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THE UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

SIGN-SENTENCE THEORY
A METHOD OF ENCODING AND DECODING NONVERBAL COMMUNICATION

A DISSERTATION
SUBMITTED TO THE GRADUATE FACULTY
in partial fulfillment of the requirements for the
degree of
DOCTOR OF PHILOSOPHY

By
PHYLIS JONES FRAZIER
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SIGN-SENTENCE THEORY

A METHOD OF ENCODING AND DECODING NONVERBAL COMMUNICATION

A DISSERTATION

APPROVED FOR THE DEPARTMENT OF COMMUNICATION

BY

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PREFACE

I wish to express my gratitude to all my friends and family who have supported me in this effort. I also want to thank my committee chairperson as well as my committee members, especially Professor Wieder who spent many hours reading and advising.

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ABSTRACT

Sign-sentence theory is developed as a translating and decoding method for nonverbal communication. The theory incorporates those of White (1982) and Carroll (1986), and draws support from Vygotsky (1934/1962). White's theory parallels the phases of development of human infants with other mammals providing a phylogenetic origin of communication. Carroll's theory shows congruence in the communication of infants and gives evidence of the translating of nonverbal statements to verbal statements by the child him/herself in development. This translating technique is presented with the socio-historical support of Vygotsky's theory (1934/1962) and the linguistic research of Hirsh-Pasek and Golinkoff (1991) as evidence to support the decoding of samples of nonverbal communication of children. Three studies are provided: one preschool laboratory observational study; one decoding study of a nonverbal dance in a children's reading group recorded by McDermott, Gospodinooff, and Aron (1981); and one adult-infant interaction recorded by Braunwald (1983). This new theory brings insight to the origin of communication and language. It can provide an efficient decoding device for researchers in the field of communication and related fields who study child language.

INTRODUCTION

Studies of children's development of language (from one-word utterances to complicated sentences) have filled the research literature since Noam Chomsky (1957) revolutionized the study of syntax. The studies of apes (e.g., Lieberman, 1984), the support for "critical periods" for language development (e.g., Curtiss, 1977), and the studies of right and left brain activity (e.g., Henry, 1985) support the premise that the period before puberty is critical for acquiring verbal language which is lateralized in the brain's left hemisphere. Institutionalized children (Provence & Lipton, 1962), like Genie (Curtiss, 1977), the girl who was isolated and tied to a chair most of her life, suffer a lack of language development which reveals the necessity of both social interaction (nonverbal communication or right brain functioning) (Henry, 1985) and a speech environment (left-brain functioning). These factors point to the triggering action of experience advanced by Chomsky (Reiber, 1983) and others.

It appears that nonverbal communication, beginning with the mother's initiation toward the child (White, 1982), is developed and lateralized in the right brain (Henry, 1985) where verbal language follows (Curtiss, 1977; Lieberman, 1984; Pines, 1981). Because of a triggering effect from the language environment (Chomsky, 1976;

Reiber, 1983) and the renegotiating phase of development (White, 1982), the control of speech is switched from the right to the left hemisphere of the brain which is already lateralized for human speech sounds in infancy (Henry, 1985). Perhaps Chomsky's (1976) Language Acquisition Device is merely this switch in hemispheric brain control.

Burgoon, Buller, and Woodal (1989) propose that "...we may learn some things by studying nonhuman interactions and we will not hesitate to draw on these observations where they serve as useful illustrations or analogues." White (1982) proposed a set of such analogues in her phase theory. White's phase theory provides a foundation for the claim that nonverbal communication is basic and vital to the development of verbal communication. Research by Carroll (1986) provides the developmental detail concerning how nonverbal communication expands to verbal. This research creates a new perspective of children's language and communication development which has formerly focused centrally on verbal language. The Language Acquisition Device of Chomsky and the triggering action of the language environment explained by Chomsky (Reiber, 1983) leave much to be accounted for. White's (1982) theory provides a new approach to understanding human communication from an ethological background which holds nonverbal communication in a primary position in communication and language development.

Purpose

It appears that nonverbal communication holds a secondary role not only in communication research, but in linguistic studies and psychological literature. For instance, crawling infants may look at their parents for signals of approval before continuing into a questionable area: such an episode is listed under "Developmental Behavior" in a child psychology text (Hetherington & Parke, 1986), but there is no mention that a message is sent by the child or the parent, or that communication takes place. A case study by Goode (1990) shows through long-term, in-home observations that nonverbal communication practices take place between parents and their blind and deaf child. Previous professional assessments of the parents who claimed that their child communicated with them were that the parents were delusional. The study concludes that professional models of communication employed in language assessment fail to comprehend the basic descriptive elements of familial communication. White's (1982) theory could bring new insights to nonverbal communication as well as verbal exchange.

This dissertation incorporates the theory of White (1982) and the theory of Carroll (1986) into a theory of sentence-signs which I have developed. I will show that much communication takes place in childhood nonverbally which constitutes clear, adequate, and expressive message-

sending and message-receiving. For instance, a 30-month-old child who intends to send the message, "Daddy is not at home," (which is a negative transformation from the positive version in adult language) may say, "Da da home," and shake his/her head back and forth incorporating the verbal and nonverbal language into one statement. Or a nine-month old child who sees some ice cream that he/she wants may extend both arms toward an ice cream cone since s/he cannot send such a message verbally. We will see further explanation of such an episode later in the Braunwald (1983) Study. Other examples are shown in the laboratory observational study of children two to five years old. Preschool children and infants do send messages according to their level of development just as adults do; however, they generally are not acknowledged as communicators. Their communication is not an outstanding focus of the study of child development. Crain (1992), an authoritative resource for recent graduate studies in child development, makes no mention of communication. Even in Crain's (1992) discussion of the issue of forming negatives in childhood as seen in the first example above, the option of nonverbal statements is not considered. In discussing research by Klima & Bellugi (1966), Crain states:

Initially children act as if their rule is:

Put the negative in front of the whole sentence

(or after it). For example, they say "No play

that." "No want stand head." and "Car go no."

A bit later children seem to form a new rule: Put the negative after the first noun phrase and before everything else. They say things like, "He no bite you." and "I no want envelope." (p.308)

In Crain's (1992) discussion, there is no acknowledgment of the other option of forming the negative with nonverbal head movement. The child's use of nonverbal head movement is probably evidence that the transformation is indeed internalized, but is only beginning to develop in its spoken form.

A second objective of the presentation of sign-sentence theory is to show that through innate comprehension of nonverbal statements and verbal language structure, the competence of message identification and message sending, even in the prelinguistic child, may be translated into simple sentences by adults. The innate comprehension of language has been theorized as intuitive knowledge by Chomsky (1957), as the basis for Transformational Grammar. This comprehension in infants will be demonstrated in the Preferential Looking Paradigm of Hirsh-Pasek and Golinkoff (1991) where infants match behavioral display to verbal descriptions of televised images.

Translating nonverbal behavior into simple sentences will expand the details of language development in childhood

to include nonverbal behavior and identify nonverbal behavior as the originating predecessor of verbal language.

The third and final objective of sign-sentence theory is to provide a foundation from early childhood for later development in communication. By using the innate verbal knowledge as a translating device of nonverbal expressions to verbal ones, researchers may then expand transformations of this simple sentence to more complicated ones to embody all nonverbal expression as has already been done for verbal expression (Chomsky, 1957). These new transformations for nonverbal language may incorporate meanings which have already been identified in the area of nonverbal communication and should also include new meaning which have here-to-fore been inaccessible.

Intention

Intention to communicate specific meaning to another is an important issue in much communication research.

In discussing intentionality, Knapp and Hall (1992) state:

Sometimes we design a message very carefully and the other person does not get it; sometimes we do things we are not even aware of and other people respond as if we had deliberately designed the behavior to evoke a particular response. ² (p.8)

Knapp and Hall then offer MacKay's (1972) model which proposes four types of intentionality for nonverbal signals:

(a) goal directed interpreted as goal directed; (b) goal directed not interpreted as goal directed; (c) non-goal directed interpreted as goal directed; (d) non-goal directed not interpreted as goal directed. Knapp and Hall (1992) cite MacKay (1972, p.24):

Situations of these four types may be expected to differ radically both in their dynamics and in the categories of scientific explanation that they will demand in order to be fully understood. It seems important that experiments on non-verbal "communication" should be designed as far as possible to distinguish between them. (see Footnote 2)

Distinguishing between intentional or goal directed behavior and unintentional or non-goal directed behavior according to sign-sentence theory would apply only insofar as one member may signal another as to the contextual format for their interactional behavior. Bruner (1983) uses the term "intention" in this way as does Savage-Rumbaugh (1991). Such exchanges identified as involving at least two individuals encountering one another in a format or routine will be described below by Bruner (1983) and Savage-Rumbaugh (1991). Sign-sentence theory views the behavior in such routines as nonverbal language, and just as intention is assumed in verbal language (that if a person is speaking, he or she intends to send a verbal message), so also can we assume intention in nonverbal language. Intention is really

not an issue in sign-sentence theory since it does not exclude any behavior found in the interactional format, as described below in the structural definitions of communication in Birdwhistell's and Schefflin's theories. Intention can be an issue only if some behaviors are to be excluded from analysis as communication because some behaviors are not considered to be intentional communication. However, Sign-sentence theory includes all behavior in the format. The only intention required is the intention to signal the format which is the beginning of the interactional process.

McDermott, Gospodinoff, & Aron (1981) explain this:

People manage to know for sure what is going on only in relation to specific interactional environments, and they usually know a great deal about these environments because they have helped to construct them as predictable contexts for plying whatever it is that they know. Such framing takes considerable work, and it is by that work that we are able to locate what it is that members of a group are up to at any given time.

Members usually reference or in some way formulate some of the contexts for their behavior...

In addition to naming, a context can be formulated by a statement of what is required of a member in a particular context. For example, the structure of a

classroom reading lesson can be formulated by the teacher calling on a child to read or by a child complaining that he never gets a turn...

On occasion, a gesture can stand on its own as the sole signal for a prolonged context. The condition for the description of any signal as a feature of the work members do to contextualize each other is that it is responded to; that is, upon signaling the members act as if the signaled context was in fact the reality at hand, be it accepted or challenged.³ (p.378-379)

Bruner, as will be seen, ascribes intention to the child who initiates a format such as peek-a-boo, and Savage-Rumbaugh does the same with young apes in their routines. Therefore, the only intention necessary to this type of structural communication would be to initiate, accommodate, or challenge the goals of the format, routine, or program. These are public intentions. There may be other cognitive intentions of the participants, but Sign-sentence theory cannot be held accountable for such intentions since they are not public. The other question concerning intention is whether or not newborn infants possess the conscious awareness to understand interaction and its goals in formats. Bruner, as we shall see, expresses a belief that infants have an innate sense of inter-subjectivity. Sign-sentence theory takes the position that this innateness is part of the deep structural intuitive knowledge with which

each child is born and, therefore, assumes the conscious awareness necessary to enter into formats with interactional goals. In this latter case, intention, again, is not an issue.

It may be that some nonverbal messages are merely informative or even unimportant to the goals of the routine, but if we consider the total exchanges a part of a system accomplishing the goals of the routine itself, it must be understood that if any part is excluded, it may change the rest of the system. It seems critical not to exclude any parts of it.

Kendon (1972) reviews the systemic perception of communication by Birdwhistell (1970):

Birdwhistell is interested in the phenomena of face-to-face communication in people. He is interested in the order or pattern that can be observed in the ways in which people relate their behavior to one another when they are in each other's presence. For him this order or pattern "is" communication: "when we talk about communication... we discuss it as a complex and sustaining system through which various members of the society interrelate with more or less efficiency and facility" (p.12). The aim of a science of human communication, in his view, would be the systematic description of the systems of behavior by which this interrelatedness

is brought about. For Birdwhistell, thus, communication is not something that we may or may not achieve; it is not something that we may or may not do of our own choosing, for whenever we are in the presence of another, to the extent that there is an interrelation between our behavior and that of the other, to this extent communication is going on... For Birdwhistell, communication is to be viewed as a system with a structure that can be described independently of the behavior of particular participants...

