of the utterance, which refers to how the utterance is to be taken or what the speaker's attitude is toward the proposition.

Dore (1974) asserted that the study of speech acts was essential in isolating both the meaning and intentions of linguistic exchange. In asking how speech acts develop, he proposed a framework for inquiry into the holophrastic stage of children's speech. Searle's construct of the speech act was applied to emerging language and termed the

Primitive Speech Act (PSA). Dore analyzed the PSA as being composed of a Referring Expression and a Primitive Force. In order to evaluate the development of the PSA, he identified each act based on the context of the utterance. His method of analysis focused on interpreting the meaning and intentions of the dyad's expressions as revealed by the total context of each utterance. While noting the accompanying gestural behavior, systematic inquiry into the specific function of gestural behavior was excluded.

The development of linguistic and communicative competence requires mastery of syntactic, semantic, environmental, and social skills. The child's task in acquiring a language is complex and multi-faceted. He is exposed to speech events from which he must develop rules capable of generating an infinite number of utterances. Confronted with the physical environment, he must extract meaning from it. Diverse attitudes about information being proposed and diverse functions of assertions must be understood and utilized for linguistic interchange. The present inquiry was undertaken to look at what factors in the interaction between mothers and children provide direct assistance to the acquisition of communicative competence. Understanding of the environment and knowledge about how to use it are believed essential in this process. Naturalistic study of the interaction between mothers and young children is

presumed to be a rich source of information regarding emerging language. If, as believed by some researchers, gestural communication provides a basis for linguistic exchange, then it appears necessary to assess the role of gesture in dyadic communication.

Studies of Gestural Communication

The functions of gesture in communication have long been recognized, however, it was not until Birdwhistell's (1952) work that formal study of non-verbal events was first initiated. The systematic study of kinesics deals with the relationship of movement to speech and the manner in which human beings communicate through body movement, gesture, posture, facial expression, and eye movements. Birdwhistell's methodology consisted of filming interaction sequences that would then be analyzed microkinesically in order to describe interpersonal communication. Analogous to the phoneme, he proposed the kineme (the smallest unit of perceivable action which may be mutually substitutable, without changing the general interactional sequence). The study of kinesics views gestures as consisting of kinemorphs (akin to allomorphs), which may have different contextual meanings (Birdwhistell, 1972).

Hayes (1964) revealed the following insight:

> . . . one must beware of the notion of the meaningfulness of gesture devoid of context. The "meaning" of a gesture must be viewed contextually in two senses: the situational context within a given cultural or

> subcultural setting, and the context provided by the paralinguistic, kinesic, and no doubt other as yet unanalyzed subsystematic material which may or may not be present. (p. 160)

The study of proxemics; study of the use of social and personal space, was utilized by Hall (1964) in explorations of interpersonal communications. How effectively people communicate, as well as the nature of their communicative intent, have been judged according to proximal and distal space relationships during interaction sequences. Close physical proximity was found to enhance communicative effectiveness, while distance and lack of eye contact have been interpreted to indicate a person's disinterest and withdrawal from communicative exchange. Sociologists and anthropologists using proxemics as a method to understand cultural patterns have determined that individuals tend to vary space relationships with conversation units. Bloom (1970) employed the concepts of proximal and distal space relationships of the children in relation to objects in coding the non-linguistic context of the utterance (see Bloom, 1970, Appendix B.2). Although her findings were not specifically reported, it would appear that the spatial immediacy of objects (Proximal, Distal, or Removed) provided part of the foundation for Bloom's explanation of functional categories of negation.

Mahl and Schulze (1964) noted that speaking behavior is determined by both the linguistic code and the speaker's

intention, a construct parallel to that of Searle, 1969. Divergence in these philosophies is seen in the emphasis the former investigators placed on extra-linguistic phenomena.

> . . . we need detailed psychological knowledge about particular children and particular child-parent-societal interactions to understand with any depth the interactive significance of extralinguistic phenomena. (p. 104)

Extra-linguistic phenomena would include kinesics, proxemics, and supra-segmental aspects of vocalization.

Psychiatric studies probably best reflect the study of kinesics and proxemics. An example is the study conducted by Robertson (1962). In this study observational recordings of 25 dyads in attendance at the Well-Baby Clinic during the previous four years were evaluated. Observable features of mothers' handling were assessed in regard to body tonus and the quantity and quality of child responsiveness. Judgments were then made related to physical and emotional development based on the quantity and quality of physical and gestural exchange. Results indicated that children whose physical development was normal and who were emotionally content had been exposed to greater fondling, physical play, and gestural contact during early development.

Studies of Verbal Interaction

Investigation of verbal interaction between mothers and their children have recently begun to focus on vocalizations during infancy. Relationships between mutual gazing

and mother-child vocalizations were hypothesized to be the precursor of adult conversational exchange (Stern and Jaffe, 1975). Studying protracted verbal exchanges of an infant (at ages one-three months) and mother, in terms of both acoustic and temporal characteristics, Bateson (1975) found that the vocalizations were symmetrical in content. This symmetry was represented by equivalent time intervals of vocalizations balanced by their alternation between mother and child. Analysis of timing and alternation of mother-child vocalizations established that these were jointly sustained social performances, analagous to later joint performances of games and conversation. Bateson concluded that the development of the ability to respond appropriately to social contexts precedes the acquisition of language.

Evidence from a variety of studies (Drach, et al., 1969; Broen, 1972; Snow, 1972; Phillips, 1973; Clarke-Stewart, 1973) has indicated that the speech of mothers to young children differs significantly from the speech of mothers to older children and to adults. Results have shown that the speech of mothers to young children was slow (with pauses employed at sentence boundaries), consisted of a limited vocabulary, and simple syntactic constructions. In addition, such speech was high in question forms, consisted of short utterances, and was very repetitive. Emphasis on the verbal input to young children has resulted in an

erroneous tendency to conclude (as did Snow, 1972) that this input is the only source of information about language to which young children are exposed.

On the other hand, Ervin-Tripp (1973) hypothesized that the repetitiveness of questions serves as a vehicle to aid children in discriminating questions. When either no response or an inappropriate response occurs, she postulated that greater repetition would be used by the mother. Ervin-Tripp states that the listener may rely on non-linguistic cues or on single words within an utterance, without fully processing the structure. If so, then new research must focus attention on non-linguistic expression of knowledge in the study of grammatical development.

Examples cited by Ervin-Tripp refer to data based on studies which have investigated functional categories of expression. One such category is the "Modality" of the utterance, referring to the contrast between asking, demanding, and commenting. "This difference may be signalled by gesture and paralinguistic features before identifiable words begin" (p. 210). As Dore (1973) and Bruner (1975) have also indicated, she concluded that problems for study must include the intentions of communication.

Carlson and Anisfield (1969) studied the language protocols of a two-year-old child and observed a clear distinction in the child's ability to use language for both

communicative and non-communicative purposes. An interesting aspect of his communicative speech was the use of eye contact or physical contact with these verbalizations. In interpreting their study, Friedlander (1970) noted that the child's emerging productive syntactic regularities appeared to be based on his listening experience combined with his observation of non-verbal cues.

In a study of "Receptive Language Development in Infancy" Friedlander (1970) pointed to the significance of evaluating the infant's role as listener in interaction. He viewed listening as a convergent system, constrained to processing the speech of others. Listening, from this perspective, is fundamentally designed to reconstruct what has been said. It operates progressively to more limited options of interpreting input. Speaking, in contrast, is seen by Freidlander as highly divergent. It is a generative system which is essentially unconstrained and subject to continual branching of novel utterances. Whereas the speaker has total freedom to control the message, Friedlander believes the listener's only options for controlling the speaker's selection of language elements are to indicate comprehension and non-comprehension, by word or gesture. Friedlander concluded that it seemed plausible that young children develop linguistic control signifying decreased reliance on supplementary non-verbal cues in comprehending a

spoken message. This would culminate in the ability to understand a spoken message when the elements of the context are contradictory.

In discussing "Cognitive-Linguistic" development Bloom et al. (1975) observed the importance of the child's acting on his environment and being able to observe others act in order to organize his experiences. "The sequence of linguistic development of semantic-syntactic relations appears to recapitulate the cycle of deriving knowledge of states from knowledge gained through action or the perception of movement" (p. 31). They found that the children in their study relied on supportive relevant action in order to express relations between objects and people or objects and objects. Acquisition of verbal agents was observed as the children accompanied their utterances with appropriate action.

Halliday's (1970) model of the functions of language postulated three basic functions of language involved in establishing meaning: the ideational function serving to express content and give structure to experience; the interpersonal function, through which social roles are expressed; and the textual function through which langauge is linked to the contexts of the situation. In addition, young children must obtain mastery of linguistic subfunctions, which Halliday hypothesized are hierarchial in development. Examples

of subfunctions are the following: Instrumental--"I want"; Regulatory--"Do as I tell you"; Interactional--"Me and you"; Personal--"Here I come"; Heuristic--"Tell me why."

Schmidt (1974), in application of Halliday's model, studied the speech of a 30-1/2 month old child. Data were collected over a four-day period by transcribing all linguistic expressions and noting the context of each utterance. Results indicated that Halliday's functional model of language could not be applied to a child beyond the holophrastic stage, due to multiple functions expressed in the two-word utterance. Schmidt asserted that many of the child's utterances could serve dissimilar functions simultaneously. "'Truck's broken' may be informative and regulatory at the same time, reporting an event and requesting action from a parent" (p. 361). In spite of the difficulty in analysis, Schmidt believes that language is partially the result of its uses based on the connecting links between structure and functional options. The child in this study had mastered a variety of verbal techniques to control the behavior of others. Evidence indicated his ability to assess his own aims in control, to decide on effective interpersonal attitudes for regulation of behavior, and to determine the nature of the argument to be used. The child variously asked, demanded, or cajoled, expressing different interpersonal attitudes. Schmidt believed that the child's

objectives were clear and the uses of his language reflected the options selected to strengthen a particular argument.

Friedlander et al. (1972) studied the natural home language environment of two one-year-old infants. Data were collected by use of daily time sampling on a continuous schedule for five out of every 20 minutes during the child's waking day for a period of one week. Results were analyzed to assess language interactions between parent and child. Non-interactive language (declaratives, imperatives, or fragments which did not generate a verbal response but were intended for behavioral control) represented significantly large proportions of conversation directed towards the children. The authors interpreted this finding as a reflection of family styles and attitudes towards child rearing. An alternate interpretation proposed by this writer is that "non interactive verbalization" are designed in part to express intentions of people and to assist in acquisition of social skills, without demanding a linguistic reply.

The exploration of interaction has also focused on the development of communicative competence involving subtle social and role-taking skills. The findings of Fraser and Robert (1975) confirmed previous data regarding the nature of verbal input to young children. Additionally, they stressed that betweeen 1-1/2 and 2-1/2 years of age, the most dramatic modifications occurred in the children's

speech. While use of attention and comprehension cues (both verbal and non-verbal) were of particular importance to the mother in communication, they appeared less often in the behavior of very young children.

Berko-Gleason (1973), in preliminary study of four- to eight-year-old children in a variety of speech situations, found that the language addressed to these children was primarily a language consisting of socialization rules. By this she meant that this teaching language is filled with social rules, including how to have a conversation, and is designed primarily to tell about the world. In a follow-up study of the speech between kindergarten children and the teacher and of the children to one another, Mishler (1975), in support of this hypothesis, contended that different ways of extending a conversation through questioning reflect the authority role of adults to children. He postulated that the adult retains control of conversation by specific use of acquired rules for conversation. Most apparent was the use of question chaining in which adult-initiated conversation was maintained by the adult use of questions based on the child's last response. In contrast, the speech between children showed little evidence of chaining.

Prior research cited above has noted the need for systematic analysis of both language and its potential uses. Research into the importance of the child's acquiring

knowledge about the world has tended to stress the acquisition of verbal forms as based on the ability to act upon objects or people in the environment. Studies of dyadic interaction have stressed the nature of the acoustic input in the acquisition of communicative competence. As a result, little exploration has been applied to the uses of gestural behavior and its relationship to verbal decoding and encoding.

Interactional Studies of Gesture and Verbalization

A study undertaken by Sugarman Bell (In Press) was designed to explore how preverbal children develop understanding and forms for their expression in order to develop communicative competence. The inquiry examined how children coordinate actions and vocalizations directed towards a person with actions directed towards an object. Four infants, initially four-five months of age, were observed during a five-month period to obtain spontaneous social-interactive behavior protocols. Results indicated that development consisted of a three-step sequence. Initially, the children used repetitive actions directed toward a person or object, with no discernible attempt to manipulate the environment. When differentiated actions directed toward person or object emerged, these were interpreted as attempts at environmental control. The final stage was observed as the emergence of integrated person-object activity. Coordination of object

pursuit and social focus in interpersonal expressions dominated. "In both the social and the physical maneuver, the child uses one means (pushing a stick, signalling to an adult) which produces another action (the approach of the object, or of the child to the object), leading the child to his goal" (p. 16).

Beckwith (1971, 1972) explored both physical and verbal contacts between mothers and infant children in naturalistic settings. Results indicated that the more the mothers talked about the ongoing behavior, the less the children vocalized. She observed that the more appropriate a mother's speech is to an infant's immediate behavior and wants the more she seemed to be able to stimulate in the infant a meaning for linguistic interchange. Changes in physical contact occurred over time. At Time I (7-9 months) physical contact was observed to serve a soothing function. At Time II (8-11 months), the physical contact was used more significantly for social interchange. Interpretation of the data was solely related to the frequency of behaviors based on written observations. There was no attempt either to isolate gestural function or to assess its relationship with verbal behavior.

Tulkin and Kagan (1972) combined aspects of kinesics and verbalizations in studying dyadic interaction in homes of differing social class backgrounds. Although viewing

both aspects of communication, they focused not on the possible relationship between the two modes, but rather on the differences between middle-class and lower-class homes. They concluded that minimal class differences existed in the affective elements of mother-child interaction. Larger differences occurred in the quantity of verbal interaction and cognitive stimulation. They believed that differences expressed social class parental perception of dependence. In the middle-class, child-centered home, greater verbal and gestural stimulation was observed. This was interpreted as a result of the mothers' concept of the infant and their presumed ability to stimulate and influence behavior. In lower-class homes, Tulkin and Kagan interpreted less frequent parental stimulation as reflecting a belief that verbal and gestural stimulation had limited influence on development.

Ling and Ling (1974) in a study of communicative interaction with children from 1 to 36 months, used time sampling techniques to study the relationship between various modes of interaction. Their findings, contradicting earlier evidence, indicated that mothers used complex sentences with almost equal frequency regardless of the children's age. Regarding gestural frequency, they noted that little use of gestural behavior was evident by either mothers or children and that there was "none among children

before their use of word approximations" (p. 156). This surprising finding regarding the incidence of gestural behavior raises the question as to how the preverbal and language learning child expresses intentions or acquires the ability to extract meaning from the environment. Implicit in this observation is the notion that when speech begins, the child spontaneously emerges with a system of understanding not previously demonstrated. They did indicate that mothers provided their children with opportunities to derive meaning from context, but failed to indicate how.

In contrast to Ling and Ling (1974), Escalona and Gorman (1971) and Eveloff (1971) both found frequent gestural events were utilized by both mothers and children to communicate prior to the emergence of linguistic forms in the child. Naturalistic observations conducted by Eveloff indicated an infant's ability, by ages 9-10 months, to globally understand simple spoken commands if they were accompanied by gesture. He viewed the mother's role as reflecting facets of reality by organized interpretation of the world both verbally and gesturally. Eveloff interpreted his data as showing that a child's development of gesture involved a progression from sign to symbolic meaning. Gestural behavior, like the social smile, was viewed as nondifferentiated behavior signifying the first stage of mutuality in language development. Later symbolic functions expressed by gesture

indicated comprehension of knowledge about the world. Escalona and Gorman observed two children in their home environments weekly from birth to age two. Data indicated frequent gestural behavior occurred very early in communicative exchange and frequently preceded linguistic expression. One of their subjects, at eight and a half months of age, had learned to indicate refusal by a headshaking gesture. The complementary verbal usage of "No" followed shortly after the specific functional gesture was operative.

Moerk (1974a) appropriately observes that research in child language has neglected the mother-child dyad, the situational variables, and individual differences in child development. In a series of interaction studies, Moerk (1972, 1974a, 1974b) postulated a theoretical framework for a multivariate analysis of verbal behavior. He noted elements of interaction as being linear (containing a single utterance and response by each member of a dyad) or circular episodes (in which the response is followed by a concluding comment by the member of the dyad who initiated the conversation). Moerk hypothesized that in the course of development, the interaction patterns would change. Initially, mothers were found to model the encoding of objects, activities, and situations for children by accompanying activities or facts about the environment with verbal descriptions. In the next stage, mothers prodded their children by using

questions. If the children did not respond, Moerk observed that mothers modelled both the question and the appropriate response. In the final stage, the child (age 5.0) spontaneously expressed events, processes, and activities to the mother. Results indicated that messages were frequently communicated non-verbally. Moerk stated that the frequency of non-verbal message communication can be explained as the linguistic demands are decreased, and non-verbal communication, therefore, becomes more economical. The child's use of non-verbal behavior for communication allows him to refer to new phenomena for which he may as yet not have appropriate linguistic forms. As language skills increase, it was proposed that a decrease or suppression of non-verbal communication would occur. A multivariate analysis is designed to assess the effects of the pragmatic and semantic aspects of the verbal stimuli. The pragmatic dimension is viewed as consisting of both person variables and variables of the behavior setting. Person variables include linguistic skills, cognitive competence, and the ability to use gestures to express meaning. Moerk concluded by postulating a hierarchy of development, in which, initially, all the child's communication is non-verbal. The second step, termed parallel encoding, occurs when the child verbally expresses an action or identifies something in the environment. Third, in verbal compelementization, the child's

non-verbal message is completed by an utterance, serving a complementary function. Finally, the verbal message assumes dominance and becomes increasingly more nearly sufficient for communication. Communicative efficiency is viewed by Moerk as increasing through this hierarchy to adulthood.

It would appear that the most significant study of interaction to date is that of Bruner (1975). He videotaped dyadic interaction of six subject pairs (7-13 months) monthly during feeding, bathing, and play situations. Subjects came to the laboratory, which had been constructed to re-create a home setting. Bruner's objective was to trace the development of fundamental concepts about actions and attention. Preliminary results indicated that the mother's initial interpretations of the children's behavior determined their consequent reactions. Two types of interpretations were observed. In one form, the infant's behavior was interpreted as an intention to carry out some action. Consequently, mothers saw their role as supporting the child to achieve an intended outcome. A second interpretation was that the child was trying to gain attention in order to find out about something rather than to do something. Bruner concluded that the structures of action and patterns of attention provide landmarks to interpret word order in initial grammar and that a concept of agent-action-object at the prelinguistic level aids the child in grasping linguistic

meaning. "The process is, of course, made possible by the presence of an interpreting adult who operates not so much as a corrector or reinforcer but rather as a provider, an expander, and idealizer of utterances while interacting with the child" (p. 17).

Summary

Recently, researchers have increasingly focused their attention on dyadic interaction in order to better understand the process of language acquisition. Bloom's (1970) important monograph demonstrated that the form and function of emerging language are inextricably tied to the context of the utterance. Her contribution, appropriately, drew attention to the need for further inquiry based on dyadic and environmental interactions. Review of the existing literature revealed that four basic paradigms determined the focus of investigations.

The study of kinesics and proxemics predates Bloom. The effects of movement and personal space on verbal utterances have been explored, although not necessarily as they affect the process of language acquisition. Recognizing that the gestural mode is an important parameter of communication, resulting research has focused on microkinesic analysis of message transmission (Kestenberg).[1]

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[1]Judith Kestenberg, 1975. Personal Communication.

Believing that the acoustic input is primary in interaction, some investigators have analyzed the content, structure, and differential styles of mothers' speech to young children in contrast to other age groups (Drach et al., 1969; Broen, 1972; Snow, 1972; Phillips, 1973; Clarke-Stewart, 1973). Friedlander (1972) investigated specific methods of verbal intercourse which mothers use to assist the acquisition process. Studies of the development of rules for discourse, role-taking skills, and conversational control in communicative interaction have been explored by Ervin-Tripp (1973), Berko Gleason (1974), and Mishler (1975).

The third paradigm stressed the significance of the functions of language (the message variables and personal intentions) and theoretical models of language usage have been proposed (Searle, 1969; Halliday, 1970). Application of these models to children's emerging language systems were employed by Schmidt (1974) and Dore (1974, 1975).

The fourth paradigm appears as an outgrowth of concern of the functional development of language. Recently, investigators have studied how children develop concepts of action from context: the ability to understand how people, objects, and processes interact in the environment. In this view, action contexts are presented as necessary precursors to linguistic development (Bloom et al., 1974; Bruner, 1975; Sugarmen Bell, in Press).

Despite the valuable information provided from these studies regarding interactional dimensions of communicative exchange, results have been fragmented. Implicit in each paradigm is the assumption that the specific aspect being investigated is the critical factor in the interaction process as it affects language acquisition. Whether it be gesture, syntax, functional uses, or action contexts, each is viewed as dominant. Investigators have included observations regarding gesture when studying verbal interactions; contextual descriptions have noted accompanying gestures; studies of gestural behavior have commented on the effects of gesture on the verbal exchange. In general, however, studies have not investigated both modes of communication simultaneously.

Both Moerk (1972, 1974a, 1974b) and Bruner (1975) have attempted more systematic inquiry into the relationship between the two, and yet have not explored the functional significance of gestural behavior.

The development of communicative competence allows the child to participate meaningfully in social and intellectual exchange. Not only must a child acquire linguistic skills, but by necessity, human communication demands the development of strategies to extract meaning from the environment, intentions of the speaker, role-taking skills, and the ability to recall and store both linguistic and

non-linguistic information. A holistic approach is necessary to avoid the previous fragmentation of studies of communicative interaction. Assuming that gesture plays a role in acquisition of meaning about the environment is inadequate. Systematic inquiry into the nature of gesture is needed to begin to understand its role in communication. As functions of verbal categories have been isolated in the linguistic performance of emerging language systems (Bloom, 1970), it appears necessary to investigate whether or not gestural behavior also has functional parameters to assist the acquisition of communicative competence. This present study was designed as an exploratory assessment of both verbal and non-verbal dyadic interaction. There are many unresolved questions concerning dyadic exchange and its significance in language development. It was hypothesized that study of both modalities of communicative interchange would result in greater insight into the acquisition process. This present study examined the functions of verbal and gestural behavior used by mothers and young children. The inquiry looked at how gestures are used to assist in the acquisition of meaning; whether gestures serve similar functions for both mothers and children; and what, if any, relationships exists between gestural behavior and acquisition of linguistic skills. This exploratory evaluation of the development of communicative competence investigated

interactive behavior over time to assess the possible changes in functional use of both modalities of communication.

