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ABSTRACT

The study examines the communicative interaction process between two profoundly deaf mothers and their profoundly deaf young children who use American Sign Language (ASL) to communicate. The hypothesis is explored that deaf mothers modify their language when directly addressing their children in the same fashion as hearing mothers. Utterances containing pointing behaviors and modulated verbs were isolated. Findings in phonological, semantic, syntactic, and pragmatic domains clearly support the hypothesis that deaf mothers modify and simplify their language in conversation with their deaf babies. Data further supported previous reports that young developing signers do not make use of the inflectional/verb modulation system of the ASL in the early stages of acquisition. Children combined deictic points and lexical signs. Similarly, the mothers did not employ much modulation in their language with their children. Strategies used by mothers included explicit forms of reference to referencing non-present objects, locations, and people through indexic incorporation and verb modulation. (Author/CL)

BOSTON UNIVERSITY

SCHOOL OF EDUCATION

COMMUNICATIVE INTERACTION IN AMERICAN SIGN LANGUAGE BETWEEN DEAF MOTHERS AND THEIR DEAF CHILDREN: A PSYCHOLINGUISTIC ANALYSIS

by

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B.A., University of Rochester, 1975

Submitted in partial fulfillment of the requirements for the degree of

Doctor of Education

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Communicative Interaction in American Sign Language Between Deaf Mothers and Their Deaf Children: A Psycholinguistic Analysis

(order no.)

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Boston University, School of Education, 1981

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Abstract

This study investigates the communicative interaction process between two profoundly deaf mothers and their profoundly deaf children who use American Sign Language to communicate. The hypothesis that deaf mothers modify their language when directly addressing their children in the same fashion that hearing mothers do is explored. Utterances containing POINTing behaviors and Modulated Verbs were isolated for examination to illustrate this process because of their profound significance in the structure of American Sign Language and in the developmental course of acquisition in young deaf children. The underlying hypothesis that deaf mothers will modify and simplify their language in conversation with their deaf babies is clearly supported by data in this study and is described in detail in the Results section. Evidence is presented in phonological, semantic, syntactic and pragmatic domains.

The children's data in the present study are in complete agreement with the previous reports that young developing signers do not

make use of the Inflectional/Verb Modulation system of American Sign Language in the early stages of acquisition (Hofmeister 1971; Fischer 1973; Newport and Ashbrook 1977). These reports have indicated that Verb Modulation by Indexic Incoporation is a relatively late and slowly developing acquisition that does not begin until approximately 1.6 years of age.

In the absence of productive inflection to mark semantic or grammatical role in an utterance, the children in the present study (as those in the previous studies) combine deictic POINTS and lexical signs. POINTing comprises the bulk of their sign productions [in a decreasing trend from 100% in the early sessions of the younger child, (age 12-20 months) to 66% in the later sessions of the older child (age 12-20 months)].

This study is the first to examine mothers' input in conversations with their children vis-a-vis the inflectional system of Verb Modulation by Indexic Incorporation. The mothers' data indicate that they likewise do not employ much modulation in their language with their children. Most of their utterances contain lexical, citation form signs and deictic POINTS. Furthermore, when modulation does occur it is always in the presence of the referent object, location or person. There is only a single case of Indexic Reference where the Index is established in signing space for a non-present referent.

In her discussion of morphology, Newport (1979) suggests that American Sign Language has the property of having highly analytic forms with units which are inside units organized in constrained ways; this

results in a "shell like hierarchical structure of discrete forms" for marking the same semantic distinctions marked by spoken languages. Her acquisition data support her linguistic analysis; "young deaf children appear to enter the system making precious little use of the iconic or analouge possibilities [1] rather they doggedly perform their own analysis, morpheme by morpheme, over a period of years."[2]

The present study suggests that mothers indeed offer the system without use of the rich modulation system but rather morpheme by morpheme. Furthermore they use several strategies during the course of development from explicit forms of reference to referencing non-present objects, locations,and people vis-a-vis Indexic Incorporation and Verb Modulation. These strategies, listed below, are discussed in detail in the Results and Discussion section:

1) The use of referent objects brought directly into the dyadic space : This strategy is the most explicit form, one which does not require the child to follow the extention of the POINTing gesture. This strategy was used in an average of 20% of all utterances of the mother of the younger child and drops to an average of 3% for the mother of the older child.

2) The use of POINTing as a phonological replacement in lexical items and to mark semantic/grammatical roles in an utterance. POINTing comprises about 50% of all signs in the corpuses of both mothers.

3) The infrequent use of modulated verbs during early conversations. When modulation does occur it is in the form of incorporating present objects, people, locations only. As modulation increases so does the use of redundant a POINT to mark roles. Locational verbs are modulated first.

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Chapter One

Introduction

The importance of communication to the development of attachment and emotional bonding between an infant and his mother has been widely recognized and researched (Bowlby 1969; White 1959; White and Bel [illegible] and many others). As Schlesinger (1978) points out, this communication manifests itself primarily by non-verbal means (e.g. voice quality, touch or smile) during early infancy and shifts to symbolic/linguistic means during early childhood.

Over the past decade, communicative interaction between mothers and children has been studied by developmental psycholinguists to determine its influence on the course of language and cognitive development. There is evidence of reciprocal communication occuring between a mother and her infant long before linguistic forms can be comprehended or produced by the infant. Bateson (1971); Lewis and Freedle (1972) and others have noted that mothers and their children use non-verbal means such as voice, quality, touch or smile to establish

alternating interactions that appear to have conversation-like form. This interaction is maintained through the language learning years by the regular adjustments mothers make in the form (phonologic and syntactic), content (semantic), and conversational style (pragmatic) of the language they use when directly addressing their children (Snow 1972; Broen 1972; Farwell 1973 and many others). In general, mothers' language has been characterized as well formed, short in utterance length, repetitive, redundant and simplified. In addition, mothers seem to be 'sensitive' to their children's level of linguistic competence and alter the characteristics of their conversation as their children's language evolves over time. The exact relationship between this process and the acquisition of specific linguistic structures is as yet undetermined but researchers agree that it occurs extensively and cross-culturally (Ferguson 1974 and elsewhere). It is very possible that by providing a "special" context for social interaction mothers are also providing an optimal early language learning environment.

The present study investigates this communicative interaction process between two profoundly deaf mothers and their profoundly deaf children who use American Sign Language (henceforth ASL) to communicate. It was hypothesized that deaf mothers and children similary engage in conversations that are finely tuned and regulated to the children's level of linguistic competence and that these conversations are made possible by the mothers' modifications in their language. A restricted set of structures was chosen for analysis to exemplify this process.

POINTing behaviors and Modulated Verbs were chosen for

examination for several reasons. First, and most importantly, the POINT is the basis for the indication of pronominal reference, possessives, plurals, determiners and a complex morpho-syntactic process called Verb Modulation by Indexic Incoporation, which can regulate the agreement of the verb with its arguments.[3]. This process constitutes one of the most important grammatical operations in ASL; in ASL the verb complex has the potential to carry most of the grammatical information in an utterance (Freidman 1975; Kegl 1976a; 1976b; Pizzuto 1979).

Second, the POINT was chosen because Hoffmeister (1978a; 1978b) recognized the important role of POINTing behaviors in the early linguistic productions of a deaf child acquiring ASL and provided a detailed account of its development (which was later substantiated by Pizzuto 1978, 1979). Third, the POINT, along with other gestural behaviors, is thought to function before and during the emergence of a hearing child's first words during the shift from pre-verbal to verbal communication. (Bruner 1975 a; 1975 b; Bates et al. 1977, 1979). This raises the possibility that POINTing has cross-modality as well as cross-cultural linguistic significance.

The interactions of two profoundly deaf mother-child dyads (one boy, 12-20 months and one girl, 20-30 months), who are all considered to be native signers of American Sign Language, were videotaped every three to four weeks for eight months in their homes. Two cameras were used, (one focused on the mother and one on the child) with the use of a special effects/ split screen generator to allow the mother's and child's data to be reveiwed together on one monitor for anaylsis. All data were collected with the aid of a deaf associate to maximize

communicative effectivness with the families and each transcript was reviewed at least once by a native, deaf signer. The relevant utterances were then extracted from each transcript for coding and anaylsis by the author and trained assistant. These utterances were those that contained one or more instances of : 1. an object brought into the dyadic space for comment, 2. an explicit POINT 3. possessive pronominals 4. a Modulated Verb.

Educational Implications

The results of this study of mother-child interaction have profound implications for the early education of hearing-impaired children. In the past five years, education has extended to include infants and toddlers below 3 years of age as well as children above 3 years whose education is required by law. This has been a direct reaction to the awareness through research of the importance of the parent-infant relationship to every aspect of the child's development.

No one doubts the importance of communicative interaction between mothers and children and the extent to which communication is distorted quantitatively and qualitatively in families with a child who is hearing impaired. In fact, Hilde Schlesinger and Kay Meadow, two psychologists involved in the study of deaf children, profiled a grim relationship between hearing mothers and deaf children who do not share a communicaion system (Schlesinger and Meadow 1972). The mothers they observed who could not communicate with their children appeared inflexible, controlling, didactic, intrusive and disapproving. Their children (all between the ages of 2.5 and 4 years) equally frustrated and ungratified by their attempts to communicate appeared to be less happy, to enjoy interaction with their mothers less, to be less compliant, less creative and to show less pride or joy in mastery of skills.

These mothers were also looked at for child rearing practices and were found to use more constant supervision, a very narrow range of disciplinary techniques and to experience more feelings of frustation when communicating with their children than mothers of hearing children or mothers who were able to communicate via Total

Communication. Schlesinger and Meadow suggested that these mothers could not be flexible when confronted with the need to modify their childrens' behavior because of the communication difficulties they face. They are not able, for example, to reason out the situation or to qualify a flat out "No" by offering alternative suggestions for activity or behavior.

The etiology of the frustration for these mothers and children has its roots in the earliest phases of infant development when communication first becomes important to the emotional development of the child. John Bowlby for example, famous for his description of the four developmental phases of attachment and separation patterns that occur between mothers and infants, pointed out the importance of communication in that process. The ability of a child to successfully seperate from her mother for short intervals begins typically with the mother verbally communicating her plans for leaving. This communication lessens the distress during brief seperations until finally in phase IV of this process when mother and child can jointly and verbally agree on plans for departure and return. The child during these phases of attachment is developing a crucial and basic trust in her world.

That language and communication between mothers and children must be successful, effective, reciprocal and joyful for successful emotional growing is an obvious part of an optimal language environment and one which has stimulated a tremendous amount of research in hearing families. It is beginning to be investigated in families with young deaf children.

Another equally important but not as obvious implication of the

success of this communicative relationship is on the course of language acquisition. For most of the 50's and early 60's, the prevailing view held by developmental psycholinguists was that children are born into the world with an innate capacity and innate devises for language development; exposure to a suffient language environment allows this process of language development to occur. In this view, it doesn't matter what form the language environment takes provided it is not a depriving one; the process belongs to the child not to the environment.

More recently, in the late 60's and through the 70's, people who study language development began to realize that mere exposure to a sufficient language environment is not enough. Psycholinguists noted that mothers and other significant adults provide a special form of language for their children and that children respond in very special ways to their mothers. This communicative relationship is thought to be the basis and foundation for language development. Researchers observed hearing mothers talking directly to their children and found for example that their speech is slower, their sentences are shorter and their syntax is simplier than their talk to other adults. Further, their language is rich in redundancies and paraphrase and topics for conversation, introduced by the child, are tied to the immediate environment. Researchers have actually identified over a hundred systematic and predictable features in the way mothers talk to children.

Mothers make excellent conversational partners for their children treating their babies from the beginning as conversational partners. Mothers accept even their children's babbles as

communication and in their acceptance set the stage for reciprocal communication. In turn, mothers' talk to their 8 month old babbling infants is characterized by exaggerated intonation and high pitch. This does not necessarily simplify the language but might serve to attract the children's attention in preparation for later symbolic communication.

When children at about 10 months begin to show evidence of understanding, their mothers language begins to change and simplification occurs at all linguistic levels. As children mature and develop in linguistic ability their mothers' language becomes more sophisticated and complex along with them. Mothers, without being consciously aware of it, provide more and more sophisticated language input at the most appropriate times.

It is important to point out that while their input language is optimal for learning language mothers are not consciously teachers of language. Research has shown that communication and not language teaching is the goal of mother-child interaction. Mothers rarely correct the grammatical form of their children's language, nor control and direct the conversation for teaching purposes. Rather, it is in conversation with their mothers that children learn that language is used to ask and answer questions, to get their needs met and to express their feelings. These are the basic notions of communication.

The present research has looked at mother-child conversation where both mother and child are deaf and American Sign Language is the means of communication. It has discovered the very same kinds of processes occuring (with certain different characteristics that are related to the fact that ASL is a manual-visual language). The

modifications deaf mothers make in their sign language when signing with their children is very important information for educators using Total Communication in their programs with hearing mothers.

Programs variously called 'early intervention', 'parent infant education' and 'infant stimulation' are being established at increasing rates thoughout the country. Teachers in these programs are finding themselves in the middle of this intimate relationship between mothers and children where they are expected to teach hearing mothers how to parent a hearing impaired child. The focus of these programs naturally is language and communication as language is the central issue in deaf education and biggest concern for a new parent of a deaf child. Traditionally parent-infant teachers are trained in graduate programs to teach mothers how to provide a language stimulating environment for their children including what to talk about and how to talk about it. The following quote is from a 1979 brochure for such a program: "Parent teachers will be able to teach parents basic skills in dialouge, four language areas, selection of target vocabulary, expansion and reinforcement".

Educators have to look very carefully at hearing mother-hearing child relationships and deaf mother-deaf child relationships before they determine what their goals for intervention will be. Mothers already possess the skill to provide a language stimulating environment and if educators are careful not to create an overly self-conscious mother or to create a teacher in mother, they can facilitate this relationship and bring the natural quality back to their interaction and communication. The challenge is not to train parents in <u>new</u> parenting techniques but to help them realize what they

know and how they can use it with their new deaf child.

We have to also take yet another look at the old modality question in view of this new information; i.e., are we going to provide an Oral or Total Communication environment for deaf children? The language environment hearing parents naturally provide their hearing children can be recreated via Total Communication without special alterations and with the support of a parent-infant specialist. Reciprocity, that is, both partners being able to participate in communication equally is so vital to this relationship and can be achieved with Total Communication. Can it be acheived without sign language?