By this systemic view of communication, anything that anyone does in the presence of another must be considered as potentially part of the system. Speech and gesture, posture and orientation, touch and relative position in space--all must be taken into account if we are to comprehend communication. We cannot at the outset of our investigations decide not to attend to certain aspects of behavior. So long as it is detectable by the other, it must be presumed communicative until proven otherwise.⁴ (p.442)

Kendon uses the term "interrelationship" instead of context or format. The contextual structure of communication is viewed by Scheflen (1968) as "programs." Scheflen explains the identification of programs:

It is when you have watched the stream of behavior 30,

50, or more times that the pattern will begin to be evident. Dozens of microbehaviors will be seen to recur in the same sequence, and the sequence as a whole will be repeated.

There will not emerge a single pattern, but patterns of pattern. Your problem in recording will not be lack of order, but great complexity.

The units are found to form a hierarchy of levels of integration in a stream of behavior; that is, small units are lawfully put together with other units to form larger units, and these in turn form even larger units. The complexity is reduced to a unity when it has been shown how all of these units come together in a single configuration, like baby bathing...Fortunately, people, whether they know it or not, signal each terminus to a stage and each beginning of the next (Harris, 1952; Schefflen, 1964), so we can cross-check the shift points in our structural analysis.

The properties of such a diagram are programmatic. They have implicit coded instruction, for those who know the interaction, equivalent to "After this is done, do that." And they have alternatives or branching possibilities, such as "if so and so happens, shift to format so and so." If, for example, it begins to rain at a picnic there are traditional

alternatives for continuing. If the business meeting is to be followed by a speaker, the short form of the meeting is used. After the baby has been dried, the mother shifts to activities for dressing him and, depending on whether the contingencies call for taking him out or putting him to bed, the dressing activities vary accordingly. We can speak, then, of the interaction having a "program."⁵ (p.45-46)

Different theorists have focused on the process of structuring interaction in different ways, but we can see in each one that the interactants understand what they are doing together. We can see, for instance, in the children's reading group of McDermott et al. (1981), which will be analyzed later into sign-sentences, how the children orient to one another on a moment-to-moment basis, holding one another accountable and creating the working consensus for the context of the reading group. McDermott et al. (1981) comment:

The term "working consensus" was originally used by Goffman(1959:9-10) to refer to a "kind of interactional 'modus vivendi.' Together the participants contribute to a single overall definition of the situation which involves not so much a real agreement as to what exists but rather a real agreement as to whose claims concerning what issues will be temporarily honored." The term has been used by Kendon (1976:322) in much

the same way we have been using it: "A central problem in the investigation of interaction...will be to see how, in terms of the functioning of observable behavior, the 'working consensus' for a given behavioral system is established and maintained. In particular, this means that we must identify those aspects of behavioral function which serve to control or regulate the behavior of the participants in relation to the currently established pattern of relationship. This requires that we look for regularities in behavioral relationship, but that we look closely at places where these regularities change." (p.396-397) (See Footnote 3)

Leeds-Hurwitz, Sigman, & Sullivan (1995, p.173) report the evaluation of the structural approach in the theory of Garfinkel.

Garfinkel's (1967) ethnomethodology eschews grammatical or rules investigations, emphasizing instead the transcontextual interpretive procedures employed by collectivity members as part of making sense of action around them. Garfinkel rejected rules as an a priori explanation of human conduct because this would require a view of persons as "judgmental dopes" wired to behave in certain ways, but unable to make determinations that would fit rules to particular circumstances.

However, Leeds-Hurwitz et al. (1995) admit that they do acknowledge the value of programs or rule-based explanations:

We contend that descriptions of programs provide valuable sociocultural insights, but that students of communication must examine the process by which program resources find their way into performance, and not stop at a description of the program.⁵ (p.173)

Bruner (1983) has investigated how programs find their way into the interactive performance of a human child, although he chooses to use the term format instead of program. He defines the format:

A format is a rule-bound microcosm in which the adult and the child do things to and with each other. In its most general sense, it is the instrument of patterned human interaction. It is of particular importance to us at this point since formats are established between infant and caretaker before lexico-grammatical speech begins, and they provide the framing context into which language is introduced... (There are) three forms of reciprocal commitment in "pragmatic interaction:" (1) relating to the future and to signalling and acknowledging intention; (2) to the present that is deictic; and (3) to the past that is presuppositional. They provide a useful set of rubrics for considering

what is meant by a format.

A format formally entails a contingent interaction between at least two acting parties, contingent in the sense that the response of "each" member can be shown to be dependent upon a prior response of the "other." Each member of the minimal pair has a goal and a set of means for its attainment such that two conditions are met: first, that a participant's successive responses are instrumental to that goal, and second, that there is a discernible stop order in the sequence indicating that the terminal goal has been reached. The goal of the two participants need not be the same; all that is required is that the conditions of intra-individual and inter-individual response contingency be fulfilled. Formats defined formally in this sense represent the simplest instance of what Schank and Abelson (1977) characterize as a "scenario." Formats, however, "grow" and can become as varied as the scenarios described by those authors. Their growth is effected in several ways. They may in time incorporate new means or strategies for the attainment of goals of two partners not only in the sense of "agreement" but also with respect to a division of labor and a division of initiative. And they may become conventionalized or canonical in a fashion

that permits others within a symbolic community (e.g., a "speech community") to enter the format without special instruction...The creation of higher order formats by incorporation of subroutine formats is one of the principal sources of presupposition. What is incorporated becomes implicit or presupposed.

Formats, except when highly conventionalized, cannot be identified independently of the perceptions of the participants. In this sense, they have the property of contexts generally in being the resultant of definition by the participants. The definition of formats communally is one of the major ways in which a community controls the interaction of its members. Once a format is conventionalized and "socialized" it comes to be seen as having externality and constraint and (in Karl Popper's 1968 sense) becomes "objective." This is typical of such speech act formats as "promising..."

It is the goal-directed aspect of formats that makes the signalling of intention (and the signalling of uptake) so simple. This is greatly aided by the fact that early formats are so overt, as in games like hide-and seek, give-and take, peek-a-boo, and where's the X?...Infants learn early to signal intended action formats and to expect uptake. Indeed, what seems to be

going on is a segmentation of the action into constituents, the child then seeking an appropriate way of signalling his intentions to the adult not only at the beginning, but at each segment. This provides the almost ideal-typical case of framing, for it assures that the child knows the referent for which he is signalling and can recognize by immediate context what the mother's utterance, provided as corrective "means."⁷ (p.36-37).

Bruner (1975) also comments upon intention in the very young child:

The one thing that is special about the kinds of concepts the child is said to be operating with is that they are based on the presumption that the child grasps the "idea" of inter-subjectivity--that others have intentions...

This is not to say that the child is born equipped with a "finished conceptual schema" for interpreting inter-subjective phenomena--that he "knows about" sharing experience with another from the start, or knows about another's intentions. Rather, it is to say that the child has the innate capacity to construct such schemata. He does so by interpreting feedback from another as constituting a special class of events in contrast to other events. And he is greatly aided in this by the existence of

systematic intentional (or intention-like!) behavior in the people with whom he comes in contact.² (p.8)

Similar ideas and concerns have been identified in the language learning of young apes. Savage-Rumbaugh (1991) reviews the language learning studies with apes that have shown that intention could not be attributed to primates in language use. The language learning of this lower species, though demonstrating ability, was faulted on the grounds that the ability was shown merely as a performance for a reward without true symbolic meaning. Since that time, Savage-Rumbaugh (1991) has published evidence of what could be identified as intentional communication in the ape.

Savage-Rumbaugh (1991) reports:

Initially it was assumed that apes, unlike children, could not acquire symbols observationally, but had to be rewarded for using the correct symbol (Gardner & Gardner, 1971; Premack, 1971), and often the object of note had to be shown to them before they could name it (Terrace, 1979).³ (p. 210)

. These conclusions which were based on either a vocal or a sign language system have been shown to be erroneous.

Savage-Rumbaugh explains:

In retrospect, the imitative skills required by either of these systems were beyond the capacity of young apes (Tomasello, 1990). Because the apes could not easily imitate either the words or the signs,

shaping and reward of the response morphology was required. Such shaping functioned to deter comprehension and referential learning, because it stressed response topology, being "right" at the expense of communicating, and coming to understand the communication of others. (p. 210)

Savage-Rumbaugh has recorded the acquisition of lexical and vocal symbols through observational learning of Kansi, a pygmy chimpanzee (*Pan paniscus*) (Savage-Rumbaugh, Sevcik, Rumbaugh, & Rubert, 1985), and three other apes (two pygmy chimpanzees and one common chimpanzee) (Brakke & Savage-Rumbaugh, 1989). Contextual data of the symbol acquisition of two additional chimpanzees reared with Kansi trace the evolution of words used first in routine-dependent imitation, to initiation of routines, to the use of the words to control which routine is selected by the caretakers, to "generalized comments" that finally reflect sophisticated comprehension and word usage.

Whereas Bruner (1983) uses the term "format" in identifying contextual interaction, Savage-Rumbaugh (1991) uses "routine." In the rearing of chimpanzees by human caretakers, Savage-Rumbaugh (1991) shows that the acquisition of symbols begins with the learning of a routine. Furthermore, the routine would be a "...more or less regularly sequenced set of interindividual interactions that occur in a relatively similar manner across time, or at

different times" (p.215). Some examples of routines would be changing diapers, getting ready to go outdoors, taking a bath, riding in the car, packing a backpack, blowing bubbles, etc. The chimpanzee may be a willing or unwilling participant or observer.

Once the routine is comprehended by the ape, behavior will reflect this comprehension; for instance, a young chimpanzee may wait patiently for the nipple to be placed on the bottle in the "preparing the milk bottle" routine rather than grabbing a bottle without the nipple and perhaps pouring and spilling the milk. This learning of routines is accomplished by very young apes with no explicit reinforcement. The routine is inevitably accompanied by gestural, lexical, or vocal markers by the caretakers to convey the intended action to the ape. Savage-Rumbaugh (1991) states:

Once the routine is understood, it will be initiated by the ape. At first, such initiations will be rather primitive in the sense that they will be action based and context dependent. For example, the chimpanzee may see the bottle of bubbles among other toys and pick it up and look at the caretaker. By selecting the bubbles from among other things, the chimpanzee thus has conveyed its desire to execute the "bubble-blowing" routine. Later, it may simply point to the bubbles and look at the caretaker. Still later, it will point

to the BUBBLES lexigram and turn to the caretaker.

In so doing, the ape moves from being a passive observer of a routine to an active participant, to a primitive initiator, to a communicator symbolically announcing his or her intentions to another party (p.217) (see Footnote 9)

Examples are provided by Savage-Rumbaugh (1991).

If Kanzi wants to blow bubbles, he may pick out the bubble bottle, open it, and begin to blow bubbles. However, commencing and carrying out such a routine without markers or signals being directed to others is successful only to the extent that others need not be involved or coordinate their behavior with Kanzi in any predictable manner. If others are involved, they can cooperate only if they know the routine. For example, should Kanzi wish to play with bubbles while out in the woods, it will be necessary to retrieve them from the caretaker's backpack. If Kanzi simply walks over to the caretaker and grabs his or her backpack and starts pulling things out of it, this will be responded to in a negative manner. It is not that the caretaker does not want Kanzi to play with the bubbles, but unless he announces his intended action, the caretaker will not understand why the backpack has been taken and is being rifled through. If, however,

Kanzi announces "bubbles," and points to the caretaker's backpack, he can be given the backpack with knowledge of his intended action. Everyone, including Kanzi, is comfortable because they know what is being done, and within reason, what will occur next: Kanzi will play with the bubbles and perhaps solicit the interactions of others in the bubble-blowing game. However, if the back pack is simply grabbed, no one in the group is sure what will happen next. The caretaker may get angry and try to grab it back, Kanzi may climb a tree with the backpack if he sees the caretaker is angry, everything may fall out of the backpack, and so forth, and no comfortable, coordinated, agreed-upon routine will be in place. (p.222)

As shown in the above example, Savage-Rumbaugh (1991) believes that symbolic markers are acquired for the purpose of controlling events:

The driving force that moves the ape from symbol comprehension to symbol production is the desire to exert some control over what happens or is done next. To the degree that future events entail social companions, it becomes propitious to achieve joint engagement by announcing intent. To the extent that the ape fails to do so, it has little control over what happens to it next. In a sense, this perspective

is similar to that offered by Bruner (1983) when he observed that for children "the engine that drives the enterprise is not language acquisition per se, but the need to get on with the demands of culture" (p.103).