CHAPTER II

METHODOLOGY

Plan of Study

A longitudinal study of three mother-child subject pairs was undertaken to observe non-structured spontaneous communication. Sound films were taken once a month over a four-month period during regular bathing and feeding events in the home of each dyad.

Results of the pilot study indicated that maximal spontaneity of communicative exchange existed during these caretaking tasks. Therefore these events were selected for study.

Audio and typed transcripts of the interaction protocols were prepared. The data were analyzed in terms of the frequency of occurrence and functional expression in both gestural and verbal modalities over time.

Rationale for Method

Studies of interaction have attempted to assess behavior mainly in naturalistic settings. However, problems of reliability of naturalistic observation, observer and instrumentation effect on spontaneous interactions, and methods of classifying behaviors have been reported in the literature.

Problems of objective quantification have underscored the methods used in data collection. The ecological approach of Barker and Wright (1955) placed observers in the homes of subjects for extended periods of daily observations. Observers were encouraged to make interpretative comments of the interactional exchange based on handwritten descriptions of verbal behavior described within the context of the utterance. The lack of permanent records (audio, video, or film) precluded objective study of contextual and gestural events.

Reaction to the observer and observer bias have often intruded on naturalistic study. The literature concerned with subjects' reactions to an observer is contradictory (Johnson and Bolstad, 1973, p. 39). However, evidence does lend support to subjects' abilities to adapt to observer and instrumentation presence, and particularly to the ability of young children to demonstrate minimal reactive effects (Barker and Wright, 1955).

Controversy exists regarding time or event sampling in interactional study. A time sample refers to a preselected unit of time for observation with a fixed interval of non-observed time between samples. Ling and Ling (1974), for example, collected their data by means of time sampling, in which one-second observations were made every thirty seconds for each consecutive hour until 100 observations were completed.

The value of observation during a concentrated time sequence would be the ability to focus on specific behaviors and eliminate extraneous behavior when little or no one-to-one interaction occurs. It would appear necessary, in order to study interaction, to observe continuous behavior during a concentrated time sequence, rather than using the method of time sampling (Condon and Oston, 1971). This writer believed that the arbitrary delineation of a time segment would diminish the potential for drawing inferences about the interaction process.

An attempt to minimize subjective assessments by observers has resulted in the development of checklists of discrete behavioral categories. Used in event sampling (data collected in a specific observation of an event) preselected response categories are utilized to determine measures of frequency and duration. This procedure is believed able to produce precise and absolute data (Hutt and Hutt, 1970).

Checklists are also utilized in time-sampling procedures (Ling and Ling, 1974). Hutt and Hutt (1970) stated that ample evidence exists for repeated time samples being representative of behavioral patterns. Condon and Oston (1971) found that their initial plan to isolate discrete behavioral units had to be altered in order to focus on patterns of change. Filmed data of dyads, studied by time and

motion analysis, revealed a process of interaction rather than discrete behavioral units.

Patterson and Cobb (1971) developed a method of recording an extensive list of behavior by coding events. Observers were systematically trained to specify all behavioral events by code letter (indicative of behaviors), numbers (indicative of person acting), and arrows (indicative of direction of behavior towards another). The extensive time needed for adequate training in these procedures appears to be a negative factor in the efficiency of the coding system.

Kagan et al. (1969) similarly utilized a method of coding behaviors. Audio tapes of play situations between mothers and children were collected in a laboratory setting. These were supplemented by descriptions of coded non-linguistic behaviors simultaneously recorded from an observation room.

Still another approach was developed by Santostefano (1968). He proposed that miniature situations would be productive in studying interaction. Observers invited individuals to act upon objects. Events were coded according to the initiator, the receiver of action (i.e., mother, child, object), simultaneity of action, and separateness or mutual exchange of objects.

Rationale for Population Sample

Moerk (1974) used a cross-sectional design in studying child-mother interaction. The population for his study consisted of one protocol for each of five subjects (ranging in age from 1.8 to 5.0 years). However, by using five different dyads for study, Moerk was unable to isolate specific differences in the linguistic and non-linguistic behavioral patterns of each. It was assumed that a longitudinal study of three subject pairs, as used in this present inquiry, would provide more valid information.

Further, Moerk's data were obtained by tape-recording all language behavior during a one-hour observation period. Observers were instructed to describe as completely as possible all the accompanying non-verbal behavior of the mother and child during the observation period. Moerk[2] has indicated that because of the failure to use audiovisual methods, his findings "could not be complete; and quantitative comparisons of verbal and non-verbal message transmission were not possible."

Pilot Study

Prior to the initiation of this study extensive piloting was undertaken to assess the feasibility of the method and to isolate gestural functions. The two subject

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[2]E. Moerk, 1975. Personal Communication.

pairs of the pilot study were from different families from those finally selected for the study, but were the same chronological age and sex. Films were taken of generalized mother-child interactions, including caretaking events of bathing and feeding, within the homes. There was a noticeable degree of awareness of the observer during free play situations. This was particularly apparent with the mothers who tried to elicit specific verbal performances from their children. In contrast, during bathing and feeding events, as anticipated, the focus of the interaction became the task, and the communicative interaction was relatively free of observer interference. It was, therefore, decided to film these specific events for the actual study.

Additionally, gestural events were isolated based on the films collected during the pilot study. Combining the intuitive expectations of this investigator with the observed gestural events and their functions, a typology of gestural function was developed (see Appendix B). The pilot study also served to provide comfortable knowledge of the instrumentation and to aid in identifying potential problems.

Instrumentation

The instrumentation for this study was the KODAK Ektasound 130 Movie Camera. It was selected for its compactness, minimal interference from ambient noise, synchronous audio-visual fidelity, and potential for quality

reproduction without additional lighting. A Grundig Model C 215 tape recorder was used to produce audio tapes from the sound track of the films in order to prepare transcripts of the data.

Population

The study began in March of 1975 and was completed early July, 1975. The population consisted of three dyads. The children, Peter, David, and Reno (all first-born male singletons) ranged in age from 19 months to 23 months at the initiation of the project. Although the psychiatric literature has often suggested that qualitative differences exist between mother-son and mother-daughter interactions, the psycholinguistic literature has not isolated reliable sex differences in language acquisition. However, to avoid possible confounding of affective variables, the sex variable was held constant in this present study.

All three families were college-educated white middle-class residents of suburban communities. Peter's father was a resident in child psychiatry. Reno's father had an M.S. in electrical engineering. His mother had an M.A. in Special Education and had taught for several years prior to his birth. The mothers ranged in age from 26 to 33 years and were not working outside the home at the time of this study. Their main responsibilities were child rearing and homemaking. Initial contact with these families

was established through a pediatrician and a graduate student in speech pathology.

Methods

Sound films were taken of each dyad during bathing and feeding events, once a month. Each event sample (i.e., bathing or feeding) represented three, three-minute consecutively filmed samples, resulting in eighteen minutes of filmed data per dyad at each time period. To obtain reliable samplings for a time period, the subjects were visited on two consecutive days within a time period. Event samples of nine minutes each of bathing and feeding segments were filmed on successive days. An additional three-minute control, e.g., bathing sample filmed of the alternative activity (i.e., feeding), was collected on the day the nine-minute event sample was filmed. As the intent was to be as unobtrusive as possible and not upset the household routine, specific time for data collection was determined by each mother. With both Peter and David, filmings were done in the evenings for the children's evening baths and suppertime. Peter's routine included a bath after dinner; David was bathed prior to his evening meal. As Reno was bathed after breakfast, data collection for this dyad represented breakfast followed by bath time. The sample for Reno at Time I consisted of supper and the following morning's bathtime.

Nature of Observer Interaction

To potentially minimize effects of observer presence, the observer became familiar to both mother and child by frequent visits prior to actual filming. A requisite factor for attainment of sponteneity was assumed to be the accepted presence of the observer as part of the day's routine. This demanded time and involvement with the members of the dyad other than the proscribed filming sessions. Each twelve-minute film sample per day (nine minutes of either bathing or feeding plus a three-minute control film of the alternate activity) represented a sample of a total one and one-half to two-hour observation time within the home. Time other than direct filming was involved with conversation, informal play, and observation of each member of the pair seperately and together. This observational time, although un-recorded, provided intuitive support for the validity of the filmed sample. In addition, each child developed his own routine regarding preparation of the film for the camera and this fixed ritualistic game helped to further adaptation to the presence of the instrument. Their assistance in preparation of the film and loading of the camera became the procedure immediately associated with the observer's arrival.

Mothers were informed that the focus of the study was the nature of emerging language. They were told to pursue their normal routine and not attempt to elicit any

particular language from their children. Prior to the formal beginnings of the study, a "dry run" was held to help acclimate the participants to the observer. The mothers were also reassured that their children were not being compared vis-à-vis their linguistic prowess or behavioral patterns, but rather that the concern was how each child acquired language by interacting with his environment. During actual filming, the observer never initiated conversation but if the child addressed her directly by gesture or verbalization, she would respond.

Procedures for Analysis

Preparation and Reliability of Transcripts

The sound track of the filmed data was transferred to audio tape and then written transcripts representing each nine-minute segment were prepared. By then reviewing the films, it was possible to isolate the parallel gesture for each verbal event. Final typewritten transcripts showing both verbalizations and parallel gesture were prepared. Reliability of the transcripts was obtained by having another observer (a graduate student in speech pathology) prepare randomly selected portions of written transcripts of verbalizations and gesture. As this same observer later also timed conversation units (see p. 50), this was a double check on the reliability of the verbalizations. Reliability was 95%.

Quantitative Analysis

A Frequency Scale of verbal and non-verbal behaviors was devised. Particular categories were established based on the intuitive hypotheses of this investigator and observations resulting from the pilot study. The ability to isolate behaviors determined their inclusion as discrete units. Verbal behaviors included items such as two-word utterances, complete sentences, and modality of the utterance. Specific motor activities and attending behavior were incorporated into the gestural category (see Appendix A). After studying the data from Time I, initial categories were either confirmed or modified, but no additions to the behavioral categories were made. Forms used by Ling[3] were also evaluated and adapted where appropriate.

Reliability Evaluation

Three judges were selected to observe the films and rate the frequency of occurrence of behaviors according to the Frequency Scale of Interactive Behavior, presented in Appendix A. Two of the judges hold an M.A. in speech pathology, the third a B.A. in speech pathology. They were told that the study was concerned with the interaction between mothers and children in early language acquisition.

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[3]Daniel Ling, 1975. Personal Communication.

Six training sessions, of two to three hours each, were instituted prior to the initiation of the judge's evaluation, in order to obtain at least 90% reliability of pilot film observations. During training, each three-minute segment was viewed in its entirety, and ratings were done immediately after during the second viewing.

In the actual judging of the subject pairs in this study, each three-minute segment was presented only once and ratings were established during this presentation. Judges rotated in observing one of the members of the dyad for each three-minute segment of the nine-minute total event sample. In this way, there were two observations of each child and one of the mother per segment, and the reverse for each new segment. This method made it possible to obtain inter-judge reliability scores. Intra-judge reliability scores were obtained by having each judge individually re-rate randomly selected film segments at a later date. Comparisons resulted in 100% intra-judge reliability. Inter-judge reliability measures were determined by computing the number of agreements between two observers in recording the occurrence of a particular category of behavior, divided by the number of agreements plus disagreements in recording each occurrence (O'Leary and Kent, 1973, p. 28) (see Chapter III, pp. 53-54).

Qualitative Analysis

Gestural. The development of a typology of gestural function was based on observations of gestural function obtained from the pilot study (see Appendix B--Definition of Terms). It was hypothesized that similar motor acts may express different communicative functions. As with verbalizations, discrete gestural functions then could be isolated according to these categories. Gestures intending a communicative function as well as functionally non-communicative gestures were included. Communicative gestures were defined as gestures designed to elicit a response from another person. Included in the typology were categories of gestures which took notice of persons, objects, or events in the environment; effected change on, or demanded change from objects or persons in the environment. Non-communicative gestures, in contrast, were not directed towards nor requested a behavioral response from the other member of the dyad. This typology was viewed as an exploratory assessment of early gestural function.

Analysis of gestural function was initially performed on the individual care-taking events for each time period sample. As both events yielded similar results, final analysis represented a combination of both bathing and feeding.

Frequency of occurrence of gestural categories was separately determined for each mother and child for each

time period. Additionally, percentages of verbalizations associated with each gestural category were determined. Only those verbalizations interpreted as directly associated with the observed gestural behavior were included for percentage calculations.

Verbal function analysis. The establishment of verbal functional categories was adapted from Brown (1974). As with functional gestural categories, the frequency of occurrence of the child's verbal functions was analyzed by combining both feeding and bathing samples and computed for each time period. Gestural events directly supporting particular verbalizations were analyzed in terms of their percentage of occurrence for each category. Both gestural and verbal categorical events were evaluated within each time period as well as comparative analyses over time. A graduate student in Speech Pathology analyzed random samples of both gestural and verbal profiles. Comparisons with this investigator resulted in 95% reliability.

Conversational Units

A Conversational Unit (CU) was defined as a verbal interaction focusing on one topic; it may include pauses in the conversation but excludes comment or conversation on another topic intruding within the unit. The investigator identified each CU on the transcripts. Audio tapes of the

data were then timed according to the established CU by a graduate student in Speech Pathology. There were few instances of disagreement regarding the beginning and end of each CU, and these were resolved by discussion until agreement was reached.

CU time analysis. Comparisons of the length of the CU were made between dyads for each time period. Subsequent inter-subject and intra-subject comparisons were computed.

A mean length of CU time (MLCU) was obtained for each dyad across time.

Initiation of CU. It was believed that an interesting factor in assessing communicative competence would be the identification of who initiated the CU. The growth of the child's linguistic competence should be reflected in his interest and ability to initiate and maintain conversation for communicative purposes.

Therefore, identification of the primary speaker of the CU was determined for all data. The MLCU was computed for those CUs initiated by the mother and for those initiated by the child. MLCU comparative analysis assessed changes over time for each participant in the study.

Tense changes present in CU analysis. Brown (1974) has reported that children's early telegraphic utterances are not inflected for tense. Children with a MLU (Mean

Length of Utterance) of 2.25 morphemes (characterized by Brown as Stage II of grammatical acquisition) are demonstrating initial abilities to inflect the verb and modify it with auxiliaries. Slobin (1971) believes that the child has semantic intentions prior to the time he is able to express the meanings linguistically. Parental responses, even when the child is using unmarked verbs, indicate interpretation of semantic intentions, particularly to the immediate past or the child's intentions for future events. These responses by adults lend support to Slobin's assertions. It remains to be demonstrated whether or not the child at this time period has the communicative competence to deal with topics about the past or future. In order to answer this question, identification of topic time of the event of CUs was isolated. Results were arrived at by determining the topic time event as initiated by each speaker. Comparative study of each subject over time, as well as between participants, was performed.

Gestural support of the CU. The focus of this investigation was the role of gesture in the acquisition of communicative competence. Assessment of the use of gesture in conversation was applied to CU analysis. Previous investigators (Bateson, 1975) have indicated the difficulty in isolating the initiation of non-verbal events. As the CU has been defined by nature of the conversational topic, this

problem bears no relevance to the present study. Instead, gestural support of the CU was evaluated in terms of its use as support for the topic by either member of the dyad. If the main gestural behavior was directly supportive of the CU topic, it was noted, even if there were extraneous gestures that were not topic related. If, however, mainly random gestures not providing topic support occurred during the CU, these were not counted as gesturally supported CUs. Percentages of gesturally supported CUs were computed for each subject pair over time as well as comparative analysis among the dyads.

CHAPTER III

RESULTS

Data from the present study indicated that gesture is used to assist the child in acquiring meaning from the environment. These results should not be interpreted to mean that gestural knowledge is a necessary prerequisite to the development of linguistic competence. Rather, gestural behavior may serve as an aid in this acquisition process. The presented methods of evaluating gestural function have been developed to assess its role during communicative interaction.

All statistical results were obtained by using the chi-square statistic. Unless specifically noted, the .05 level of confidence was used to ascertain significance.

Results of Frequency Analysis

Reliability

Results of judges' ratings of frequency counts of verbal and non-verbal behavior provided data for a reliability assessment. There were three judges who viewed the films in order to obtain ratings of frequency of occurrence of events. Alternation of observation of individual members of the dyad resulted in two judges viewing each three-minute

segment (see p. 47). Measures of 93% agreement for frequency of occurrence of verbal behaviors and 89% for non-verbal behaviors were obtained.

Table 1 represents a composite of the reliability scores of the judges' ratings for both verbal and non-verbal behaviors for all time periods, combining maternal and child behavior. Table 2 represents inter-judge reliability scores. The means in the last column indicate the average inter-judge reliability score for each aspect of frequency analysis. Information entered in the last row is the mean of inter-judge reliability. The percentage score in each box represents the cross reliability measure of two judges for each assessed frequency parameter.

Results from Frequency Scale of Behaviors

Table 3 indicates the absolute number of verbal and gestural behaviors observed at each time period for each person studied, as obtained from tabulation of the judges' rating on the Frequency Scale of Interaction. The last column represents the sum of behaviors across time.

The similarity of the patterns of the distribution of the children's verbal behavior over time was assessed by two-way chi-square analysis. Significant distributional differences existed for their patterns of verbal frequencies with the greatest deviation occurring at Time III.

TABLE 1

Reliability of Judges' Ratings of Frequency of Behaviors

Function	Person	Percentage Score	Mean
Verbal	Reno	.94	
	David	.96	
	Peter	.87	
			.92
Verbal	R. Mother	.93	
	D. Mother	.93	
	P. Mother	.93	
			.93
Non-Verbal	Reno	.93	
	David	.91	
	Peter	.85	
			.89
Non-Verbal	R. Mother	.92	
	D. Mother	.79	
	P. Mother	.88	
			.86

TABLE 2

Inter-Judge Reliability Ratings

Function	Judge	1	2	3	Mean
Child-Verbal	1			.97	
	2	.95			
	3		.93		
					.95
Mother-Verbal	1			.92	
	2	.94			
	3		.96		
					.94
Child-Non-verbal	1			.91	
	2	.82			
	3		.94		
					.89
Mother-Non-verbal	1			.89	
	2	.92			
	3		.90		
					.89
Mean		.91	.94	.92	

TABLE 3

Frequency of Verbal and Gestural Events over Time

Function	Person	Time I	Time II	Time III	Time IV	Total
Verbal	Reno	142	153	209	151	655
	David	124	134	167	132	557
	Peter	171	183	212	160	726
	R. Mother	201	236	163	223	823
	D. Mother	170	262	249	248	929
	P. Mother	155	176	188	175	694
Non-Verbal	Reno	97	117	110	97	421
	David	110	109	84	75	338
	Peter	128	130	134	103	495
	R. Mother	66	86	58	68	278
	D. Mother	61	60	42	65	228
	P. Mother	64	61	40	51	216

Analysis of gestural behavior for all the children across time indicated similar patterns of distribution. In general, although all the children's gestural behavior decreased over time (see Table 3), assessment of each child showed that only David's spread of gestural behavior was significantly different during the period of study. David's sharp decrease of gestural use from 110 tallied events at Time I to 75 at Time IV accounted for the significance.

In contrast with the children, maternal frequency of verbal behavior had significant distributional differences over time as indicated by two-way chi-square analysis. Reno's mother increased her verbalizations from Times I to II, decreased by 73 occurrences at Time III, and increased with 60 more verbalizations at Time IV. The pattern for David's mother was significantly different, with an increase of 92 verbalizations from Times I to II, and at Times III and IV verbal frequency plateaued. Peter's mother's verbalizations were less variable with no more than 30 additional verbalizations with a low count of 155 at Time I and a high at Time III of 188 events.

Analysis of each mother's verbal frequency resulted in the finding of significant distributional differences for both Reno's and David's mothers. A decrease of verbal frequency by 73 events at Time III for Reno's mother was observed. At Time IV she increased her verbal behavior by

60 events as seen in Table 3. A low occurrence of 170 verbalizations at Time I and a sharp increase to 262 at Time II accounted for the variability of David's mother's pattern. Peter's mother showed little variation across time periods.

As with the children, two-way chi-square analysis of the mother's pattern of frequency of gestural behavior resulted in similar patterns of distribution across time. Similarities of distribution of each mother's gestural pattern also existed during the period of study.

Relationships between the Frequency of Mother-Child Verbal and Gestural Patterns of Communication

Verbal frequency relationship. Examination of the frequency data illustrated in Fig. 1 reveals that definite relationships exist between the amount of a mother's verbal behavior and the subsequent amount of her child's verbalizations. In general, the data revealed that excessive maternal verbalizations result in a decrease of the amount of children's verbalizations, and conversely, that children are more verbal when their mothers are less so.