Chapter Two

Literature Review

2.1 An Overview of ASL Linguistics

In the twenty years since Stokoe (1960) first investigated the formation of the lexical sign, a tremendous amount of linguistic information has become available about American Sign Language (for a complete review of the recent literature see Wilbur 1979). These extensive investigations go beyond the question whether ASL is a language in the true linguistic sense of the word; rather they begin the process of detailing its stucture. Much of the early literature agreed that ASL is a language but suggested that its structure is uniquely bound to its manual-visual modality and very different from the structure of spoken languages (for example Schlesinger 1970). More recent studies, however have uncovered formal devices initially overlooked by early investigators because of their lack of experience with a manual-visual modality and the tendency to be influenced by a spoken language stucture bias. For example, facial expression, previously overlooked as a grammatical devise,is now recognized as a mechanism that operates systematically, along with Indexic Incorporation and word order, to mark subject versus object (Kegl 1976 a;1976 b; Fischer and Gough 1978, Liddell 1977). What has become increasingly clear is that ASL, like Serbo-Croatian and Japanese, is a highly inflected language that generally (but not always which will be discussed in section 2.2) relies on verb inflectional marking of grammatical/semantic roles in an utterance. The POINTing systems and this process of Verb Modulation by Indexic Incorporation are integrally related and form the unit of study in this dissertation.

2.1.2 POINTs, Verbs and Pronominals in ASL

The key to understanding ASL morpho-syntax is the recognition that locations in the signing space (the allowable area in which signs may be produced) are used for inflectional purposes. This can be accomplished in several ways. A noun phrase, when first introduced in discourse, can be accompanied by a Index (Kegl 1976 a; 1976b). The Index in turn includes a Deictic Marker and Inflection for Agreement (ibid). The Deictic Marker is usually a POINTing gesture towards a location in space but may assume any one of various handshapes for different specifications (e.g. demonstrative, reflexive or possessive, Y-hand, 1C-hand or B-hand respectively). The location in space towards which the Deictic Marker is directed serves as an Inflection for Agreement and identifies the spatial location to which the noun phrase is uniquely related for later anaphoric (by pronoun) reference. If the referent is actually present in the context of conversation, the Deictic Marker is accomplished by POINTing to the referent itself and the referent is thought of as occupying its spatial location for its Inflection for Agreement. Any pronoun refering to the noun phrase (in either case) must agree in spatial position with the Inflection for Agreement in the Index. The specifics of location for these POINTs vary according to context, style and signer. However, as a general rule, first person Agreement Inflection is always the signer, second person is always the person the signer addresses (both occupying their Inflection for Agreement).

In summary, a signer will indicate a person, object or location in the immediate environment by using a deictic POINT (or gaze) to it and this

reference is considered pronominal. If the referent is not present a spatial location is "set up" for it when the NP is first introduced. The use of these spatial locations for either present or absent referents is termed Indexing and the locations themselves are called Inflections for Agreement.

Once the spatial location is established for an NP, reference back to it does not have to be a discrete action. For example, to assign grammatical information to a verb through the Agreement Inflections, the verb can be oriented toward the spatial location for the NP and be said to incorporate it; or, the verb can be started at one location and moved to another. The verb GIVE, for example, may start at the signer's body and move out towards the addressee to indicate "I give you.", where as the reverse would indicate "You give me.". Or one can set up locations for "Bill" and "Jane" and move from Bill to Jane for "Bill gives Jane...", (really "he gives her...") or from Jane to Bill for "She gives him...". In the case of a referent present in the context of the conversation a verb can be oriented to incorporate it. For example to sign "break it", BREAK is signed towards or over the object ("it"). This system of Verb Agreement by Indexic Incorporation is referred to as Verb Modulation and has been formalized by Kegl (1976 a; 1976b; 1977) and earlier by Frishberg and Gough (1973) and Fischer and Gough (1978). All relevant arguments are reviewed in Wilbur (1979) and Lane and Grosjean (1980).

It is important to point out that the situation in ASL may parallel that of Japanese and Serbo-Croation and not other highly inflected languages like Turkish (Meier 1980). In Turkish, case inflections are the only important marking for grammatical/semantic role. In most sentences, word

order is used only to indicate the topic or focus of the sentence. On the other hand, Slobin (1978) points out that widespread hommonymity among Serbo-Croation noun inflections causes Serbo-Croation to, at times, use contrastive word order for role marking.

Similarly, not all ASL verbs can be modulated for role. Fischer (1973) observed that body anchored verbs (verbs articulated on the body) cannot be modulated to incorporate an Index because of phonological constraints [with a few lexical exceptions reviewed by Fischer (1973)]. Where Indexic Incorporation is impossible Liddell (1977) and Coulter (1979) argue that ASL uses contrastive word order; Kegl (1976 b, 1977) calls this the "flexibility condition": the more inflected the verb is, the freer the word order may be. In any case, the young deaf signer must acquire two strategies to mark role, Verb Modulation by Indexic Incoporation and word order; this is unlike the case for young Turks who only acquire a totally regular, exceptionless case-marking system.

There are many other inflectional processes that can be applied to verbs (or nouns) in ASL; for example, there are processes that indicate number, manner, or aspect (see Newport 1979; Klima, Bellugi et al. 1979 for a complete review.) There are also several stylistic and pragmatic options for indexing references and using pronominals; for example, in story telling, rhythm of signing or facial expression can be used pronominally to refer to a particular character (kegl 1978b). Another set of pronouns i.e., classifiers, involves categorizing nouns by salient, perceived characteristics of the referent and interacts with Indexic Reference and Verb Modulation in the same fashion as other pronominals. In summary, ASL employs a complex morphology much like that in spoken languages. Morphemes

in ASL make up a limited number of discrete components which are combined in consistent, linguistically, constrained ways that are usually combined simultaneously rather than sequentially. Newport (1979) summarizes the structure of the "word" in ASL this way: (P.22)

> "...as in spoken languages, complex forms are made up of a limited number of discrete components. Moreover, these discrete units are combined with a shell-like structure like that in spoken languages. Significantly, the inner layer of this shell consists of the root and derivational morphology, those components which add basic meanings to the root; operating outside of these is derivational morphology which changes the grammatical category of the stem from verb to noun; and outside of these is flectional morphology. In short, ASL has the same kind of analytic character, with discrete units inside of discrete units that is displayed by spoken language."

2.2 Acquistion Data for Indexic Reference and Verb Modulation

The study of the acquistion of ASL is relatively limited (see Wilbur 1979 for a complete review), but is is already clear that deaf children learn ASL in a manner similiar to hearing children learning a spoken language. For example, deaf children acquiring ASL have been shown to pass through manual articulation stages (McIntire 1975, 1977) and to express the same full range of semantic relations found in children learning English (in English: Bloom 1970; In ASL: Newport and Ashbrook 1977, Bellugi and Klima 1972 and Hoffmeister 1978).

Fischer (1973) was the first to report on the acquisition of verb inflection. She looked at two deaf children of deaf parents who she referred to as Shirley and Corey. Fischer arbitrarily divided the data into six month stages for analysis. For Corey, she analyzed five stages: stage 0 (2:0 years), stage 1 (2:6), stage 2 (3:0), stage 3 (3:6), stage 4 (4:0) and for Shirley, she analyzed the corresponding stages 1-4. Fischer divided the verbs she studied into three classes: 1) locational (these verbs are non-body-anchored, and modulated for Indexic Incorporation by being produced at or toward the Inflection for Agreement and remain stationary during formation), 2)reversing (also made off the body, these verbs involve reversing or modifying hand orientation toward an Inflection for Agreement), and 3) directional (these verbs move between two Inflections for Agreement to indicate their nominal arguments).

At stage 0, (2:0 years), Fischer observed no Verb Modulation in the productions of either child. In the absence of Verb Modulation, Cory, in

the following example, strings together a citation form verb and deictic POINT using the POINT to indicate a location, which in the adult form, would be incorporated with the verb.[4]:

Cory:-SIT PT. (you) SIT PT. (there)-

"You sit there."

Adult:-Pt. (you)#sit there#-

"You sit there."

At stage 1, (3:0) both children tended to use mostly locational verbs, even modifying directional verbs to look more like locational verbs. At stage 2 (3:6), both children showed evidence of having learned a Verb-Modulation rule as well as having learned to over-generalize it. In several cases, the children modulated body anchored verbs such as DRINK and EAT. The beginning use of reversing and directional verbs appear also during this stage. By stage 3 (3:6) and 4 (4:0) both girls knew which verbs were modulated and in which way, with just a few lingering overgeneralizations.

Hoffmeister (1978) conducted a more in depth, longitudinal study to investigate the development of various systems based on the POINTing gesture. One child referred to as Alice, was video-taped once a month, from age 25 to 53 months, with data from another child (42-71 months) used as a verification.

Hoffmeister discusses his considerably large body of data in terms of five developmental stages. These stages are determined by total output of utterances (divided into units of 2100 utterances each) and correspond to the following ages: Stage I, 29 months, Stage II, 38 months, Stage III, 45 months, Stage IV, 50 months and Stage V, 52 months.

Stage I is a period during which Alice's utterances consisted mostly

of deictic POINTS and lexical signs and the notable absence of any Verb Modulation or Indexic Incorporation.

Stage I is characterized by the predominant use of naming and classifying POINTS. In fact, 56.3% of all semantic relations expressed consisted of POINT + noun for demonstrative entity ("that cat") or POINT + adjective for demonstrative attribute (That [is] green"). This diminished to 24.3% by Stage II, to 12.8% by Stage III and to 5% by Stages IV and V. The other 43.7% of semantic relations expressed in Stage I were used to indicate agent (e.g.; pt. (that/to a bird) fly), patient and locative, but were used syntactically only as a demonstrative. Importantly, in this initial stage, POINTing gestures are constrained to the signer, addressee and objects present in the room. Also important in this stage is the fact that it is comprised of two sign utterances where one sign is almost always a POINT. Plurals at this stage were indicated mostly by repeated POINTs to the same object. POINTing also comprised the early expressions of possession, in the form of , PT. (that/object) Pt. (me) and were constrained to objects present in the room.

Stage II sees the emergence of Verb Modulation. The demonstrative-entity relation continued to dominate the utterances produced by this child but an increase of other relations and the emergence of new relations also occurred. Three relations begin to emerge in Stage II. The Point shows up regularly in these three term relations in the form of three POINT utterances, one sign and two POINT utterances, two signs and one POINT utterances and finally late in Stage II, three non-POINT signs. Importantly, in this stage, Hoffmeister finds what he calls "Real World Indexing", i.e., POINTing toward the object followed by use of the a verb in

the direction of that object, or the utterance of a verb directly on the object. He also found the use of of the demonstrative Y handshape (THAT) on the real world object followed by a POINT towards it. In the expression of the possessive, third person possessors emerged but still with the immature POINT handshape rather than the adult B handshape.

In Stage III, Hoffmeister reports development in non-POINT areas. For example, the appearance of conjoined and complex sentences. There is also refinement and some stabilization of the demonstrative, i.e., the NP was expanded to include the adult demonstrative THAT (Y handshape) in the position previously taken by the POINT without an accompanying POINT as in Stage II. Importantly, the use of abstract reference begins to emerge in Stage III. For example, the child located a Bat on the living room drapes with a deictic POINT and then referred to this location in a later sentence when the bat itself had disappeared. The child was also able to index a person not present in the room and refer to that Index.

In Stage IV full control of all two and three unit semantic relations were observed. All possible possessive forms were produced correctly and the reflexive (A hand) emerged although interchanged with the POINT. The reflexive was at this stage, only used in reference to members within the conversational dyad. Later, third person reference was attempted. In addition, third person reference was initially restricted to objects present before extended to non-present objects, although early in Stage IV the child was still using an object present in the room to substitute for another, similar object not present. Classifier usage emerged in this stage but is not relevant to this discussion.

By Stage V the child had mastered adult use of the POINT for its

function in possessives, plurals, reflexives and indexing nouns in space with pronominal/verb agreement.

As each of the various functions based on the POINT developed, a sequence emerged: confinement to the immediate dyad followed by extension to objects and persons not present. Noun indexing for pronominal reference followed this sequence: indexing <u>on</u> the objects, indexing toward the object or substitute object, and finally referencing non-present objects. Furthermore, it is not the case that this sequence emerged for all POINT functions simultaneously. Rather, during Stage IV this sequence emerged for the reflexive when control of pronominal and possessive POINTs was already established. There is a movement from concrete to abstract reference with a transition stage where an object is used to substitute for another object. The POINT was used in the first productions of possessives and demonstratives which represents phonological simplification.

Indexic Incorporation was also analyzed in the spontaneous linguistic production of one deaf child of deaf parents by Loew (1980). Loew studied five videotapes, selected from a larger collection, covering the period from age 3:1 to 3:7.

Loew's data confirmed those of Hoffmeister and Fischer in indicating that Indexic Incorporation is a late acquisition. By age 3:1, her subject had <u>begun</u> to use Indexic Incorporation for both present and non-present referents but with interesting modifications and constraints.

At the first described age (3:1), very few directional verbs appeared, modulated or unmodulated. Most verbs were non-modulatable (such as EAT, SLEEP) with an occasional use of verbs such as SIT that incorporate only a single argument (such as, "sit there") This is in agreement with

Fischer's (1973) report. Loew's subject progressed from avoiding the modulation of directional verbs by POINTing to or naming the people or objects involved and sometimes using non-sign gestures, to using directional verbs, (GIVE,TAP,SHOVE) incorporating the index for the patient (which Loew refers to as the "Goal" of the verb) but leaving unspecified the agent (or "source" to Loew). In some instances where the child herself was the agent, this was appropriate; in others, the ommision created ambiguous utterances with no indication of who was preforming the action. All Indexic Incorporation were produced with present referents and all patients were second or third person pronominals with no instances of reversing the verb to incororate herself as a patient ("look at me" or "ask me").

At 3:6, the first true modulations to incorporate two arguments were noted: "She gives me". The subject was also attempting to modulate verbs for non-present referents but would do so without first explicitly establishing their indices. This would be equivalent to a younger speaker of English using a pro-form "he" or "she" without first introducing the nominal. At the last taping, 3:7, the subject had still not acquired this process.

One last piece of confirming evidence comes from Newport and Ashbrook (1977). These authors studied the development of semantic relations in three deaf children with deaf parents between the ages of 27 months and 36 months. They originally separated semantic relations expressed through a sequence of signs from those expressed within a complex sign (one which incorporates an agent or patient through Verb Modulation) to see if development differences in expression type exists. In fact no such difference was found. Newport and Ashbrook also noted that before acquiring the incorporation process for marking grammatical/semantic role in ASL

utterances young signers rely on word order. So, for example, "he gave to her" would not be signed with agent, "he" and benefactor "her" incorporated in the verb, "give" but rather as three distinct, unmodulated signs in a fixed word order.