Culture, however, is a very general term, making it difficult to know just what it is that is driving the child--other than the desire to be like other human beings. In our view, it is not culture that is driving the ape, but the desire for control. (p.223)

Chomsky would, no doubt, object to comparisons of the language of human children with that of apes, for he believes the human language to be species-specific. In an interview (Reiber, 1983), Chomsky states:

Let me begin by saying something that I hope is uncontroversial. Namely, there is something characteristic of the human species--there is some species-specific property, some part of human biological endowment that contributes to the growth of language in the mind. That is, language doesn't grow in a rock or in a bird under comparable conditions of stimulation. That's obvious, I hope. So, therefore, there is something about the human mind that plays a role in determining that knowledge of language grows, develops in that mind. A second point that is equally obvious is that the way in which

language grows in the mind is going to be affected by the nature of the outside environment; that is, if we're growing up in the United States, we'll learn to speak English and if we're growing up in parts of East Africa, we'll learn to speak Swahili. That's again obvious. So what's clear is that there is some biological capacity which differentiates us from rocks and birds and apes and so on; it plainly isn't just a sensory capacity, because we can easily translate language into some other sensory modality accessible to birds or apes and the same observation will hold. So there is some mental characteristic, if you like-- something about our nature which reflects itself in the structure and growth of a particular mental organ that constitutes the intrinsic, innate contribution to the growth of language.¹⁰ (p 49)

It does appear, though, that Savage-Rumbaugh (1991) has provided the "comparable conditions of stimulation" of human children for young apes and has shown comparable results. It may be that the "growth" of language is species-specific in the human child, but the innateness of the seed of that language certainly seems to be phylogenetically inherited as exhibited through communication ability in both species. We have seen this tendency in the work of Savage-Rumbaugh (1991) with young apes, although they do not explicitly

employ translations, and the development in the human child will be shown by Carroll (1986).

Background for Definitions

The Sentence

The transformational approach to grammar (Chomsky, 1957) stipulates that a child seeks to impose a specific kind of structure in the formation of sentences. This process of relating a sentence to a set of sentence-like structures is carried on anew every time the language is learned by a child. These sentence-like structures are actually very simple sentences with a noun phrase and a verb phrase. Through a system of transformational rules, more complicated sentences are generated. The process is highly intricate. Labov (1970) has identified five major steps of substitution, deletion, and conversion that must be made to derive the sentence, "John wants to know how you like him." from "John wants;" "John knows;" and "You like John how." These underlying propositions are related and transformed to produce the final surface structure or spoken sentence.

Holophrastic Sentences

The first sentence-like structures spoken by children are one-word "sentences" These are called holophrastic sentences by Fromkin and Rodman (1983) and appear sometime around the age of twelve months. They include such words as "Hi;" "No;" "Don't;" "Up," ("Get me up.").

The holophrastic stage is preceded by the babbling stage for about six months in which the pitch or intonation contours begin to resemble the intonation contours of sentences of adults.

Telegraphic Stage

The stage of telegraphic speech follows the holophrastic stage. In this stage, the sentence is more complete, but small "function" words (e.g., "so," "the," "can") are left out so that the message is more like that of a telegram from Western Union. This stage occurs around 24 months of age (Fromkin & Rodman, 1983). Of course, all ages and stages may be different for individual children.

Telegraphic Sentences

"Cat stand up table."

"What that?"

"He play little tune."

"Andrew want that."

"Cathy build house."

"No, sit there."'' (Fromkin & Rodman, 1983, p.330)

Gradually, more words are added so that the sentences, around the age of five years are many times indistinguishable from those of adults (Clark & Clark, 1977). It is generally assumed by linguists that a child's competence, or understanding of sentences precedes his/her production of sentences in speech (Ingram, 1989).

The sentence form used in the theory of sentence-signs presented here will be that of the short, simple sentence such as "The lady sings;" or "I'm watching you." The translations of Sign-sentence theory are based on initial meaning embodied in the syntax of the language. Innatist linguists have proposed these to be the basic sentences from which all other sentences are made. Hirsh-Pasek and Golinkoff (1991) have shown that infants display competence in understanding of these sentences during their first year of life. (Their infant subjects faced with two monitors with different television pictures choose the proper display to match a verbal sentence; e.g., "She's kissing the keys.")). Children use these sentences in verbal communication when they are about three years old. This basic sentence is similar to what Chomsky (1957, 1965) calls "deep structures." Crain (1992) explains the concept of deep structures:

When we create, comprehend, and transform sentences, we intuitively work on two levels. We attend both to the surface structure and to the deep structure of sentences...Consider these sentences:

Susan ate the apple.

The apple was eaten by Susan.

Susan did not eat the apple.

What did Susan eat?

Susan ate the apple, didn't she? (p.305)

(see Footnote 1)

Crain identifies the first sentence ("Susan ate the apple.") as the one closest to one of deep structure.

...It is a simple, active, declarative sentence and follows the subject-verb-object word order. It is the basic kernel sentence upon which one can perform certain operations to generate all the other sentences. One could not take any other sentence... and derive a clear set of operations for creating the others (Chomsky, 1957, pp. 45, 91; 1965, pp 138-41)...

McNeill (1971) has hypothesized that children will initially speak in deep structures. (p.305-306)

(see Footnote 1)

The kernel or deep structure type sentence form is sufficiently close to that of the child's beginning sentence form and complete enough in its structure for use by adults. Therefore, these definitions follow:

Definition of Terms

Sentence: Any simple declarative construction following the subject-verb or subject-verb-object word order depicting a conceptual representation of deep structural knowledge that is performed through speech and writing in communication.

Examples of sentences:

The man walks (is walking).

She holds (is holding) the book.

The cat is on the table.

The lady is watching you.

Sentence-sign: Any produced behavior which makes a statement as a conceptual representation of deep structural knowledge and is, therefore, recognizable to communicators participating in real life formats through visual or other sensory means and may be translated¹² into a simple sentence.

Such behavior, recognizable to all participants in any given format, is used by the participants to hold one another accountable as participants in the task at hand. We see this in McDermott et al. (1981) in their discussion of the children's reading group (which will be used later to demonstrate sign-sentence theory):

Members usually hold each other accountable for proceeding in ways consistent with the context for their concerted activities. Perhaps the most compelling of the criteria for locating people's answer to the question of "What's happening?" at any given moment is that the members of any group hold each other to behaving in certain contextually appropriate ways. Depending upon the positioning that the group members achieve, there are only certain

kinds of behavior which are acceptable at certain moments, and the members call upon those who misbehave to change their behavior to fit the dominant version of what that positioning should look like. This is most clearly the case in the classroom reading activities by the teacher calling them back, by other members of the group simply stopping their own participation until the stragglers return, or, in a case to be described in detail, by an elaborate postural-kinesic dance in which the children and the teacher quietly round each other up until they all return to the book to read. (p.381)

(see Footnote 3)

The behaviors which correspond to the above examples of sentences would be:

The man walking;

The woman holding the book;

The cat sitting on the table;

The lady looking at you.

These signs would include all movements such as smiling, talking, walking, reaching, standing, etc.

Sign-sentence: the spoken or written translation of a sentence-sign. This is not to imply that this is a verbal sentence, but a representation of conceptual knowledge common to prelinguistic as well as linguistic communicators, and expressed in a sentence to convey the nonverbal

statement (depicted by the sign, the behavioral display) as linguistic communicators would do.

The linguistic meaning, therefore, is found in the simple sentence with the subject/verb/object pattern to convey the nonverbal statement of the behavioral displays.

From these aspects of sentences and sentence-signs used in language and communication may be derived a definition of communication.

Communication: the exchange of messages by two or more interactants who participate in concert and hold one another accountable for the accomplishment of goals in a format through the use of sentences including sign-sentences and sentence-signs.

The sentence as a code for translations

Because the communication context of formats includes all the behavior in the context as communication in Sign-sentence theory, certain theorists would find the theory and its use of the sentence code objectionable. Wiener, Devoe, Rubinow, and Geller (1972) like Burgoon, Buller, and Woodall (1989) object to defining all behavior in interaction as communication. They, therefore, oppose Watzlawick, Beavin, and Jackson (1967). Wiener et al. (1972) identify these authors as those:

who explicitly define communication as "any behavior occurring in the presence of another."

Investigators who hold this view seem to justify the use of the context (interpersonal setting) as defining communication behaviors, by trying to show how the behaviors which do occur in this setting can be understood by an observer. In showing how they make sense of the behaviors, they, like many others, seem to be making the transformation and fusing the notions of sign and communication which from our viewpoint require separation. (p.198)

If communication is defined in such a way that "all" behaviors are to be included in the category, there is nothing to be gained from labeling this all-inclusive category as "communication" rather than simply as "behaviors" in an interpersonal context. Incidentally, it is not always clear whether investigators who hold this definition mean that all behaviors of which they can make sense, which reoccur, and which elicit predictable responses from the other people in the context will be included. (p.199)

Where the participants in an interaction include a child and an adult, the child is always in a state of learning and the adult is always in a state of modeling. Bandura (1962) has identified the modeling process in his Social Learning theory. Communication in such interaction

with a child, in contrast to adult-to-adult, can be said to be on a highly exaggerated level, especially if the child is less than five years old. Children of this age have an uncanny imitative ability and Montessori preschool teachers present many lessons nonverbally. Sign-sentence theory can provide the communication dimension to show how the modeling process actually works. For example, a Montessori teacher's nonverbal presentation of the Handwashing Exercise to a preschool student in the classroom might show the communication messages through translations such as these:

First, I put on my apron.

Then, I stand at the table.

I pick up the pitcher with both hands.

I hold the handle with one hand.

I place my other hand on the other side of the pitcher.

I tip or move the pitcher over.

I pour some water into the basin.

I set the pitcher down on the table.

Etc.

For adults, some might call these movements "mindless," but in an interaction with a preschool child, this is total communication which is exclusively nonverbal. The teacher must present the movements accurately, for if any false or irrelevant movements are introduced, the child will produce

these also in his/her presentation when s/he takes his/her turn. Certainly, all the behavior must be included as communication.

Coding nonverbal behavior in this way with simple sentences is different from traditional nonverbal coding. Ekman and Friesen (1969) conceptualize coding for verbal and nonverbal behavior as extrinsic or intrinsic. They explain:

An extrinsic code is one in which the act signifies or stands for something else, and the coding may be arbitrary or iconic. An intrinsic code is in a sense no code in that the act does not stand for but is its significant: the meaning of the act is intrinsic to the action itself. We will characterize these as three coding principles: ARBITRARY (extrinsic) codes, ICONIC (extrinsic) codes, and INTRINSIC codes.

Acts which are arbitrarily coded bear no visual resemblance to what they signify. In this they are like words, most of which do not sound like what they mean; exceptions are words like "shush" and "buzz." When the opening and closing of the raised hand signifies greeting or departure, we have an example of arbitrary coding of nonverbal behavior, since the movement does not intrinsically show what it signifies.

Acts which are iconically coded carry the clue to their decoding in their appearance; the nonverbal act, the sign, looks in some way like what it means, its

significant.