Support for the belief that maternal verbal frequency is inversely related to the child's may be found in the data displayed in Table 3. Although Peter's mother was the least verbal of the mothers in the study (a total of 694 verbal events), Peter was the most verbal child with a total of

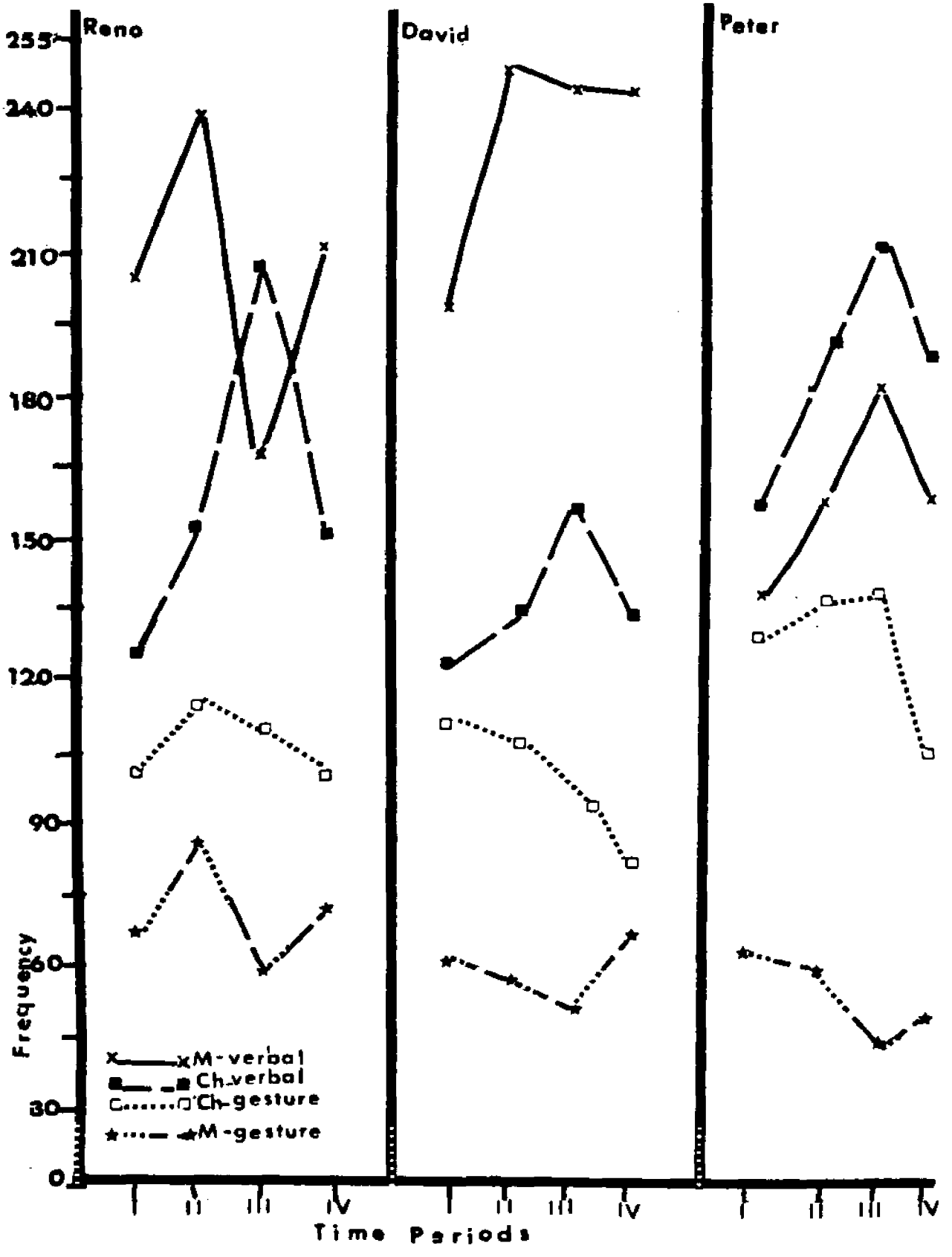


Fig. 1. Relationship between frequency of verbalizations and gesture for each dyad.

726 verbal occurrences tallied. In contrast, David's mother, the most verbal, had 929 total counts, and her son was the least verbal of the three children, verbalizing a total of 557 times during the study. Reno's mother's total verbalizations were tallied at 823, and Reno had a total frequency of 655 verbal events across time.

When comparison of the frequency of dyad verbal behavior was assessed over time, two-way chi-square analysis revealed significant differences. Although the children's patterns of distribution of verbal frequency were similar, significant differences did exist for the mothers (see p. 58).

As indicated in Fig. 1, Time III represented the peak of verbal frequency for all the children. Evidence for the direct effect of maternal verbal frequency on a child's verbal frequency is illustrated by Reno and his mother at Time III, the only time period in which his verbalizations exceeded hers (209 compared to 163). A decrease of 73 verbal events by Reno's mother from Time II to Time III was complemented by 46 more verbalizations by Reno from Time II to Time III. At Time IV, the difference was 72 events, with his mother's verbalizations again more frequent than Reno's. The distributional pattern of verbal frequency was found to be significant only for Reno and his mother when each dyad was compared (two-way chi-square).

Between David and his mother, the dramatic effects of a mother's verbal frequency on her child's verbal behavior are illustrated in Fig. 1. As indicated above, this was the most verbal of the mothers studied, whereas David was the least verbal of the children. David's mother exceeded her son by a total of 372 more verbalizations during the study while Reno's mother's total verbal behaviors were 168 more than her son's. David and his mother's differential pattern of distribution approached significance, $p < .10$. Of interest at Time III is David's increase of 43 verbal behaviors from the previous time period. This increase was viewed in relationship to his mother's slight decrease in verbalizations from Time II and eventual plateau at Time IV as illustrated in Fig. 1, and further supports the presumed frequency relationship.

Although no significant differences existed between Peter and his mother by a two-way chi-square analysis, examination of Fig. 1 is supportive to the thesis that children are more verbal when their mothers are less so. The pattern of verbal frequency for Peter and his mother are very similar. Increased verbal behavior by each at Time III was viewed in terms of the mother's increased response to her child's increased verbalizations. This pattern will be discussed more fully in Chapter IV.

Gestural frequency relationships. Unlike verbal behavior, in general, all the children decreased gestural behavior over time. Fig. 1 also indicates that the children's gestural behavior exceeded their mother's at all time periods. Discussion of results supporting the hypothesis that with increased linguistic skill, gestural behavior decreases will be found in Chapter IV. Of interest, at Time IV, is that all mothers increased their gestural behavior at this time period. Increases of 10, 23, and 11 gestures for Reno's, David's, and Peter's mother respectively were noted from Time III to Time IV (see Fig. 1).

Two-way chi-square analysis of patterns of gestural behavior when each of the three dyads was compared over time revealed that significant differences existed. When each dyad was assessed individually (two-way chi-square), only Reno's data indicated similar distributional patterning with his mother. For Peter, a slight increase of gestural behavior to a tally of 134 events at Time III was followed at Time IV by a decrease of 31 occurrences. His mother's slow decrease from Times I to II (64-61) was followed by a sharp decline of 21 events at Time III and then an increase at Time IV to 51 gestural incidents (see Fig. 1). Where David's pattern of gestural behavior demonstrated a steady decline across time (from 110-75) as seen in Fig. 1, his mother

evidenced a parallel decline through Time III. However, observations of 65 gestures at Time IV represented an increase of 23 from Time III and four more than had occurred at Time I.

Results of Functional Analysis

Gestural Behavior of the Children

Analysis of the children's gestural behavior according to the functional typology of gestures presented in Appendix B resulted in the finding that non-verbal behavior is used by the language-learning child to express a diversity of functions. Further, evidence from this study indicates that functions of gestural expression change over time. As noted above, gestural behavior decreased with the emergence of linguistic skills. Further interpretation of the specific relationship found to exist between functional modes of gestural and verbal communication will be found in Chapter IV.

Fig. 2 (a-c) indicates the frequencies of gestural functions across time periods for all the children. For computational purposes, both Non-Communicative and Non-Communicative Object Manipulation gestures were combined into one category. The figures on the ordinate of Fig. 2 are the absolute numbers of occurrence of gestural events.

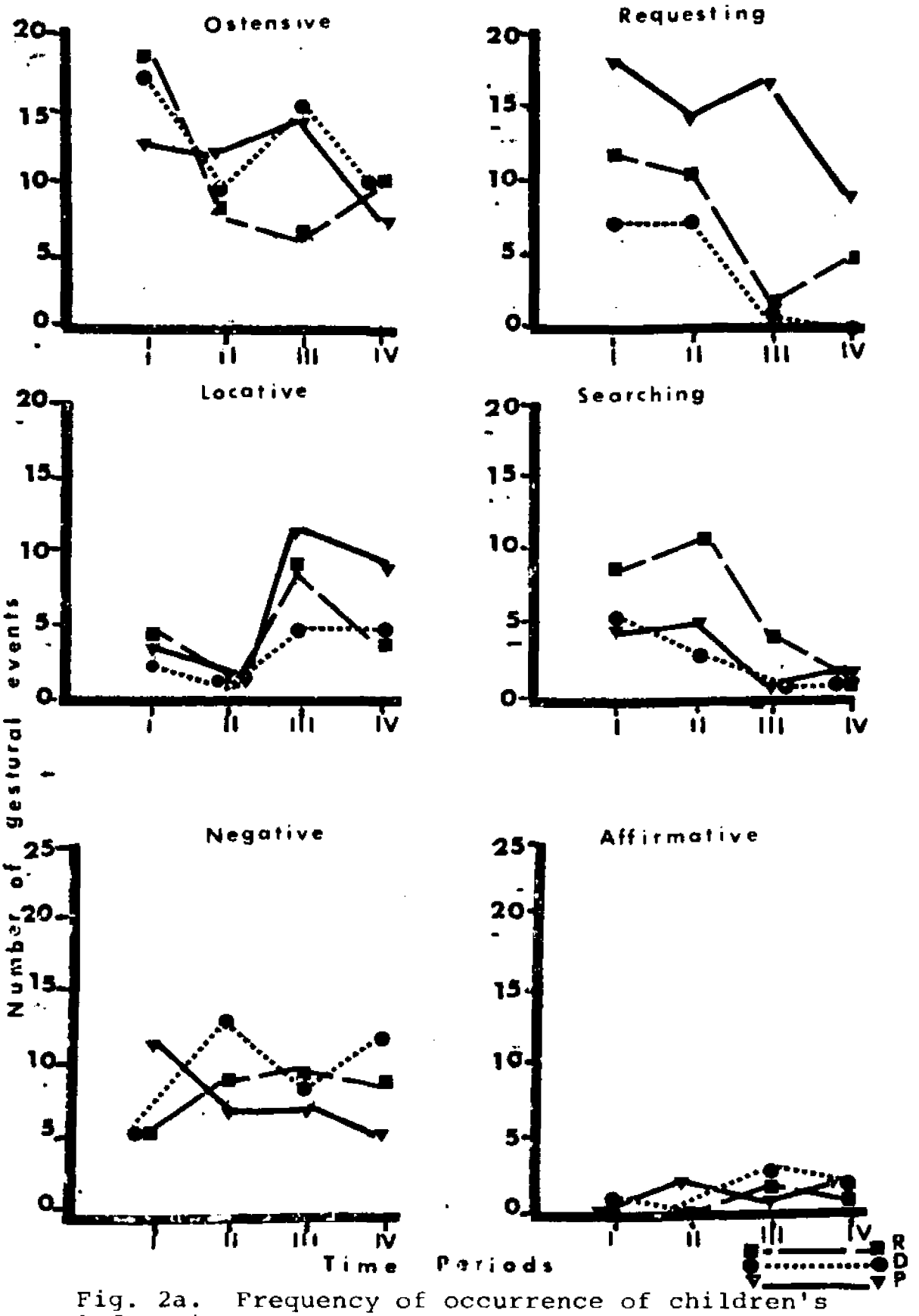


Fig. 2a. Frequency of occurrence of children's gestural functions across time.

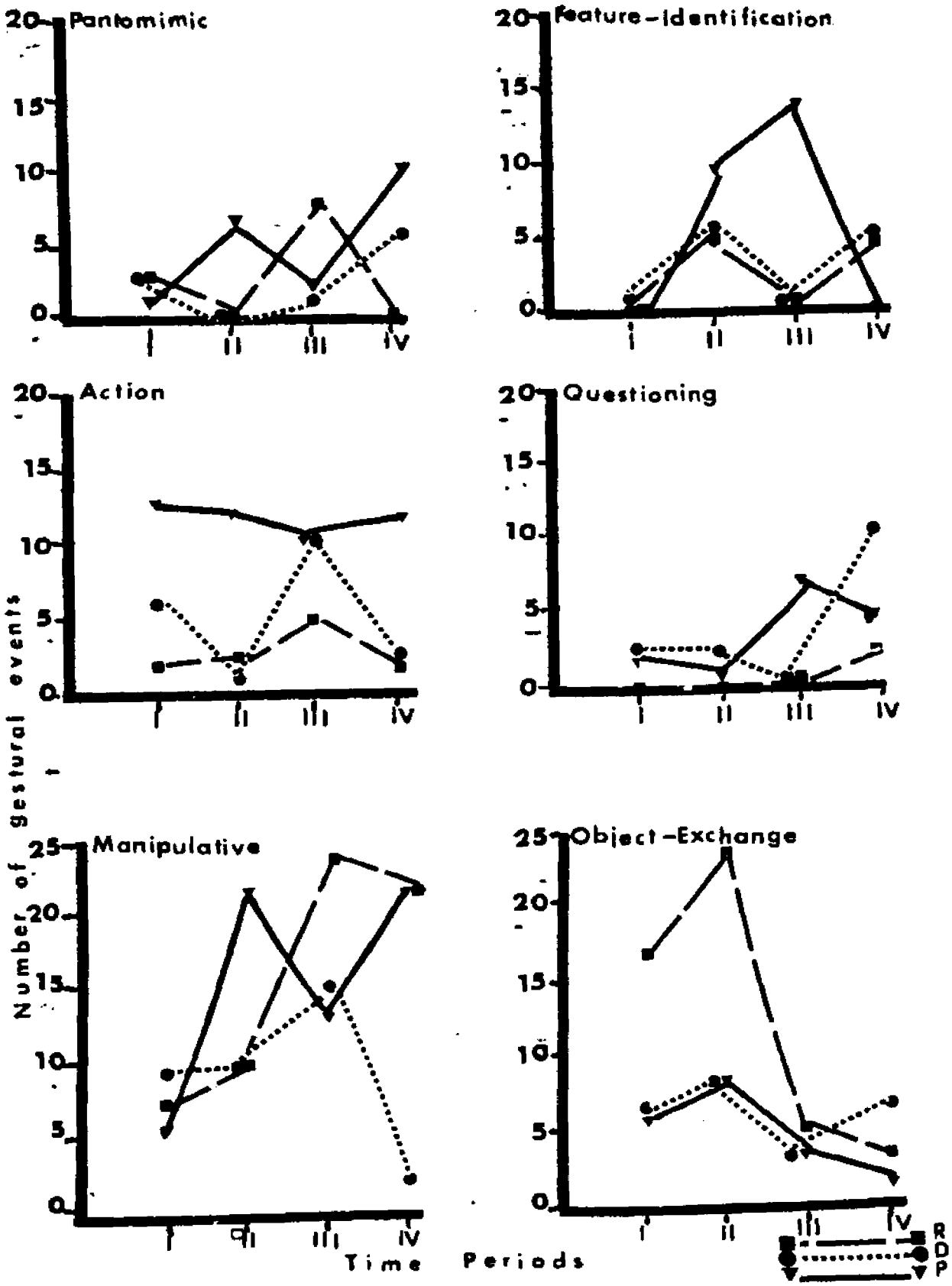
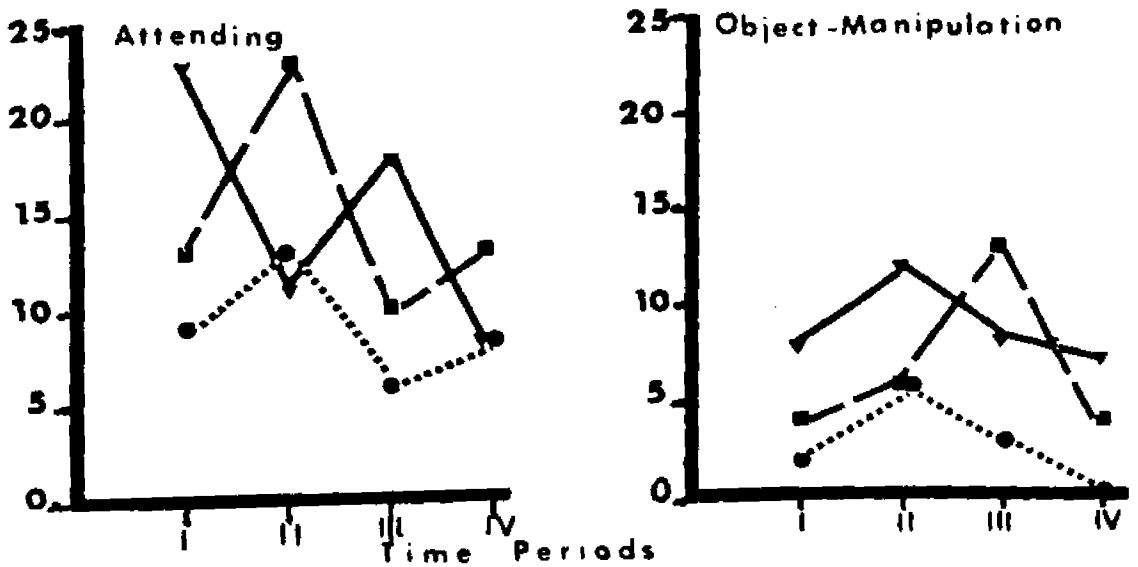


Fig. 2b. Frequency of occurrence of children's gestural functions across time.



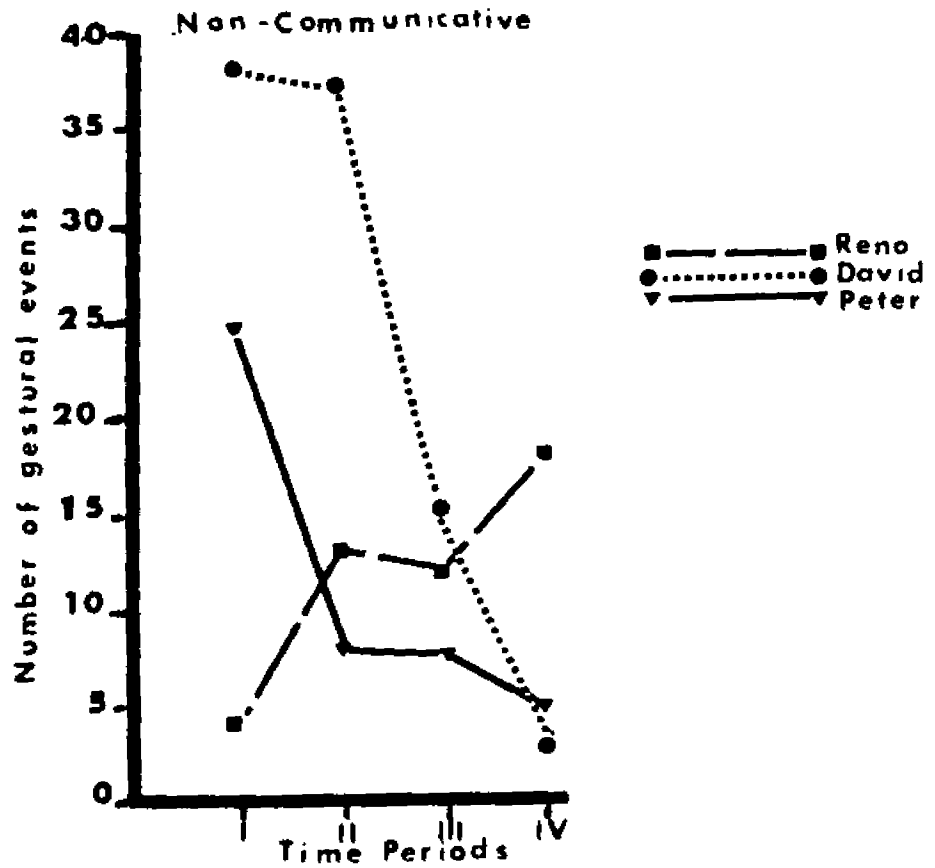


Fig. 2c. Frequency of occurrence of children's gestural functions across time.

Distribution of Gestural Functions across Time

By means of a two-way chi-square analysis of the children's patterns of gestural functional behavior, similarities in distribution were found to exist in the following categories: Ostensive, Locative, Negative, Affirmative, Action, Manipulative, Object-Exchange, and Attending functions. Significant distributional differences for all the children (two-way chi-square) existed in the categories of Questioning, Pantomimic, Feature-Identification, Requesting, Searching, and Non-Communicative gestures. For each child, the functional categories were found to have differential distributions of gestures. Individual differences will be discussed below. The children's diversity of usage of functional categories is displayed in Fig. 2.

Reno's data revealed that the functional categories of Ostensive, Locative, Negative, Affirmative, Action, Attending, Questioning, and Feature-Identification gestures were similarly distributed across time, as shown in Fig. 2. Gestural fuctions of Searching, Object-Exchange, and Requesting significantly decreased over time. Both Manipulative and Non-Communicative gestural behaviors significantly increased over time. Pantomimic gestures peaked at Time III with eight events in this category (see Fig. 2).

Similar patterns of distribution were found for David and his use of Ostensive, Locative, Negative, Affirmative,

Action, Object-Exchange, Attending, Pantomimic, Feature-Identification, and Searching gestures (see Fig. 2). Gestures which had the functions of Non-Communication, Manipulative, and Requesting expression significantly decreased over time. Only David's Questioning gestures significantly increased during the study.

The data from Peter revealed similar patterns existed for Ostensive, Locative, Negative, Affirmative, Action, Object-Exchange, Questioning, Requesting, and Searching gestures. Feature-Identification, Attending, and Non-Communicative gestures significantly decreased over time. In general, Pantomimic and Manipulative gestures increased over time as can be observed in Fig. 2.

As noted above, the information presented in Fig. 2 is presented in terms of absolute numbers of occurrence of specific functional categories. It was believed important to also examine the data in terms of the percentage of use of a particular function in relation to total gestural behavior at each time period. Table 4 shows each child's proportion of gestural function as a percentage of the total gestural behavior for each time period studied. All the children demonstrated variance in use of gestural categories over time. Categories predominantly observed at one time period were not the same at subsequent times.

At each of Times I, II, and IV, four categories were tabulated at 10% or more of total gestural behavior for

TABLE 4

Percentage of Gestural Function for Each Child

Verbal Function	Reno				David				Peter			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Ostensive	19.5	7.6	7	10	14.5	12	18	13	9.4	7	11	7.4
Requesting	11	13	1	4	6	6	1	-	15	10	12.7	9
Pantomimic	3	-	7	-	2.8	-	1	8	1	5	1.5	10
Manipulative	6	8.5	20	23	7.2	9	18	4	5	19	8	22
Feature Identification	-	4	1	5	2	5.5	1	5	1	8	10	-
Locative	4	1	8	4	2	1	5	5	2.3	3	7.5	8
Searching	8	8.5	4	1	4.5	30	1	3	2	4	1	1
Object Exchange	19.5	18	4.5	3	6	7	5	8	5	6	4	12
Action	1	2.5	4.5	1	5	2	12	4	10	9	7.5	5
Negative	5	7	4.7	8	6	12	9.5	16	8.6	4.7	5	5
Affirmative	-	-	2	1	-	2	1	4	1	-	2	1
Attending	13	20	9.6	13	8	12	7	11	17	8.5	13	9
Questioning	-	-	1	3	2.8	3	-	15	2	1	6	3
Non-communicative	4	11	11	18.5	31	20	17	4	16	6	6	5
Object-Manipulation	4	6	12	4	1	5.5	3.5	-	7	9	6	7
Total number of Gestures	97	117	110	97	110	109	84	75	128	130	134	103

Reno, while only three categories at Time III exceeded 10% of use. However, the scatter of functional use was different. Ostensive, Requesting, Object-Exchange, and Attending gestures represented the highest proportion of his gestural function at Time I. At Time II, Reno's use of Ostensive gestures had decreased to 7.6%, but Non-Communicative events had incrased to 11%. The same three other categories surpassing 10% were utilized at Times I and II. A sharp increase from 8.5% to 20% (see Table 4) was noted in Reno's use of Manipulative gestures at Time III. The only other categories exceeding 10% of use were Non-Communicative and Non-Communicative Object Manipulation. During Time IV, Ostensive, Manipulative, Attending, and Non-Communicative gestures exceeded 10%.