Meier discusses the above, summarized reports (Hoffmeister 1978; Fischer 1973; Newport and Ashbrook 1977) in terms of language universals and cross-linguistic generalities that have been made in the psycholinguistic literature. He notes that most early psycholinguistic studies describe a two-word stage in the child's development in which no productive, inflectional morphology is used. The classic citation is Slobin's (1967) study. In it Slobin discusses a variety of studies which found this two-word stage in essentially analytic, word order languages, such as English, as well as in fused, inflecting languages with comparitively free word order such as Russian. Without inflection children mark grammatical/semantic roles through word order.

Meier also notes that Slobin's more recent work (1978) found exceptions to this phenomemon in Turkish children and speakers of other agglutinative languages who make early use of inflectional morphology. Slobin suggests that early versus late acquisition of inflectional morphology is dependent on typological characteristics of the language; for example, whether or not the language is agglutinative versus fusional in its morphology, is regular or irregular in its paradigm or uses pre-fixation versus suffixation.

Meier reviews cross-linguistic data from Turkish and Serbo-Croation in detail and concludes that in Turkish the case-marking system is totally regular and exceptionless. As a result Turkish children develop its use

early in the one or two word stage of acquisition. However in Serbo-Croation, in Japanese and in ASL two strategies are employed to mark role: inflectional processes and contrastive word order. Furthermore, in all three languages, young learners who lack control of the inflectional system, employ rigid word order to mark grammatical/semantic role.

Meier does not accept the presence in ASL of two linguistic devices to mark role as sufficient to account for the relatively late acquisition of Indexic Incorporation. Rather he suggests that Indexic Incorporation may be one facet of a highly fusional morphology and that these two characteristics of ASL typology are responsible for the late acquisition of Verb Modulation of Indexic Incorporation.

2.3 POINTing Behavior in Hearing Children

Some psycholinguistic researchers treat POINTing behaviors in hearing children acquiring a spoken language as paralinguistic phenomena (Bowerman 1973; Bloom 1970). Others have considered POINTing, along with other gestural behaviors, to be part of the repetoire of communicative strategies for interaction that is precursory to verbal language. In this section, some of these studies will be reviewed.

Bullowa (1977) analyzed patterns of interaction between two small children and their caretakers. Her initial interest was to differentiate behaviors that might proceed what she categorized "performative" utterances (those that express demands) and those that might proceed "reportative" utterances (those that point to or indicate someone or something). After careful anaylsis of these behaviors Bullowa suggested that important conditions for the emergence of language in the ontogeny of communication are: 1) interaction with caretaking adults, 2) shared focal attention and 3) specificity of reference. She further hypothesized that the first means an infant has for reference to specific things in his environment is to direct his gaze at it, augmented by the action of sucking. Head-eye movements (orientation and tracking) and arm-hand movements (reaching giving, receiving, indications) at three months of age, give way to reaching and pointing movements at nine to ten months as means for engaging her addressee's attention and of specifying orientation. Further, reaching and pointing are related to the later development of naming and therefore categorizing and labelling. In this example offered by Bullowa, mother and

child attended together to an object in the environment through POINTing behavior: (cit. pg. 203)

> " ..at 1· months, Dory pointed to the wall. Her mother pointed to a pattern in the wallpaper immediately after, as Dory withdrew her hand. Thus, both attended simultaneously to the same environment object after Dory indicated it".

Bruner (1975a: 1975b) was also interested in the pre-speech communication of infants and in identifying behaviors that might be considered precursors and prerequisites to later linguistic development. He also sought for these behaviors in the context of interactions that occur between the infant and his mother.

Bruner discusses the differences between "indicating", "deixis" and "naming" and suggests that indication and deixis are instrumental to the development of naming. This is in keeping with his argument that it is necessary for the child to master certain cognitive skills as "the constituent skills for linguistic mastery". In other words, one set of behaviors is not merely replaced by a set of linguistic skills: rather, the cognitive skill underlie and are fundamental to the mastery of linguistic forms.

Bruner defines indication to include gestures, postural leans and vocal patterns that serve to call an addressee's attention to an object, action or state. Deixis according to Bruner's model, involves the use of "spatial, temporal or interpersonal-contextual features of a situation" to establish joint reference. Bruner's examples of indication behaviors, like Bullowa's, involve the mutual attention of the mother and child on the same object, person or state. The mother uses the infant's focus of attention to

infer his needs or requests. In turn, the infant, by four months, will follow the adult's gaze when it is turned away from the child. By eight months of age, the extended hand is used to focus on a line of regard rather than to focus on the direction of an action.

To support his argument , Bruner noted what he calls "visual cross-checking" or "looking at the other face while in the process of indicating," (apparantly to agree on a referent) which he considers to be part of a process of conventionalizing these indication routines. He also observed decontextualization and increased economy in their use over time.

Pizzuto (1979) in a discussion of Bruner's work, suggests that POINTing and naming are both processes that reflect the child's attempt to master reference or "using signs (whether gestural or linguistic) that mean what they mean only by agreement"(cit. pg. 18). Pizzuto also points out that symbols must be ultimately created both for representation and communication.

Deictic markers appear at the linguistic level in spoken language in such word classes as pronouns, adverbs, adverbial location and more, which all have in common constant meaning but a virtually infinite number of referents. Words such as "I", "you", "here", "there", only have referential meaning within a particular discourse. Bruner argues that these concepts emerge in interactions without formal language. Specifically, he infers this concept in indication routines and other games established between mother and child. One such example offered by Bruner is seen in the game Peekaboo.

Games like Peekaboo require mother and child to establish roles and then reverse them. According to Bruner the turn taking actions are often

accompanied or "marked" by distinctive vocalizations and direct eye contact at crucial places during the play, "as if to calibrate his intended action with hers (mother's) and to check which one is playing which role" (Bruner 1975a). These games and the indication routines (which utilize gestures and POINTing) according to Bruner, are the beginnings of the capacity to understand the relational concepts that underlie the use of pronominal forms.

Bates and her associates were similary interested in the relationship between manual gestures and linguistic/cognitive development. They conducted a series of studies to investigate the emergence of vocal symbols i.e., names , in hearing children between the ages of 9 and 13 months. Like Piaget (1962) and Werner and Kaplan (1963), Bates et al. view naming as a process that gradually emerges out of a "complex of interactions with objects " (cit. pg. 8). Further, all the above researchers view solitary naming (i.e., the tendency for normal infants to name things to themselves in the absent of eye contact of feed back from adults) as part of an active process of constructing and categorizing reality. Bates et al. points out that neither they nor any other of these reseachers ignore the interactive and communicative functions of naming for shared reference; rather, they seek to find a common cognitive process that underlies the use of naming "inside and outside" of communication.

In order to find underlying processes, Bates et al. looked to the development of gestures in children ages 9-13 months. They collected evidence to support an argument that certain gestural conventions are a kind of naming "in so far as they are used to recognize, categorize or identify an object as members of a known class" (cit. pg. 4). For example, Bates et al. found a consistent relationship between the ritualized babbled forms of

a nine month old child and her reaching toward an object. Reaching later developed into such behaviors as giving, showing, and eventually POINTing to objects with the onset of more "wordlike" sounds. Further, these behaviors occurred without any evidence of communicative intent: i.e., they occurred in the form of solitary POINTing and reaching accompanied by vocalization.

Bates et al. identified another set of gestures in children that emerges at about ten months and becomes firmly established by the end of the first year. This is a set of what Bates terms "brief imitations of characteristic behaviors with objects taken from well known scripts like 'lunch' and 'bedtime' but executed outside their usual context". These manual gestures (like "stirring" or "sipping") are seen as preforming a recognitory or labelling function.

Bates et al. outlined four sets of gesture schemes: 1) POINTing for self (no adult feedback present) 2) object oriented imitation (stirring, sipping, etc.), 3) giving, showing, POINTing for others, 4) "showing off routines, e.g. patty cake", in terms of those that might function for communicative purposes and those for cognitive purposes. Of most relevance to this present review are the POINTing behaviors. (Bates et al. considers POINTing-for-self (no adult feedback) to be significantly different from communicative POINTing sequences that serve to orient someone else's attention toward something external).

The researchers then conducted a large variety of standardized and observational quantitative tests of early language comprehension and production (gestural and verbal) in a sample of 25 hearing children. A correlational anaylsis was done to determine a pattern of correlations within and between categories as well as the predictions that could be

made. Below is a summary of their findings:

1) A "gestural complex" consisting of the four (out of ten) behaviors most strongly correlated with each other was identified. These behaviors were: giving, showing, communicative POINTing and ritualized requests.

2) A "language complex" was identified consisting of information from three comprehension tests, five production tests and one observation of babbling behavior.

3) A "cognitive complex" could not be similarly indentified from such measures as object permanence, spatial relations, means-end relations and others. However, certain details of the correlations between cognitive measures and linguistic/gestural measures emerged as important to the Bates' group model. These details are not relevant here (See Bates et al. for discussion)

Bates et al. were essentially interested in finding adequate proof that language does not replace gestural communication (replacement model). Rather they were interested in a model of development which sees gesture as foundational to language (exparsion model). Indeed it was the case in their study that children who developed quickly in language area most exercised the gestural schemes.

Bates et al. made a distinction between Communicative and Non-Communicative POINTing in terms of their function and their relation to the Language Complex. Communicative POINTing was used in interaction to call an addressee's attention to some object, person or state and is highly correlated with other behaviors that constitute the Gestural Complex. Non-Communicative POINTing or POINTing -for-self occurred outside of

interaction. These POINTs were made toward objects "close at hand in solitary exploration, with no evidence of communicative intent" (cit. pg. 10). Further POINTing occurred in the following sequence: "She (the child) would first point to the object, then swing around and point to the listener, then turn around again to point to the apparent referent. t took several weeks for this chain of acts to smooth into a single action of pointing away while looking for confirmation" (cit. pg. 11). Non-Communicative POINTing did not correlate with other measures of Gestural Complex except, not surprisingly, with Communicative POINTing.

Both types of POINTing correlated with Language Complex, in fact, the percentage of positive correlations for Communicative POINTing was 53% and Non-Communicative POINTing 29%. (Other percentages of positive correlations were: 32% for giving, 22% for ritual request and 2% for showing.) Bates et al. suggest that Communicative POINTing is related to language in two ways: as a general set (among many) of conversational signals and as a specific set of structures that function for reference to external objects and events. They consider POINTing to be a gestural form of naming which functions to share reference with the addressee.

Bates calls attention to another interesting aspect of the findings. One would expect gestural measures to correlate more highly with language production in so far as they were in fact communicative production, than with language comprehension. This prediction proved wrong. Language comprehension correlated with gestural development at the same level as referential speech and slightly higher than non-referential speech. In particular, "the strong relationships between Communicative POINTing and

Comprehension were similar to those for POINTing and production" (Bates et al. pg. 12).

The use of deictic POINTing gestures and the use of what Bates et al. term "gestural schemes" come together in Goldin-Meadow's (1975) study of a gestural language invented by six deaf children who were presumably not exposed to a conventional signed language. Goldin-Meadow examined in detail the representation of semantic relations in the communication system spontaneously developed by these children whose ages ranged from 1:5 to 4:6. These deaf children whose hearing parents supported an "oral" training (amplification, speech-training and speech reading) very consciously chose to not include sign language in the communicative repetoire used with their children. The children were observed longitudinally at play in their own homes.

Goldin-Meadow used Fillmore's (1968) case grammar to determine the semantic nature of these children's productions into two basic types: deictic (POINTing) and "characterizing" signs. "Characterizing" signs as defined by Goldin-Meadow are very similar, if not identical, to Bates' "schemes". These are usually gestures of actions or properties generally associated with their referents. For example, Goldin-Meadow considers the child's pounding the air with a fist to mean "hammering" and twisting a hand to mean "opening a jar."

In Goldin-Meadow's analysis all "nouns" are realized in the children's productions as POINTs and "verbs" as characterizing signs. A two-sign phrase had therefore a noun-equivalant (a POINT) and a predicate (a characterizing sign) that make up a surface structure expression.

Goldin-Meadow charted the development of this self-generated sign system and claims to find a course remarkably similar to that of hearing children in the early stages of learning to talk.

2.4 Summary Literature Review

The POINT has been shown to be fundamental to basic morpho-syntactic processes in American Sign Language. A process called Verb Modulation by Indexic Incorporation has been outlined and its relationship to POINTing explained.

It seems that POINTing has a vital role in the early communication of deaf children acquiring ASL, deaf children not exposed to signing but developing a self-created gestural system and hearing children acquiring spoken language. It is also a strategy used by hearing children and their mothers in communicative interaction. The literature reviewed in this section support a cross-modality, cross-linguistic notion of the importance of POINTing.

For deaf children acquiring ASL, Indexic Incorporation seems to be a late acquisition and one with many interesting modifications and processes during its development. POINTing is used to express semantic/grammatical roles that in adult grammar can be subsumed and expressed by Verb Modulation.

This study investigates the conversations of deaf mothers and their deaf children for these processes related to POINTing and Verb Modulation and asks the following questions:

:How does Verb Modulation appear in the mothers' language directed to her children;

:Is POINTing a strategy employed by mothers and if so in what ways;

:What evidence can be found in early conversation between deaf mothers and children for a developmental process that has modifications towards simplicity as its underlying theme.

Chapter Three

3.0 Methodology

3.1 Subjects

The subjects for this study are two mother-child dyads. The mothers are both:

:severely to profoundly and congenitally deaf,

:native signers of ASL or have used ASL as a primary means of communication since an early age,

:using ASL to communicate with their children,

:married to a deaf signer.

To qualify as a subject for this study, the children had to:

:indicate a serious hearing loss although deafness cannot be quantified at such young ages,

:be of normal intelligence,

:be free of any neurological impairment,

:be free of any other handicap.

Table 1 summarizes the pertinent information on the characteristics of each child.

Table 1

	Sex	Birth Order	age at intial observation	age at expected final observation
Child M	Male	2	12 months	20 months
Child E	Female	1	20 months	32 months

Child M's mother and father both received some college education, child E's did not. Both fathers work night shifts and are home during the day. Child M has one older sister aged 5 who is congenitally, profoundly deaf. Child E has a set of deaf grandparents and several deaf cousins, aunts and uncles. Both children were involved at the time in an early intervention program at the Boston School for the Deaf in Randolph, Massachusetts which involves a few hours of structured play a week.