Acts which are intrinsically coded are, like iconically coded behavior, visually related to what they signify. But unlike the iconically coded act, the intrinsically coded act does not resemble its significant; it is its significant, at least in part. If one person hits another during conversation, that is not similar to aggression; it is one form of aggression; the act is the significant.¹⁴

Knapp and Hall (1992) point out that it is the arbitrary coding system that Wiener et al. (1972) would study as a part of a nonverbal code. Knapp and Hall recap the logic behind this conceptualization:

The logic behind this ...goes like this:

- (1) Start with a known code, for example, verbal language.
- (2) Nonverbal behaviors associated with certain verbal behaviors are then identified.
- (3) When the verbal channel is eliminated, these nonverbal behaviors will predictably be introduced for communicating.
- (4) If the introduction of the nonverbal behaviors does not significantly change the receiver's understanding of the message, then those nonverbal behaviors are considered a substitute for verbal behavior and therefore components of a nonverbal code--that is, an agreed upon set of rules for determining meanings assigned to certain

signals. (p.10) (see Footnote 2)

Knapp and Hall continue,

In fact, there are probably relatively few nonverbal behaviors that would qualify as "communication" by this standard. Most often, nonverbal phenomena are used at the receiving end for drawing inferences, as when we infer depression from a person's slumping posture. Surely the depressed person is not trying to communicate depression. (p.10) (see Footnote 2)

Knapp and Hall are correct if inferences are to be made, which would probably be the case in the theory of Wiener et al. (1972). However, for Sign-sentence theory, the matter in question here is not the inference that the person is depressed but merely the translation of slumping behavior into the sentence, "He is slumping." or "He slumps."

The translation could not be "He is depressed," a translation which might develop from additional messages or further transformations. If the meaning is inherent to the behavior, the behavior may be removed, and the sentence stands in its stead; or if the sentence is removed, the behavior continues to hold the meaning.

Wiener et al. (1972) would no doubt object to such intrinsic meaning, since they object to intrinsic coding.

To the extent that Ekman and Friesen seem to imply that coded behavior is used to signify some referent, it is difficult to see why they have included, in coding, behaviors which have no referents other than themselves. Again, in our framework, a code is taken to be a set of behaviors which have referents other than themselves; with this concept, it makes no sense to include, as coding, behaviors which do not have such referents. To imply that every behavior is coded in some way, as Ekman and Friesen seem to do, dilutes the importance of both the concept of code and the concept of coding, and leads once again to the possibility of including any and all behaviors as part of a communication system. (p.201-202) (see Footnote 13)

The "concept of coding" referred to by Weiner et al. (1972) above, as well as that of Burgoon, Buller, and Woodall (1989) and Burgoon (1985), along with the coding system of Ekman and Friesen (1969) explained above, all share the same type of coding system which is a naming system drawing names or labels of common meaning from the culture to match to or name nonverbal behavior and, thereby, attach meaning to the behavior. This is not the coding system of sign-sentence theory which finds meaning in the structure of the sentence which produces the surface meaning from the unspoken deep structural knowledge of the infant.

These deep structures previously explained by Crain (1992) as "kernel sentences" and theorized as intuitive knowledge in the description of English syntax (Chomsky, 1957), have been identified as competence in the understanding of English sentences in infants in the experiment of Hirsh-Paseck and Golinkoff (1991) as we shall see later. These sentences and the formulaic transformations identified by Chomsky (1957) may be used by speakers of English to produce an endless number of original more complicated sentences. Similarly, Bruner (1975) has theorized that infants have innate knowledge of inter-subjectivity which provides potential competence for interaction in communication formats. He has identified some of these beginning formats as infant games (e.g., peek-a-boo) (Bruner, 1983). Savage-Rumbaugh (1991) has demonstrated that young apes also have this ability for acquiring language observationally by participation in beginning routines (e.g., blowing bubbles game). Competence in language and competence in format participation provide the meaning for behavior which is an understanding of the structure of language and the structure of formats. The words or vocabulary culturally provided merely fill in that structure. Knapp and Hall (1992), Wiener et al. (1972), Burgoon et al. (1989), Burgoon (1985), and Ekman and Friesen (1969) are exclusively concerned with cultural vocabulary, not structure. Vocabulary may change over time, but structure remains the same.

The idea that the structure of language as used in human formats is vital to meaning is not new.

Wittgenstein's theory, as explained by Hartnack (1986), provides a simple illustration:

Now it is possible to imagine a primitive language situation or language-form--what Wittgenstein calls a language game--where there would be some reason for maintaining that the meaning of a word is the thing to which it refers. It is conceivable that the conversation between a skilled workman and his mate might consist of names only, that is, the names of the tools needed by the workman and handed to him by his mate every time he mentions one of them. Such a language--or a language game--consists of names only, and in order to master the language one must learn what the individual names refer to... (But) Has the mate learned this language game as soon as he knows the names of the tool? Certainly not. He knows, for instance, that this particular thing is called a hammer. But what does he suppose the workman means when he says, "Hammer." Does it mean that he is repeating the name to himself? Or is he uncertain, and asking the mate to reassure him that this is really a hammer? Or does it mean that he wants the mate to give him the hammer? Or does it have some further and completely different meaning? The mate who

knows only what the word "hammer" stands for has no way of understanding what the workman means when he says, "Hammer." He has not learned the language-game simply by knowing what the words name. In this particular game, "hammer" means more than a particular tool; it means that this particular tool must be handed to the workman.¹⁵ (pp.64-66).

Kendon (1972) explaining the theory of Birdwhistell (1970) echos Wittgenstein's (Hartnack, 1986) philosophy:

For him, to ask what a given unit of body motion "means" is to ask what its "use" is. Questions such as, What does it mean when a person smiles? or What does it mean when a person raises his fist and shakes it back and forth? can only be answered by giving a list of the environments in which these forms are generally seen. In other words, we can answer these questions in terms of the range of use. (p.446)

(see Footnote 4)

It is this use based on the organizing structure of the intuitive knowledge of the infant for language and formats which provides meaning to communicative behavior in Sign-sentence theory.

Wiener et al. (1972) would also object to any implication of universal meaning.

Since we assume that the relationship between

the code component and its referent is most often arbitrary, that is any behavior A, B, or C can be used to refer to any experience X, Y, or Z, as long as the participants agree that a given behavior (e.g., A) stands for or refers to a particular experience (e.g., X), we would not expect any nonverbal communicative behaviors to have universal significance, as some investigators apparently imply (e.g., Ekman & Friesen, 1971). Rather, we would expect cross-cultural differences and even sub-group differences in (a) the experience to be made public, (b) the nonverbal behaviors used to make experience public, and (c) the relationship between experience and the particular nonverbal behaviors. (see Footnote 13)

If organizing structures are biologically endowed, they would have to be universal, although different cultures would provide different languages for their content and vocabulary. Crain (1992) comments upon this:

Many psycholinguists believe there may be universals in the developmental process. So far the evidence is strongest for the earliest phases. Children everywhere probably proceed from babbling to one-word to two-word utterances. Babbling and two-word structures, in particular, appear to be highly similar throughout the world. (Brown &

Herrnstein, 1975, pp. 477-79; Sachs, 1976)

The search for syntactic universals after the two-word phase becomes very difficult, and the search has really just begun. Some evidence suggests that children everywhere may initially handle negatives in the same manner, and they may overregularize some parts of speech (Slobin, 1972, 1973; Cairns and Cairns, 1976, p.205). By the time children are mastering transformations, they are clearly using rules that differ somewhat from language to language. Still there may be universal considerations, such as structure dependence, which limit the rules they will learn. (p.309)

(see Footnote 1)

Optional rules may differ for different languages, but this would not cancel the universality of beginning language structure and development.

That self-conscious enactment may be only a temporary awareness is proposed by Wiener et al. (1972). On this, we can agree: This becomes an important issue in Sign-sentence theory when applying the same sign sentences to nonverbal communication throughout the life span.

We assume further that the relationship between A and experience X, for a particular communication group, must at the start of the relationship between A and X (or in developing any formal code) have

been made with some awareness, although the experience of self-conscious use of A to stand for X may dissipate for the group as well as for the individual with increasing association between A and X. That is, we view this shift to nonawareness as being no different than the equivalent change in awareness in driving a car. (pp.203-204).

(see Footnote 13)

Weiner et al. (1972) set the criteria for selecting behaviors to study as possible components in a communication code:

There are several criteria that such behaviors must meet if we are to consider them as possible components in a communication code, as opposed to reactions to some immediate stimulus or as opposed to a socially patterned behavior (i.e., patterned behavior learned in the process of acculturation):

- A. The behaviors must be emitted by the particular communication group studied. This criterion eliminates idiosyncratic behaviors and meets the requirement of socially shared behaviors.
- B. The behaviors must occur in several different contexts. This criterion is likely to eliminate some behaviors which are reactions to a specific set of stimulus conditions.
- C. The behaviors must be more likely to occur
 8 in verbal contexts than in any or all

other contexts. If a behavior (e.g., scratching) can occur in any context--that is, with or without an addressee--it is difficult to accept it as a possible component in a communication code.

- D. The behaviors as code components should encompass a relatively short time duration. This criterion serves to focus on ongoing experience rather than on socially prescribed patterns of behavior or on behavior related to personality styles (e.g., the wearing of rings or the handling of teacups). (p.209)

(see Footnote 13)

Sign-sentence theory would propose different criteria: Whatever occurs in the communication exchange between two interactants in a particular routine, format, or context to accomplish the goals of that routine would have to be included for analysis. Savage-Rumbaugh (1991) has identified the routines or formats in which young apes are engaged (e.g., diaper changing, bottle preparation, etc.). Bruner has identified similar routines for young children (1983). Each format with two or more interactants must stand as a system with its own systematic goals. As we have seen in Kendon's (1972) discussion of systems, no behavior which is part of the system can be excluded.

All message exchanges in Sign-sentence theory should be considered as valid messages, even if a message may be encoded as affect display (e.g., crying). The behavior may be a response to certain environmental stimuli, but the message is still there (i.e., "I'm crying.").

The behaviors considered as communication events from the Sign-sentence approach will always be bound to and a part of the context. Since all behavior in any communication format is part of the context, it is also true that time duration has no importance. An exchange may occur briefly as in a "passing someone in the hall" routine or may encompass a longer time such as an hour-long "classroom lecture" format. For all of these reasons, it is evident that the theory of Wiener and his associates is not compatible with that of Sign-sentence theory. The same can be said for that of Burgoon.

Burgoon (1985) reviews the research and significant findings in the area of nonverbal communication. She summarizes these findings:

Nonverbal signals are essential ingredients in the interpersonal communication mix. Research substantiates that they carry a significant, and often dominant, portion of the social meaning in face-to-face interchanges. Whether their importance is attributable to innate orientations toward

nonverbal signals, to the superiority of nonverbal codes in performing certain interpersonal functions, to the manner in which nonverbal cues are cognitively processed, or to their special coding properties, it is clear that nonverbal signals are more than mere auxiliaries to the verbal stream. They manifest many of the same properties as verbal language (such as rule structures, discrete units, multiple meanings, and transformation), as well as exhibit some unique ones (such as universality, multimodal simultaneous encoding, and iconicity). This mandates a broader, more integrated view of exactly what constitutes language or interpersonal discourse.¹⁶ (p.381)

Burgoon specifies the language properties of nonverbal signals first as discrete units using Dittmann's (1978) examples of emblems, smiles, head nods, eye contact, gestures, postural shifts, degree of body lean, and body orientation. Second, rules are identified for semantic, syntactic, and pragmatic use:

Single cues and combinations of cues show semanticity in that they have consistently recognized meanings. A head nod, for instance, conveys such affirmative meanings as agreement, approval, and attentiveness...Similarly, nonverbal expressions exhibit syntacticity in that they follow combinatory and

never displayed together because they would create a nonsensical display...At the pragmatic, or use level, nonverbal presentations are governed by cultural and subcultural norms and display rules.

(p.351) (see Footnote 16)

Although Burgoon identifies nonverbal expressions as exhibiting syntacticity, she attributes this to combinatory and ordering rules, not to the deep structural knowledge of syntax of the infant as does Sign-sentence theory.

The third language property which Burgoon identifies is that nonverbal behaviors are context-bound.

Just as interpretations of words and sentences rely on the rest of an utterance or the interactional context to make clear their meanings, so do nonverbal interpretations rely on the linguistic context, the other co-occurring nonverbal cues, and/or the interactional context for clarification.