Table 4 demonstrates that Ostensive gestural function exceeded 10% of David's total gestural behavior at all times. At Time I, Non-Communicative behavior was the only other category with a high proportion of occurrence (31%). Non-Communicative behavior exceeded the 10% point at Times II and III, but by Time IV represented only 4% of David's gestures, as seen in Table 4. Gestures of Searching, Negative, and Attending functions occurred more than 10% of the time at period II. Of interest is the increase to 18% and 12% of Manipulative and Action gestures respectively at Time III. A different distribution can be found at Time IV

when Negative and Questioning behaviors were used by David more frequently.

For Peter, dissimilar patterns of gestural function are displayed in Table 4. While Ostensive gestures were used frequently by the other children, Peter's maximal use of this function gesturally was only 11% at Time III. Categories of Requesting, Action, Attending, and Non-Communicative events were high at Time I. Besides Requesting, Manipulative gestures spiked to 18% at Time II. Simultaneously, the non-verbal function of Feature-Identification demonstrated an increase of seven percentage points and continued to rise at Time III, as shown in Table 4. Pantomimic gestures jumped from 1.5% at Time III to 10% at Time IV. Manipulative and Object-Exchange behaviors also showed a rise from previous proportions to now represent more than 10% of gestural function at Time IV.

Verbal Support of Gesture

Data from this study indicated that with increased linguistic skills children's need to express communicative functions through gestures decreased. The results revealed that children increased appropriate verbal support for gestural behavior over time. This was evidence for their increased ability to communicate effectively linguistically. In viewing the gestural behavior accompanied by verbalizations, only those verbalizations appropriately supportive of

the gesture were tallied. Appropriately supportive verbalizations were those which expressed the same or similar function as the gesture through the verbal mode; i.e., pointing accompanied by "more." In the above example, "more" functioned as a verbal Imperative appropriately supportive to the Requesting gesture, pointing.

Analysis (two-way chi-square) of those gestures supported by verbal expression by all the children were compared over time and indicated similar patterns of distribution. Comparison of each child's pattern revealed that significantly different distributional patterns existed for both Reno and Peter across time.

Table 5 indicates the percentage changes in the use of verbally supported gestures for each of the children at each time period. Reno's verbal support of gestural behavior increased, as shown in Table 5. Although Peter had fewer appropriate verbally supported gestures at Time IV than at preceding times (54 paired events compared to the previous low count of 61 at Time I), at Times II and III a significant increase in his ability to express verbal support can be noted in Table 5. At Time I, David used only 41 gestures combined with appropriate verbal expressions. In general, verbal support increased over time (see Table 5). Although at Time III fewer absolute numbers of gestures accompanied by appropriate verbalizations occurred, examination of Table 5 reveals that twelve categories at Time III

TABLE 5

Percentage of Children's Verbal Support for Gesture

Gestural Function	Reno				David				Peter			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Ostensive	84	78	88	100	69	100	67	100	67	90	71	71
Requesting	46	33	100	100	27	71	100	-	100	54	82	89
Pantomimic	-	-	88	-	-	-	100	50	100	14	50	60
Manipulative	50	50	64	50	38	50	67	100	-	67	36	67
Feature Identification	-	100	100	80	100	100	100	100	100	100	100	-
Locative	100	100	56	75	50	-	75	75	67	50	90	88
Searching	25	30	75	100	80	67	100	100	50	46	-	50
Object Exchange	21	67	60	67	29	50	75	83	33	50	20	50
Action	100	30	60	100	50	50	80	100	46	58	76	8
Negative	60	63	67	75	71	85	100	67	55	83	67	20
Affirmative	-	-	50	100	-	50	100	100	100	-	67	10
Attending	8	70	100	62	56	62	50	88	82	73	7	44
Questioning	-	-	100	100	-	-	-	100	50	-	100	67
Non-Communicative	-	15	50	56	3	27	6	67	-	100	-	20
Object Manipulation	25	14	46	75	-	16	33	-	11	8	13	29
Mean Percentage	42	55	74	81	52	61	75	81	66	61	60	48

were used with 50% or greater verbal support in comparison to ten at Time II.

Gestural Behavior of Mothers

The finding that the mothers used less gesture than their children at all time periods indicated their greater reliance on the verbal mode for communicative expression and their children's concommitant abilities to comprehend linguistic exchange. The increase of gestural behavior observed at Time IV in all of the mothers was presumed to represent their use of gesture as support to meaning and as support to their children's comprehension (see Chapter IV for Discussion). As with the children's behavior, maternal use of non-verbal behavior was evaluated using the typology of gestural function described in Appendix B.

Table 6 provides the data demonstrating the differential use of gestural categories for each of the mothers at each time period. Information is presented in terms of percentage of occurrence of a particular category in relation to total gestural behavior at a time period.

Table 6 indicates that maternal gestures also demonstrated diverse functional expression. In contrast to the children, significant distributional differences were found in gestural patterns for the mothers across time (two-way chi-square). Similarities of distributional patterns existed in the mother's use of Pantomimic,

TABLE 6

Percentage of Mothers' Gestural Function

Verbal Function	Reno				David				Peter			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Ostensive	29	22	3	16	7	5	5	27	3	2	10	16
Requesting	11	5	5	-	3	-	-	-	-	10	8	-
Pantomimic	5	3	7	2	3	8	10	-	6	-	5	2
Feature Identification	2	2	2	2	-	3	-	6	-	-	-	2
Locative	-	-	2	2	15	3	2	2	6	11	5	3
Searching	2	-	-	2	2	-	2	2	-	-	-	-
Object Exchange	12	7	3	6	8	7	12	2	26	13	15	15
Questioning	26	34	10	14	8	7	12	23	3	2	3	12
Action	6	7	5	8	10	5	12	6	3	3	15	8
Negative	-	9	7	6	8	7	5	11	17	33	25	31
Affirmative	2	3	17	19	12	12	17	14	3	2	8	12
Attend	2	3	9	10	12	25	12	12	29	2	3	3
Manipulative	6	5	19	13	10	18	12	5	29	23	5	2
Non-Communicative	-	-	2	2	2	-	2	-	-	-	-	-
Object-Manipulation	-	-	-	-	2	-	-	-	-	-	-	-

Feature-Identification, Searching, Object-Exchange, Action, Manipulative, Attending, and Non-Communicative gestures. When studying the pattern of each mother separately (two-way chi-square), results indicated that David's mother's significantly different patterns of gestural use were the same for either one or the other adults studied. In general, David's and Peter's mothers' use of Locative gestures decreased significantly over time as seen in Table 6. Although David's mother used Locative gestures the most at Time 1 (15% of the time), Peter's mother reached her peak of 11% at Time II. Table 6 indicates that although significant differential patterns existed for both David's and Reno's mothers, the former increased her usage over time and the latter significantly decreased her use of Questioning gestures from Times I to IV. Significant differences in distributional patterns for both of these mothers were observed in their use of Ostensive gestures over time. However, David's mother increased this behavior, from 7% to 27% of total gestural behavior from Times I to IV, and Reno's mother's decrease at Time IV represented 9% less than had occurred at Time I. The pattern of Affirmative gestures used by Reno's mother showed a significant increase from 2% at Time I to 19% at Time IV of total gestural behavior (see Table 6). Her pattern of Negative function displayed a high proportion of 9% of total gestural behavior at Time II, and

then slightly declined to represent 6% of total function at Time IV. The use of Requesting gestures by Peter's mother was significantly distributed over time as seen in Table 6, with an increase to 10% at Time III and none at Time IV. The significant decrease of Manipulative gestures as shown in Table 6 is to be noted with the sharp decrease from 9% of gestural behavior at Time I to 3% at Time IV.

The increase of maternal gestural behavior at Time IV was not believed to represent an artifact. This increase indicating a specific relationship between children's linguistic performance and maternal gestures will be further developed in Chapter IV.

Verbal Behavior of Children

Analysis of the functions of the children's verbal behavior confirmed previous findings that the language-learning child expresses multiple functions linguistically (Bloom, 1970; Brown, 1974). In general, the data indicated that these verbal functions change over time as the child develops increased linguistic skill. The children's verbalizations were analyzed according to thirteen functional categories, two of which were Non-Communicative (see Appendix C). Functional categories were similar to those previously determined categories of other investigators (Brown, 1974).

Distribution of Verbal Functions across Time

Comparison (by two-way chi-square) of the distributional patterns of the children's verbal behavior across time revealed similarities in the use of Nominative, Locative, Affirmative, Recurrence, Possessive, and Instrumental functions. Overall decreases were observed for Nominative and Recurrence expressions. Affirmatives and Possessives increased during the period of study. Little change was observed in their use of Locative verbal behavior. There were very few instances of Instrumental expressions by any of the children, confirming the findings of Brown (1974) for children at this stage of grammatical development.

Analysis for each child revealed significant differentials in their patterns of verbal function across time. Although both Reno and David expressed multiple verbal functions with significant distributional patterns over time, Peter did not. This was attributed to Peter's more sophisticated use of a variety of linguistic forms and functions at Time I than that of the other two boys.

Table 7 depicts the percentage of total verbalization accounted for by each function at each time period for each of the three children. Note that different categories are used more frequently at different time periods. Each child evidenced different patterns of distribution which will be discussed below.

TABLE 7

Percentage of Children's Verbal Function

Verbal Function	Reno				David				Peter			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Nominative	38	35	15	15	31	28	20	13	14.7	8.7	9	4
Locative	6	0	2	7	11	4	5	8	8	3	7.5	7.5
Possessive	1	4.5	1.4	.6	1	8	2	4	1	6	1.8	3.7
Attributive	13	16	2.4	12	2.4	6	10	11	5	12	7.5	7
Action	8.5	9	23	30	20	15	29	27	15	21	21	19
Imperative	2	2	4	2	-	7	3	4	15	4	15	11
Question	-	7	5	3	3	1	3	1.5	7.6	9	15	15
Instrumental	-	.5	-	-	-	1.5	-	-	-	-	-	-
Recurrence	2	3	1	1	-	5	2	1.5	13.5	4	2	8
Negative	6	5.2	9	12	-	11	9.5	14	5	10	9	2.5
Affirmative	5.6	4	6	6.6	1.6	1.6	.1	2	4	7	8	10
Stereotype	3	2.6	11	2	3	2	1	-	3	-	1	4
Non-Linguistic	14	12	20	8	27	12	13	7	8	17	3	7

For Reno, similarities in distributional patterns were observed in his use of Negative, Affirmative, Imperative, Recurrence, and Instrumental categories. As mentioned above, the Instrumental category did not become productive during the period of study, with only one observation at Time III. Of these categories, both Negative and Affirmative verbal events increased over time; Recurrence decreased and little change was observed with Imperatives.

Table 7 indicates the changes in Reno's verbal behavior over time. Nominative and Non-Linguistic verbal functions were differentially distributed over time. The significant decrease in these patterns can be observed in Table 7. Reno's Nominative behavior decreased from 38% at Time I to 15% of total verbal behavior at Time IV. Similarly, Non-Linguistic behavior represented only 8% of his total verbal behavior at Time IV in contrast to 14% at Time I. Patterns of Locative, Possessive, Attributive, and Questioning behavior were also significantly distributed over time. The significant increase of Action verbal events across time (8.5% to 30%), as observed in Table 7, was viewed in relation to the significant decrease in Nominative behavior.

As with Reno, David displayed significant distributional patterns in the decrease of Nominative and Non-Linguistic behavior and the increase of Action verbalizations

over time (see Table 7). Significant increases in the use of Attributives (2.4% - 11%), Negatives (0-14%), and Possessives (1%-4%) over time were found. Further, Locative behavior had a significant differential pattern. Although only 3% less Locative behavior occurred at Time IV than at Time I, at Times II and III Locative behavior occurred about 50% less often of the total verbalizations than at other time periods (see Table 7).

Peter, like the other two children, demonstrated a significant decrease in Nominative behavior over time (14.7%-4%). In contrast, however, as can be seen in Table 7, Action verbal functions did not have significantly different distributions during the study. Significant decreases were observed across time in Peter's use of Imperatives, Recurrence, and Negative expressions. The significant increase of Questions (7.6%-15%) and Possessives (1%-3.7%) across time was believed to represent affective variables in the mother-child relationshps which will be discussed later.[4]

Gestural Support of Verbalizations

An important result from this study was the finding that all children used less gestural support for verbalizations across time. As the children developed the ability

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[4]While a syntactic analysis of these data was not carried out, general observations regarding syntactic skills will be found in Chapter IV.

to express multiple functions linguistically, less reliance on functional expression through the gestural modality was observed. In contrast to the data displayed in Table 5 (see p. 74) showing an increase of appropriate verbalizations accompanying gestural behavior, Table 8 demonstrates the decrease in gestural support for complementary verbalizations across time.

As shown in Table 8, Reno decreased gestural support for complementary verbalizations from 45% at Time I to 30% at Time IV, and David's decrease was 11% across time. Although Peter's decrease was only 6%, data from Times II and III (see Table 8) support the assertion that his linguistic ability to express multiple functions required less reliance on gestural support. The observed relationship between particular gestural and verbal events will be discussed in the next section.

Reno decreased gestural support for Nominative behavior by 22% across time. At Time I, he relied on 100% gestural support for Recurrence expressions. At Time IV, although this expression occurred only twice, on both occasions no gesture was observed. Questions were not observed at Time I as shown in Table 8. Question behavior was noted at Time II requiring 80% gestural support. At Time IV observations of five questions required only 40% gestural support.

TABLE 8

Percentage of Gestural Support for Verbal Function

Verbal Function	Reno				David				Peter			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
Nominative	48	34	39	26	37	38	21	35	48	31	26	67
Locative	67	-	0	55	43	28	44	38	79	40	31	58
Possessive	0	43	100	0	0	18	0	40	0	30	50	33
Attributive	0	64	20	39	67	50	24	14	88	43	6	36
Action	17	36	23	31	60	30	25	11	65	45	38	52
Imperative	67	2	50	100	-	33	40	20	65	0	36	56
Question	-	80	20	40	50	-	20	0	46	12	39	24
Recurrence	100	20	0	0	-	33	67	0	48	29	60	0
Negative	78	50	0	0	-	43	25	58	25	22	32	25
Affirmative	25	100	0	0	0	50	0	0	14	8	6	17
Instrumental	-	-	0	-	-	100	-	-	-	-	-	-
Non-Linguistic	45	50	41	42	0	-	5	0	29	31	29	73
Mean	45	48	24	30	32	40	25	21	46	27	32	40

Similar changes in gestural support can be observed for David in Table 8. Although gestural behavior decreased only by 2% from Time I to Time IV as support for Nominative behavior, at Time III only 21% gestures were observed with this verbal function. Significant decreases can be observed in the use of gestural support for verbal functions of Locatives, Attributes, Action, and Questions (see Table 8). Note in Table 8 that, as with Reno, when David did not express a specific function at Time I (i.e., Imperatives and Recurrence), their initial usage was accompanied by a high degree of gestural support which had decreased by Time IV.

Peter's changes over time can be seen in Table 8 with a decrease of gestural behavior as support to complementary verbalizations of Locative, Attributive, Action, Imperatives, Question, and Recurrence functions. Some of the increases in gestural support observed at Time IV will be explained below.

Relationship between Gesture and Verbalization

Data from this study revealed that a positive relationship exists between gestural and verbal functions. The children were found to use gesture for functional expression prior to the development of the ability to express this complementary function verbally. As a particular linguistic function emerged, they tended to rely on increased gestural

behavior as supportive to the verbal mode. The stability of a linguistic form (as measured by consistency of appropriate usage) was observed to result in a diminution of gestural support. Further, with the advent of more complex linguistic forms and functions being expressed, the children resorted to gestural use as supportive of previously determined stable linguistic functions. This latter point will be discussed in greater detail in the next chapter.

Analysis of the typologies of both gestural and verbal events led to recognition that similar functions were expressed through both modes of communication. Thus, pairs of complementary gesture and verbalization may be subsumed under one event category. Negative, Affirmative, Feature-Identification and Attributive, Manipulative-Action and Action, Requesting and Imperative, Questioning, Locative, Ostensive and Nominative, and Non-Communicative and Non-Linguistic were the observed categories of events.

Fig. 3 (a-i) shows the relationship between gestural and verbal aspects of event categories for each of the children and their mothers. Information in Fig. 3 displays the absolute number of gestural or verbal events in each categorical event on the ordinate. Evidence for the assertion of the positive relationship between both functional modes of communication is detailed below.

Fig. 3 indicates that David expressed 25 verbal Action functions at Time I, and 14 equivalent gestural

Fig. 3a. Complementary gestures and verbalizations across time.

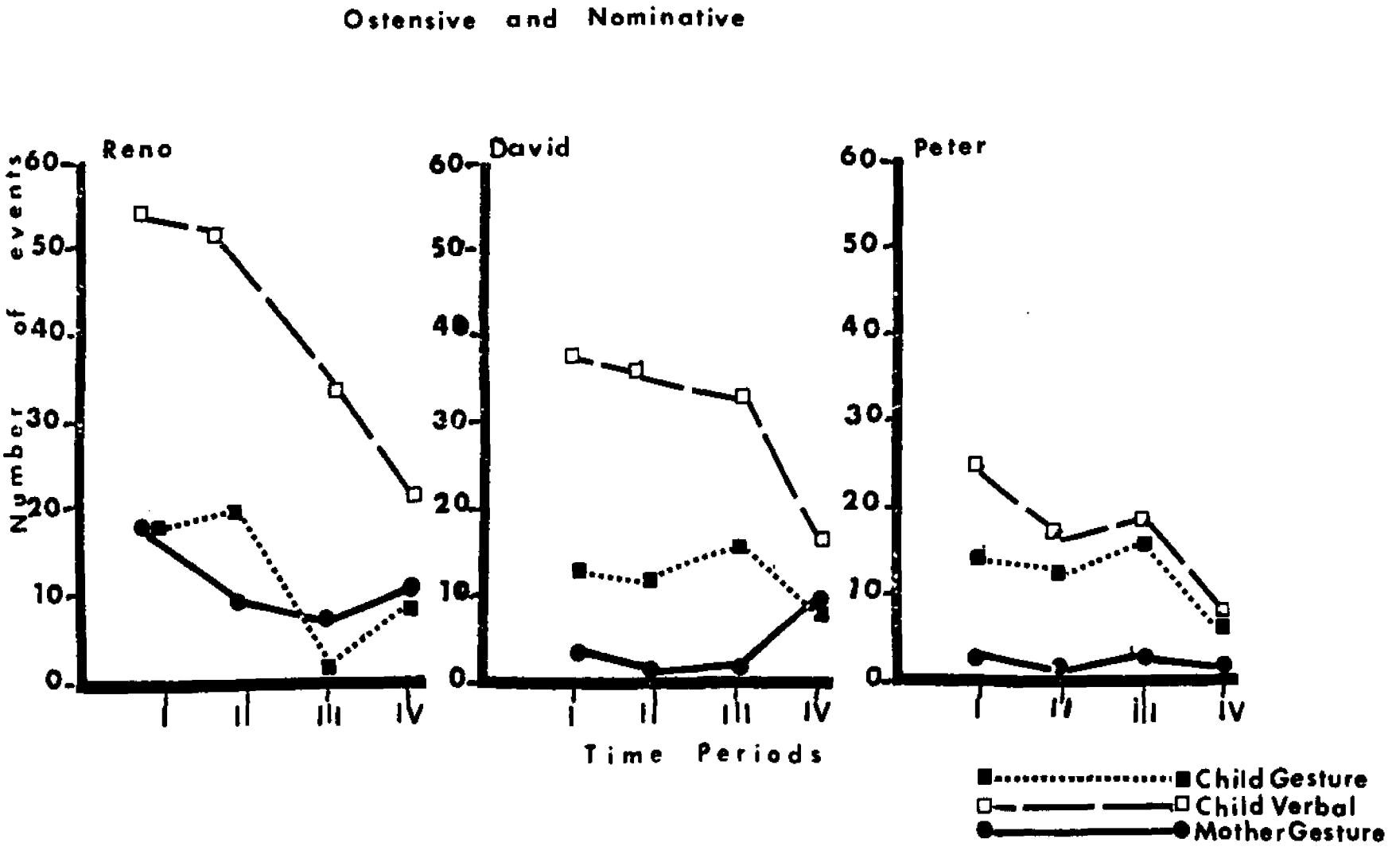


Fig. 3b. Complementary gestures and verbalizations across time.