3.2 Data Base

It has been documented that the presence of a hearing person has a strong influence on the kind of signing a deaf adult will produce (Markowicz and Woodward 1978). Most hearing people communicate through a system of Signed English (signs put in English word order). Most deaf people respond to this by code-switching to a more English-like variety of signing when conversing or in the presence of a hearing person. Therefore, this study was conducted with the aid of a deaf associate to maximize communicative effectiveness with the subjects and to insure that the data will be "pure" ASL.

The analyzed data are composed of one-hour videorecordings obtained in the mother-child's home every three weeks for the duration of the study[5]. Two cameras were used, one focused on the mother and one on the child. Recordings were made with the use of a special effects/split screen generator. This allowed the mother's and child's data to be viewed together for analysis on one monitor.

3.3 Procedures

The mothers were told that I am interested in the child's sign language development. I asked the mothers to interact with their children in a natural and typical manner. My assistant and I filmed during play and feeding times. Free play sessions allowed the child and parent to explore the child's toys without experimenter manipulation; structured play sessions involved a specific activity to more actively involve the parent. Examples of this kind of activity are: (1) "reading" together a book brought in by the reseacher; (2) putting together a puzzle or playing with a game provided by the researcher. Each session lasted between 45 and 60 minutes.

3.4 Data Analysis

3.4.1 Procedures for Transcription

A total of eighteen videotapes were transcribed at least once by a native deaf signer and reviewed a second time by a deaf or hearing signer. Every utterance of both the mother and child was included in a continuous transcription. Utterance boundaries were judged by the deaf, native transcribers on an intuitive basis, as linguistic rules for utterance boundaries have not yet been determined.

All context information was included for each communicative turn. In the following example of the notational system, dashes (- -) placed on either side of the utterance length indicate its boundaries. (yes^{n} or No^{n}) placed under the signs indicates an affirmative or negative head movement produced simultaneously with the sign. A question mark (?) over some part of the utterance length indicates a question facial marker for that part of the utterance. A

zero placed in the right corner next to a sign (MAMA^{0}) indicates a phonological modification and the handshape used is indicated after an equal symbol(MAMA^{0}=g). Cross-hatches (# #) indicate Verb Modulation. POINTs are treated this way: Pt. is a symbol for a POINT. Next to it, in parantheses is included the meaning of the POINT (this, that, here, there, those, etc.), and then its goal [Pt.(this/to toy doll)]. An English translation is given under each utterance. The following is an exchange between mother and child:

Mother	Child
? -want glasses Pt.(that/to glasses)	-yes^{n}-
? want glasses Pt.(that/to glasses)-	"yes"
"Want glasses. Want glasses?"	

[picks up can of play dough]	
-Pt.(This/on can) ? make glasses want-	-Pt.(that/to can) glasses^{0}=5 hand- "(want)that glasses."
-Sit Pt.(there/to floor) Sit Pt.(there/to floor)-	
"Want to make glasses with the play dough? Sit there on the floor."	

3.4.2 Coding

Every utterance in the transcript containing a POINT, an object brought into dyadic space, a possessive pronoun and/or a Modulated Verb was then coded for the following information:

1) Semantic Relation Expressed by Utterance

The coding system allowed for all one, two, three, four and five term semantic relations expressed by utterances to be coded. (In fact no five term utterances

emerged in the period under study and only a few four term). Terms for semantic relations followed those used by Hoffmeister in his study (1978) which were based on Brown (1973) and Chafe (1975). Appendix A lists the possible relations and examples from the transcript.

2) Pragmatic Function Expressed by the Utterance

The categories I devised sought to describe the communicative function of the utterance, coding all utterances as one of seven types of reportatives and one of six types of questions or requests. The reportatives name, confirm, disconfirm, negate,locate,comment, explain or describe. The questions/requests could be of the wh-type, stative verb type("do you want", "do you feel/know" etc.), emphatic/directive type (to direct the addressee's actions or stop her activity), questions relating to action ("are you eating?" "are you playing?"), clarifications [(did you say) "me?"] and the most subtle form, indirect requests ["Its hot in here" (please open a window)]. Appendix B lists these categories and examples from the transcripts.

3) Information About the Way the Referent was Indicated

Hoffmeister (1978) found a significant, developmental progression from POINTing on the referent, to POINTing toward the referent, to use of a substitute object for the referent, to indexing a present referent, in the data of his subject. These differences in articulation were therefore coded for in the present study as well. In addition the coding included information about the introduction of an object brought from outside the dyadic space.

4) Phonological Information About the Deictic Marker

This coding category allowed for the specification of the handshape used for the Deictic Marker: B hand, Y hand, 10 hand, or 5 hand.

5) Introduction of Referent

This category (a simple yes/no code) recorded which one, mother or child, introduced the referent for the Deictic Marker.

6) Number of Signs in the Utterance/Number of POINTs in the Utterance

This category allowed a sign-to-point ratio to be calculated to illustrate the proportionate amount of POINTing that occured and its change over time.

7) Verb Complex Modulation

The following information was included about the verb complex: 1) whether it incorporated an index for a present referent (where the present referent can be thought of as occupying its Agreement Inflection in space); 2) whether it incorporated a previously

established Index for a non-present referent. 3) whether it was a citation form verb (no modulation).

3.4.3 Summary of Coding

Both mothers' and children's utterances containing the units for study were subjected to phonological, morpho-syntactic, semantic and pragmatic analysis. A frequency count of each instance of the coded categories was made and proportions by percentage calculated. Descriptive tables will illustrate the development in the results and discussion chapters.

Chapter Four

4.0 Results

4.1 Total Number of Utterances Containing the Units of Study (POINTs, Modulated Verbs, Possessive Pronouns and Instances of Objects Brought into the Dyadic Space)

The children show an appreciable increase in production of utterances over time, especially the older child C_E (see table 2). C_E who seems to be a transitional two-sign stage signer averages more signs per utterance than C_M, a "one-sign-at-a-time" signer. This measure needs clarification. It is understood that multi-morphemes can be expressed simultaneously in one "sign". However, a count of signs for the children is still a meaningful measure because their productions consist mostly of POINTs and citation form signs with almost no modulation or inflection of any kind. Therefore, a count of signs would approximately equal a count of morphemes. Table 3 displays the mothers' number of utterances and signs produced over time. Both mothers show a trend of increasing production over time. $Mother_M$ averaged 39 utterances in the first four sessions and 91 in the second four sessions. $Mother_E$ averaged 89 utterances in the first five sessions and 213 utterances in the second batch of sessions. Even allowing for differences in levels of talkativeness between the mothers, this is a considerable difference in the number of utterances containing the units of study addressed to their children. These differences certainly compare correspondingly to the differences between children.

Table 2

Children's Number of Utterances Coded (Over Time)
and Number of Signs Per Utterance
Key: T_1-T_8=C_M (12-20 mos.)
T_9-T_{18}=C_E (20-30 mos.)

	Utterances	Signs	X Signs in Utterance	X POINTs in Utterance
T_1	14	15	1.36	1.36
T_2	2	2	2.00	0.00
T_3	3	3	1.00	1.00
T_4	5	5	1.00	1.00
T_5	16	17	1.00	.81
T_6	6	5	.83	.83
T_7	6	6	1.00	.16
T_8	17	18	1.05	1.00
T_9	58	90	1.55	1.12
T_{10}	71	114	1.60	1.33
T_{11}	34	56	1.64	1.09
T_{12}	41	74	1.80	1.26
T_{13}	53	93	1.75	1.15
T_{14}	118	187	1.58	1.20
T_{15}	82	126	1.53	1.06
T_{16}	119	201	1.68	1.15
T_{17}	141	229	1.62	1.09
T_{18}	72	108	1.50	1.09

Table 3

Mothers' Number of Utterances Coded (Over Time)
and Number of Signs Per Utterance
Key: T_1-T_8=M_M (12-20 mos.)
T_9-T_{18}=M_E (20-30 mos.)

	Utterances	Signs
T_1	53	84
T_2	21	26
T_3	19	26
T_4	63	97
T_5	64	109
T_6	89	128
T_7	88	137
T_8	125	200
T_9	85	142
T_{10}	71	130
T_{11}	73	175
T_{12}	90	186
T_{13}	127	310
T_{14}	172	421
T_{15}	166	381
T_{16}	236	660
T_{17}	321	887
T_{18}	173	411

Table 4 displays the percentage of utterances in the total transcribed videotapes that were coded for study because they contained the relevant structures. The percentages for all four members of the study represent a fairly large sample ranging from a low of 20% to a high of 76%. Unfortunately, analysis of uncoded utterances is not available for comparison. It would be interesting to know the make up of utterances which did not contain one of the structures that were studied. This will have to be accomplished in a follow-up study.

Table 4

Percentage of Total Transcribed Utterances That Were Coded Because They Contained a Unit of Study

	Children ($C_M=T_1-T_8$; $C_E=T_9-T_{18}$)	Mothers ($M_m=T_1-T_{18}$ $M_E=T_9-T_{18}$)
T_1	52%	42%
T_2	66%	38%
T_3	20%	23%
T_4	21%	32%
T_5	43%	46%
T_6	20%	28%
T_7	38%	44%
T_8	37%	46%
T_9	50%	48%
T_{10}	76%	35%
T_{11}	53%	55%
T_{12}	56%	50%
T_{13}	49%	55%
T_{14}	63%	54%
T_{15}	71%	53%
T_{16}	50%	41%
T_{17}	54%	44%
T_{18}	42%	44%

4.2 Proportional Use of Objects, POINTs, and Modulated Verbs

Tables 5 and 6 illustrate the frequency and distribution over time of the three relevant categories in the productions of the children and mothers. Let's first consider the far left column which represents objects brought into the conversational space, from outside of the space, for reference or comment.

$Mother_M$ employs this strategy in an average of 16% of all utterances transcribed for each session. (Each session contained a total(X) number of utterances; when reference is made to coded utterances, this means utterances extracted from the total (X) that contained the units of study). The trend over time looking at both mothers is certainly a decreasing one. The children represent an age span of 12-30 months with no overlap (i.e. C_m=12-20 months and C_E=20-30 months) and the tendency is for mothers to use this strategy less as the child matures; $Mother_E$ used this strategy an average of only 3%.

Looking at the object column for the children we see that neither child reciprocates by using this strategy in conversation with their mothers. Each child has one session with an uncharacteristically high percentage (C_M: T_7=18% and C_E: T_{16}=22%). This relates to the kind of play activity the mother-child pairs were engaged in which involved a "show me" or "where is X?" kind of routine. For example:

[looking around, shoulders shrugged]

__?__ __?__

M_C:-WHERE YELLOW WHERE-

"Where is yellow?"

[picks up yellow block]

C_C: Pt. (this/on yellow block) YELLOW-

"This is yellow."

On the other hand, both members of the conversational dyad make frequent use of POINTing; in fact a strikingly high percentage of all coded signs were POINTs. The younger child, C_M, (the one sign-stage signer) had four sessions where all of his coded utterances consisted of single POINTs. Session 2 for C_M was a hard session due to a cold and he slept or cried through most of the taping. In fact, his only signing during this session was two imitations of a Modulated Verb produced by his mother. Therefore, the session is out of step with his seven others.

C_E continues the trend of a high percentage of POINTing with a range from a high of 81% to a low of 66% of all signs in all coded utterances. In general, over time from T_1 to T_{18} the trend is a slightly decreasing one indicating a tendency to use more non-POINT signs in production as the child matures.

The far right column of tables 5 and 6 are equally as interesting. Neither child makes use of Verb Modulation to indicate

the arguments of an utterance. There is a slightly increasing trend towards the late sessions of C_E which jump to 17 and 8 instances of Verb Modulation at T_{17} and T_{18} which may indicate the emergence of this process (this age in keeping with all previous reports: see Literature Review). Both mothers too, show surprisingly little use of Verb Modulation with a corresponding jump in T_{17} and T_{18} to 123 and 43 instances of Verb Modulation.

In summary, in a large proportion of all utterances transcribed both children and mothers employ POINTing, Unmodulated Verbs and citation form signs. The strategy of using objects very explicitly is one used by the mother of the younger child in a decreasing trend over time. Modulated Verbs emerge in the last sessions of the older child and increase at the same time in productions of her mother.

Table 5

Children's Frequency Distribution of Objects Brought into Dyadic Space for Comment, POINTing and Modulated Verbs Over Time *(Key: T_1-T_8=C_m T_9-T_{18}=C_e)

	Objects	Points	Modulated Verbs
T_1	0/0 %	15/100%	0/0 %
T_2	0/0 %	0/0 %	2/100%
T_3	0/0 %	3/100%	0/0 %
T_4	0/0 %	5/100%	0/0 %
T_5	3/8 %	13/76 %	0/0 %
T_6	1/3 %	5/100%	0/0 %
T_7	3/18%	1/17 %	0/0 %
T_8	0/0 %	17/94 %	0/0 %
T_9	0/0 %	65/72 %	3/3 %
T_{10}	0/0 %	92/81 %	2/2 %
T_{11}	2/3 %	35/63 %	2/3 %
T_{12}	3/4 %	52/70 %	0/0 %
T_{13}	2/2 %	61/66 %	0/0 %
T_{14}	7/4 %	142/76 %	0/0 %
T_{15}	0/0 %	87/69 %	3/2 %
T_{16}	52/22%	132/66 %	0/0 %
T_{17}	6/2 %	155/68 %	17/7 %
T_{18}	0/0 %	75/69 %	8/7 %

Table 6

Mother's Frequency Distribution of Objects into Dyadic Space for Comment, POINTing and Modulated Verbs Over Time
*(Key: T_1-T_8=M_M T_9-T_{18}=M_E)

	Objects	POINTs	Modulated Verbs
T_1	31/25%	55/65%	2/2 %
T_2	6/10%	13/50%	5/19%
T_3	4/5 %	22/85%	0/0 %
T_4	32/16%	61/63%	7/7 %
T_5	31/22%	51/47%	10/9 %
T_6	20/6 %	83/65%	12/9 %
T_7	29/14%	85/64%	5/4 %
T_8	77/28%	114/55%	14/7 %
T_9	10/5 %	78/55%	12/8 %
T_{10}	1/.4%	77/59%	6/5 %
T_{11}	6/4 %	73/42%	12/7 %
T_{12}	10/6 %	93/50%	10/ 5%
T_{13}	10/4 %	147/49%	11/3 %
T_{14}	13/4 %	201/48%	29/7 %
T_{15}	4/.1%	189/50%	20/5 %
T_{16}	35/6 %	260/39%	26/4 %
T_{17}	7/.9%	310/35%	123/14%
T_{18}	0/0 %	174/42%	43/11 %

* percentages: for objects, percentage of all transcribed utterances in which objects are brought in; for POINTs and Verbs, percentage of total signs in coded utterances that are POINTs or Modulated Verbs.