(p.351) (see Footnote 16)

Burgoon describes nonverbal communication as "context bound," but according to this approach, certain units of behavior would be extracted out of the communication context. The reason for this is that Burgoon's approach, in its effort to find meaning for nonverbal signals, draws semantics exclusively from the cultural vocabulary, excluding the innate knowledge of structural use in the Sign-sentence approach. Burgoon acknowledges:

excluding the innate knowledge of structural use in the Sign-sentence approach. Burgoon acknowledges:

Just as a coding system must have semantic and syntactic rules, so must nonverbal signals as they are combined to form messages--if they are to be treated as a coding system. This assumption delimits the nonverbal domain to the extent that it excludes behaviors lacking consistent meanings and behaviors that fail to be combined in systematic, "grammatical" ways with other nonverbal signals. (Burgoon, 1985, p.349) (see Footnote 16)

Burgoon also discusses the property of transformation; however, she does not identify appropriate deep structure:

Fourth, nonverbal codes have the property of transformation; that is, a relatively small set of basic meanings may give rise to a variety of different forms of expression, all of which are semantically equivalent. Like "surface structures" in language, these different forms are all transformations of the same underlying meaning. A caress, close physical proximity, or a flirtatious smile may all communicate intimacy. (p.351) (see Footnote 16)

I would agree with Burgoon that nonverbal behavior has the property of transformation. However, for the examples above, intimacy is not the deep structure of basic meaning

which she implies, but the transformed one, or the surface structure, or the adult meaning. The basic meaning of a caress would be, "He is caressing her." or "He is hugging her." etc. This is transformed into "He is being intimate with her." The same would be true of the other examples: "He is standing close to her." "She smiles." or "She is smiling at him." and "She is flirting."

Because of the seemingly overwhelming task of finding names or consensually-agreed on labels for all behavior, Burgoon finds it necessary to distinguish some behavior as communication and other behavior merely as behavior. Burgoon defines the broad category of "behavior" as "any actions or reactions performed by an organism" (Burgoon et al. 1989, p.14) Behavior can take place without others witnessing it, responding to it, or understanding it.

It seems more useful to distinguish between the broad category of "behavior," which encompasses "any actions or reactions performed by an organism," and the more specific category of communication. The difference is that behavior can take place without others witnessing it, responding to it, or understanding it. Typically, routine activities such as sleeping and eating would be classified as "informative behaviors" rather than as communication unless there is some apparent attempt to make a statement through the manner in which they are done

or the context in which they occur. As with verbal communication, there should be some notion of a sender encoding and transmitting a message to a receiver before an action is labeled communication. It is doubtful that a person taking a nap in the privacy of her own home intends to communicate something to an accidental observer; however, if she chooses to do it in the middle of a political science lecture, the publicness and inappropriateness of the act may suggest that it is a statement. The important point is that not every behavior should be regarded as communication; as with information, "communication is a subset of behavior, which is itself a subset of information." This perspective reduces to a manageable level the number of things that qualify as nonverbal communication.¹⁷ (Burgoon et al. 1989, p.14)

Burgoon proposes that a definition of communication should have a "message orientation."

An alternative that I have proposed elsewhere (Burgon, 1980) is a message orientation. What qualifies as communication are those behaviors that form a socially shared coding system; that is, they are behaviors that are typically sent with intent, used with regularity among members of a social community, are typically interpreted as intentional, and have consensually recognizable

interpretations. This approach is similar to that of Wiener, Devoe, Rubinow and Geller (1972) in emphasizing socially shared rather than idiosyncratic behavior patterns. However, it is broader than their approach in that it includes habitual behaviors that have well-recognized meanings among members of the social system.

The key word is "typically." If a behavior is usually encoded deliberately and is usually interpreted as meaningful by receivers or observers, it does not matter if, on a given occasion, it is performed unconsciously or unintentionally; it still qualifies as a message. Thus the "unintended" frown qualifies because the behavior is one that people typically encode as a signal of displeasure and typically decode as an intentional signal of displeasure. If one accepts the notion that much of our daily nonverbal communication is well-practiced and operates in a semi-automatic fashion (what some call "mindless" fashion), then it becomes more productive to attempt to identify the "vocabulary" of nonverbal communication than to divine intent on each occasion of a behavior's enactment. At the same time, this approach requires that a behavior be regularly used as part of a coding

system, which implies that communicators frequently treat it as a purposive and meaningful signal. (Burgoon, 1985, pp.348-349)
(see Footnote 16)

According to this view, if the busboy at the local pizza place wears unmatched tennis shoes, this may be merely idiosyncratic behavior and is unlikely to produce consistent meaning among observers. It may be informative--we may infer from it that he is disorganized or socially inept--but we would probably not regard this single behavior as communication. However, if it is coupled with other behaviors such as wearing spiked blue hair and one earring, it becomes apparent that the busboy is attempting to make a statement. The totality of his appearance is likely to produce consistent recognition of him as a would-be punker. Thus a key criterion for deciding if something is communication is whether or not a behavior or collection of behaviors generates consensually agreed-on meaning within a culture or subculture.
(Burgoon et al. 1989, p.17) (see Footnote 17)

I very much admire Burgoon for her insight into the language-like qualities of nonverbal communication; however, since her theory is based on the premise that meaning of behavior stems from a labeling process that is considered "consensually agreed-on." Sign-sentence theory cannot accept

it as a totally valid theory. Burgoon would exclude behaviors in Sign-sentence theory because they are not typically understood. But, as we have seen in the work of Kendon (1972) and Wittgenstein (Hartnack, 1986), merely naming things does not produce full meaning. It is in the understanding of structural usage that true meaning may be found. This is the premise of Sign-sentence theory, that the meaning of communication originates in that understanding of structure present in the beginning of life of every human being and develops therefrom.

Another admirable facet of Burgoon's theory is her identification of the social functions of nonverbal communication. Describing nonverbal behavior as a collective of regular and meaningful patterns, she names the performance of these patterns:

Social functions for which such patterns have been identified include facilitation of cognitive processing and learning, expression of emotions and attitudes, impression formation and management, relational communication, deception, social influence, and the structuring and regulation of interaction. (Burgoon, 1985, p.382)

(see Footnote 16)

Such categories might be useful to future researchers in developing transformations of usage from the basic simple structure. In his early work, Chomsky (1957) identified

many transformation rules for the English language. Similar transformation rules may be identified for nonverbal language. It is not the purpose of this dissertation to uncover all nonverbal transformational rules, but to establish the foundation for the basic structure of nonverbal meaning from which nonverbal transformation rules may be derived.

The fact is that the verbal language is the main tool used by researchers, and especially linguistic researchers who have carried the burden of most of the research in child language (Ochs, 1988). However, linguistic research, although it has uncovered and analyzed the underlying system of rules which govern the formation of sentences by speakers of the language, has not considered nonverbal behavior as part of the language. Knapp, Wiemann, & Daly (1978) remind us that verbal and nonverbal communication are parts of the same system.

While some behaviors may seem less integrated than others, verbal and nonverbal behavior are unquestionably part and parcel of the same overall system of communication. Separation may be intellectually comforting to those who find too much complexity in the larger system, but we must constantly recognize the artificiality and potential distortion brought about by the separation.¹⁶ (p.272)

The sentence, as defined above, is one constant decoding device which can be applied to all nonverbal behavior and is known to all researchers and speakers of English. Since children themselves facilitate the original translations of verbal language from nonverbal (as will be shown in Carroll's [1986] theory), an experience which cannot usually be recalled by adult speakers, applying the basic language of children and adults, the simple sentence, seems appropriate to capture meaning.

REVIEW OF THE LITERATURE

Language Acquisition and Communication Theories

Researchers have been fascinated with child language for many years. There is a long history of research, and sources are abundant for the study of verbal language. The research begins with the study of vocabulary growth and expands to include more and more aspects such as the structure of language and the pragmatic use of language.

Most recently, the inclusion of context has become an important feature of the study of language and communication development (Ochs, 1988; Worobey, 1989). An overview of the developmental studies will be presented including those reported by Knapp and Hall (1992) with a report on pertinent aspects from the theory of Ochs (1988), White (1982), and Carroll (1986). Vygotsky (1962) and Hirsh-Pasek and Golinkoff (1991) will be offered as foundational support for sign-sentences.

All of the theories presented offer a wealth of knowledge concerning language and communication; however, none offer a satisfactory explanation of the origin of language or communication. Chomsky (1957) provides for the innateness of language. Crain (1992, p.362,369) explains Chomsky's (1972, p.171;1980, pp.232-34) innateness hypothesis:

Chomsky says that the linguistic accomplishments

of the ordinary child are too great to be explained in terms of any kind of input from the environment. Children hear only a limited body of speech, much of which is poorly formed, yet they rapidly and uniformly develop an intricate system of rules for creating an unlimited number of sentences. Their knowledge extends far beyond their experience. One can only conclude, Chomsky says, that children do not build grammars primarily from the evidence they hear, but according to an inner design--a genetic program...When children master a grammar, they are guided by an innate knowledge of "universal grammar;" they automatically know the general form that any language must take...Thus, children need information from the environment to...determine which rule their particular language follows...As they put words together, they must intuitively know that certain combinations are possible and others are not. If children lacked this knowledge, if they had to learn grammar primarily from experience, they could never master such a complex system in so short a time...Chomsky also postulates (1980, Ch 6; 1983, p.37) (that) the child's capacity to learn languages is species-specific (found only in humans) and is a highly specialized faculty within the human mind. That is, it is quite unlike the faculty for learning science, music, and so on. It has its own

genetic design...Although children master most aspects of grammar by the age of five or six years, some of the most complex transformations are still beyond their grasp. For example, they seem to have difficulty with the passive voice until age seven or so (Turner and Rommetveit, 1967). The years five to 10 may be important for the acquisition of the subtlest and most complex grammatical skills (C. Chomsky, 1969).

(see Footnote 1)

There is evidence that children do set some parameters in learning language (Hyams, 1986) and do seem to have built in constraints in using transformational rules (Crain & Nakayama, 1987). However, Chomsky's theory does not deal with the pragmatic use of language, and as Littlejohn (1983) points out, "Even if basic language mechanisms are innate, we are far from understanding their nature or how they operate" (p.85). It seems that there is still much to learn about the origin of language.

Nonverbal origins are more well-defined. Ekman and Friesen (1969) define three types of origins of nonverbal behavior:

One origin of nonverbal behavior is a relationship between stimulus events and nonverbal activity which is built into the nervous system of every intact member of the species. A reflex is the most obvious example, and some authors have argued that facial expressions of

emotion are also based upon inherited neurological programs.

A second origin is experience common to all members of the species; this differs from the first origin in that one need not assume that the nonverbal behavior is inherited, but rather that it is acquired as part of the species-constant experience of the human equipment interacting with almost any environment. For example, regardless of culture, the hands will be used, with or without an implement, to place food in the mouth.

A third origin of nonverbal behavior is experience which varies with culture, class, family, or individual. Some nonverbal behaviors are learned as part of an instrumental task in which the goal is mastery of a particular activity such as farming, driving, swimming, and in learning particular styles of eating, defecating, etc. Other nonverbal acts are learned as part of a social interaction, where the goal is the establishment or maintenance of a type of social interaction. Some nonverbal behaviors are learned explicitly with conscious attention from learner and tutor, or from only the learner; others are acquired more implicitly with less focus upon the acquisition process. Imitating the posture or facial expression of a favorite movie star may be quite explicit and

practiced, while the acquisition of the posture or other movements of the same-sex parent may occur with less awareness on the part of the learner. Imitation can also be relevant to learning NOT to resemble another person's nonverbal behavior. The parent can explicitly caution the child about not talking with his hands or to smile when uncle and aunt visit; or the parental reinforcements can be more subtle, with neither child nor parent specifically aware of the reinforcement contingency. (p. 59) (See Footnote 14)

It appears that the origin of the essence of basic sentential knowledge is from the first type and is tied to the needs of the infant experiencing emotional distress or fulfillment and the resulting display and communication with caregivers. In light of the affect display studies of Ekman and Friesen (1969), as well as those of Pitcairn & Eibl-Eibesfeldt (1976) and Eibl-Eibesfeldt (1987), together with the language learning studies with apes (Leiberman, 1984; Savage-Rumbaugh, 1991) and, of course, the studies of Hirsh-Pasek and Golinkoff (1991), I believe that comprehension of basic sentential meaning is almost certainly inherited phylogenetically.