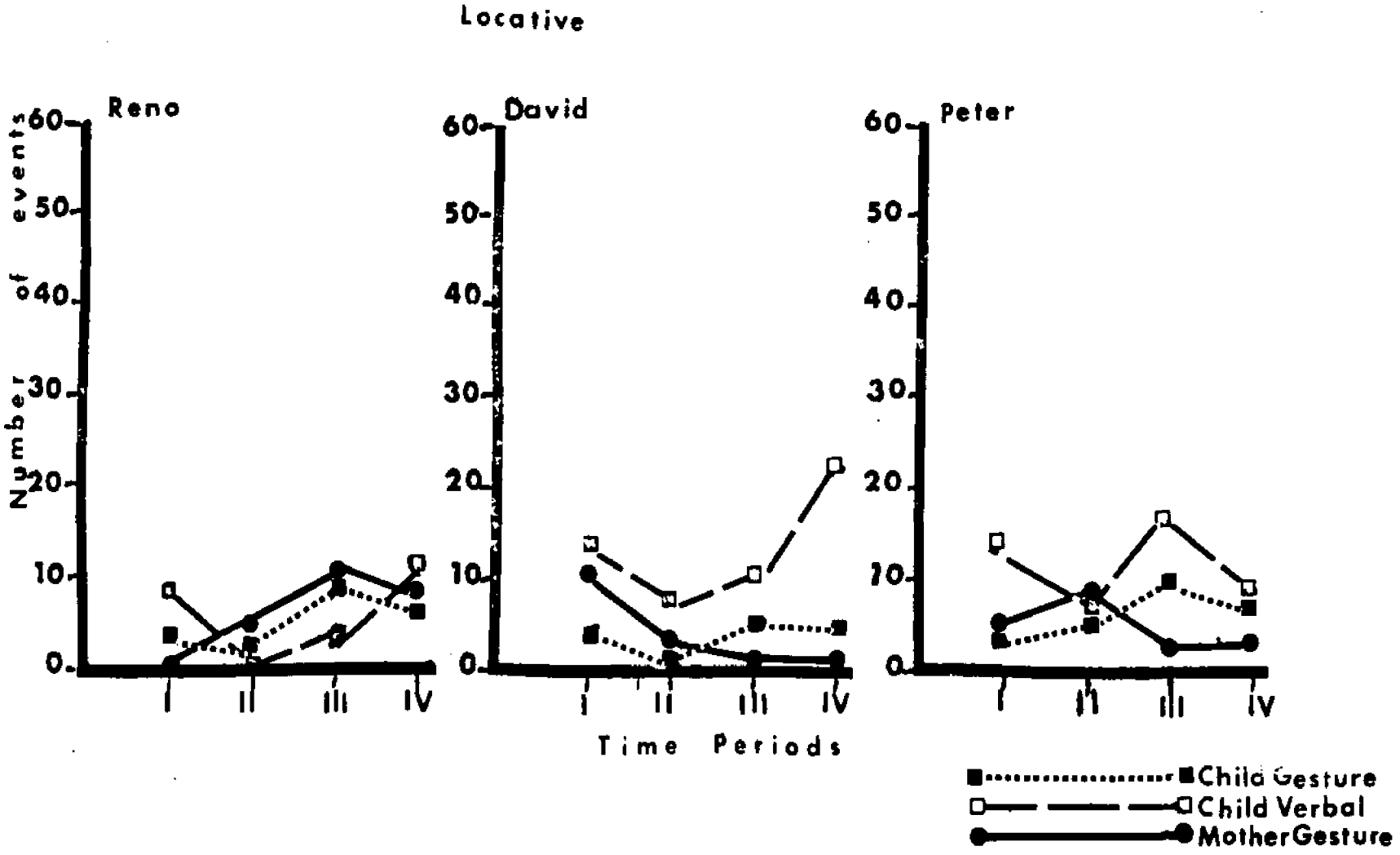


Fig. 3c. Complementary gestures and verbalizations across time.

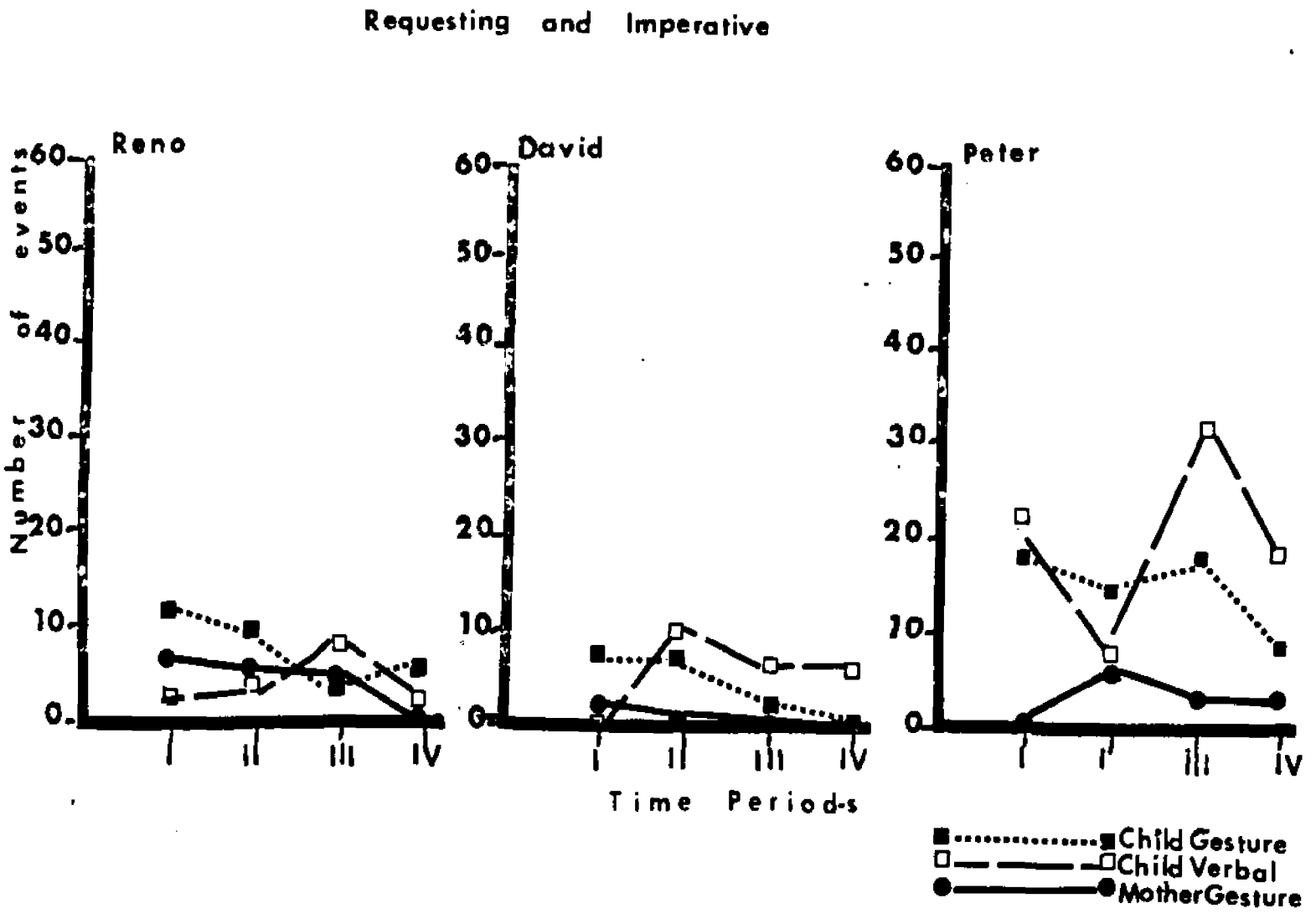


Fig. 3d. Complementary gestures and verbalizations across time.

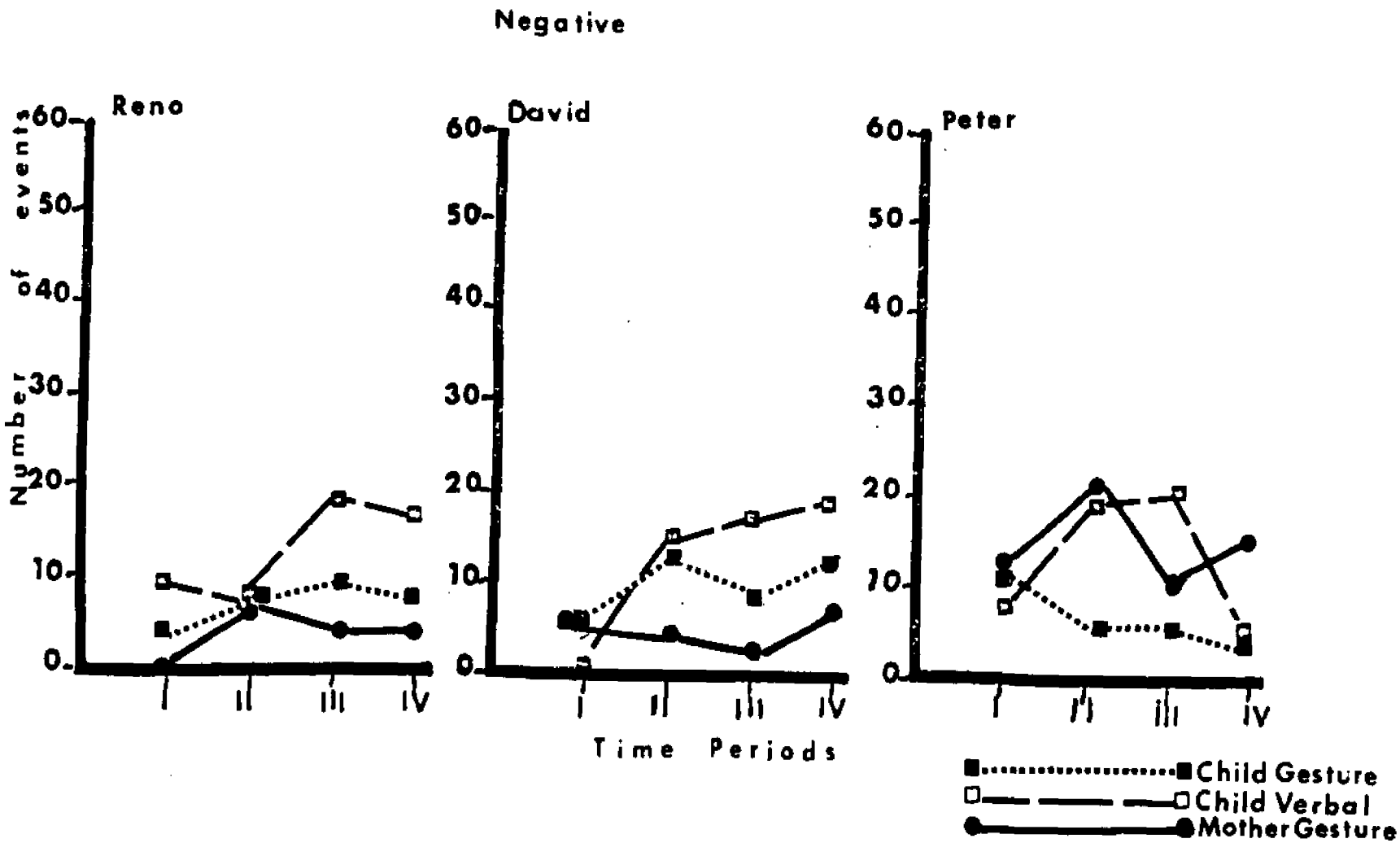


Fig. 3e. Complementary gestures and verbalizations across time.

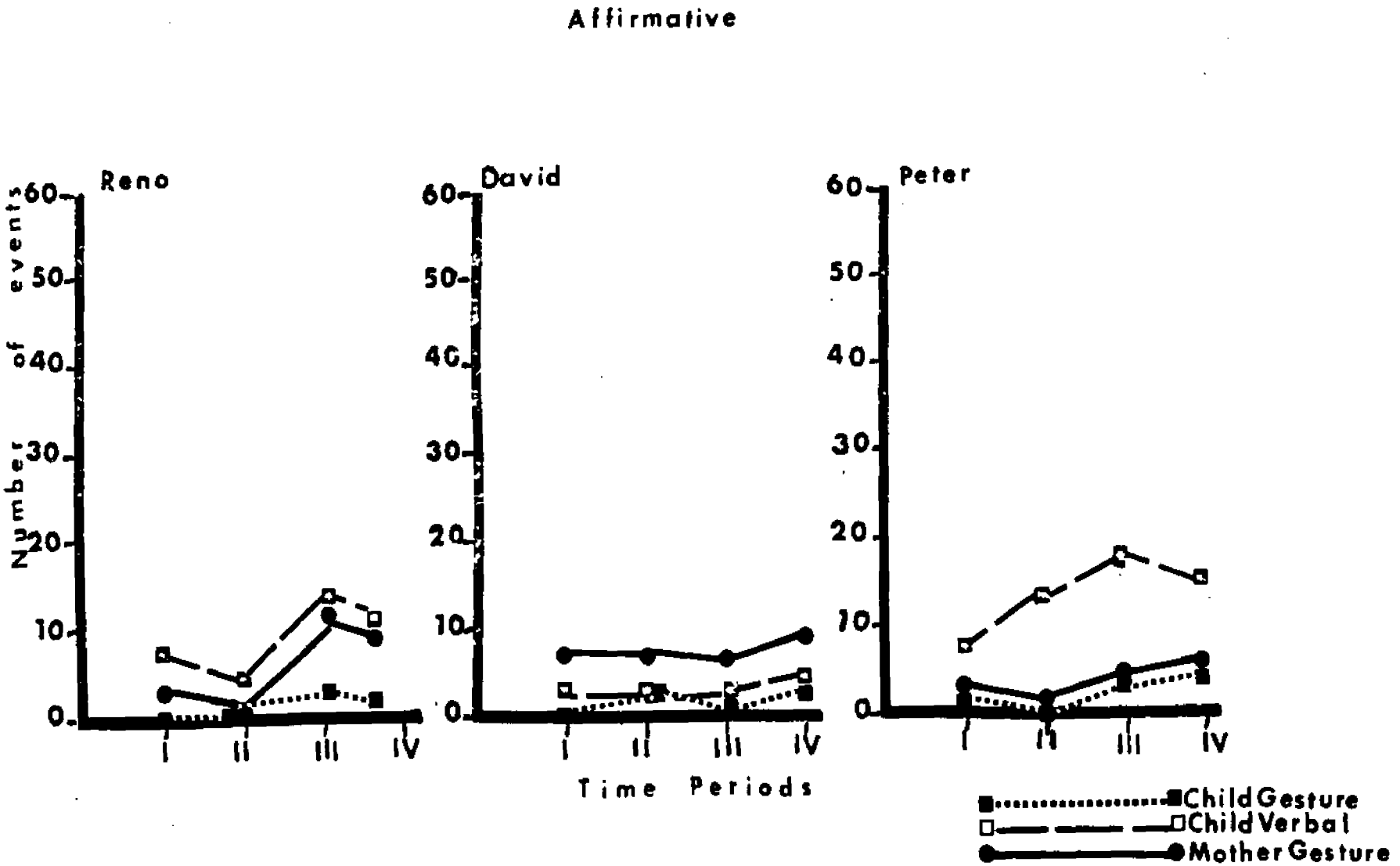


Fig. 3f. Complementary gestures and verbalizations across time.

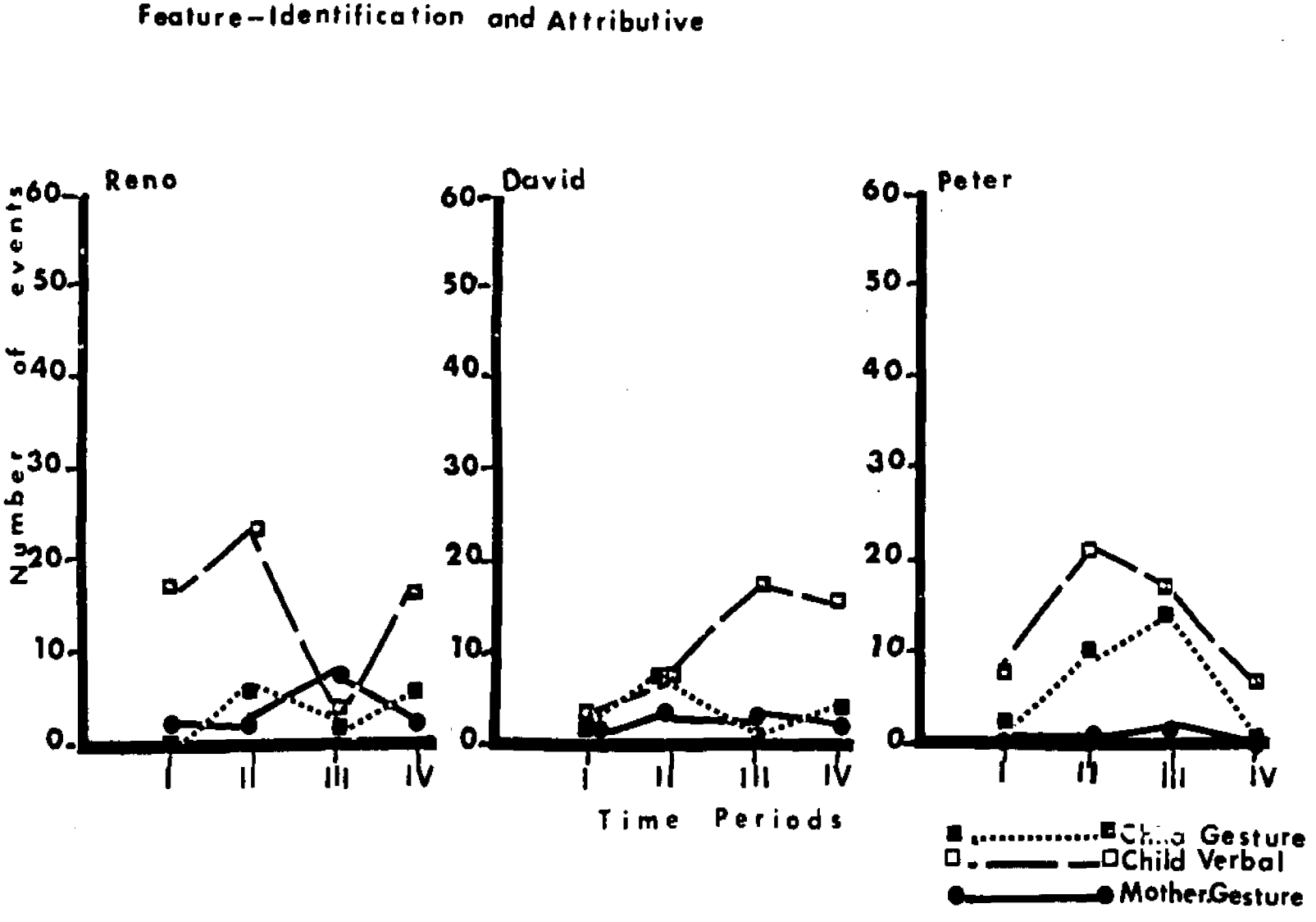


Fig. 3g. Complementary gestures and verbalizations across time.

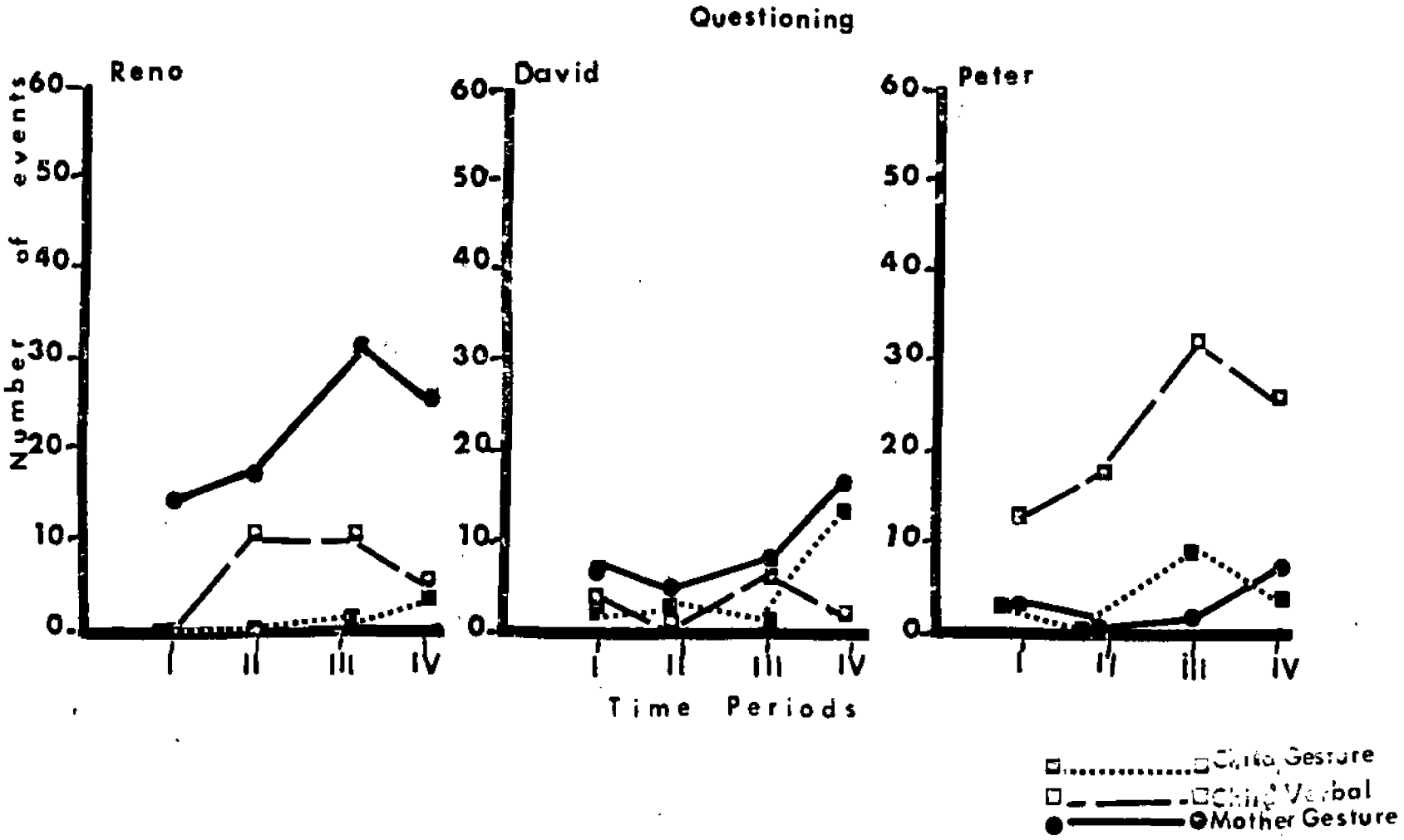


Fig. 3h. Complementary gestures and verbalizations across time.