4.3 Information About the Indication of Referents in Coded Utterances.

There is, throughout the data a thread of explicitness which will be explored in the Discussion Chapter. However, Tables 7, 8, 9 and 10, which illustrate the indication of referents, will be examined here in that framework.

Bringing the referent object into the dyadic space and POINTing on the object together with a POINT on an object already in the dyadic space are the most explicit, direct strategies for ensuring the comprehension of the indication of the referent by the addressee. In Table 7 which reports on the mothers' behavior, there is a trend away from these categories which are heavily used in early sessions and toward the category "POINT toward" (which is somewhat less explicit) as the child matures. The children's picture is somewhat different. Table 8 shows that there is almost even distribution between POINTs on and toward the referent in their productions.

In the case of Modulated Verbs (Table 9 and 10) the most striking fact is the almost total absence of indication for non-present referents in both mothers' and children's utterances. In all but one case of Verb Modulation the Index Incorporated is present with the object occupying its spatial location and the verb articulated on, toward or over it.

Table 7

Information about the Indication of Referent
for POINTs and Objects By The Mothers in Order of Explicitness
(M_M=T_1-T_8 M_E=T_9-T_{18})

	Object and POINT on Referent	POINT on Referent	Object And POINT Toward Referent	Holding Referent Object	POINT Toward	Sign on Referent Object	Substitute Object for Non-Present Referent
T_1	19	25			5		
T_2	1	9			1	1	
T_3	1	3		1	14		
T_4	10	10	9	1	25		
T_5	17	13	3	1	9		
T_6	5	29	1	1	32		
T_7	14	43			28		
T_8	28	11	24	9	35	1	
T_9	4	29			43		
T_{10}		22		2	39		
T_{11}	6	26			40		
T_{12}	6	47			31	2	
T_{13}	7	48	3		75		
T_{14}	5	59			130	1	
T_{15}	1	75			105	1	
T_{16}	9	48	24		163		
T_{17}		70		2	203	1	
T_{18}		64			97	7	

Table 8

Information About the Indication of Referents for POINTs and Objects by the Children (C_M=T_1-T_8 C_E=T_9-T_{18})

	Point on Referent	POINT Toward Referent	Object and POINT on	Object and POINT Toward	Holding Object	Substitute Object	Index Established
T_1	14						
T_2	1	2					
T_3	2	2					
T_4	2	2					
T_5	5	5					
T_6					2		
T_7	1						
T_8	3	12					
T_9	29	30					
T_{10}	23	34					
T_{11}	10	19	1		1		
T_{12}	17	29	1	1			
T_{13}	33	19		2			
T_{14}	33	54	2	3	1		
T_{15}	37	48					
T_{16}	26	58	30	12	8		
T_{17}	53	84			6		
T_{18}	19	41					

Table 9
Information About the Indication of Referent
for Modulated Verbs by the Mothers
(M_M-T_1-T_8 M_E=T_9-T_{18})

	On Referent	Toward Referent	Over Referent	Substitute For non-present Referent	Holding Referent	Index Established non-present Referent
T_1	1					
T_2		5				
T_3						
T_4		4				
T_5		5	5			
T_6	2	6			2	
T_7		4	1			
T_8		2	1		4	
T_9		5	6			
T_{10}	2	4				
T_{11}	1	8	2		1	
T_{12}	2	7	1			
T_{13}	3		3			
T_{14}	3	13	1		1	
T_{15}	2	10	5		3	
T_{16}	2	15		1		
T_{17}		21	13	1		
T_{18}	9	26	7			1

Table 10

Information about the Indication of Referents for Modulated Verbs by the Children (C_M=T_1-T_8 and C_E=T_9-T_{18})

	On Referent	Toward Referent	Over Referent	Substitute Holding Object for Referent non-present referent	Index Established for non-present referent
T_1					
T_2		2			
T_3					
T_4					
T_5					
T_6					
T_7					
T_8					
T_9			3		
T_{10}		1		1	
T_{11}	2				
T_{12}					
T_{13}					
T_{14}					
T_{15}	1	1	1		
T_{16}					
T_{17}	5	4	2		
T_{18}	3	5			

Table 10A

Distribution of Modulated Verbs With and Without Backup POINT in Mothers' Utterances (M_M=T_1-T_8, M_E=T_9-T_{18})

	Modulated Verb Alone	Modulated Verb With Backup POINT
T_1	50%	50%
T_2	100%	0%
T_3	0%	0%
T_4	57%	43%
T_5	100%	0%
T_6	75%	25%
T_7	80%	20%
T_8	85%	15%
T_9	92%	8%
T_{10}	66%	33%
T_{11}	83%	17%
T_{12}	60%	40%
T_{13}	82%	18%
T_{14}	77%	23%
T_{15}	70%	30%
T_{16}	88%	12%
T_{17}	76%	24%
T_{18}	50%	50%

Table 10A displays the frequency with which mothers' employed a redundant POINT to mark semantic role in Modulated Verbs (where role is already incorporated). There is a slight trend toward increased redundancy as the frequency of Modulated Verb increases.

4.4 The Expression and Development of Semantic Relations

Table 11 displays all semantic relations expressed in the utterances of the younger child with a frequency of greater than 1%. C_M's utterances are restricted to a narrow range of only eight semantic relations and POINT substitution in lexical items. Most of his utterances are about the existence and location of objects with few verb relations or object attributes. He also expresses mostly single-term relations.

The older child (Table 12) continues to talk more about objects than actions preformed on objects but with a greater variety of all categories. She begins to talk about attribution, possession, location, as well as "who did what to whom". The trend over ten months of taping is toward a wider and wider use of the various, possible semantic expressions. At T_1 only nine expressions were utilized, at T_{17} twenty different relations were expressed. Three term relations begin to emerge in the third and fourth session (T_{13}=22 mos., T_{14}=23 mos.) and are seen with greater frequentcy in the ninth session (T_{17}=29 mos.).

Table 13 displays the combined categories of existence relations (e.g., demonstrative, demonstrative-entity, entity-recurrence, entity-locative etc.) and the developmentally <u>increasing</u> trend in the combined categories of verb relations (e.g., agent-action, action-patient, action-locative etc.).

Table 11

Frequency Distribution of Semantic Relations
Expressed Over Time by the Younger Child
(C_M=12-20 mos.)

T_1	demonstrative 71%	demonstative-entity 21%	
T_2	possessor-possessed 100%		
T_3	demonstrative 33%	V-state-patient 66%	
T_4	demonstrative 80%	action-locative 20%	
T_5	demonstrative 50%	patient 6%	lexical item 19%
T_6	demonstrative 33%	lexical item 33%	locative 17%
T_7	demonstrative 100%		
T_8	demonstrative 80%	lexical item 12%	entity recurrence 6%

*only those over 1% included

Table 12

Frequency Distribution of Semantic Relations
Expressed by the Older Child Over Time in Ranked Ordered Percentages
(C_E=20-30 mos.)

T_9	entity-locative	17%	T_{10}	lexical item	30%
	patient	16%		demonstrative-entity	28%
	possessor-possessed	11%		demonstrative	13%
	demonstrative	11%		entity-location	5%
	agent-action	11%		action-patient	5%
	lexical item	9%		agent	5%
	demonstrative-entity	9%		entity-attribute	4%
	action-location	4%		possessor-possessed	4%
	experience-patient	3%		locative	2%
				possessor	2%
T_{11}	demonstrative-entity	20%	T_{12}	demonstrative-entity	33%
	patient	18%		demonstrative	17%
	action-locative	10%		lexical item	11%
	patient-locative	10%		action-locative	11%
	lexical item	8%		agent-action	8%
	locative	8%		agent-patient	4%
	entity-attribute	8%		possessor-possessed	4%
	agent-action	5%		agent-action-patient	4%
	entity-non-existence	5%		entity-locative	2%
	demonstrative	5%		possessor	2%
				locative	2%
				V-state-patient	2%

*only those over 1% included

Table 12

Continued
(CE=Semantic Relations)

T13	demonstrative-entity	47%	T14	demonstrative	25%
	demonstrative	25%		entity-location	17%
	lexical item	13%		demonstrative-entity	11%
	agent	3%		lexical item	10%
	action-locative	3%		locative	8%
	patient-locative	3%		entity-attribute	6%
	agent-patient	2%		agent-patient	5%
	action-patient	2%		agent	5%
	action-demons-patient	2%		experiencer-patient	3%
				demons-entity-locative	2%
T15	demonstrative	19%	T16	agent	23%
	entity-attribute	11%		demonstrative	16%
	locative	10%		demonstrative-entity	10%
	patient	9%		entity-locative	8%
	action-locative	9%		agent-patient	8%
	entity-locative	8%		agent-action	6%
	agent-action	8%		locative	5%
	agent-patient	7%		action-patient	4%
	demonstrative-entity	7%		entity-attribute	3%
	action-patient	6%		patient	3%
	agent	4%		lexical item	3%
	possessor	2%		agent-action-patient	3%
				experiencer-patient	2%

Table 12

continued
(C_E=Semantic Relations)

T_{17}	demonstrative	17%	T_{18}	lexical item	18%
	agent	10%		demonstrative	10%
	lexical item	9%		agent	10%
	locative	8%		demonstrative-entity	8%
	agent-locative	8%		entity-locative	8%
	agent-action	6%		action-patient	8%
	possessor-possessed	6%		experiencer-V-state	8%
	entity-attribute	5%		patient	6%
	agent-action-patient	4%		agent-patient	5%
	patient	3%		agent-action	5%
	demonstrative-entity	3%		experiencer-V-state	4%
	agent-patient	3%			
	action-patient	3%			
	entity-locative	3%			
	experiencer-V-state	2%			
	experiencer-patient	2%			
	experiencer	2%			
	demon-entity-attribute	2%			
	demon-possessed-possessor	2%			
	experiencer-V-state	2%			

Table 13

Distribution of existence and Verb Relations
Expressed Over Time in the Children's Utterances
(C_M=T_1-T_5, C_E=T_9-T_{18})

	Existence Relations	Verb Relations
T_1	100%	0%
T_2	100%	0%
T_3	33%	66%
T_4	80%	20%
T_5	94%	6%
T_6	100%	0%
T_7	100%	0%
T_8	100%	0%
T_9	57%	34%
T_{10}	88%	10%
T_{11}	54%	43%
T_{12}	71%	29%
T_{13}	85%	15%
T_{14}	79%	15%
T_{15}	57%	43%
T_{16}	45%	49%
T_{17}	55%	45%
T_{18}	50%	46%

A similar trend exists from a restricted to a wider and wider range of semantic relations expressed in the mothers' utterances. This is displayed in Table 14 and 15. At Time 1, M_M uses only five semantic relations which are mostly about the existence of objects and their locations. This begins to change noticeably at Time 4 where an increase to fourteen semantic expressions can be seen. This expansion over time includes more and more expressions of verb relations (Table 16). Occasional three term expressions are used in later sessions but with a relatively low frequency.

The mother of the older child, M_E, continues the same trend of increasing range (see Table 15) and decreasing use of object-existence category relations (see Table 16). Three term relations are used with greater frequency by M_E.

Table 14

Frequency Distribution of Semantic Relations Expressed By the Mother of the Younger Child (M_M) Over Time in Rank Ordered Percentages

T_1	demonstrative-entity	50%	T_2	action-patient	43%
	demonstrative	14%		demonstrative-entity	26%
	lexical item	11%		demonstrative	17%
	action-patient	10%		locative	4%
	locative	6%		lexical item	4%
	entity-locative	6%		agent-action	4%
				demonstrative	14%
T_3	demonstrative	23%		demonstrative-entity	14%
	locative	18%		patient	11%
	entity-locative	18%		lexical item	9%
	demonstrative-entity	14%		action-locative	9%
	agent-patient	9%		locative	8%
	agent	4%		patient-locative	5%
	agent-action	4%		action-patient	5%
	lexical item	4%		entity-locative	4%
	V-state-patient	4%		agent-action-patient	4%
				action-patient-locative	4%
				agent-action-patient-locative	4%
				agent-patient	2%
				experiencer-patient	2%

*only those over 1% included

Table 14

Continued
(MM Semantic Relations)

T5	demonstrative	24%	T6	demonstrative	24%
	action-locative	24%		lexical item	15%
	lexical item	11%		action-patient	13%
	demonstrative-entity	10%		agent-patient	8%
	patient	7%		locative	7%
	entity-attribute	7%		entity-locative	7%
	agent-action	4%		patient	5%
	action-patient	4%		entity-attribute	5%
	demonstrative-entity-attribute	4%		demonstrative-entity	5%
	locative	3%		action-locative	5%
				action-patient-locative	3%
				agent	2%
T7	demonstrative-entity	20%	T8	demonstrative	31%
	entity-locative	20%		demonstrative-entity	24%
	demonstrative	17%		action-patient	8%
	locative	15%		lexical item	8%
	action-patient	7%		patient	4%
	lexical item	5%		agent-action	4%
	action-locative	4%		locative	3%
	V-state-patient	3%		entity-locative	3%
	patient	2%		agent-action-patient	3%
	entity-attribute	2%		agent-patient	2%
	action-patient-locative	2%		entity-reccurrence	2%
				agent-action-benefactor-patient	2%
				agent-action-patient-locative	2%

Table 15

Frequency Distribution of Semantic Relations Expressed By the Mother of the Older Child (M_E) Over Time In Ranked Ordered Percentages

T_9	demonstrative	13%	T_{10}	lexical item	17%
	demonstrative-entity	12%		agent-action	16%
	agent-action	11%		demonstrative-entity	15%
	patient	8%		demonstrative	9%
	action- cative	8%		entity-attribute	8%
	lexical item	6%		action-patient	8%
	entity-attribute	5%		possessor	5%
	entity-locative	5%		locative	4%
	experiencer-patient	4%		agent-locative	4%
	agent	3%		V-state-patient	4%
	entity-non-existence	3%		action-locative	3%
	locative	2%		patient	3%
	entity-reccurence	2%			
	agent-patient	2%			
	agent-action-patient	2%			
T_{11}	demonstrative-entity	26%	T_{12}	demonstrative-entity	28%
	agent-locative	14%		agent-action	18%
	demonstrative	10%		lexical item	11%
	lexical item	8%		entity-locative	8%
	agent-action	6%		entity-attribute	7%
	agent-action-patient	4%		action-patient	7%
	action-patient	3%		demonstrative	7%
	experiencer-patient	2%		agent-action-patient	3%
	entity-attribute	2%		possessor-possessed	2%
	agent-locative	2%		entity-non-existence	2%
	agent-action-locative	2%		experiencer-V-state-patient	2%
	action-patient-locative	2%			
	entity-reccurrence-locative	2%			
	locative	2%			
	patient	2%			