The more complex transforming ability to generate an endless number of sentences or "surface structures" seems more appropriately to be assigned to origins of the second type. For, as Bruner (1983) says, when a child is born into

a culture s/he has a "committment" to the maxims or rules of that culture. Although Bruner was speaking about the pragmatics of language use, initially we are "committed" to speaking the language of our environmmment, and since the human species is the only one that transforms sentences, this ability may be inherited ontogenetically.

The other rules and knowledge of the culture that are so closely bound to the use of language in practice would have to be considered as the origin of the third type. Here we find the building up of vocabulary, the meanings of words, the understanding of all aspects of the cultural context (Ochs, 1988)

White's (1982) theory will be offered as a theory which can provide the basic foundation for the origin of nonverbal communication with Carroll's (1986) theory showing the developmental extension to verbal language. Pertinent points from the writings of Vygotsky (1934/1962) as well as a report of a study by Hirsh-Pasek and Golinkoff (1991) will complete the review to provide evidence of support for Sign-sentence theory translating or decoding nonverbal behavior to reveal the verbal understanding which nonverbal behavior exhibits, thus bringing nonverbal behavior into its proper perspective as communication.

Developmental Theories

Ingram (1989) describes early accounts of language development which began in 1876 as diaries of researchers who were also parents. Charles Darwin among others kept a parental diary on the language of his son which he reported in the journal Mind. This era of "baby biographies" continued until 1926 when sample studies began. These studies, which concentrated on vocabulary growth, sentence length, and correctness of articulation, ended in 1957. The studies measured large samples of up to 173 subjects and resulted in average measurements such as the mean sentence length for different age groups. In 1957, longitudinal studies began with selected subjects and taped observations recording small samples with a minimum of three children. The goal of language acquisition research was to establish how the child acquires rules of sentence formation. This was the result of the publication of Chomsky's (1957) Syntactic Structures. This new theory of transformational grammar stimulated research on syntax. Chomsky defined grammar as a set of rules for generating all the grammatical sentences of a language. He distinguished between the "competence" of a speaker and the "performance." The rules of grammar which describe language are rules of the "competence" of a speaker, not "performance." Chomsky was very critical of language research that revealed linguistic competence of children based on language samples alone. He

called for other kinds of observation of children's abilities and comprehension in many different kinds of circumstances. Current research reviews usually begin with this 1957 period.

A comprehensive overview of research on the development of spoken language is given by Garton and Pratt (1989) beginning with a differentiation of the behaviorist (Skinner, 1957) and nativist (Chomsky, 1957) views. Also outlined are other aspects such as adult assistance in learning language (Cazden, 1983), "Motherese" (Gleitman, Newport, & Gleitman, 1984), and learning problems, such as ambiguity in messages (Robinson & Robinson, 1977, 1978, 1981; Robinson & Whittaker, 1987).

Golinkoff and Gordon (1983) begin their review of language development with Chomsky (1957) and with Lenneberg's (1967) theory of critical periods. Included are semantics studies (e.g., Bloom, 1970), constructivist theory (Piaget, 1951), the pragmatic approach (e.g., Searle, 1969), and the social and communicative interaction found in the functional approach (e.g., Bates, Camaioni, & Volterra, 1975). They conclude with the socio-cultural findings of Ochs (1982) and a revival of the nativist approach applied to the field of artificial intelligence and computational linguistics (Pinker, 1979).

Knapp and Hall (1992, p.211) report on the seemingly inborn sensitivity to language by citing the study of

infants by Condon and Sander (1974) which found babies 12 hours old whose head, hands, elbows, hips, and leg movements tended to correspond to the rhythms of human speech.

When the babies were exposed to disconnected speech or to plain tapping sounds, however, the rhythmic pattern was not observed. If this finding is validated by other researchers, it may mean that an infant has participated in and laid the groundwork for various linguistic forms and structures long before formal language learning begins. (See Bernieri, Reznick and Rosenthal, 1988.)¹⁵

Knapp and Hall also present photographs from videotape recordings of two- to three-week old infants imitating facial expressions of an experimenter from a study by Meltzoff and Moore (1977). Knapp and Hall report:

Newborns seem to have the facial muscle actions necessary to express virtually all basic affect display of adults (Oster & Ekman, 1978). Do newborns show affect displays resembling those of adults? Yes, but more rigorous research is needed. Individual parts of various facial displays have been extensively studied, e.g., smiling, frowning, brow knitting, and crying. But these studies typically do not consider the whole facial expression, nor do they provide the kind of fine-grained observations that might, for example, distinguish expressions associated with

different types of infant cries. One line of research, however, suggests that the early ability to imitate adult expressions (and possibly other behaviors as well) may be inherited and may ultimately play a role in the development of various facial displays.

In the late 1970's, Meltzoff and Moore (1977, 1983a, 1983b) demonstrated that twelve to twenty-one-day-old infants imitated adults who performed four actions: tongue protrusion, mouth opening, lip protrusion, and sequential finger movement. Subsequent research replicated the finding for tongue protrusion and mouth opening for neonates 0.7 to 71 hours old. Their experiments seem to negate explanations for such behavior based on innate releasing mechanisms similar to those found in many animals and the learning processes based on caregiver behavior. Instead, they argue that infants are born with the ability to use what they call "intermodal equivalencies," which means that the infant is able to use the "equivalence between the act seen and the act done as the fundamental basis for generating the behavioral match. Perception and production, then, are closely linked and mediated by a common representational system from birth. (pp.431-432)

(see Footnote 19)

Knapp and Hall report on further infant findings which show that infants are born with the ability to discriminate and imitate happy, sad, and surprised facial expression as well as disgust (Rosenstein & Oster, 1981). He expresses concern that if imitation plays a role in the development and refinement of facial affect displays, there is more to learn about similar show of affect display in congenitally blind children such as those studied by Eibl-Eibesfeldt (1973, 1975). Pitcairn & Eibl-Eibesfeldt (1976) concluded that the spontaneous expressions of sadness, crying, laughing, smiling, pouting, anger, surprise, and fear are not significantly different in blind/deaf children. Also, refusal behavior was similar to that of sighted children. Even thalidomide babies who had no arms and other handicapped children show similar expression.

Knapp and Hall also point out similarities in facial displays to primate relatives during similar activities such as play or aggression. Pitcairn and Eibl-Eibesfeldt (1976) observed the eye behavior of adult human beings, human infants and children, blind persons, and nonhuman primates in greeting rituals and found remarkable similarities. Eibl-Eibesfeldt's studies led him to label "basic interaction strategies" in several different cultures with common rules that relate to dominance (and the fear of it) and bonding affiliation (and the fear of it) as the root of human behavioral displays (nonverbal and verbal), whether in

greeting, crying to block aggression, getting the focus of attention, or persuading a partner to give you something.

Eibl-Eibesfeldt (1987):

acknowledges that cultural teachings and environmental factors may play an enormous role in making these strategies seem very different in one culture and another. Still, his observations of children in various cultures leads him to state: "We can assume there exists a system of universal rules that structure social interactions, verbal and nonverbal alike. These rules could be rooted in certain panhuman dispositions that channel the acquisition of norms, and some norms may even be encoded in reference patterns given to us as phylogenetic adaptations."

(Knapp & Hall, 1991, p.423). (see Footnote 19)

Ekman and Friesen (1969) report a universal association between particular facial muscular patterns and discrete emotions. However, the evoking stimuli, the linked effects, the display rules, and the behavioral consequences all can vary enormously from one culture to another.

Sources for verbal development greatly outnumber those for nonverbal development (Allen, 1981; Feldman, 1982; Ziajka, 1981). A comprehensive coverage of mother-infant interaction is given by Worobey (1989). Worobey details the stages of the development of communication in the infant. A

close examination of these stages is useful here to give developmental background for the beginning of human communication.

Stage one: Regulation

This stage begins with the infant's cry which brings the mother. The child is becoming "self-regulated" to periods of comfort and discomfort, and the parent is becoming accustomed to the cries of the infant. By two months, the infant is alert, smiling, and using eye contact more regularly. The infant mirrors these behaviors of the parent.

Stage two: Reciprocity

By three months, crying declines. The mother and child bid for one another's attention with widened eyes, smiles, and vocalization. Cooing elicits words from the parent in interaction. The parent is still in control in initiating participation of the infant.

Stage Three: Initiation

By seven months, face-to-face games are given up. The infant begins to initiate social activity and indicate preferences with advances in babbling and reaching. The infant directs his/her mother's gaze to objects. The mother replies with comments. Games such as pat-a-cake are mutually enjoyed by infant and parent. The mother assumes a didactic role as the use of imitation by the infant becomes prominent.

Stage four: Intention

The child's interest turns to exploration as s/he approaches one year old and s/he begins to locomote. The mother names objects, and the child's first word emerges. Mother and child experience shared language and intersubjectivity. Interaction is no longer controlled by the parent. Worobey concludes that not only interaction, but also context may be an intervening variable in communication. The language in context is the main focus in the theory of Ochs (1988)

The Theory of Ochs

Declaring that research is still a long way from accounting for how children conceptualize events, states, objects, or persons, Ochs (1988) points out that much less is understood about children's concepts of affect, social acts, social activities, social events, or social relationships or how these relate to language. Ochs (1988) has defined discourse as a "set of norms, preferences, and expectations relating language to context, which speaker-hearers draw on and modify in producing and making sense out of language in context."

Knowledge of discourse is a part of our linguistic competence, but at the same time such knowledge is part of our sociocultural competence. This means that children developing discourse knowledge are developing

a knowledge of both language and culture.²⁰ (p.222)

A key focus of the language theory of Ochs is that, through communication between a member of the culture and a novice, the change that impacts the process is not always just toward the novice, but impacts the joint activity and the member as well. "In this sense, caregivers may be socialized by the children they are socializing. Teachers as well may be socialized by the students they are inducting into some area of expertise. Their understanding of the subject matter may be transformed by the responses and questions of the students." Ochs believes that it is important to recognize this bidirectionality in spite of the asymmetry which may exist between novice and member.

Chaos theory (Prigogine & Stengers, 1984) is offered by Ochs as a foundational theory which views disorder as leading to new dynamic states following a state of instability or chaos.

While I am not suggesting that social relationships are inherently chaotic, I do advocate the idea that the structures of knowledge of both member and novice are vulnerable and that communication between them may lead to what Prigogine and others call "far from equilibrium" conditions for both, which in turn lead to new organizations of knowledge for both. (p.227) (see Footnote 20)

Even though Ochs does not exclude unidirectional impact from member to novice, recognizing the social and psychological dominance of the member over the novice and constraints on thought and behavior, her theory allows for members' knowledge to be impacted by novices through the medium of social activity and for social activity to alter biological and psychological parameters over evolutionary time. Both member and novice are active, interactive, and vulnerable to change. White's (1982) theory provides a biological origin of this interaction.

White's theory

White's (1982) theory provides a model for biological and nonverbal processes. This phase theory defines a foundation for the claim that nonverbal communication is basic and vital to verbal communication. Using the commonalities of human and nonhuman infant behavior, White divides social development into three phases according to who initiates the interaction. A fourth phase is added for human children.

The First Three Phases²¹

Phase I mother----->young (mother initiating)

Phase II mother<----->young (mutual approach)

Phase III mother<-----young (child initiating)

In the first phase, the mother is extremely attentive, initiating social behavior (first three to four months). In

phase two, the child begins to locomote. As s/he begins to walk, s/he begins to talk. White believes that speech is developed to fill the need of the child to remain attached to the parent and still explore the environment. Both parent and child initiate behavior. Speech fills this need to remain "attached" from a distance. As the child moves into phase III, s/he becomes very demanding of the mother and she initiates most social behavior. Separation is very frustrating. Mother begins to respond less positively. Nonhuman organisms reject their young at this time, begin weaning, etc. This is the last phase for nonhuman organisms.