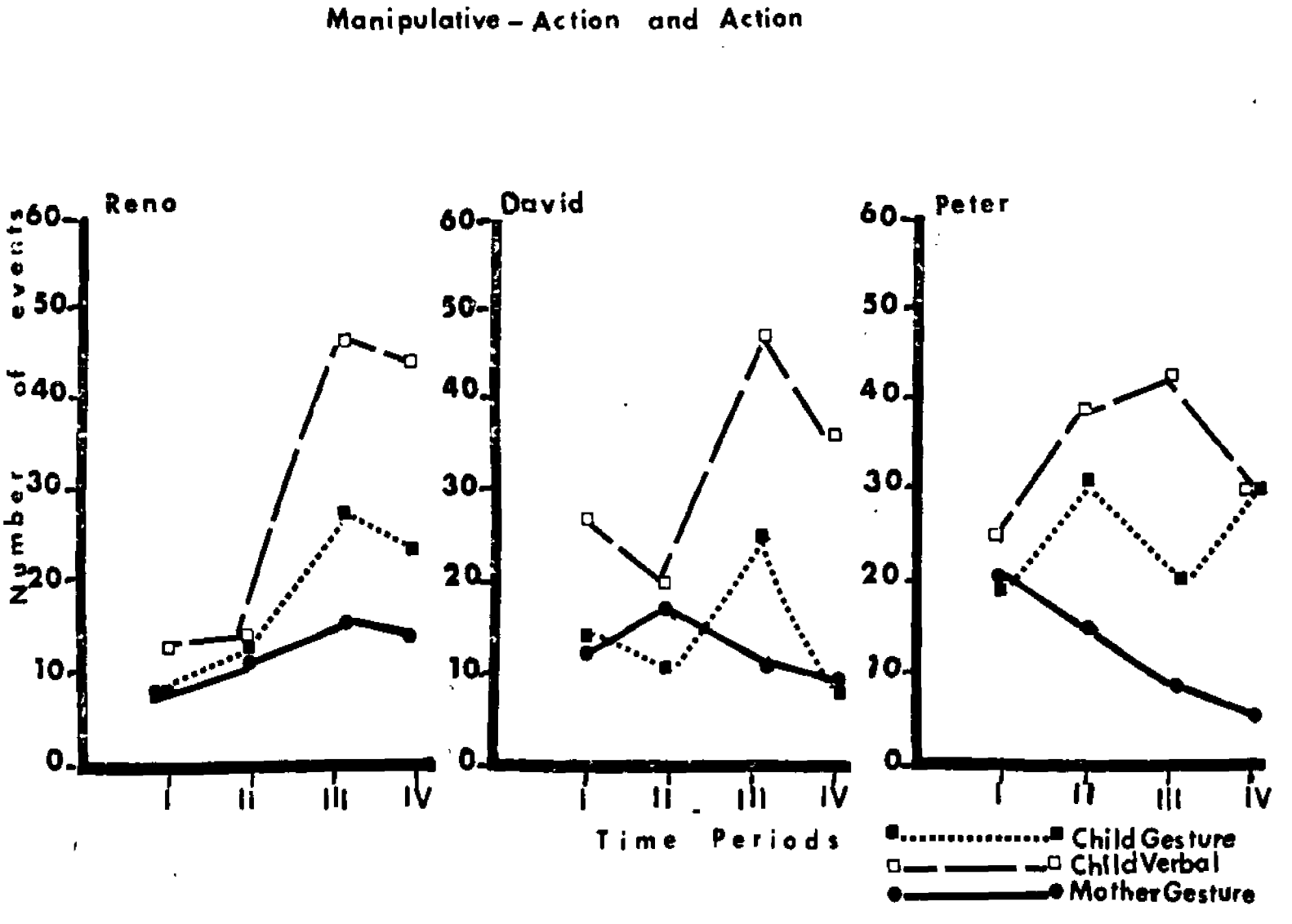
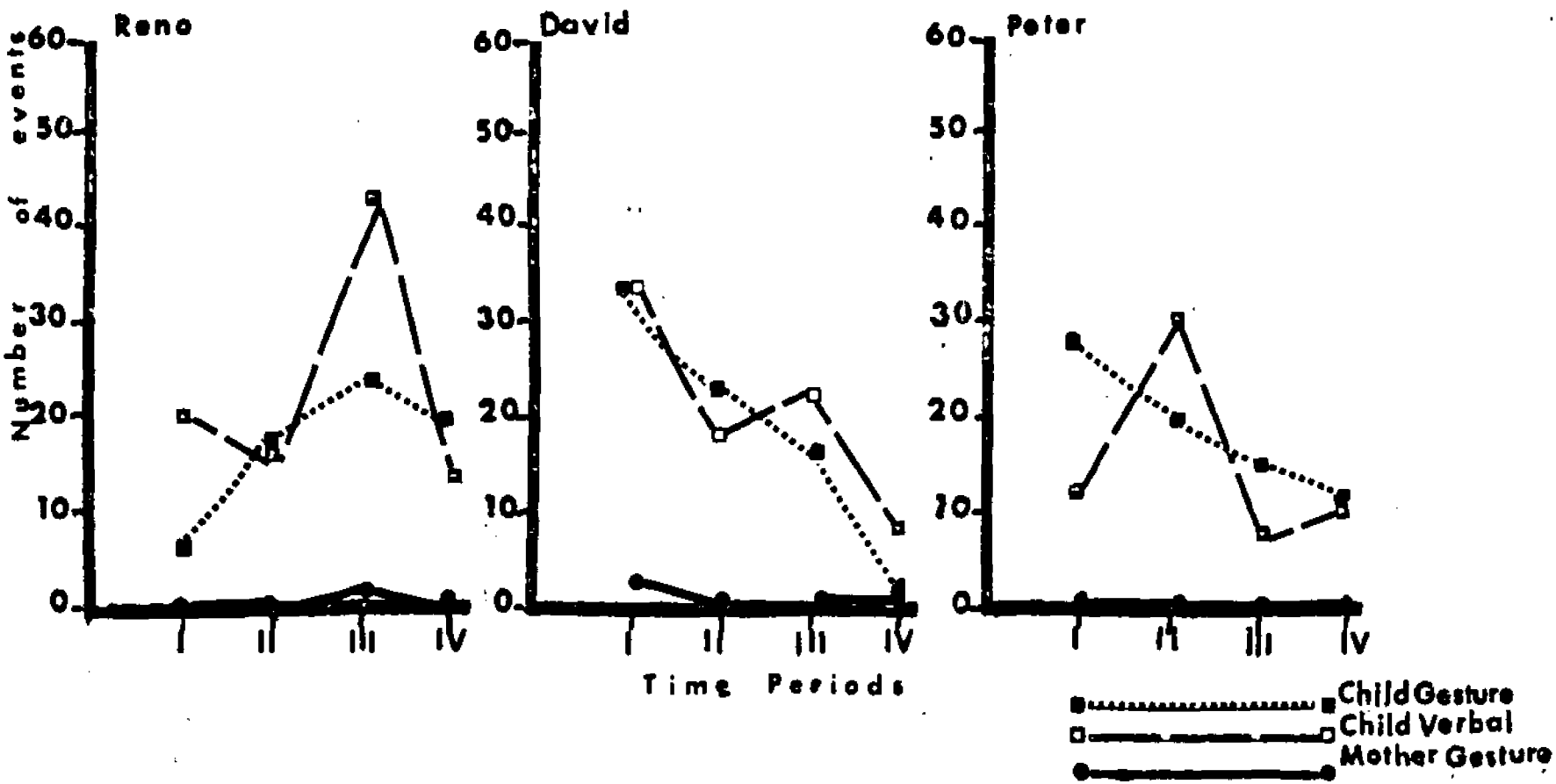


Fig. 3i. Complementary gestures and verbalizations across time.

Non-Communicative and Non-Linguistic



events of Manipulative-Action. At Time IV, 36 verbal Actions were tallied with a low of eight Manipulative-Action gestures. In contrast, Reno used eight gestures which were Manipulative and twelve complementary verbal Actions at Time I. This function was expressed gesturally fifteen times, but the verbal function at Time IV was 43 Action occurrences.

Data for the relationship between gestural function of Feature-Identification and verbal Attributes is similar (see Fig. 3). Reno consistently expressed verbal Attributes more often than the gestural modality for communication at all times studied. David initially used two more verbal forms than the complementary gestural form of Feature-Identification. At Time II, David expressed this function with an equal frequency in both modalities. Fig. 3 shows that 17 Attributes were observed at Time III and only two analogous gestural forms. Although a slight increase of gesture occurred at Time IV, the verbal modality was used for communication 16 times. Peter's use of verbal Attributes always exceeded gestural forms.

Questioning behavior shown in Fig. 3 indicates that Peter's use of both gestural and verbal modes of communication displayed dissimilar distributional patterns, peaking at Time III, although the verbal form predominated at all time periods. Similar patterns are also evident for each of

the children and their gestural use of Ostensive functions and the complementary expression of verbal Nominatives (Fig. 3).

Maternal Support of Verbalization by Gestural Use

As noted earlier (see Fig. 1, p. 60), all mothers were observed to increase gestural behavior at Time IV. This increase was interpreted as attempts by mothers to ascertain their children's comprehension as well as to lend support to the children's emerging functional use of language (see Chapter IV for Discussion). The data in support of this observation is seen in Fig. 3.

David's Negative gestures at Time I preceded the acquisition of any verbal Negatives. His mother used an equal number of Negative gestures (five). At Time II, David expressed 14 Negatives verbally, and 12 Negative gestures. His mother, in contrast, used only four Negative gestures. Fig. 3 indicates that as David increased the frequency of verbal Negatives, a decrease in gestural behavior was noted for both him and his mother at Time III. At the last time period, both members of this dyad increased Negative expression using gestures and verbalizations.

Fig. 3 demonstrates that Reno's use of Requesting gestures at Time I occurred 12 times. His mother used 7, and his complementary use of verbal Imperatives was observed

three times. As his verbal skills with Imperatives increased, his gestural behavior of Requesting functions decreased. Reno's mother's use of Requesting gestures evidenced a declining slope from Times I to IV. Similarly, an increase of Manipulative-Action functions should be noted in Fig. 3 at Times II and III for Reno's mother. At Time II, Reno used one more verbal expression of Action than the complementary gestural function. At Time III, the verbal form peaked with a tally of 46 events. Although his mother's gestural expression of this function also increased at Time III, the slight increase and following decrease at Time IV supports the assertion that she was responding to his consistent, appropriate verbal expression of Action function (see Fig. 3).

Further evidence is shown in Fig. 3 with Peter's mother's increase of Requesting gestures at Time II. This is paired with her son's decrease of seven complementary verbal Imperatives. When Peter significantly exceeded gestural function by complementary verbal Imperatives at Time III, his mother's behavior was seen to decline in the gestural modality.

Conversational Unit Analysis

Developing communicative competence is evident, in general, in changes in the ability to sustain and initiate

conversation across time for all the children studied. Chapter IV will discuss the interpretation of these results. The following section details the data obtained from analysis of the use of Conversational Units.

Analysis of conversational units resulted in the finding of similar distributional patterns in the number of CUs among the dyads (two-way chi-square). Although both Reno and David showed a slight decrease in the number of CUs, Peter evidenced no change in the number of units from Time I to Time IV.

CUs with gesture used for direct support of the meaning of the conversation were considered. Both Reno and David displayed differential patterns of gestural support of CUs. Reno's gestural support decreased from a peak of 42 at Time I to 23 at Time IV. Although David decreased gestural support for conversation from Times I to III (47 to 25), at Time IV there was an increase to 32 (see Fig. 4).

Table 9 details the CU data for each time period. The distribution was significantly different over time only for David, indicating an overall decrease in the number of CUs (although the sharp decline at Time II was followed by an increase at Time III). There were also no significant differences found in the total time spent in conversation across time periods either when comparing the dyads to each other or when comparing members of each dyad. Significant

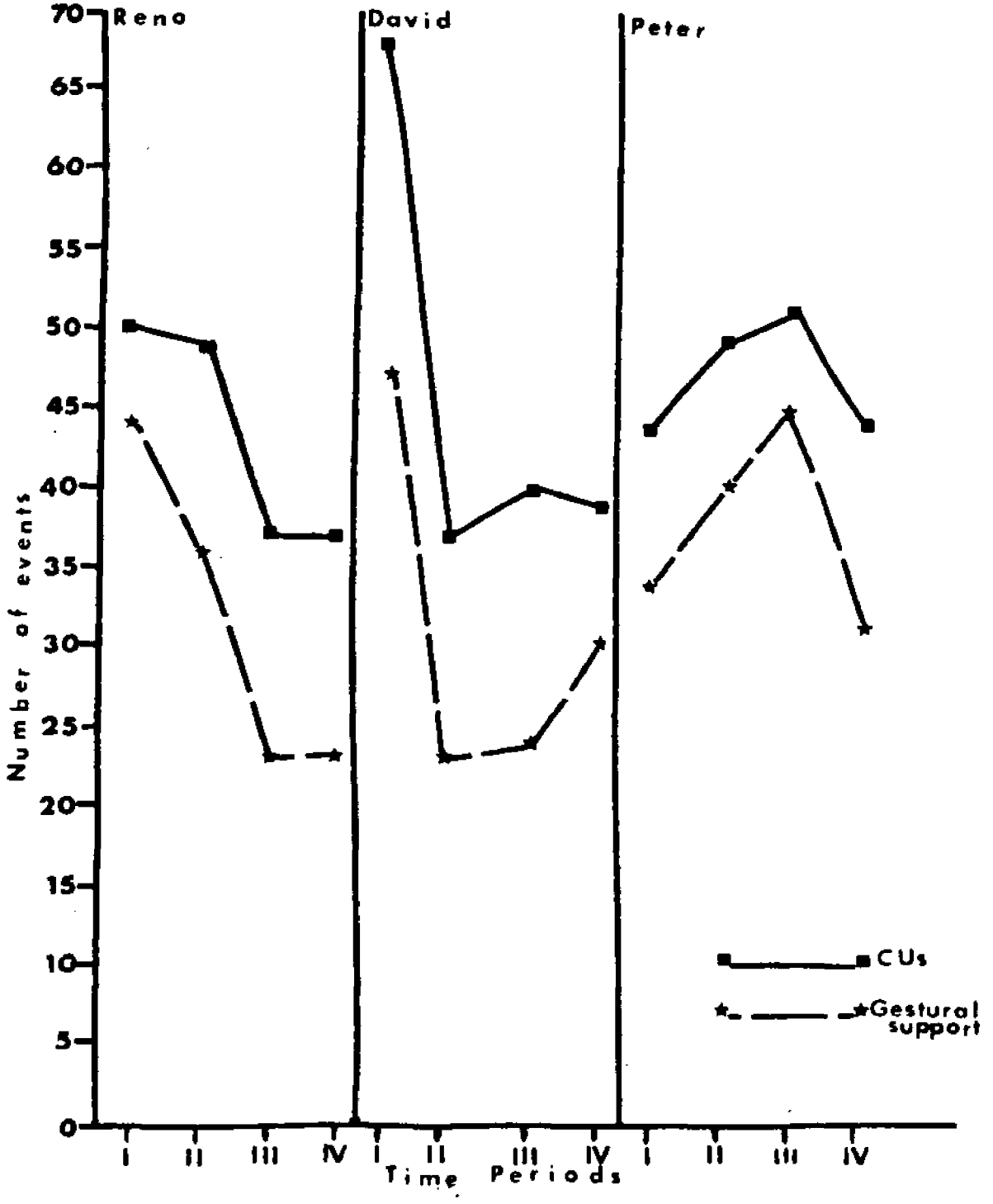


Fig. 4. Frequency of CUs and gestural support for CUs.

TABLE 9

CU Time Analysis and Gesture

Child	Time Period	Number of CUs	Time Range for CUs in Min. & Sec.	CU Total Time in Min. and Sec.	MLCU	% Gestural Support
Reno	I	50	1"-44"	6'54"	13"	12
	II	45	2"-54"	7'54"	17"	20
	III	36	6"-1'45"	9'20"	24"	36
	IV	35	5"-1'3"	7'19"	22"	34
David	I	68	1"-32"	7'26"	11"	35
	II	37	3"-9"	8'19"	21"	35
	III	45	1"-2'	9'33"	20"	44
	IV	41	2"-1'3"	8'19"	20"	22
Peter	I	44	2"-1'13"	7'6"	17"	20
	II	47	2"-36"	6'36"	14"	19
	III	54	2"-1'16"	8'9"	15"	19
	IV	44	1"-1'4"	7'15"	15"	25

distributional differences were also not found for the Mean Length of the Conversational Unit (MLCU). However, as can be seen in Table 9, the MLCU for both Reno and David increased from Time I to Time IV by nine seconds, although Peter's MLCU decreased by two seconds. In assessing the range of time of CUs, Table 9 also indicates an important increase in the ability to sustain conversation from Time I to Time IV for both Reno and David. There is a nine-second decrease in the maximal CU time for Peter comparing Times I and IV.

The initiator of conversation was tallied for all CUs. Results showed that only David had a significant decrease in the number of CUs which he initiated across time. Inspection of Table 10 indicates that Reno increased conversational initiation from 10% of the total sample at Time I to 15% at Time IV. An increase from 19% to 25% can be observed for Peter. The decrease that is evident across time for David (16%-6%) is believed to represent a response to his mother's greater verbal frequency and the assumed suppression of David's conversation.

In viewing the length of total time spent in conversation during the 18-minute sample at each period, an increase in conversational ability for both Reno and David is observable. Of particular interest is the observation that at Time III both of these dyads were able to maintain

TABLE 10

Initiator and Topic Time of CU

Dyad	Time Period	No. CUs Initiated	% Total Time in CUs	MLCU	Time		
					Pres.	Past	Fut.
Reno	I	15	10	12"	15	-	-
R. Mother		35	26	13"	35	-	-
Reno	II	10	7	12"	10	-	-
R. Mother		35	35	18"	29	5	1
Reno	III	22	25	20"	19	3	-
R. Mother		14	24	31"	16	4	2
Reno	IV	14	15	18"	11	3	-
R. Mother		21	29	25"	15	6	-
David	I	33	16	9"	33	-	-
D. Mother		35	23	9"	24	3	8
David	II	16	15	17"	15	1	-
D. Mother		21	28	24"	11	9	1
David	III	18	11	11"	16	1	-
D. Mother		27	39	26"	21	3	4
David	IV	13	6	8"	9	4	-
D. Mother		28	40	26"	24	3	1
Peter	I	24	19	14"	24	-	-
P. Mother		20	23	21"	15	2	3
Peter	II	27	19	13"	26	-	1
P. Mother		20	16.5	15"	20	-	-
Peter	III	39	36	16"	33	5	1
P. Mother		15	9	11"	10	3	2
Peter	IV	27	25	16"	25	2	-
P. Mother		17	13	14"	16	1	-

conversation for 49% or 50% of the event sampled. However, the decrease at Time IV from Time III is not interpreted as an artifact. The percentage of sustained conversation at Time IV, in comparison to Time I, represents an increase of 6% for David and 7% for Reno. Although Peter and his mother's total conversation time decreased from eight minutes and six seconds to seven minutes and fifteen seconds from Times I to IV, Peter's ability to sustain conversation was evident at Time III when the CUs represented 45% of the total time sampled.

Additional CU data is presented in Table 10. By observing the ability of the dyads to sustain conversation about more than the here and now, decisive change can be observed from Time I to Time IV. At Time I, all the CUs initiated by the children were concerned with the present. Other than Reno's mother, the mothers talked about events of past, present, and future times at the first period. By Time IV, all the children were initiating conversation about the past and the present. Data from Time II and Time III for both David and Peter also indicate their initial attempts to initiate conversation about the future, with one observed CU dealing with the future initiated by each of the children. In addition, the MLCU was seemingly not affected by this increased ability. For Reno, it was found that 22% of CUs which he initiated at Time IV were about past events.

Past events represented 31% of CUs initiated by David at Time IV, and Peter initiated conversation dealing with the past 8% at Time IV.

CHAPTER IV

DISCUSSION AND DIRECTIONS FOR FUTURE RESEARCH

Data from this inquiry were interpreted as supportive of previous findings that information about interaction between mothers and children is essential to understand the process of language acquisition (Broen, 1972; Moerk, 1974a; Friedlander, 1972; Bruner, 1975). In this present study additional information has been obtained regarding how mothers assist in the language acquisition process by helping to interpret the environment for the child. Gestural behavior as an aid in the acquisition of environmental knowledge was found to be of greater interest when viewed not in terms of the quantity of non-verbal behavior, but rather in terms of the functions the gestures served. Results showed that children's emerging linguistic skills were supported by gestural events. The development of communicative competence demonstrated a reliance on both verbal and non-verbal modes of behavior.

Although general patterns of interactive behavior were observed, significant individual differences were found. Stylistic variations suggested that individual diversity of behavioral patterns does not preclude the acquisition of common rule governed patterns of language

behavior which allow for communication beyond the dyad relationship.

Utility of the Typology of Gestural Function

Results from this study indicated that gestures, as hypothesized, serve a variety of functions. Discrete motor acts (e.g., pointing, touching, reaching) have been viewed by other researchers as generalized gestural behavior which may or may not have importance for language acquisition. By analyzing the functions which specific gestures expressed, it was possible to determine a positive relationship between non-verbal and verbal modes of early language performance. Similar motor acts were found to be used for different purposes in communication. Illustrative of this principle are the following examples:[5]

Verbalizations	Gesture
1. D: soap	1. D: looks at soap in soap dish
2. D: boat	2. D: looks for boat in bath tub

In the first example, David was using what has been identified as an Ostensive gesture, that of isolating and naming something in the environment. This gesture occurred simultaneously with the naming (Nominative) of the object. In

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[5]All episodes included in the text identify the child by the first initial of his name.

example 2, although the same gestural event, i.e., looking, occurred, David was using a gesture of Searching, specifically trying to find something in the environment. This gesture was also accompanied by a holophrastic utterance.

Although both gestures involved looking behavior, differences in functional intent were apparent based on the presence of the object in example 1 and its absence in example 2. Searching behavior was also used by the children in the presence of an object, but the functional intent was to find it and utilize it for examination, play, or expression.

In the following examples, Reno used the same motor act, pointing, to express dissimilar functions. In the third example, pointing behavior served an Ostensive function, accompanied with a Nominative holophrase. In example four, the gesture was expressive of Requesting: the utterance had the function of Recurrence.

Verbalizations	Gesture
3. R: apple	3. R: points to potato
4. R: more-more	4: R: points to table

The classification of motor events according to the purposes which they expressed provided new data in the study of child language. Gestural functions were found to reflect developing communicative competence: participants in the

interchange used diverse functions to provide support for their intentions. Interpretation of the functions of specific gestural behavior was made possible by analysis of the contexts in which they occurred. Functional intentions were ascribed to gestures based on their ability to effect change in objects, persons, or events. The development of meaning about the world was observed in the children's ability to express a variety of gestural functions during the period of study.

Relationship of Frequency of Verbalizations in Each Dyad

As stated previously (see Chapter III), a positive relationship between the frequency of a mother's verbalizations and the frequency of her child's verbalizations was found to exist. The specific parameters of this relationship could not be determined solely on the basis of these data, although clear patterns were discernible. For both Reno and David, Times I and II represented periods of the total sample in which their mother's verbalizations greatly exceeded their own. During these time periods, the mothers' frequent use of monologues was observed. The children's responses during these monologues were mainly gestural.