*only those over 1% included

Table 15

continued
(M_E Semantic Relations)

T_{13}	demonstrative-entity	27%	T_{14}	entity-attribute	19%
	demonstrative	8%		demonstrative-entity	17%
	action-locative	8%		action-patient	10%
	lexical item	8%		agent-action	7%
	entity-attribute	7%		agent-action-patient	6%
	agent-action	6%		entity-locative	6%
	agent-patient	4%		action-locative	3%
	agent	3%		possessor-possessed	3%
	action-patient	3%		demonstrative-entity-locative	2%
	patient-locative	3%		agent-patient	2%
	experiencer-V-state	2%		experiencer-patient	2%
				agent-action-locative	2%
				V-state-patient	2%
				demonstrative-entity-attribute	2%
T_{15}	demonstrative-entity	20%	T_{16}	agent-action-patient	10%
	entity-attribute	17%		experiencer-Vstate-patient	9%
	action-patient	11%		demonstrative-entity	7%
	agent-action-patient	8%		agent	7%
	agent-action	7%		entity-attribute	7%
	lexical item	7%		action-locative	7%
	demonstrative	6%		demonstrative	7%
	possessor-possessed	5%		action-patient	4%
	entity-locative	2%		Vstate-patient	3%
	entity-non-existence	2%		possessor	3%
	agent-patient	2%		patient	3%
	action-locative	2%		agent-patient	3%
				experiencer-patient	3%
				action-patient-locative	2%
				possessor-possessed	2%
				experiencer-Vstate	2%
				demonstrative-entity-attribute	2%
				agent-action	2%

Table 15

continued
(N_E Semantic Relations)

T_{17}	entity-attribute	16%	T_{18}	agent-action-patient	14%
	action-patient	13%		entity-attribute	12%
	agent-action	9%		action-patient	11%
	action-locative	6%		demonstrative	9%
	demonstrative	6%		agent-action	8%
	agent-action-locative	6%		demonstrative-entity	8%
	possessor-possessed	4%		possessor-possessed	7%
	demonstrative-entity-attribute	4%		experiencer-Vstate-patient	6%
	agent-action-patient	4%		entity-locative	5%
	lexical item	4%		lexical item	3%
	agent-patient	4%		Vstate-patient	2%
	experiencer-Vstate	4%		locative	2%
	demonstrative-entity	3%		action-locative	2%
	Vstate-patient	3%		agent-action-benefactor-patient	2%
	entity-reccurence				
	locative	2%			
	entity-locative	2%			
	locative	2%			

Table 16

Distribution of Existence and Verb Relations
Expressed Over Time in the Mothers' Utterances
(M_M=T_1-T_8 M_E-T_9-T_{18})

	Existence	Verb
T_1	87%	10%
T_2	51%	47%
T_3	77%	21%
T_4	49%	46%
T_5	60%	39%
T_6	63%	36%
T_7	79%	18%
T_8	71%	25%
T_9	46%	44%
T_{10}	58%	38%
T_{11}	50%	41%
T_{12}	65%	30%
T_{13}	50%	37%
T_{14}	49%	34%
T_{15}	59%	30%
T_{16}	28%	55%
T_{17}	43%	49%
T_{18}	45%	46%

Semantic relations expressed in Modulated Verbs have been separated out and displayed in Table 17 and 18. The mother of the younger child, M_M, uses only action-patient and action-locative expressions where the locative and patient are present in the conversational context and incorporated in the verb. Examples of each category are provided. Most action-patient expressions are directives and are almost a modelling of the action the mother is trying to evoke from the child. For example, #PULL-TOY# is articulated with the sign, PULL, made over the toy. C_M has almost no productions of Verb Modulation.

C_E's (see Table 18) process of Verb Modulation begins the same way-with patient and locative incorporation. This expands to include the agent in later sessions (but not agent-incorporation); she uses a redundant POINT to herself when she is the agent. For example, -PT. (me) #WIPE-SPILL# ("I am wiping the spill").

M_E began to modulate a few state verbs as well as action verbs (for example, she signed FINISHED over a drawing to mean "the drawing is finished"). She also included more agents, benefactors and locatives in three term relations with Verb Modulation. However, she rarely made use of all three terms in one verb were it was possible. For example she could have signed,

#SHE-WATCH-YOU#

"She is watching you."

by signing WATCH (or look at) with an orientation from the agent (the experimenter behind the camera) toward the patient (the child). Instead, M_E signed,

-Pt. (She/toward Becky) #Watch-you#-

"She is watching you."

with the sign WATCH made in front of the mother's eyes and oriented to the patient (the child).

Table 17

Distribution of Semantic Relations Expressed in Modulated Verbs by C_M and M_M (With Examples)

	C_M	M_M	
T_1	0	action-patient 50%	#PULL-TOY#
		action-locative 50%	#MOVE-HERE#
T_2	action-patient 100% #HAIR-RUB#	action-locative 50%	#SLIDE-DOWN# #COME-HERE#
		action-patient 50%	#PULL-TOY# #RUB-HAIR#
T_3	0	0	
T_4	0	action-locative 70%	#FALL-DOWN# #COME-HERE# #FLY-UP#

		action-patient 30%	#WATCH-THIS#
T_5	0	action-patient 80%	#PUSH-TOY# #TURN-KNOB#
		action-locative 20%	#FALL-DOWN#
T_6	0	action-patient 82%	#WIPE-NOSE# #TURN-IT#
		action-locative 18%	#FALL-DOWN#
T_7	0	action-patient 75%	#PUT-ON-NECKLACE# #DIAL-TELEPHONE#
		action-locativ	PUT-ON-HERE#
T_8	0	action-patient	-APART-BEADS#
			#BLOW-WAND# #DRAW-ON-PAPER#
		action-locative 15%	#PUT-IN-MOUTH# NO[N]

Table 18

Distribution of Semantic Relations Expressed in Modulated Verbs
By C_E and M_M (With Examples)

T_9	action-locative 100% #FALL-DOWN#	action-locative	50%	#FALL-DOWN# #COME-HERE#
		action-patient	33%	#KISS-HER# #PUT-ON-GLASSES# #PUT-ON-SHOES#
		agent-action-patient	8%	-Pt. (you) #PUT-ON-BARRETES#
		action-benefactor-		#GIVE-ME# TELEPHONE
T_{10}	action-patient 50% #THROW-BALL-TO-ME#	action-patient	50%	#HIT-FATHER#
	action-patient 50% BREAK-IT#	action-locative	50%	#COME-HERE# #THROW-AWAY-THERE#
T_{11}	action-patient 50% #WASH-DOLL#	action-locative	50%	#FALL-DOWN# #WIPE-SPILL#
	action-locative 50% #WIPE-THERE#	action-patient	33%	#WASH-DOLL# #WIPE-SPILL# #OPEN-IT#
		entity-attribute	8%	#COME-HERE# #IT-IS-FINISHED#
		action-patient-locative	8%	#PUT-GLASS-ON-FLOOR#
T_{12}	0	action-patient-locative	25%	#PUT-TOYS-IN-HERE# #PUT-CHALK-IN-MOUTH# NO[N]
		action-locative	25%	#PUT-ON-THERE# #COME-HERE#
		action-patient	25	#WASH-HAIR#
		action-benefactor	12%	-Pt. (you) #PICK-IT-UP#
T_{13}	0	action-locative	60%	#FALL-DOWN# #COME-HERE# #PUT-HERE# #PUT-ON-TABLE#
		action-patient	10%	#OPEN-IT#
		agent-action-	20%	-Pt. (HE) #FALL-DOWN# -GLASSES #FALL-OFF#
T_{14}	0	action-patient	58%	#PAINT-PAGE# #STIR-EGG# #SEE-YOU# #TAKE-OFF-CLOTHES#
		agent-action-patient	8%	-Pt. (you)#TAKE-OFF-CLOTHES# -Pt. (she) #WATCH-YOU#

		action-locative	31%	#POUR-HERE# #FALL-DOWN# #THROW-TO-BECKY# #PUT-IN-BOX#
		Vstate-patient	8%	#WANT-THAT# #LIKE-HER# NO$_N$
T15	action-patient 100% #BRACELET-TAKE-OFF# #BITE-IT#	action-patient	50%	#PULL-OFF-BRACELET# #BITE-IT# #PAINT-PICTURE# #LOOK-AT-THAT# #PULL-THAT#
		action-locative	21%	#LEAVE-THERE#
		agent-action-benefactor-patient	14%	-Pt. (you) Pt. (that) #GIVE-TO-MAMA#
T16	0	action-locative	40%	#TAKE-OUT-OF-MOUTH# #PUT-IN-BOX# #GO-TO-DADDY#
		action-patient	33%	#BREAK-IT# #PULL-UP-PANTS#
		action-patient-locative	13%	#PUT-TOY-ON-TOP#
T17	action-patient 33% #TAKE-OFF-SHOES# #WASH-HAIR# action-locative 22% #LOOK-UP# PUT-IN-POCKET# agent-action-patient 22% -Pt. (me) #WIPE-IT# -Pt. (me) #CLOSE-JAR# agent-action-benefactor-patient 11% -GRANDMA #GIVE-ME# Pt. (these)-	action-locative	40%	#PUT-HERE# #LEAVE-HERE# #CREEP-AROUND# #DRIVE-TO-STORE#
		action-patient	40%	#PUSH-IT# #CLOSE-IT# #BLOW-IT# #TELL-YOU# #LOOK-AT-IT#
		Vstate-patient	5%	#HELP-ME# MOMMY
T18	action-patient 40% #PUSH-THESE# #CHEW-IT# agent-action patient 60% DOG #BITE-IT#	action-patient	70%	#READ-BOOK# #BLOW-CANDLE# #TEAR-BOX# #LIFT-BOOK#
		action-locative	15%	#PUT-IN# #FALL-DOWN#

Table 19

Examples of Unmodulated Verbs
in Mothers' Utterances

MotherM

-OPEN Pt. (that/to box)-
-CLOSE Pt. (that/to toy)-
-PULL Pt (that/to chain)-
-CRY Pt. (you/on (M)-
-EAT Pt. (that/to cookie)-
?
-PLAY Pt. (that/to bulb)-
-SQUEEZE Pt. (that/to bulb)-
-LOOK Pt. (this/on toy)-
-SIT Pt. (here/on floor)-
-COME Pt. (here/on floor)-
-Pt. (that/to block) Pt. (here/on tower) -["Put that block on here."]
-Pt. (you/to C_M) RUN-
-LOOK Pt. (there/to shape sorter)-
-THROW Pt. (there/to Daddy)-
-THROW MAMA BALL-
-Pt. (you/to C_M) PLAY Pt. (this/on toy)-
-Pt. (you/to C_M) Pt. (this/on bubble wand)-["you take the wand."]
-Pt. (you/to C_M) DRAW Pt. (there/to paper)-

Table 19

Continued

MotherE

-Sit Pt. (here/on floor)-
?
-PLAY Pt.(that/on toy)-
-HELP PT. (you/on C_E)-
-EAT Pt. (that/on meal)-
?
-CRY Pt. (you/on C_E)-
-THROW AWAY Pt. (there/to basket)-
-BROKEN Pt. (that/to toy)-
-CLOSE Pt. (that/to book)-
?
-DRINK Pt. (you/to C_E)-
-LOOK Pt. (around/sweep)-
-THROW Pt. (there/to Daddy)-
-RUB Pt. (this/on book)-
-PICK-UP Pt. (that/to up)-
-WASH Pt. (her/to doll)-
-SEE Pt. (those/to blocks)-
-ASK Pt. (her/to Becky)-
?
-BREAK Pt. (that/to glasses) Pt. (you/on C_E)-
-Pt. (you/to C_E) SMOKE-
-Pt. (me/on M_E) CHEW-

4.5 The Development of Pragmatic Function

The distribution of pragmatic function in C_M's utterances is given in Table 20. Most utterances express facts ("The object is there") and statives ("I want that"). There is slight trend towards the use of increasing numbers of functions over time.

Table 21 gives the distribution of pragmatic function in C_E's utterances. Earlier sessions (T_9-T_{14}) contain a restricted set of functions, mostly facts, nominations, directives (request/emphatics) and stative questions ("want that") with some scatter in categories of locating, attribution and WH-type questions. The trend toward use of a widening range of function is continued especially after T_{14}.

The mothers Tables (22 and 23) display very similar developmental trends. M_M's (Table 22) early sessions also contained a restricted range of pragmatic function. The four categories, directives, nominations, facts and stative-questions, contained the bulk of the utterances with some scatter in early sessions. Sessions 5-8 show much increase in use of other categories.

Table 23 displays M_E's utterances according to pragmatic function. Although M_E uses almost the entire range of pragmatic functions, there is a heavier concentration in the first four categories.

Table 20

Distribution of Pragmatic Function Over Time in Percentages *
Child M (12-20 mos)

	Report Fact	Quest. Stative	Report Nomination	Request Emphatic	Report Confirm	Report Negate	Report Locate
T_1	100%						
T_2			100%				
T_3	33%	66%					
T_4	20%	80%					
T_5	19%	12%	62%			17%	
T_6	33%	50%					16%
T_7	29%	59%			2%		

* Only those functions with at least one instance are included. Figures are arranged in approximate rank order.