The Fourth Phase

As the human child learns more about the environment, s/he becomes more positive and is not frightened by separation. Mother becomes more positive. This is a renegotiation phase, or phase IV where mother and child renegotiate to begin the phase pattern over again.

White believes that the child is forced into speech because of this renegotiation motivated by the child's desires for more freedom, more knowledge of the world, and more control. This begins a cyclic pattern for the child: as s/he desires more interaction, s/he develops more speech for further negotiation.

While White's theory is a theory of animal behavior, we can see that its proposals are supported in a very general way by the observations of Ilg and Ames (1955) at the Gesell Institute: children go through patterned periods of equilibrium and disequilibrium, cycles of positive, then "breaking-up" behavior throughout their development. Arnold Gesell (1946) and his associates began collecting data at the former Clinic of Child Development in the School of Medicine at Yale University with a sample of 50 children examined at 5, 5 1/2, 6, 7, 8, and 9 years of age. The children were of high average or superior intelligence from families of upper or middle socio-economic status. Three-fourths of the children had attended the guidance nursery of the clinic; some had also been examined during infancy. Nearly all attended a public elementary school. Case records for each child included (a) a psychological examination based on the Yale developmental schedules and Stanford Binet scale; (b) performance tests (e.g., the Arthur series); (c) reading readiness tests; (d) visual skills tests; (e) naturalistic observations of the child's play behavior; and (f) a wide-ranging interview with the mother concerning behavior at home and school. Children were also observed in their classrooms and their teachers were interviewed. From these clinical studies, records were analyzed to reveal a gradient of growth still used today by child development consultants and child care experts.

Although the concept of growth stages is not new (Erickson, 1952; Freud, 1949), the work of the Gesell Institute focuses on the contrast of behaviors that take place in the life of an individual child (Ilg & Ames, 1955).

"Better" or "worse" behavior tends to alternate with the ages in a fairly lawful sequence of unfolding. There is a second, equally rhythmic alternation. Too concentrated or "focal" behavior, as we call it, at one time, is followed by too diffuse, widespread, or "peripheral" behavior at a succeeding time. A good example of focal behavior is seen in the average 5-year-old who tends to hug his mother's skirts, to shadow her wherever she goes. Six, in contrast, is a peripheral stage. He may be all over the neighborhood, never at home, always ready for new places, people, experiences. It is the task of growth eventually to help the individual to be neither one extreme nor the other but to intermesh these extremes.²² (p.7)

The Development of White's Theory

White (1978) generalized from the studies of mammals, whose young are born dependent upon the mother, that behavior is expressed by certain behavioral patterns. Although the time course differs (weeks, months, or years, depending on the animal in question), the pattern is the same. Drawing on the work of Hinde and Spencer-Booth (1967), Rheingold (1963), Rosenblatt and Lehrman (1963), Schneirla and Rosenblatt (1961), and Schneirla, Rosenblatt, and Tobach (1963), White developed the phase theory reviewed above (White, 1982). Four aspects of this theory are:

- (1) Biologically, humans have a long infancy period.
- (2) Adequate development during this period requires involvement in complex social interactions (Neonates who are abandoned, simply do not survive.)
- (3) The interactions in which infants engage are the basis for normal communication and, ultimately, language.
- (4) Anything that disrupts these interactions may disrupt communicative functioning and, ultimately, language.

(White, 1984a, p.2)

White has followed these theoretical concepts in her work with intervention programs for deaf children (e.g., White

1980, 1984b). In extending White's model to include the specific detail of development of the individual child, the research of Carroll (1986) is a logical point of continuation. White's theory provides generally for the origin of nonverbal communication and its development into the verbal phase, but it does not provide specifically for this. There is an important connection between White's theory and Carroll's (1986) because, unknown to the theorists themselves, Carroll (1986) has identified specific behaviors which transform nonverbal communication to verbal to give support to White's theory (1978).

Carroll's Theory

Carroll (1986) has shown that infants extend their communication naturally from nonverbal communication, to partly nonverbal and partly verbal, to verbal. Carroll contends that formulating messages that are congruent with the given information of listeners is part of learning to communicate effectively. To explain the aspect of congruence in the infant's communication, Carroll divides each of four stages into the "given information" already known by the adult listener and "new information" added by the infant.

First Stage

The child in the first stage points to an object that an adult is already looking at ("given information") or waits for the adult to attend to the object on which s/he

wants to "comment." Then, the child points to the object, making a "comment" or "assertion" nonverbally ("new information"). Carroll labels this first stage as the beginning of intentional communication which occurs when children apply their understanding of means/end relationships to social goals. Early prelinguistic gestures have been studied (Bates, Camaioni, & Volterra, 1975) which focus on two communicative acts: "assertions," the use of an object as a means of obtaining adult attention, and "requests," the use of adults as means to an object. An example of a nonverbal request would be a child's looking intently at the adult from whom s/he is trying to take an object, whereas if the child attempts to take the object from the adult without "looking intently," the adult is unyielding. This stage occurs by 10 to 12 months of age.

Second Stage

In the second stage, the "given information" is still nonverbal, such as pointing to a shoe lying underneath a bed. The child may then give the "new information" verbally, "bed." Carroll stipulates that children use verbal encoding of new information with nonverbal encoding of given information by the end of their second year (Greenfield & Zukow, 1978).

Third Stage

The third stage involves the child's calling attention to an object verbally, e.g. "cat," and also adding the new information verbally, e.g. "hat" (The cat has a hat.)

Example: Child: Cat (looking at book)

Mother: Hm?

Child: Cat (pointing to picture)

Mother: Cat!

Child: Hat!

Mother: Hat, yeah. The cat has a hat.

Carroll reports that it is common for children at the one-word stage to express both forms of information in verbal form, using a previous utterance as given information and the new utterance as new information (Clark & Clark, 1977; Greenfield & Smith, 1976; Scollon, 1976).

Fourth Stage

In the fourth stage, two words are combined into one "sentence," e.g. "Cat hat." or "Water more."

Results of Carroll's Study

Although these expressions are not complete sentences in the formal grammatical sense, they may be translated as the mother did in the example above. All of these examples show that children do understand and communicate complete statements before they are able to express them verbally. As they mature linguistically, they, themselves, translate

to verbal statements those which they formerly expressed nonverbally. In stage three above, the translation becomes part of the nonverbal statements in the verbal/nonverbal transaction. First, the deictic behavior of pointing to an object is used by the infant to translate the picture of a cat into the verbal label, "cat." The total statement seems to be saying, "I'm pointing to the cat." Second, upon hearing the mother's response, verifying that she has received the message element, "cat," the procedure is repeated for "hat," timed immediately while the mother's attention and eye gaze are still focused. Her response of "hat" seems to be saying, "I see you are pointing to the hat." This facilitates the mother's final translation, "The cat has a hat." The content of this final verbal sentence of the mother's, "The cat has a hat." concerns the environmental context, which early speech acts usually do, and the encoding of this verbal information would not be possible without the statements sent through the nonverbal behavior. This whole interchange was initiated and carried through by a communicator who speaks in one-word utterances.

Analyses as the one above provide observable evidence of the fact that the child translates nonverbal statements to verbal statements, and it appears that translations from nonverbal to verbal statements are not only possible but are inherent in the language development of the child.

This is the underlying rationale of the Sign-sentence theory. (see Appendix B for Developmental Path Chart)

Summary of White's and Carroll's Theories

White has shown that nonverbal communication is exhibited in lower mammals through the same patterns of development which extend phylogenetically to human infants. She theorizes that verbal language is a direct extension of this nonverbal communication.

Carroll's study supports White's theory by providing a concrete, observable example of the fact that verbal behavior develops directly from nonverbal behavior. Carroll's study shows that nonverbal communication and verbal communication are indeed part and parcel of the same phenomenon. The child begins communicating nonverbally and translates his/her nonverbal statements to verbal statements as he/she develops language and verbal communication.

Vygotsky

The writings of Vygotsky were banned in Russia in 1936 shortly after his death and are still being translated to generate new ideas and concepts in child development (Crain, 1992). Vygotsky (1934/1962) points out the similarities in language development between chimpanzees and human beings from his study of Koehler's (1925) work.

The chimpanzee is an extremely gregarious animal and responds strongly to the presence of others of his kind. Koehler describes highly diversified forms of "linguistic communication" among chimpanzees. First in line is their vast repertory of affective expressions: facial play, gestures, vocalization; next come the movements expressing social emotions: gestures of greeting, etc. The apes are capable both of "understanding" one another's gestures and of "expressing," through gestures, desires involving other animals. Usually a chimpanzee will begin a movement or an action he wants another animal to perform or to share--e.g., will push him and execute the initial movements of walking when he wants the other to give him a banana. All these are gestures "directly" related to the action itself...

By and large, these observations confirm Wundt's (1900) opinion that pointing gestures, the first stage in the development of human speech, do not yet appear in animals, but that some gestures of apes are a transitional form between grasping and pointing (p.219) We consider this transitional gesture a most important step from unadulterated affective expression toward objective language.²³ (p.34-35)

However, Vygotsky did not believe that anthropoids could obtain "objective language" because evidence had shown that

they did not represent any objective meaning in their art work, for instance, when Koehler (1925) was working with them. He also saw similarity in affective expression.

The coincidence of sound production with affective gestures, especially noticeable when the chimpanzees are very excited, is not limited to anthropoids-- it is, on the contrary, very common among animals endowed with voice. Human speech certainly originated in the same kind of expressive vocal reactions.

...But it is not connected with intellectual reactions, i.e., with thinking. (p.40) (see Footnote 23)

Vygotsky summarizes his study of anthropoids:

We undertook this analysis of several studies of ape language and intellect to elucidate the relationship between thinking and speech in the phylogentic development of these functions. We can now summarize our conclusions, which will be of use in the further analysis of the problem.

1. Thought and speech have different genetic roots.
2. The two functions develop along different lines and independently of each other.
3. There is no clear-cut and constant correlation between them.
4. Anthropoids display an intellect somewhat

like man's in "certain respects" (the embryonic use of tools) and a language somewhat like man's "in totally different respects" (the phonetic aspect of their speech, its release function, the beginning of a social function).

5. The close correspondence between thought and speech characteristic of man is absent in anthropoids.
6. In the phylogeny of thought and speech, a prelinguistic phase in the development of thought and a preintellectual phase in the development of speech are clearly discernible. (p.41) (see Footnote 23)

The preintellectual phase of speech observed in the anthropoids are identified in the human newborn child as babbling, crying, social reactions to voice, laughter, inarticulate sounds, movements, and first words. This phase continues until about the second year of life when the child discovers that objects have names.

Before the turning point, the child does (like some animals) recognize a small number of words which substitute, as in conditioning, for objects persons, actions, state, or desires. At that age the child knows only the word supplied to him by other people. Now the situation changes: The child feels the need for words and, through his

questions, actively tries to learn the signs attached to objects. He seems to have discovered the symbolic function of words. Speech which in the earlier stage was affective-conative, now enters the intellectual phase. The lines of speech and thought development have met. (p.43) (see Footnote 23)

The ontogenetic development of the human child is summarized by Vygotsky as follows:

In other words, speech cannot be "discovered" without thinking.

In brief, we must conclude that:

1. In their ontogenetic development, thought and speech have different roots.
2. In the speech development of the child, we can with certainty establish a preintellectual stage, and in his thought development, a prelinguistic stage.
3. Up to a certain point in time, the two follow different lines, independently of each other.
4. At a certain point these lines meet, whereupon thought becomes verbal and speech rational. (p.44)

(see Footnote 23)

Until recently, these views or similar ones have seemed to predominate the thinking of language developmentalists. However, with the new evidence of Savage-Rumbaugh (1991), it can now be seen that the language of apes is not constrained

as Vygotsky states. By supplying the same negotiation of cultural contexts as those of human children, the apes have acquired symbolic markers. An example of a routine is given by Savage-Rumbaugh (1991):

(An) example is the "going outdoors routine." As this routine is initiated, the chimpanzee may be asked to retrieve a shirt to wear outdoors. After this routine is well established and the components are behaviorally anticipated by the chimp, the routine will be initiated only by symbolic markers (or words). If the chimpanzee does not link these vocal markers to the next expected component of the "going outdoors routine," it will not respond. The caretaker then will produce more elaborate and direct action-based markers, such as looking toward the shirts, putting a shirt in the chimp's hand, and, if necessary, returning to the original action of the routine, that of putting the shirt on the chimp. (p.219) (see Footnote 9)

Routines and their symbolic markers are naturally interdigitated because components of one routine invariably are used in a different manner in other routines. As the routines and symbolic markers overlap, the referent of these markers is made increasingly specific and becomes divorced from its original context.