	Verbalizations	Gesture
5. II. M:	Is it raining?	5. M: watching R.
	Yeah--	
	That's what rain looks like.	
	You're very smart, Reno.	
	Would you like to wash yourself?	
6. II. M:	Let's have some fun with the busy bath.	6. R: watches M.
	You know what?	
	If you put this here--	M: demonstrates how to turn wheel
	This will turn around.	
	Wanna see it turn?	R: watches at it turns
	Would you like to see it turn around?	
7. II. M:	Ah--you're silly--	7. M: looking at R.
	It's not--	
	That's Gloria's dog.	
	Aunt Arlene's dog's name is Shotzie,	
	Right?	
	Reno, please don't eat with your fingers. Use this, Reno.	7. M: points to spoon
	I don't like that.	
	I like little boys who eat with their spoons.	R: looks at M. picks spoon up and eats

In example 5 and the first half of 7, Reno's mother was talking about events in the environment, which elicited no verbal response from Reno. The function of her utterances seemed to be to explain or comment on the world. Reno may have been a passive participant in these monologues. Further, they seemed to have an effect of suppressing his

verbalizations. It was assumed that he did not have the linguistic skill to respond appropriately, and the mother's utterance was too lengthy for immediate decoding. No monologues occurred at Time III. At Time IV, Reno responded with appropriate verbalizations. This latter observation supports the assumption that at Time II he did not have the linguistic skill nor the memory skill to respond.

In examples 6 and the second half of 7, Reno's attention was directed by his mother's gestural behavior. His response was an appropriate gestural event, indicative of his comprehension of his mother's verbal utterance.

Viewing the dyadic verbal interaction between David and his mother, a similar pattern emerged.

	Verbalizations		Gesture
8.	I. M: What'd the fork do? Leave the fork alone. I'll get you another one. Want a new fork now? A clean fork? Here's a new fork for David. mmmmm Spaghetti good.	8.	D: looking at fork M: picks fork up from floor D: takes fork and eats

Although Reno's mother's monologues were primarily observed at Time II, David's mother made extensive use of these monologues at both Time I and Time II. This was interpreted as critical to the suppression of David's verbal frequency in comparison to the other children. Contrasted with the monologues, at Time I, the longest CUs consisted of

conversational exchanges of one or two sentences on the part of the mother, as in the following example:

	Verbalizations	Gesture
9. I.	M: Do you know where we're going tomorrow, David? to Grandma's house. And you know who's going to be there?	9. D: looks at M.
	D: Carol	
	M: Carol	
	D: and [in and] Poppa	
	M: and Poppa and who else?	
	D: [R]ichie	M: shakes head
	M: No, Richie's in school. Where's Richie?	
	D: Uh	
	M: Where's Richie?	
	D: Koo [school]	M: nods head
	M: And Carols gonna be there though and Paul.	
	D: Baby Paul.	M: nods head
	M: And Baby Mark, yes.	

Apparently, the short simple construction of the mother's utterance allowed for David's easy participation. The question chaining used by the adult was supportive of Mishler's (1975) analysis of adult-child control through questioning.

Also apparent at Time II is a CU of 62 seconds, during which time, although David was absorbed and interested in his mother's monologue, he interrupted only five times with a telegraphic utterance.

In contrast, Peter's mother infrequently communicated with monologues. At Time I, Peter initiated conversation 25% more often than Reno did, and 6% more frequently than did David.

The frequency of a mother's verbalizations to her child, in terms of their length, was found to have direct bearing on a child's verbal responses. Extended utterances by the mother seemed to comment on, explain, or demonstrate something concrete in the environment. However, these monologues generally failed to elicit verbalizations from the child in the earlier time periods studied. Further study is needed to confirm these observations. Evidence of initiation of verbalization in response to a gestural event performed by the child was common. These multi-modality communications appeared successful in developing communicative competence.

Imitation and Expansion

In support of previous findings (Ling & Ling, 1974), this present study presented little evidence of expansion by any of the mothers. Reno's mother expanded more than the others, yet her expansions represented only 3% of the total

sample. Peter's mother expanded 2% of the total utterances and less than 1% of David's utterances were expanded upon by his mother. Reduced imitation of the model sentence was found for all the children.

Bloom et al. (1974) found that some children imitate frequently. However, when and why a child imitated was found to be based on his productive capacity. The child cited in their study did not imitate what he knew well, and did not imitate what he knew nothing about. Once lexical and syntactic categories became predominantly spontaneous they were not used again predominantly as imitated utterances. In this present study, Reno imitated a high proportion of his mother's utterances. His imitations, frequently reduced to holophrases, did not express syntactic relations. At times these imitations were stereotyped expressions, and it was difficult for this investigator to determine Reno's comprehension.

	Verbalizations	Gesture
10.	I. M: Could you wash your hands for Mommy? Show Mommy how you wash your hands. Do you want Mommy to wash you? There--you'll be nice and clean	10. M: holds soap out to R.
		M: starts washing R.
	R: Nice and clean	
	M: Nice and clean	
	R: Wash face	

The lack of a response, either gestural or non-imitated verbal, prevented an evaluation of Reno's comprehensive skills.

Non-Stereotyped reduced imitations used by the other children more clearly demonstrated their comprehension of the utterance, and their use of imitation as a strategy to induce latent structure (Brown & Bellugi, 1964).

	Verbalizations	Gesture
11. I.	M: Here Peter-- Oh--you broke it	M: blowing bubbles P: reaches towards bubble and it breaks.
	P: laugh boke [broke] it?	
12. I.	M: Shall we give some spaghetti to Baby Mark?	
	D: Baby Mark	D: takes fork from M. takes a handful of spaghetti and turns away as if offering to someone.

Moerk (1972, 1974a) has indicated that mothers use a diversity of verbal techniques in interaction during the language learning periods. The data from the present study isolated individual differences in maternal verbal style. Dyadic interaction between Reno and his mother was more directed and adult controlled linguistically than that of the other dyads. Observations of the question behavior of Reno's mother supported the findings of Leach (1972) that

questions represent a high percentage of verbal exchange. Her use of question chaining indicated a method of conversational control observed by Mishler (1975) in interactions between adults and kindergarten-age children. Although Reno used few question structures formally during the time of study, it was apparent that he was developing communicative competence related to semantic and syntactic constraints of discourse. His mother's professional background was assumed to have been a factor in her high use of question-chains. An example of this form of interaction follows.

	Verbalization	Gesture
13. I.	M: Do you like it?	
	R: Potato	R: points to potato
	M: What else?	
	R: Potato	
	M: And what else?	
	R: Corn	
	M: And what else?	
	R: Corn	R: points to pea
	M: That's a pea. That's a baby pea. Let's see what else you find. Use the spoon. Oh--delicious	
	R: delish I find it!	R: looks in bowl becomes very excited
	M: You found it!	

As long as his mother asked additional questions based on the initial query (chaining), Reno responded with appropriate semantic-syntactic categories. When chaining was stopped, Reno was able to use a complete sentence (including appropriate pronoun use). Although this method of verbal exchange did not limit the child's ability to develop skills of communicative competence (e.g., Reno's appropriate categorical responses, and appropriate gestural behavior), productive skills were assumed to be reduced.

Use of closure games dominated the dyadic style of Reno and his mothers at all time periods.

	Verbalization	Gesture
14.	I. M: No that's a po--	14. M: points to potato
	R: potato	
15.	I. M: It's not hot its co--	
	R: co	
	M: cold	
16.	II. M. What is this called?	16. M: puts jacket hood on her head
	R: a lady	M: moves back startled
	M: this not me	points to hood again points to herself
	R: not me	
	M: This is a h--	R: reaches toward M.
	R: hat	

	Verbalizations	Gesture
17. III.	M: What's that called?	17. M: points to razor
	R: a ter	
	M: sh--	
	R. she--	
	M: (laugh) shaving	
	R: shaving	
18. IV.	M: What is it? What did Daddy buy you? Another--	
	R: banjo	

In one instance at Time IV, his mother mouthed the initial sound of the desired word as a further clue to Reno. Closure games were also evident in frequent songs and stories, during which Reno would be expected to supply the missing words.

David's mother used closure games similarly to elicit utterances, although not as often. Dominating her style at Time I was the use of stereotyped "baby-talk" intonations, cooing sounds, omission of phonemes, diminutive forms, and rhyming words.

	Verbalizations	Gesture
19. I.	M: No-na-na, na-na Eat your spaghetti Make ALL-GONE spaghetti	
20.	M: Wanna go swimmey-swimmey, Honey?	

	Verbalizations	Gesture
21.	D: Mingo, mingo M: Bingo-Bingo D: a mingo, mingo	
22.	M: oo loves spaghetti!	
23. I.	M: Who's a good boy Yumming up all those carrots You're gonna turn into a carrot. David carrot, David carrot	M: leans close to D--faces touching

At subsequent time periods, diminution of diminutive forms, phoneme omission and rhyming words were observed, although the patterns of cooing and stereotyped intonations were maintained. David's response to these strategies was apparent in his continued use of babbling and vowel play long after syntax was productive for him.

Bateson (1975) established that alternation of mother-child vocalizations during infancy were jointly sustained social performances preceding language acquisition. Data collected from David and his mother indicated that alternation of mother-child vocalization patterns may continue through the period of emerging language and serve to reinforce a conversational exchange. Each instance of this type of exchange was initiated by David, and presumed to indicate his exploratory investigation of rules for conversation. Example 23 illustrates this pattern.

Verbalization

23. II. D: am

M: mmm--yes

D: um, um

M: um

D: um, um

M: um--yes

Participants in communicative exchange must develop rules for discourse. Such rules allow the participants to know the cyclical relationship of speaker and listener and be able to vary statement, silence, and response in conversation. Further, conversational rules demand differentiation between statements and questions posed to elicit information. The rules of discourse in developing communicative competence require the ability to sustain conversational topics, introduce new topics, and express intentions.

None of the maternal strategies observed with the other dyads were evident between Peter and his mother. In almost all instances, Peter's behavior, either verbally or gesturally, stimulated his mother's subsequent responses. Her relatively passive role resulted in Peter's determination of topic. Much of her communicative behavior was aimed at socialization, as observed in the high proportion of negative expressions. At Time I, Peter primarily used intonation as his question strategy, yet initial evidence of

the productive use of why was observed. Why questions became more regularized and consistent throughout the rest of the study, and preceded the acquisition of other wh forms. Peter's use of why elicited a lengthy causal response from his mother and it was presumed that this served as primary motivation for his use of why. Not until Time IV was a causal relationship discernible in Peter's use of and/or response to why.

Verbalization

24. IV. M: Why'd you throw it down?

P: I trow da microphone.

M: You were gonna throw it at the microphone?

P: Yes.

Prior to Time IV, there was no data indicating that Peter was able to respond appropriately to how questions. In response to his mother's frequent use of what, Peter's rule appeared to be what = repeat the previous statement. This was an appropriate rule in terms of discourse; as often her intent was solely confirmation of his utterance rather than information gathering.

Data from this study confirmed previous research that mothers' speech to young children is high is questions, consists of many repetitions, and uses simple syntactic constructions. It was additionally found that lengthier, more

complex utterances (as used by two of the mothers) tended to suppress children's verbalizations.

Relationship of Dyadic Gestural Behavior

The hypothesis that mothers use gesture to assist in acquisition of environmental knowledge and that their use of gesture would decrease over time was not fully substantiated. All mothers increased their gestural behavior from Time III to Time IV, although Time IV gestural behavior was less than Time I (except for Reno's mother, where Time I and Time IV were equal). This increase was interpreted as representing the mothers' attempts to assess their children's knowledge of the world, to reinforce existing skills, and to teach new concepts. In example 24 David's mother had previously asked: "What color slippers did you get?" David had changed the topic to comment on his food. After his mother appropriately responded to his intervening comment, the following CU occurred.

	Verbalization	Gesture
24. IV.	M: David got blue slippers	M: picks up foot to show him slipper
	There it is--I see it.	D: bends forward to look at foot
	M: Where's your other slipper? Where's the other--what did we do? Where the other one?	M: holds up other foot without slipper D: shakes head--looks at foot

	Verbalization	Gesture
24. IV.	D: outside	D: turns and looks toward door
	M: It's outside. We washed it-- didn't we?	M: nods head

Prior conversations had dealt with color identification. David's mother's gestural behavior in example 24 served to reinforce the color name, and assist in decoding where. A 44-second CU during Time IV consisted of reinforcement of color names. By asking the names of specific colors, accompanied by pointing to the colors as named, the mother's gestures were very directive in isolating and teaching knowledge about the environment. If David's responses were correct, she confirmed these by repetition. If incorrect, she gesturally isolated the appropriate color, and then verbally and gesturally indicated the correct response.

Similarly in example 25, Reno's mother used gesture to teach him the concepts of under and on top, although both of these terms had appeared earlier in the transcripts.

	Verbalization	Gesture
25. IV.	R: a submarine	
	M: Make it go under the water like a submarine--See, that's a special kind of boat--A submarine.	25. M: pushes boat under the water

	Verbalization	Gesture
25. IV.	M: It goes under water. Put it under the water. Put it under the water now. Now put it on top of the water	R: floats boat puts boat under puts boat on top of the water
	R: under the water	R: puts boat under
	M: Is it under the water now?	
	R: Yes	
	M: All right. Now bring it up bring it up	R: puts boat on top of water
	R: up	
	M: When its under the water it's like a submarine	
	R: like a submarine mean dere [submarine there]	R: puts boat under water

The fact that the children exceeded their mothers in gestural behavior at all periods was presumed indicative of their great reliance on gesture to assist in communication. The diversity of gestural functions utilized by children represented their exploration of knowledge about people, objects, and events in the environment. Ostensive and Manipulative-Action gestural events developed action and relationship concepts which were then expressed linguistically. Maternal gestural behavior was observed as functioning to aid in extracting meaning about the environment.

Gestural behavior by the mothers was also observed to have different functions. Initially the higher frequency of Ostensive behaviors functioned to isolate discrete elements in the environment. At later time periods increased Manipulative gestures expressed action concepts providing information about how people and objects interact.

The children's greater reliance on gesture as supportive of linguistic forms confirmed the hypothesis that communicative competence is dependent on linguistic skill, environmental knowledge, and acquisition of action constructs.

Relationship of Gesture and Verbalization

Slobin (1973), in discussing language acquisition, has observed that children may rely on old forms as transitional stages in the acquisition of new linguistic functions. Similarly, the data from this present study revealed that children may rely on previously productive gestural forms in the process of acquiring new linguistic forms.

Investigation of categorical events (similar functions expressed either gesturally or verbally) indicated the nature of the relationship between both modes of communication. Figs. 3 a-i (see Chapt. III, pp. 87-95) show the relationship between gestural and verbal events of functional categories, for each of the mothers and their children. If the child appropriately used a linguistic form with consistent frequency at Time I, then it occurred significantly

more often than its gestural equivalent. However, if the stability of the linguistic form (as measured by appropriate use and productive occurrence) was weak, then a high percentage of gestural behavior of the equivalent linguistic form occurred. Differences between relative frequencies of different communicative behavior and proximity of modality use were interpreted as representing the child's need to use gesture to support a still developing linguistic form.

Prior to the stabilization of linguistic forms, children used gestures to express functions for which they did not as yet have linguistic mastery. As verbal functional complexity increased, the children were observed to increase gestural expression of functions which previously appeared linguistically stable. This pattern was interpreted as representing the children's increased attention to emerging forms and syntactic complexity. By using gesture to express simpler functions, concentration was focused on linguistic performance.

Most categorical events indicated greater verbal than gestural behavior initially. When gestural behavior increased at Time II, either matching or exceeding complementary verbal behavior, the verbal category was interpreted as a weak linguistic form, requiring greater gestural support. Observation of this phenomenon was found with Reno and David with Negative function; David with Attributives;

Reno with verbal Action and Locatives; and Peter with Imperatives. Only when verbalizations exceeded gestures and either significantly increased or plateaued did gestures decrease. The assumed stability of the new linguistic form no longer required as much gestural support. A counter example to this pattern emerged with Peter at Time IV, when his gestural behavior of Manipulative-Action functions exceeded his Action verbalizations. Peter at Time IV was using a higher percentage of diverse linguistic forms than the other children (i.e., Questions and Imperatives). The atypical pattern of Action was interpreted as supportive to the assertion that gestural expression of previously stabilized linguistic function increase as demands of linguistic complexity increase.

Increased frequency of occurrence of gestural behavior at Time IV (when it neither exceeded nor represented a high percentage of categorical occurrence) was assumed to represent individual stylistic patterns of gestural behavior rather than gesture used as supportive to linguistic expression.

Maternal Support of Verbalization with Gesture

The data indicated that when a child's linguistic form was stable, mothers used little gestural behavior. However, Figs. 3 a-i (see Chapt. III, pp.87-95) illustrate

how mothers used gesture to reinforce emerging linguistic forms.

David's Negative gestures at Time I preceded the acquisition of any verbal Negative. His mother used as many Negative gestures. Her behavior coincided with her son's equal use of verbal and gestural negatives. At Time III, Reno displayed a significant increase in linguistic Negative forms and both he and his mother's Negative gestures began to plateau.

Reno, at Time III, used only three verbal Attributes in contrast to previous counts of eighteen at Times I and IV. This sharp decrease did not represent a diminution of skill in using this linguistic form. Rather, data indicated a sharp increase of new linguistic forms (i.e., Action, Negatives, Imperatives). Individual verbal functions representing a few categories decreased in frequency as the ability to express a greater variety of linguistic forms and functions emerged. His mother's increase of Feature Identification gestures (surpassing in frequency his verbal form) appeared to represent her response to quantity rather than quality. By increasing gestural behavior in this functional category, she appeared uncertain as to whether or not he had developed mastery of Attributes. Her increase in Feature Identification gestures was interpreted as an attempt by her to confirm this function and to provide direction for Reno.

In general, patterns over time revealed that when the child needed a high degree of gestural support for an utterance, his mother increased gestural behavior of that specific function. When a significant decrease of a verbal function occurred by the child, the mother increased her gestural support. This pattern was assumed to represent the mother's assessment of the child's knowledge and/or reinforcement of previously apparent linguistic performance. Maternal gestural behavior served, in addition, to provide direct teaching about the environment (see examples 24, 25).

CU Interpretation

As a CU has been defined as a linguistic exchange about one topic, determination of the boundaries of the CU (despite the frequent similarity of topics) was possible. Examples 26-27 illustrate the determination of the beginning and end of CUs.

	Verbalization	Gesture
26a.	III. R: dop it	R: drops cereal on lap. looks at lap.
	M: What's that? Pick it up and put it back. Now eat it.	M: picks up ceareal and puts in bowl
	R: dop dop cackal-cwakal-cwakal dirty dirty dirty doity doity dirty dirt	

		Verbalization	Gesture
26b.		R: saw Grandma	26b. R: looks at M.
		M: Yes. Yesterday you saw Gramma. How is Gramma?	M: nods head
		R: O.k. Said hello gramma	
26c.		R: Don't talk to me	26c. R: looks at M.
27a.	I.	D: [c]arrots?	
		M: oops--the carrots got in your spaghetti. What'd you do?	
		D: carrots, carrots, carrots	D: holds up piece of carrot to show M.
		M: Yes, carrots. What color are the carrots? The carrots orange? And more	M: gives D. more meat
27b.		D: hot, hot	27b. D: picks up piece of meat
		M: Yes, it is hot.	
27c.		M: Finish up your spaghetti, sweetie.	

In both of the previous examples, 26b and 27b were new conversations initiated by the child, and immediately following the previous CU (26a and 27a). In examples 26c and 27c a new topic was again introduced.

As with Moerk's (1977) data, linear episodes were observed in 26b and 27b. However, the importance for acquisition of communicative competence is not to be found solely

on the basis of a description of the interactional sequence. Rather by studying the episodes, in terms of topic, initiator, and time, inferences can be drawn about the development of conversational skills.

Although no significant distributional differences were found in any of the parameters of the CU studied, further interpretation indicated that the absolute figures were misleading. Verbal functional complexity, as evaluated through the CU, increased substantially for both Reno and David. Peter's linguistic skills were more sophisticated at Time I than those of the other children, and relatively less change was observed in his conversational behavior over time. Both Reno's and David's data revealed that the number of CUs decreased at Time IV, as hypothesized. Although the MLCU for both dyads increased by only nine seconds from Time I to Time IV, greater skills in conversational exchange accounted for the increase of the interval range of the CU time (Reno, Time I: 1"-44"; Time IV: 5"-1'3"; David, Time I: 1"-32"; Time IV: 2"-1'3"). These two children were more involved conversationally, both in initiating and sustaining conversation. At Time III (the peak of verbal frequency) these dyads maintained conversation 49% of the time for Reno and 50% of the time for David. At Time IV, even though fewer CUs occurred, their respective increase of CU time from Time I was 7% for Reno and 6% for David. The increase

in the number of CUs and length of time relative to the entire sample indicated that language had acquired greater functional use for communicative purposes (see Table 9, p. 101).

The ability to communicate beyond the here and now considerably changed over time for all the children, as indicated previously. Conversations between Reno and his mother at Time I all dealt with the present. However, at Time II, although Reno did not initiate any CU other than in the present, his mother initiated five in the past and one in the future. Of the five CUs dealing with past events, Reno appropriately responded to three of them (Examples 28, 29).

	Verbalization	Gesture
28. II.	M: Reno, who did you see yesterday?	28. R: looks at M.
	R: Cammera	
	M: And who else?	
	R: Denise	
	M: And who else? And who hurt you? Who hurt your nose? Did Aunt Arlene come over with Uncle Sal?	R: looks at M. M: touches nose R: watches M.
	R: over	
	M: And their dog? Do you remember the dog's name?	
	R: Uhm [yes]	

	Verbalization	Gesture
28. II.	M: What's the dog's name?	
	R: [s]igger	

Example 29 was a 32-second CU, which Reno actively participated in.

	Verbalization	Gesture
29. II.	M: You know you bought something new today. What did you buy?	R: Looks at M.
	R: Candy	
	M: No--Mommy bought you something new. New--	
	R: Candy	
	M: No New--	
	R: New nea	
	M: Say sneakers	
	R: [s]neakers	
	M: And what color are your sneakers?	R: picks up foot and looks for sneakers[6]

Example 30 shows Reno's ability to handle future events.