Table 21
Child E Distribution of Pragmatic Function
Over Time in Percent

	Report Fact	Request Emphatic	Report Nomination	Quest. Stative	Report Locate	Quest WH
T9	15%	36%	5%	14%	7%	5%
T10	32%	14%	25%	1%	7%	7%
T11	29%	23%	23%	6%	6%	
T12	29%	15%	32%	15%	5%	5%
T13	6%	6%	77%	7%		4%
T14	33%	28%	11%	13%	3%	4%
T15	21%	23%	4%	21%	9%	6%
T16	18%	29%	18%	4%	13%	4%
T17	25%	23%	4%	17%	6%	5%
T18	21%	29%	10%	15%	10%	5%

Report attribute	Report Confirm	Report Negate	Quest. Action	Report Non-Conf.	Quest. Clarification
5%			3%		2%
7%		4%	1%		
9%			3%		
2%	2%	2%		1%	1%
8%		4%			
5%			1%		
4%	8%	1%	1%	1%	0%
3%		3%	1%		

Table 22
Mother's Distribution of Pragmatic Function
Over Time in Percent*

	Request Emphatic	Report Nomin.	Report Fact	Quest. Stative	Quest. WH	Report Locate	Report Attribute
T_1	24%	45%	39%		2%		
T_2	57%	24%	5%	10%	5%	5%	
T_3	10%		4%	26%	5%	10%	
T_4	48%	38%	5%	5%	2%	3%	
T_5	28%	22%	8%	12%	3%		16%
T_6	43%	4%	27%	8%		2%	4%
T_7	35%	24%	7%	4%		14%	2%
T_8	38%	22%	26%	9%	1%		1%

Report Negate	Report Confirm	Quest. Action	Quest Clarif.
9%			
	11%		
6%	2%	3%	
6%	7%	1%	
1%	1%		2%

Table 23
MotherE Distribution of Pragmatic Function Over Time in Percent

	Request Emphatic	Report Fact	Report Nomination	Quest Stative	Report Confirm	Report Attribute	Quest WH
T9	20%	15%	5%	14%	14%	7%	5%
T10	22%	11%	14%	14%	14%	4%	0%
T11	26%	14%	19%	8%	15%	1%	10%
T12	26%	19%	27%	3%	8%	1%	10%
T13	23%	17%	16%	6%	16%	5%	8%
T14	23%	24%	9%	9%	13%	6%	5%
T15	19%	24%	17%	8%	2%	11%	2%
T16	2%	12%	9%	16%	3%	10%	8%
T17	24%	19%	5%	12%	8%	11%	8%
T18	21%	38%	6%	9%	2%	6%	10%

Report Non-Conf.	Report Negate	Report Locate	Quest. Action	Quest Clarif.	Quest Indirect
3%	5%		6%	7%	
	8%	1%	3%	1%	
3%		1%	3%		
2%	2%		2%		
8%	1%				
3%	1%	2%	2%	4%	
2%	1%	4%	5%	1%	
8%	2%	1%	3%		
2%	4%	3%	2%	1%	1%
	3%		3%		

4.6 Development of Linguistic Function

In table 24 the distribution of linguistic function of POINTs in children's utterances is given in percent over time. In time 1 through time 8, C_E's POINTs are employed mostly to signify specific objects with some scatter in late sessions (T_5-T_8, 16 mos-20 mos) in location, lexical item and personal pronoun, "you" categories.

C_E's use of POINTs continues to represent more and more categories of linguistic function over time. In early sessions there is a heavy concentration of POINTs in the specific object category which decreases over time. The signalling of pronominals "I", "you", "he/she" increases steadily over time in the order Pro_2, Pro_1, Pro_3. Possessives first emerge in the Possl or "mine" category. No instances of classifier or Indexing for non-present referents occurred before the end of the period under study.

In Table 25 the mother's utterances containing POINTs are categorized for linguistic function. There is the same general trend as in the children's data toward a greater and greater variety of function expressed. The far left column, specific object, decreases steadily over time as all other categories increase.

Table 24
Distribution of Linguistic Function of POINTs
in Children's Utterances ($C_{N=T_1-T_{18}}$)

	Specific Object	Specific Location	Lexical Item	Pers Pro_1	Pers Pro_2	pers Pro_3	Poss Pro_1
T_1	100%						
T_2							
T_3	100%						
T_4	100%						
T_5	69%		23%		8%		
T_6	25%	25%	50%				
T_7	100%						
T_8	88%		12%				
T_9	57%	12%	9%	2%	7%	7%	
T_{10}	44%	6%	31%	4%	10%	3%	4%
T_{11}	51%	14%	14%	6%	14%	4%	
T_{12}	49%	18%	12%	8%	6%		
T_{13}	67%	3%	13%	11%	5%	4%	
T_{14}	46%	23%	11%	0%	6%	1%	1%
T_{15}	57%	22%		11%	5%	2%	2%
T_{16}	32%	12%	10%	16%	19%		1%
T_{17}	35%	17%	10%	20%	12%		4%
T_{18}	43%	11%	19%		16%	8%	

Poss Pro2	Poss Pro3	Plural	Classifier	Index
	6%			
		2%		
		2%		
		1%		
1%				
1%				
	1%	1%		

Table 25
Distribution of Linguistic Function of POINTs
in Mothers' Utterances
(M_I=T_1-T_8 M_E=T_9-T_{18})

	Specific Object	Specific Location	Lexical Item	Pers Pro1	Pers Pro2	Pers Pro3	Poss Pro1
T_1	68%	12%	14%	2%		2%	
T_2	69%	8%	8%		8%		
T_3	45%	30%	10%		5%	5%	
T_4	57%	10%	15%		8%	3%	
T_5	69%	6%	17%		2%		
T_6	57%	18%	18%	2%	5%		
T_7	51%	42%	6%				
T_8	64%	9%	9%	1%	14%	1%	
T_9	49%	9%	7%	7%	14%	13%	
T_{10}	37%	9%	18%	8%	18%	4%	
T_{11}	49%	13%	8%	6%	11%	8%	
T_{12}	55%	5%	12%	5%	16%	1%	
T_{13}	49%	11%	4%	6%	16%	9%	1%
T_{14}	47%	10%	5%	6%	16%	9%	1%
T_{15}	51%	7%	9%	6%	18%	1%	1%
T_{16}	27%	6%	5%	15%	26%	14%	1%
T_{17}	34%	10%	4%	12%	26%	8%	1%
T_{18}	39%	8%	4%	7%	23%	9%	

Poss Pro2	Poss Pro3	Plural	Classifier	Index
		2%		
8%				
		5%		
		4%		
1%		1%		
3%	3%			
3%	1%			
1%	1%	3%		
1%	1%	1%		
6%		3%		
		1%		
2%	2%	1%		
3%	1%			
		1%		

The pronominal categories show the same developmental trend as the children's in the order of emergence for personal pronouns,i.e., Pro_2,Pro_1, Pro_3 (but not in the possessive category which emerges $Poss_2$, $Poss_3$, $Poss_1$). Classifier and Index categories were used with less than 1% frequency and are therefore not included in the table.

The next two tables, Table 26 and Table 27 display the linguistic function of the Index incorporated in Modulated Verbs in the children's and mother's utterances. The younger child, C_M uses modulation to incorporate specific object only. C_E begins to incorporate other categories (location and Pronominal "you").

C_N's mother, M_N, uses a correspondingly few linguistic functions-mostly specific objects and locations with development in the final section (T_8) in pronominal categories. C_C's mother, M_E, incorporates location with much greater frequency than M_M and with the order Pro_3, Pro_2,and Pro_1. Classifiers were not present in either mothers' utterances or with less than 1% frequency.

Table 20
Distribution of Linguistic Function of Index
Incorporation in Modulated Verbs in Children's Utterances
(C_M=T_1-T_8 C_E=T_9-T_{18})

	Specific Object	Specific Location	Pers Pro$_1$	Pers Pro$_2$	Pers Pro$_3$	Classifier
T_1						
T_2	100%					
T_3						
T_4	100%					
T_5						
T_6	100%					
T_7						
T_8						
T_9		100%				
T_{10}	50%			50%		
T_{11}	100%					
T_{12}						
T_{13}						
T_{14}						
T_{15}	100%					
T_{16}						
T_{17}	59%	23%	12%	6%		
T_{18}	75%			25%		

Table 27
Distribution of Linguistic Function of Index
Incorporation in Modulated Verbs in Mothers' Utterances
(N_M=T_1-T_8 N_E=T_9-T_{18})

	Specific Object	Specific Location	Pers Pro$_1$	Pers Pro$_2$	Pers Pro$_3$	Classifier
T_1	50%					
T_2	60%	20%	20%			
T_3						
T_4	28%	71%				
T_5	100%					
T_6	67%	33%				
T_7	80%	20%				
T_8	50%			30%	14%	
T_9		58%	8%	17%	17%	
T_{10}	17%	67%		17%		
T_{11}	42%	17%			42%	
T_{12}	10%	20%	10%	20%	30%	
T_{13}	9%	73%		8%		
T_{14}	41%	3%		21%	27%	
T_{15}	100%					
T_{16}	50%	46%				
T_{17}	45%	24%	1%	5%	8%	
T_{18}	63%	16%	2%	19%		

Table 28
The Use of Possessive Pronouns in the Dyad
M_E and C_E Over Time

	Use of B handshape		Use of POINT	
	C_E	M_E	C_E	M_E
T_9	0%	0%	100%	0%
T_{10}	50%	0%	50%	100%
T_{11}	0%	0%	0%	100%
T_{12}	0%	100%	0%	0%
T_{13}	0%	0%	0%	0%
T_{14}	0%	50%	0%	50%
T_{15}	0%	20%	100%	80%
T_{16}	0%	33%	0%	66%
T_{17}	0%	0%	100%	100%
T_{18}	0%	93%	0%	7%

The next table, Table 29, displays the substitution of the POINT for the B handshape in the expression of possessive pronominals in the dyad M_E-C_E in percent over time. The trend in both mother and child was to use the POINT predominately until later sessions when the adult B handshape begins to emerge more regularly.

Table 29 lists some examples of the phonological substitution of the POINT for other handshapes in lexical items.

Table 29
Some Examples of POINT Substitution for other Handshapes in Lexical Items

FATHER

MOTHER

DRINK-BOTTLE

LISTEN

EAT

WATER

HORSE

WAIT (G hand held up, palm facing addressee)

NO (G hand shake side to side with NO^{N})

PIG

COOKIE (Two G hands make contact at fingertips)

PUZZLE

BAD (Sharp movement G hand once in vertical position)

BOTTLE

COW

GIRL

LOOK

MOON

5.0 Discussions and conclusions

The results of this study will be discussed in three sections: 5.1 Child Language Development, 5.2 Parental Language Directed to Children, 5.3 Conclusions and Implications for Further Research.

5.1 Child Language Development

The research on hearing impaired children reviewed in chapter two (2.4) of this dissertation all have in common a desire to understand the process involved in the child's shift from signalling to symbolizing objects in the environment. From birth, a child is engaged in the process of analyzing, interacting with and learning how to communicate about his environment. These researchers have looked for patterns of behavior during the "pre-linguistic/symbolic" stages of communication that relate to the later development of specific linguistic structures.

Each researcher (Bullowa, Bruner and Bates et. al.) postulates a somewhat different developmental scheme. In Bullowa's model, development proceeds from directed eye gaze at 3 mos. of age to reaching and POINTing at 9-1 mos of age. At fourteen months, according to Bullowa, the mother and child can be observed making sophisticated use of behaviors in carefully calibrated, communicative sequences.

Bruner also began his description of mother-child interaction when the child was three and four months of age to look for predictive pre-speech behaviors. His scheme and Bullowa's are very similar; however he describes routines between mother and child with greater detail and claims that these routines are related to 1) indication, 2) later signification and 3) specific linguistic structures.

The Bates et. al. model emphasizes the relationship of these pre-speech gestural behaviors to later naming rather than to shared reference with a conversational partner, although they acknowledge the relationship of these behaviors to both systems.

Regardless of the specifics of each of these models of development, they all ascribe significant importance to the role of POINTing. Again, there are differences between the researchers as to whether POINTing plays an equal role role in indication and in naming but all agree it has a large influence on both areas of development.

In section 2.2 and 2.3 of this dissertation the POINT was discussed vis-a-vis the linguistic structure of American Sign Language. For the deaf child, this adds to the list of indication and signification/symbolizing/naming the need to learn the morpho-syntactic parameters of POINTing. Where POINTing eventually gives way to verbal and vocal means of signalling and naming for hearing children, it remains part of the communicative/linguistic system of deaf children.

According to the research studies outlined in section 2.3 (Hoffmeister, Fisher, Loew) which are confirmed by the data of this study, POINTing as it relates to Indexic Reference and Incorporation does not emerge during the early stages of development. In fact, it does not emerge until the child is well into his third year of life. However, POINTing is employed extensively in early communication, (see Tables 5 and 6) in a somewhat different capacity.

A closer look at the semantic, pragmatic and linguistic analyses (Table 14, 20, and 24) of the early sessions for the younger child reveals mostly signalling functions. Demonstratives, Demonstrative-Entity and Entity-Location relations dominate these early sessions semantically, Reportative-Factual ("See that") and

Reportative-Stative ("Want that") dominate pragmatically and "specific object" dominates linguistically. In the list of possible functions that POINTing can assume, it seems that signalling the existence of objects for deaf children, like hearing children, comes first.

Pizzuto (1980) reports similar evidence in her study of the early development of pronouns in ASL by one deaf child of deaf parents aged 8 months to 2:5 years. Pizzuto makes a distinction, which is not made in this study, between POINTing gestures which are not specific but serve to orient the addressee to an "object of shared attention" and POINTing signs that specify object, person or location. Her conclusion is that POINTing gestures are prevalent in the "pre-linguistic" stage (10-12 months) and decrease at the junction between "pre" and real linguistic development. POINTing gestures and a large portion of the "real" POINTing signs (as defined by Pizzuto) function as demonstratives to signal objects in the environment. Pizzuto's claim is that POINTing gestures are identical to those used by hearing children.

While I object to the distinction between POINTing signs and POINTing gestures in the child's production or in the adult grammar (which Pizzuto claims is a real distinction on the adult level as well), I think her results and the results of this study overlap and support each other. The idea is that children, deaf or hearing, at the crucial early phase of interaction and development are involved in learning to direct an addressee's attention, and are involved with objects and learning to signal and symbolize them. The POINT, gesture

or sign, is a handy visual-motor tool to accomplish this end. What is interesting in the case of the deaf child is how that sign continues to gain linguistic function, semantic meaning and communicative importance.

As the child ,C_M, matured in later sessions and through all of C_E's sessions the POINT assumed more and more semantic roles (agent, possessor, possessed, location, patient, experiencer) and utterances containing them assumed more and more pragmatic roles. Furthermore, this all occured for the most part in the absence of Verb Modulation. C_E's early sessions can be accounted for by the same eight semantic relations as those Brown found accounting for 70% of multi-morpheme utterance types in hearing children. Furthermore, the same trend of existence relations before verb relations as found in hearing children is found in the present data for deaf children. This finding confirms that of Newport and Ashbrook (1977).

When Verb Modulation does begin to emerge, it is with the same modifications and constraints found by earlier researchers. That is, indexes are established and incorporated only for referents present in the conversational context as in Hoffmeister (1978) and Loew (1980). Furthermore, Locational Verbs (as opposed to directional or reversing verbs) were the first to be modulated as in Fischer's (1977) study.

One last piece of data about pre-linguistic development of deaf children that finds confirmation in this study is that related to possessive pronouns. Hoffmeister (1978) reports a tendency for deaf children to first express the possessive with a POINT handshape rather

than the adult B handshape. This is also true of the children in this study.

To summarize the development of these two children: 1) POINTing emerges as an important first structure in early production; 2) it emerges as an indicator or signalling device in a similar fashion used by hearing children but not as a Deictic Marker to establish an Index for a non-present referent, 3) as the child matures, the POINT signals more and more semantic roles in an utterances; 4) Verb Modulation by Indexic Incorporation is a late acquisition; when it does begin to emerge it is used first in locational verbs (those that remain stationary during formation) and for present referents only.)5) Verb Modulation emerges first for action-patient and action-locative constructions; 6) The POINT a simpler handshape than many others and one which is an early phonological acquisition (McIntire 1975; 1977) is substituted for many handshapes in lexical items and for the possessive B-handshape.

5.2 Parental Language Directed to Children

Over the past 10 to 15 years, developmental psycholinguists have studied the quality of language adults use (especially mothers because they are typically the primary caretaker) when talking directly to their children. Researchers have noted that the language of adults to very young children is syntactically more simple, grammatically better formed, slower in rate, higher in pitch, and freer of disfluencies than their language to other adults (summarized in Snow 1977). Semantically, the same restricted set of semantic relations used to describe the early language of children can account for a large proportion of the language of adults to young children. Mothers' language has been characterized as having a quality of "the here and now," using a vocabulary that's restricted and concrete in reference (Phillips 1970). To what extent did the deaf mothers in the present study modify their "input" language to "match" their children's language level?

Looking first at the earliest phase pf production in C_M's corpus, the "signalling" phase, we find a corresponding strategy used by Mother. C_M's mother uses the strategy of bring a referent object directly into the dyadic space to signal attention to it, a strategy that decreases in frequency over time. There seems implicit in this strategy a concern for specificity of reference. Bullowa (1977) articulates the child's need for such specificity:(cit., pg. 209)

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..."I suggest that an individual's language, as distinct from the more general behavior, communication, derives

from the need to deal with desires arising in a complex human environment. I am referring to ontogeny, not phylogeny. At first the best means an infant has for being specific is to direct his gaze, perhaps augmented by the action of sucking. His dependency on more developed beings for control of his position in space vis-a-vis others may augment or impede his development of visually directed reach, but in any case, hand-arm action, as it becomes free from early reflex patterns, develops a variety of useful ways of specifying his wishes..

In this view, elements that contribute to the emergence of language in the ontogony of human communication are:

1. Interaction with caretaking adults.
2. Shared focal attention.
3. Specificity of reference.

This strategy of "specificity of reference" can be seen in the mothers' productions long after the object-in-space strategy diminishes. POINTing itself as a way to signal semantic roles in an utterance is more explict than the incorporation of these roles in the verb complex via Verb Modulation and Indexic Incorporation. These mothers, in early conversations with their children, seemed to avoid Modulated Verbs and chose to use body-anchored verbs that can not be modulated and verbs that can be modulated (mostly locational or

reversing) in their citation form, (with no POINTs to indicate semantic role). As use of Modulation increased, so did the use of a redundant POINT to mark semantic role. This would presumably peak and then decrease over time. It is also the case that mothers began to modulate verbs to express two arguments before expressing three.

The fact that mothers do not introduce Verb Modulation in early communication is a syntactic simplification and certainly a "match" with the child's production. As with the children, Verb Modulation by the mothers begins with present referents only, with locational and some directional verbs first, and with a restricted set of semantic expressions (i.e., action-locative and action-patient).

Other areas of "match" occur in the semantic and pragmatic domains. Catherine Snow (1977) did a study of semantic case relations expressed by mothers in conversation with their young children. She found that the context of mothers' speech is largely limited to semantic constructions the child has already mastered and this is basically true in the present study as well. The mothers, like the children, begin by talking mostly about the existence of objects and their locations. Later, both members of the dyad expand the range of expressions used to include more and more verb relations.

The pattern of restricted range in overlapping categories to a wider range over time is also evident in the mother-child pairs vis-a-vis pragmatic function. Finally, mothers, perhaps in imitation of their children, substitute the POINT handshape for many lexical items and for the possessive B handshape as well.

To summarize the development of these two mothers' language to their children: 1) objects were brought clearly into the dyadic , conversational space during the phase where first words were emerging.; 2) the "object-in-space" strategy diminished over time but specificity of reference was maintained by a strategy of POINTing on the referent object and by avoiding Verb Modulation by using citation form verbs and POINTs to indicate semantic role instead; 3) Verb Modulation began to emerge with increasing frequency over time expressing only two (out of three) arguments and in locational and occasional directional verbs first. The use of a redundant POINT increased during early use of Verb Modulation as well; 4) the mothers' use of semantic case relations was largely in sync with the children's. A restricted set of relations gave way to a larger range over time; 5) the same trend of narrow to wide range of use was found in pragmatic and linguistic function and 6) the POINT was substituted in many lexical items for more sophisticated handshapes and for the possessive pronominal B handshape as by the children.

5.3 Conclusions and Implications for Future and Research

In progressing from a very specicic use of the object referent, to a somewhat less specific use of POINTs with unmodulated verbs, to an even less specific (but redundent) use of Modulated Verbs with redundant POINTs and then to Modulated Verbs (but only with the referent present), there is a sense of "stringing out" what is usually very compacted information. In a language that tends to be highly inflected and not very linear, this is a curious phenomenon.

However, in making the verb complex more linear more specific and more redundant, these mothers are also making their language more concrete, explicit and more similar to the productions of their children. This study has shown the tendency for mothers to modify and tailor their language for their children across language modalities.

Unfortunately, data collection terminated before the mothers and children integrated the use of POINTs (and other Deictic Markers to establish indexes) and Modulated Verbs in an indexing situation where the referent object was not present. This would necessitate the establishing of a "trace" POINT which is extensive in adult to adult conversation and a more abstract than real world indexing involving higher order rules. It's the nature of mother-child conversation that topics are constrained to the "here and now" and topics that do not relate to the immediate conversational environment are rarely introduced. Future research could continue the observation of mother-child interaction over the course of development from Verb Modulation indexing present objects, people and locations to indexing non-present referents. It would also be important to extend the present line of research to earlier stages of interaction prior to 12:0 months to look for similarities/differences compared with the interaction between hearing mothers and their hearing children. One such study is in process at the time of this writing (Maetas Y Moores) and is looking at communicative strategies from birth to two years when both mother and child are deaf.

The study of the communicative process in children who are deaf and acquiring ASL has been recognized many times for the contributions it can make to the understanding of the primacy of the auditory channel and the organization of the language acquisition process. The present study is but a small step toward that end.

Footnotes

1.Newport, 1979, Page 34.

2. Newport calls a portion of American Sign Language "mimetic". These kinds of signs have also been called "non-standardized", "analogue" or "sign-mime". These signs reflect aspects of the real world in form, in the sense that handshapes often refer to shapes of objects and movements of the handshape through space. Newport's thesis is that mimetic depiction is like morphology in spoken language and not analouge in nature. These morophemes might have some iconic qualities but they are compossed of a limited number of discrete components combined in regular ways.

3. In ASL (as in Japanese and Serbo-Croation) inflectional cues are not the only strategy for marking semantic role. Certain Verbs, (e.g. body-anchored verbs) because of their phonological parameters, cannot accept inflectional marking of role. Utterances containing such a verb rely on constrastive word order instead (Liddell 1977; Coulter 1979).

4. See Methods and Coding Section for an explanation of Notation and Transcription devices.

5. One session during Christmas was conducted in the lab because the family christmas tree occupied too much room in the living room.

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Appendix A
Semantic Relations Coded for and Examples from the Transcript

One Term Semantic Relations

(signs are indicated in capitals and implied meaning in asterisked parentheses such as -Father *(eats)* Pt. (there/to chair)-

1.demonstrative	-Pt. (that/to book)-
2.locative	-Pt. (there/to chair)-
3.possessor	-Pt. (mine/on C_E)-
4.agent	-Pt. (she/to doll) *(DRINKS)*
5.patient	-*(SEE)* Pt. (her/to doll)-
6.lexical item	-$DRINK^C$=ghand-
7.experiencer	-Pt. (me/on C_E) *(WANT)*-

Two Term Semantic Relations

1.demonstrative-entity	-Pt. (that/to toy) TOY-
2.demonstrative-attribute	-Pt. (that/to block) GREEN-
3.entity-locative	-DOLL Pt. (there/to bed)-
4.entity-recurrence	-Pt. (that/to milk) MORE-
5.entity-non-existence	-Pt. (this/on bowl) GONE-
6.agent-action	-Pt. (he/to horse) Fall-
7.agent-location	-FATHER *(EATS)* Pt. (there/to chair)-
8.agent-patient	-Pt. (you/to $mother_C$) *(THROW)* Pt. (that/to ball)-
9.action-patient	-THROW Pt. (that/to ball)-
10.action-locative	-SIT pt. (there/to floor)-
11.experiencer-Vstate	-Pt. (me/on C_E) SLEEP- ?
12.Vstate-patient	-WANT Pt. (that/on book)- ?
13.experiencer-patient	-Pt. (you/to C_E)*(WANT)* Pt. (this/on toy)-
14.possessor-possessed	-Pt. (this/on blanket) Pt. (yours/onC_E)-
15.patient-locative	*(PUT)* CHAIR Pt. (here/on floor)-

Three Term Semantic Relations

1.demonstrative-entity-attribute	-pt. (this/on sweater)SWEATER GREEN-
2.agent-action-patient	-pt. (you/to C_E) HIT Pt. (her/on doll)-
3.agent-action-locative	-Pt. (you/toC_E)#COME# Pt. (here/on M_M)-
4.demonstrative-entity-locative	*(PUT)*Pt. (that/to book) BOOK Pt. (here/on shelf
5.demonstrative-entity-recurrence	-Pt.(this/on bowl) CEREAL MORE-

6.demonstrative-entity-non-existence	-Pt. (This/on plate) COOKIE FINISHED-
7.demonstrative-possessed-possessor	-Pt. (this/on teacup) TEA Pt. (yours/to C_E)-
8.experiencer-Vstate-patient	-Pt.(you/to C_E) WANT TEA- (?)
9. action-demonstrative-patient	-#THROW AWAY# Pt. (that/to towel) TOWEL-
10.V state-demonstrative patient	-WANT Pt. (this/on cookie) COOKIE- (?)
11.action-patient-locative	-THROW GLASSES Pt. (there/to sofa)-
12.action-benefactor-patient	-#GIVE ME# GLASSES-

Four Term Semantic Relations

1.agent-action-benefactor-patient	-Pt. (you/to C_E) #GIVE ME# Pt. (that/on toy)-
2.experiencer-V state-patient-locative	-Pt. (you/to C_E) KNOW BOOK Pt. -(there/to bedroom)-
3.agent-action-patient-locative	-Pt. (you/to C_E) #WIPE SPILL#- -Pt. (here/on floor)

Apendix B

Pragmatic Functions Coded for and Examples from the Transcript

1.Reportative/Nomination	-Pt. (this/on toy) BOY-
2.Reportative/Confirming	-Pt.(this/on toy BOY- YES^{N}
3.Reportative/Non-confirming	-Pt.(this/on toy) GIRL- NO^{N}
4.Reportative/Negation	-Pt. (there/in bowl) EMPTY- NO^{N}
5.Reportative/Locating	-Pt.(that/to toy lamb) Pt. (they/to box)-
6.Reportative/Attribute	-Pt. (this/to block) YELLOW-
7.Reportative/Fact	-Pt. (she/on doll) BROKEN ?
8.Question/Report. Stative Verb	-WANT MORE Pt. (this/on bread) ?
9. Question/WH	-WHOSE Pt. (this/on toy)-
10.Request/Directive	-#WIPE-UP-SPILL#-
11.Request/Indirect	
12.Question/Clarification	-Pt. (yours/to C$_E$) Pt.(this/on toy)-
13.Question/Action	-Pt. (you/to C$_E$) SLEEPING-

*The difference between non-confirming and negating lies in the fact that non-confirming must follow an utterance made by the partner in a dyad. For example:

Mother	Child
	-Pt. (this/on toy) BOY- "THIS IS A BOY"
-No^{N}-Pt. (this/on toy) BOY- NO^{N}	
"No, this is not a boy"-	

Appendix C
Examples of Interactions between M_M and C_M

[MM gives toy to CM]	[CM plays with toy smiling]
-Pt. (this.on toy door)-	[looks at M_M]
"This one"	
-Pt. (this.on toy door)-	no response
"(look at) This one."	

[taps on C_M's arm]
-FINISH FINISH-
"Finish" (playing with that toy)-

[M_M gives C_M another toy]	[C_M takes yellow block from toy]
-Pt. (this/on block C_M holding)	
Pt.(that/to hole) Pt. (This/on block) Pt. (that/to hole)-	
	[tries to put block in hole]
"Put this block in that hole."	

[picks up toy with picture of a tiger on it]	
	[picks up doll]
-Pt. (this/on toy) tiger-	
"this is a tiger."	
[takes doll] and rocks in arms	
-Pt. (this.on doll's nose) pt.(this/on C_M's nose)-	
	[looks at doll]
'This nose (is like) your nose."	
-Pt.(this/on dolls's eye)-	
Pt. (this/on C_M's eye)-	
"This eye (is like your eye."	
-HAIR Pt. (this/on doll's hair)-	
	[C_M feels doll's hair]
HAIR Pt. SThis/on C_M's hair)-	
'This hair is like your hair."	

	[feels doll's hair then feels his own hair]
	-HAIR-
-HAIR Pt. (this/on doll's hair)	
YES[N]	"Hair"
Pt. (this/on C_M's hair)-	
"Yes, this hair (is like) your hair."	
-SAME-	
YES[N]	
'Yes, Same."	

Appendix C Continued
Examples of Interactions Between M_E and C_E

T:	M_E	C_E
		[holding toy dog]
		-dog- Pt. (this/on dog)-
		"Is this a dog?"
-dog Pt. (that/to dog)-		
YES^N		
dog Pt. (that/to dog)-		
YES^N		
		throws dog at M_E]
-Throw Pt. (that/to dog)		
NO^N		
"Don't throw that."		
-Pt. (this/on dish)		
	what=shoulder shrug, palms up	
Pt. (this/on dish)-		
"What is this?"		
		-Water^O=g-
		"Water."
-Water^O=g Pt. (This/on water dish)-		
YES^N		
"Yes, This is water."		
[picks up baby doll]		
?		
#WASH HER# (signed on doll)		
"(want to) Wash her?"		
-Wash Pt. (her.to doll)-		#WASH HER# (on doll)
"(want to) Was the doll?"		"Wash her."
?		
-Pt. (you/to C_E) BATH Pt. (that/to dish)		
?		
Pt. (you/to C_E) Pt. (that/to water dish)		
		[C_E lifts up her skirt]
"You (want) a bath (in) that?"		
"(Do) you (want) that?"		

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