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[6]Both candy and sneakers had been purchased that day; therefore Reno's answer initially was appropriate. However, his mother wanted him to say sneakers.

	Verbalization	Gesture
30. II.	M: When Daddy comes home he's gonna play with you. What would you like to play with Daddy? When he comes--	R: looks at M.
	R: ba ball [baseball]	
	M: And what else	
	R: And ba ball [baseball]	

By Time IV, 27% of Reno-initiated CUs focused on past events.

	Verbalization	Gesture
31. IV.	R: See ma mou? [my mouth]	
	M: Wha happened?	
	R: I hurts my mouf.	R: points to mouth
	M: Where?	M: looks closely at R's mouth.
	R: At Andrew's I hurt it on-- A bi-cecal [bicycle]	R: raises hands to face M: nods head
	M: Oh--you crashed. O.K.	M: smiles
	R: I crash tagain. [crashed again]	

Example 31 also indicates the increased complexity of Reno's speech. Sentences were complete including appropriate pronoun and prepositional use (i.e., I, my, it, on). The appropriate response to <u>where</u> indicated the development of an intermediate dummy element, i.e., <u>where</u> = someplace. The /s/ morpheme as possessive showed appropriate inflectional

use. As Andrew was used elsewhere in the transcript, the /s/ morpheme did not represent a segmentation error, but rather a morphological rule.

David at Time I indicated greater ability to understand past and future than Reno, although he too initiated CUs only in the present.

	Verbalization	Gesture
32. I.	M: What do you want for dinner?	
	D: Cheese	
	M: Cheese?	
33. I.	M: Who came to see you today? Wanna tell me?	
	D: [l]ady ady	D: rubs hair, looks at E.
	M: Who else came to play with you?	
	D: edy [lady]	

By Time IV, 45% of CUs initiated by David were about past events. A 28-second CU is shown in example 34.

	Verbalization	Gesture
34. IV.	D: Daddy cean [clean] car.	
	M: Daddy cleaned the car--when? He cleaned the car yesterday. And you went to look at it, Right? Did David help Daddy clean the car?	M: looks at D.
	D: No	

	Verbalization	Gesture
34. IV.	M: What'd you do?	
	D: Help Daddy Daddy wipe David wipe Daddy ean it [clean]	D: looks at M.
	M: Yes David helped Daddy to wipe the car.	
	D: Wipe the car	
	M: What--what store did we go to today? What store?	
	D: Tu tor [shoe store]	D: looks at M.
	M: Right What store?-- The shoe store And what did David get in the shoe store?	
	D: sippers [slippers]	

A similar pattern was observed for Peter. At Time I, although all CUs which he initiated were about present events, he appropriately responded to both past and future topics.

	Verbalization	Gesture
35. I.	M: Did you have a nice day today?	
	P: David coo-kie.	
	M: David had a cookie, yes Did you have a cookie?	
	P: Cookie	
	M: You did have a cookie um-um.	M: nods head emphatically

Although only two CUs initiated by Peter dealing with past events occurred, evidence indicated his greater comprehension skills at Time IV.

	Verbalization	Gesture
36. IV.	P: Mommy I mang [bang] on my head.	P: starts to swim
	M: Well--you hurt your tooth.	
	P: Mommy--I hurt my tooth right here	P: sits up--holds tooth, points to spot where he hurt it in tub.
	M: Uh-uhm I saw that-- You have to be very careful when you're in the bathtub.	M: nods head

Although example 36 was a conversation about an immediate past event (65 seconds prior to CU 36), Peter demonstrated a consistent ability to deal with the past at Time III. Example 37 illustrated discussion dependent on his long term memory storage strategy and concomitant ability to understand protracted linquistic exchange.

	Verbalization	Gesture
37. III.	M: Wanna tell E. what you-- about the snack you had today? We went--had a soda and what did we have for a snack, hm? What did you eat with your soda?	P: points to mike
	P: fench fies [French fries]	

	Verbalization	Gesture
37. III.	M: right-- And who did we see after-- After we went for the soda? Who did we play with in the street?	P: looks at M.
	P: neba-neba [never-never]	
	M: never-never That's right You never never go in the street That's right.	M: points finger at P and shakes it

Syntactic Complexity

Syntactic analysis was not performed on this data. However, changes noted during the period of study indicated increased complexity by the children.

All of the children showed greater skill in processing questions, although Peter was the only one who used verbal question forms productively by Time IV.

Reno, at Time I, other than two complete sentences ("I find it," "Here it is"), used only holophrastic utterances. At Time IV, although some holophrastic utterances were observed, many more utterances consisted of complex syntactic utterances.

	Verbalization
38. IV.	R: This is nice and cool.
	R: Mommy fix it up.

Verbalization

38. IV. R: See my nails?
They're doity [dirty].

R: Cammery go in that boat.

Example 39 from Time IV also illustrates Reno's use of Negation.

Verbalization

39. IV. M: Are you hungry?

R: No I no hungry.

M: Are you thirsty?

R: No I am ta thir-sty.

M: Are you tired?

R: No I am tired.

Although Reno's rule for Negation based on 39 is Neg + SAAD, an initial attempt of internal negation was observed.

Verbalization

40. IV. M: What'd you tell me about before?
You said something about her.

R: I didint day.

David's productive verbal skills demonstrated less change than Reno. At Time I, his utterances consisted mainly of holophrases, and a great deal of non-linguistic vocalization. Additionally, he frequently expressed functions of Non-Existence, Rejection, Attribution, and Agent-Object, Action-Object, Agent-Action-Object utterances.

	Verbalization	Gesture
41. I.	D: [spaghetti] ette hot	D: touches spaghetti
	D: All-gone carrots	D: looks into empty pot
I.	M: You want me to fix this up?	
	D: No no mommy	D: pulls toy away from M.
I.	D: ady cama [lady camera]	
I.	D: open it	D: holds boat to M
I.	D: Boat floats awa [water]	D: moves boat in water

Time IV showed David able to communicate about many things, appropriately decoding and encoding past and future topics. However, a large proportion of his utterances were still holophrastic or telegraphic. Negation appeared in utterances such as:

	Verbalization
42. IV.	D: me no like it
	D: no like dis one
	D: no find it
	D: no bubbles ere [here]

David had adequate communicative competence to sustain extended conversations, discuss events, observe action constructs, know color names and numbers. His more primitive syntax was attributed to both the affective aspects of

dyadic interaction coupled with the great and extended frequency of his mother's verbalizations.

Peter's linguistic behavior at Time I was mainly telegraphic, with many functional relations expressed. There were also complete sentences, and frequent imperatives.

Verbalizations

43. I. P: [you] oo blow bubbles

I. P: I wanna do it!

I. P: I want cookies please.

His verbal utterances expressed a wide diversity of functional relationships at Time I.

Time IV represented significant changes in Peter's syntactic complexity. Productive question forms were apparent as well as most verbalizations expressed as complete sentences.

Verbalizations

44. IV. P: I go on da boat.

P: I got candy too.

P: Mommy, you all wet.

P: Mommy, I wanna holda dat.

P: I wan da microphone.

P: Mommy, I want Daddy pen back.

Syntactic complexity increased during the four-month period of study for all the children. Communicative competence skills were more apparent than linguistic changes

alone. Dyadic communication became more effective as the children acquired rules for conversational exchange. Prominent in the last period studied was the use of diversity of form and function expressed by the children. They were able to sustain and/or initiate conversation covering a broader range of topics. Emphasis appeared on expression of action-constructs (the ability for person, object, or state to act upon or be acted upon). Earlier communications (particularly for Reno and David) focused on isolating people or objects in the environment, rather than acting upon them. Gestural support decreased with the emergence of stable linguistic forms. Maternal use of gesture proved to assist in interpretation of the world and events, as well as to teach new concepts.

Conclusions--Implications for Language Acquisition Theory

Students of language acquisition, despite philosophical differences regarding the process, all agree on the complexity of language systems and human language behavior. A holistic investigation of language acquisition is necessary to evaluate how developmental, linguistic, and sociological phenomena relate to the language-learning child. This type of investigation can provide information relevant to the effects of interaction on developing communicative competence. Rigorous naturalistic study has produced many

investigations of small populations from which inferences may be drawn leading towards a theory of language development. Although it is obvious that observations from small samples cannot be assumed to represent generalized behavioral patterns, nevertheless, it is important to utilize objectively obtained data interpretively as a source of enlightenment for developmental psycholinguistics.

Data from this study, detailing bi-modal functional patterns of interaction between mothers and children, showed that an inverse relationship exists between frequency of maternal verbal behavior and frequency of the child's subsequent responses.

Beckwith's (1971) observations,that when mothers speak about ongoing events rather than about unrelated activities, children are more apt to respond, were replicated. It is apparent that development of an effective communicative system necessitates that a child be given the time to respond appropriately as well as the opportunity to utilize in linguistic exchange those concerns, ideas, and knowledge that have direct bearing on his activities. Suppression of a child's linguistic output is compounded when the maternal input consists of lengthy monologues. The child may attend during these monologues. However, active participation in conversational exchange occurred only when the mother's verbal flow consisted of brief statements and questions. It may be the case that the

development of communicative competence could be delayed if the child is not given adequate opportunity to play the conversation game, but rather is bombarded by frequent lengthy verbiage.

As rules for conversational exchange were acquired by the children in this study, their communicative competence increased, with an increasing ability to initiate and sustain conversational units and to communicate about events in the past, present, and future. The evidence indicates that children can understand remote events, even though their speech is replete with reference to their immediate surroundings. The impression often is that in some respects the child understands less temporal reference than he actually does. This apparent lag between comprehension and production suggests that conversational exchange about the here and now may facilitate communication between children and adults. The reciprocal relationship of communicative exchange was interpreted as being dependent upon both temporal and linguistic aspects of the child's development. Words such as yesterday and tomorrow facilitate temporal reference, have direct bearing on the child's knowledge of events in time, and are viewed as maternal strategies to reinforce the child's memory for recent events.

Individual styles of maternal speech were observed in each dyad studied. Closure games, story telling, and

question chaining confirmed previous findings of these types of interaction between adults and children (Moerk, 1974a; Mishler, 1975). The goal is communicative competence. The means to achieve that goal may vary, but implicit in stylistic variation is the modeling of informational exchange and the expression of communicative intentions (Dore, 1975).

As anticipated, as the children acquired more knowledge about the world, their linguistic skills expressed multiple relations and became functionally more complex. The verbal mode became more powerful a tool with which to manipulate the environment, express intentions, and direct behavior of self and other. For the two children who mainly used holophrastic speech at Time I, a significant decrease in their use of Nominative verbal bheavior and a complementary increase of verbal Action forms was evident at Time IV. It is presumed that productive ability expressed through functional aspects of Action concepts is dependent on children's knowledge of relations and effects in the environment. Without the acquisition of these concepts, they are limited to labeling performance and fewer avenues of linguistic exchange are available to them. The adult role is to stimulate and teach by demonstration, modeling, and questioning, and is important interactional behavior in integration of environmental knowlege.

The methodology developed to assess gestural function is believed to be an important contribution to the study of

children's acquisition of language. Development of a typology of gestural function allowed for the classification of motor acts according to their communicative purposes. Evidence from this data supported the premise that examination of gestural behavior, based on its functional intent, provides information about the child's ability to express his knowledge of the environment.

Prior research (Nelson, 1972; Bruner, 1975; Sugarman-Bell, In Press) has demonstrated that the pre-verbal child develops cognitive schema regarding relations and functions prior to the development of language. They contend that integration of action and function may be necessary pre-symbolic behavior preceding linguistic productivity. It is clear, from this study, that not all gestural behavior serves to map symbolic representation as a means to achieve linguistic ability. Specific motor activites, such as object Manipulation, have specific symbolic functions which are later translated into lexical entries. However, many functions of gesture are designed to expand communicative exchange and are viewed as supportive of linguistic development, rather than as building blocks of linguistic performance.

Moerk's (1974b) contention that a hierarchy exists of gestural expression vis-a-vis linguistic expression was not substantiated by these data. In this study, gestural

behavior was not observed to have rigid developmental stages in relation to linguistic expression. Rather, the communicative functions intended determined whether or not it was in lieu of, supportive of, or tangential to speech. The relationship of gesture to language was determined by functional intent and the children's use of gesture displayed disparate functions over time. Perceptual identification and spatial location gestures provided the basis for isolation of people, objects, or events in the environment. These gestural functions were viewed as primitive comprehension strategies resulting in translation of knowledge about the world into a semantic system. More sophisticated comprehension strategies were evident in the children's use of gestures to explore and manipulate objects as linguistic information was simultaneously decoded. Frequent observations of a child acting upon an object as his mother talked about it were noted. Also, participants in dyadic exchange were observed to initiate conversation and/or alter a conversational topic based on gestural behavior of the other. These observations support the contention that a holistic analysis of interaction is necessary. Communicative exchange, when investigated within the context, occurred with children using different modes of expression. Clearly, development of communicative competence relies not only on the decoding of the acoustic stimulus but on a combination of behaviors, both gestural and verbal.

Gestural behavior supportive to the verbal mode of expression decreased over time. A significant decrease in Non-Communicative gestures was observed. Reliance on gestural behavior as supportive to verbal expression was common. Prior to the acquisition of some verbal functions, children expressed complementary functions gesturally. As the verbal function became more productive, gestural behavior decreased accordingly. During the process of acquisition of new linguistic forms, the children relied transitionally on gestural forms to express new functions. Diminution of gesture as the primary mode of expression or as supportive of communication was observed with the increase of linguistic skills. The observed relationship of gesture to linguistic function suggests that children who do not have access to the gestural mode of expression (e.g., the blind) may learn language at a slower rate than normal children.

Although all mothers used less gesture than their children at all time periods studied, their non-verbal behaviors were used for diverse purposes. For example, some gestures were used to isolate objects and events in the environment. While this function predominated initially, subsequent use of gesture seemed to provide tangible support for complementary verbal expressions. If mothers were uncertain whether or not the children were understanding a

linguistic exchange, gesture was used to substantiate the verbalization. Maternal gestural behavior enhanced the acquisition of meaning by demonstrating relationships between people and objects, objects and objects, people and people. An important finding was that mothers increased their use of a specific gestural function when the children neither expressed the complementary linguistic function nor incrased its use from the previous time. This appeared to cue the children by providing tangible reference to some specific relationship as a linguistic form was emerging. The importance of maternal gestural behavior in language development is its effect on emerging communicative competence. Maternal gestures provide both denotative and connotative information necessary for the child to extract meaning from the environment and ascribe communicative intentions to people.

This present inquiry provided additional understanding of the complexity of communicative competence. Communicative competence is believed to develop from the acquisition of syntactic skills and the developing ability to express intentions and acquire meaning through both gestural and verbal modes of expression. Gestural behavior is believed to support the acquisition of meaning, and is therefore a potentially powerful force in the emergence of language.

Implications for Therapy with Language Disordered Children

All too often studies of normal development and behavior remain in the realm of the theoretician and are not utilized in rehabilitation programs.

Results of this study are believed to have direct application to rehabilitation of the language disordered child. Substantive findings of the inverse relationship between mothers' and children's verbal frequency should be utilized to control this parameter in the therapuetic relationship. Therapists can be trained to monitor the amount of verbalizations directed towards a client. Objective measures designed to assess the effects of adult verbalizations on the language disordered child should be obtained. By measuring types of verbalizations presented, insights into the child's abilities to respond and process information can be developed. The child's use of single word and utterances, sentence fragments, and complete sentence responses as they relate to interactive behavior should be analyzed. Information about the effects of interaction can be obtained by study of the latency of response. Finally, the child's use of language should be evaluated in relation to the communicative environment, instead of evaluation of the child in relation to a linguistic deficit.

As gestural function was observed to be an important factor in the acquisition of communicative competence,

gestural behavior should be utilized therapeutically. Gestures that may be pre-symbolic can be utilized as a transitional stage for the non-verbal child and employed to shape language. Functional intentions of gestural behavior can be emphasized as supportive to linguistic behavior and communicative intentions.

Most importantly, these data support the assertion that the language learning child is mastering not only a linguistic system but acquiring communicative competency as well. Therefore, rehabilitative techniques which focus on acquisition of communicative competence rather than acquisition of linguistic competence alone should be the goal of the future.

Directions for Future Research

Among the dyads in this population, the children's gestural behavior substantially exceeded their mothers' gestures at all time periods studied. It would seem necessary to assess gestural function between caretakers and younger children in order to ascertain when gesture becomes productive. This inquiry did not attempt to discern whether or not gesture is learned behavior. Evidence indicates that non-verbal behavior is culture-bound and may communicate different messages to different cultural groups (Mehrabian, 1971). However, studies of infant smiling behavior suggest that this early communication of emotion is similar,

regardless of race or environment. If non-verbal expression of emotion cannot be explained on the basis of conditioning, then perhaps other aspects of gesture may be preprogrammed in the child's neurological system as well (Wood, 1976). Determination of the ontogenesis of gestural function could provide answers indicative of whether or not its origins are universal. Study of gestural function with different cultural groups should be undertaken to acquire understanding as to its role as a universal strategy in the language acquisition process.

The demonstration that gestural behavior can be analyzed in terms of a functional typology is believed to be an important contribution to knowledge of emerging language. Results of this present study demonstrated that gesture is used as a strategy in the acquisition of meaning. However, these findings are viewed as preliminary and further study utilizing this typology is needed. It would be important to determine of a hierarchy of gestural development exists, and if so, relate this hierarchy to the development of verbal behavior.

Although syntactic ananlysis of the speech of either mothers or children was not performed, observations of the children's increasing syntactic skills were noted. Maternal styles of verbal interaction were observed, but systematic study was not included. Preliminary observations of Moerk

(1974a) and Friedlander (1972) have provided insights into interactional patterns. Observations from this study confirmed previous findings, providing new information regarding the role of gesture in communication and the complex process of conversational interaction.

The methodology proved effective in providing data for rich interpretation. All observed facets of interpersonal communication were not reported in this present study. The acquisition of meaning arising from gesture and verbalization provided the core for this inquiry. Observations of parallel conversational topics and similar degrees of emphasis within each home were noted. The questions still unanswered concern how the acquisition of knowledge directly affects the acquisition of lexical entries. Secondly, of what import are gestures in furthering the interpretation of intentions? Whether the similarity of conversational topic is cultural accident or if it represents something more significant is yet to be explored. The possibility that mothers use similar strategies to enable a child to extract meaning and encode knowledge into linguistic expression should be investigated.

Finally, if future research confirms these findings, inquiry must focus on interaction between mothers and handicapped children. If gestures are determined as providing linguistic support, it would be important to discern whether

or not the use of gestural function is a common strategy in atypical populations, and develop programs to guide parents within the home environment to aid language deviant children.

Knowledge that gestural behavior can be assessed according to functional categories and its observed support in emerging language provides new information for the continued study of language acquisition.

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APPENDIX A

FREQUENCY SCALE OF INTERACTION

Mother to Child

I. Vocal Behavior

- Whisper
- Laugh
- Babble
- One-Word
- Two-Word
- Connected Speech
- Imitation
- Repetition
- Context-Bound

II. Non-Verbal Behavior

a. Body Posture

- Reaching
- Resisting

b. Eye Contact

c. Facial Expression

- Smile
- Frown
- Watch
- Head Motion*

d. Action

- Point
- Touch
- Give
- Hold
- Take

Child to Mother

I. Vocal Behavior

- Whimper
- Cry
- Whisper
- Laugh
- Babble
- One-Word
- Two Word
- Connected Speech
- Imitation
- Repetition
- Context Bound

II. Non-Verbal Behavior

a. Body Posture

- Reaching
- Resisting

b. Eye Contact

c. Facial Expression

- Smile
- Frown
- Watch
- Head motion*

d. Action

- Point
- Touch
- Give
- Take
- Hold

*Head Motion was marked (P) for Positive (nodding, affirmation), or (N) for Negative (shaking, in negative expression).

11. Agreement--expressive of confirmation or approval.
12. Stereotyped--utterances produced by rote. Can be typical phrases, i.e., thank you, songs, phrases from stories or representing verbal routines.
13. Non-Linguistic--vocal behavior such as babbling or crying, shouting.

APPENDIX B

TYPOLOGY OF GESTURES

Definition of Terms

1. Ostensive--isolating and/or identifying tangible object, person, or event in the environment. Observed in pointing, touching, and holding.

2. Requesting--indication of wanting something or someone in the environment. Observed e.g., reaching towards, pulling, pointing.

3. Pantomimic--acting out of form or function of person or object, e.g., opening and closing of hands illustrating biting.

4. Manipulative--exploratory manipulation of object expressive of its function or manipulative behavior expressing possible alternate function of object.

5. Feature Identification--gestural description of feature of person(s) or object(s), e.g., demonstrating size, shape, number, etc.

6. Locative--identifying place of or locus of action of person, object, event.

7. Searching--characterized by sustained looking for person or object. May include something of someone not evident in the immediate environment.

8. Object Exchange--indicative of communicative exchange between members of dyad, i.e., giving, taking.

9. Questioning--expressing uncertainty or doubt regarding the identification of or the function of object, person, or event.

10. Action--gestural behavior expressing action and not including an object, e.g., sitting down.

11. Affirmative--behavior characterized by approval of or satisfaction with behavior of person.

12. Negative--gestural behavior characterized by expression of non-existence, rejection, denial, e.g., pushing away, head shaking, pulling or turning away.

13. Attending--characterized by sustained eye contact or gaze, expressive of attention, concentration, or questioning.

14. Non-Communicative--meaningless gestures which are context free, e.g., splashing.

15. Non-Communicative Object-Manipulation--gestural behavior expressing meaning of object function. Non-communicative in that not directed towards another nor dependent on other's initiation or response.

APPENDIX C

FUNCTIONAL VERBAL CATEGORIES

Definition of Terms

1. Nominative--naming of person or object, does not have to be present in the environment.
2. Locative--the location or spatial orientation of person or object.
3. Possessive--expression of belonging, either as property or as part-whole relationship.
4. Negative--expressing rejection, denial, or non-existence.
5. Attributive--expressive of perceptual features, e.g., color, size, shape, number.
6. Action--expressive of action; either something or someone acting upon or action towards object either causing change in state or receiving force of action.
7. Imperative--a command or statement indicating specific behavior from other. Apparent in either structure or intonation.
8. Question--request for information or behavior from other. Apparent in either structure or intonation.
9. Instrumental--inanimate force or object acting upon other object, e.g., key door.
10. Recurrence--comment on or request for repeated occurrence of person, object, or event.