...When comprehension of symbolic vocal, gestural, and lexical markers becomes fully separated from the routine, the chimpanzee can pass formal tests of word recognition and can pair spoken words with their lexical and photographic equivalents. He or she also can answer simple questions about these vocal and lexical symbols. (p.231) (see Footnote 9)

Vygotsky considered that perhaps chimpanzees could acquire language, and even while drawing conclusions as he did, was still concerned that no researchers had been able to produce adequate training for this.

Language does not of necessity depend on sound.

If it is true that the chimpanzee has the intellect for acquiring something analogous to human language, and the whole trouble lies in his lacking vocal imitativeness, then he should be able, in experiments, to master some conventional gestures whose psychological function would be exactly the same as that of conventional sounds....The medium is beside the point: what matters is the "functional use of signs," any signs that could play a role corresponding to that of human speech. (p.38) (see Footnote 23)

Vygotsky also did acknowledge that the nonverbal gestures of the child precede verbal communication and are meaningful. In his evaluation of Stern's (1928) work,

Vygotsky faults Stern (1928) for translating a child's first word, "Mama," into "Mama, put me in the chair." (Stern, 1928, p.180):

When we observe the child in action, however, it becomes obvious that it is not only the word "mama" which means, say, "Mama, put me in the chair," but the child's whole behavior at that moment (his reaching out toward the chair, trying to hold on to it, etc.)...the only correct translation of "mama," or of any other words, is the pointing gesture. The word, at first, is a conventional substitute for the gesture; it appears long before the child's crucial "discovery of language" (Vygotsky, 1934/1962, p.31). (see Footnote 23)

But this is where modern research can add additional knowledge to the theory of Vygotsky. He could not have known the actual extent of the child's comprehension of language long before the child verbalizes sentences. Chomsky (1957) first theorized the difference between the child's performance of language in simple sentences at around the age of three years of age and the internal understanding of those sentences before that time. Hirsh-Pasek and Golinkoff (1991) have shown that, indeed, children as young as 12 months of age do possess comprehension of language. They call their

study "The Preferential Looking Paradigm." The first subjects were 16 infants (half boys, half girls), mean age 14 months.

The Preferential Looking Paradigm²⁴

The rationale of the Preferential Looking Paradigm is that children will be drawn to look at a television picture screen that is consistent with a linguistic message rather than one that is inconsistent if they understand the language used. The infant is held on the mother's lap in front of and midway between two television monitors. A central speaker is placed between the two monitors to deliver linguistic descriptions. After a familiarization process, the infant's task is to match the linguistic description to the appropriate television monitor.

The familiarization process proceeds as follows:

1. Each picture is shown alone one after another. When one goes off, the other comes on. There is a "nondescript" audio message from the central speaker; for example, "What is she doing?" The picture of a girl kissing keys and holding a ball in the foreground is shown on one monitor, and the girl kissing the ball and holding keys in the foreground is shown on the other monitor. Each picture lasts for six seconds.
2. A center light comes on for three seconds.
3. Both screens come on together with a "nondescript"

audio, "What are they doing?"

In these three first steps, the child learns that both screens can be shown, and that they can be shown at the same time.

The test trial follows:

4. The center light comes on with a linguistic stimulus, "Hey, she's kissing the keys.

Where is she kissing the keys (or ball)?"

5. Test: showing both screens with linguistic stimulus, "Hey, she's kissing the keys.

Where is she kissing the keys (or ball)?

There are controls built into the activity. The mother wears a visor over her eyes so that she cannot see the stimuli and unwittingly signal the child. The observers who are recording the eye fixations from behind the screens are blind to the experimental condition. Reliability for the measurement of visual fixation has been obtained between two on-line observers, between two off-line observers (coding from videotape taken of subjects during testing), and between one on-line and one off-line observer. In all conditions, reliability exceeds .90.

Another control in the design is that the actors or objects are in constant motion so that the child cannot use activity alone to provide a strategic solution to the mapping between the language and the scene. Colors and shapes are balanced as much as possible on both screens. Also, the

tapes are shown in both video decks so that half the subjects see the matches on one pattern and the other half see the opposite pattern. Half the subjects hear an audio tape that matches one member of a video pair; and the audio matches the opposite member of the pair for the other half of the subjects.

The independent variables in this design are the linguistic stimuli (always complete grammatical sentences), the side of the match (counter-balanced across tapes and subjects), and sometimes age. The dependent variables are: (a) the amount of visual fixation time to the matching versus the nonmatching screen and (b) the latency or time to look at the matching or the nonmatching screen. Latency is calculated from the time that children look at the center light between the two screens until they look toward one of the video screens.

The results show the mean visual fixation time to the match was 2.90 sec and to the nonmatch, 2.16 sec ($p < .05$). The authors conclude that these infants, who are all in the one-word stage of language production, are predisposed to organize their input into packages of words that represent relationships. It is reasoned that if the infants did not comprehend the sentence, they would distribute their attention equally between the two screens. If the strategy of focusing selectively on the last word were used, the infants should actually look at the incorrect screen because

the object represented by the last word is foregrounded on the nonmatching screen.

Two more experiments were done with the Preferential Looking Paradigm. In all three instances, the results provide compelling evidence that the comprehension of syntactic forms precedes production of those forms of speech. What would this knowledge have meant to Vygotsky?

The Preferential Looking Paradigm's Relation to Vygotsky

Had Vygotsky realized the comprehension of verbal language infants attain before they begin to speak in sentences, he no doubt would have advocated translating not a single word backward to a pointing gesture, but the pointing gesture as well as other communicative behavior into verbalization. Indeed, he did admit that a message was provided by the child through his/her movements rather than a single word. Therefore, since the semantics for beginning language is dictated by the practice of the child's culture in choosing word labels in the native language, there can be no question as to the meaning of nonverbal messages if that meaning is confined to the observable context. And since all speakers of English follow the same semantic path toward denotative understanding of their language, there should be no reason not to translate the child's nonverbal messages into verbal ones.

Summary

Language and communication studies have been traced since the early "baby biographies" (Ingram, 1989) to Chomsky (1957). Important aspects of development as presented by Knapp and Hall (1992) have been enumerated. Context, identified as an important factor in communication studies (Worobey, 1989), has been explained in the theory of Ochs (1988) as negotiation of cultural knowledge acquired and organized through communication. White's (1982) theory has been presented to explain the origin of communication in nonverbal behavior from an ethological foundation. Carroll's (1986) study extends the theory of White to the development of the individual child and shows that children do express nonverbal statements that have verbal meaning. The child him/herself translates nonverbal statements into verbal sentences as s/he matures and develops speech.

Similarities in anthropoid and human language shown by Vygotsky (1962) have been identified as possibly identical by Savage-Rumbaugh (1991) by comparing the use of the cultural context of the human child with chimpanzees. Hirsh-Pasek and Golinkoff (1991) demonstrate the comprehension of verbal sentences in infants.

The foundation for Sign-sentence theory rests on these theories. Together, they propose that language and communication knowledge is inherited phylogenetically (Ekman & Friesen, 1969; Savage-Rumbaugh, 1991; Vygotsky, 1969;

White, 1982); and that the human infant is born with an intuitive knowledge of language (Chomsky, 1957). Infant and ape studies reported by Knapp and Hall (1992) reinforce these propositions. The development of language is triggered by the language environment (Chomsky, 1957) and the expansion of language development is promoted by negotiation of the cultural context (Ochs, 1988) as demonstrated by Savage-Rumbaugh (1991) with young apes. Sentential knowledge, known as deep structures (Chomsky, 1957), has been shown in the comprehension of sentences by infants previous to their production of such sentences (Hirsh-Pasek & Golinkoff, 1991). This comprehension of verbal sentences also demonstrates the infants' understanding of behavioral displays corresponding to the matching verbalism. Carroll's (1986) work specifies how the nonverbal communication of young children develops into verbal language through the performance of communication. These are the bases for Sign-sentence theory which translate the child's sentential knowledge of behavioral displays used for communication purposes into the sentences which the child is not yet ready to perform verbally but is committed to in future verbal performance.

METHOD AND PROCEDURE

Nonverbal communication in children is explored in three studies using qualitative methods. One is an observational study of the behavior of preschool children to exemplify the claims of White (1982) and Carroll (1986) and to identify formats according to structural theorists such as Birdwhistell (1970), Bruner (1983), Kendon (1972), McDermott, Gospodinoff, and Aaron (1981), Savage-Rumbaugh (1991), Scheflen (1968), and Wittgenstein (cited in Hartnack, 1986). The episodes were chosen for their completeness and their clarity for the reader. White's descriptions of the characteristics of children as they develop through communication phases is observed and recorded. The behavior is also analyzed according to Carroll's theory of congruence in communicative nonverbal behavior, and pertinent aspects of formats are pointed out according to the specified theorists.

Two studies display Sign-sentence theory translations. One is a nonverbal dance reported by McDermott et al. (1981) to show the verbal meanings of the nonverbal movements. The last study is the application of sign-sentences to a study by Braunwald (1983). This analysis shows how translating nonverbal behavior to sign-sentences may change the perspective of a communication study between an adult and a child.

Study 1

Preschool Laboratory Study

Behavioral Observations

Carroll's (1986) theory of congruence in effective communication and the communication phases of White's (1982) theory are applied to behavior in observations of preschool children two to five years old in an Oklahoma University laboratory program. Observation times of one and one-half hours to three hours per day, two or three days each week, were divided between morning classroom sessions and afternoon playground sessions. These observations covered a period of two months. Following is a sample of ten episodes which take place in the classroom and on the playground.

Observation categories

Each child in interaction with others is observed for outstanding signals according to White's communication phases: (Category A). The phases included are:

Phase II: two years old

These children are eager to follow the teacher's direction with little interaction or assistance until there is an interruption of crisis. In crisis, they make their demands for assistance. Teacher and student mutually negotiate to solve problems. These younger children generally work closer to the teacher.

Phase III: three to four years old

More independence and determination are exhibited in the behaviors of these children. Aggressive tendencies may result in an excessive amount of conflict. Teachers who do not have the nonverbal lessons well planned and programmed may find much frustration in the midst of several of these children.

Phase IV: four to five years old

These children are communicating their accomplishments and needs more smoothly and adequately. Especially if these students have a rich background of experience and training, they are a joy for the teacher. With their communication accomplishments, the renegotiation phase proceeds easily.

In the second category, each interaction is observed for congruence according to Carroll's division of "known information" and "new information": (Category B). Other informative observations are in a third category: (Category C).

Formats are analyzed in the final category: (Category D). A review of some structural requirements of formats may be helpful at this point. The first theorists, McDermott et al. (1981) explain identification of formats:

In addition to naming, a context can be formulated by a statement of what is required of a member in a particular context. For example, the structure of a

classroom reading lesson can be formulated by the teacher calling on a child to read or by a child complaining that he never gets a turn...On occasion, a gesture can stand on its own as the sole signal for a prolonged context. The condition for the description of any signal as a feature of the work members do to contextualize each other is that it is responded to; that is, upon signaling the members act as if the signaled context was in fact the reality at hand, be it accepted or challenged. (p.378-379) (see Footnote 3)

Aspects identified by the second theorist Birdwhistell (1970) as reported by Kendon (1972) state that:

Birdwhistell...is interested in the order or pattern that can be observed in the ways in which people relate their behavior to one another when they are in each other's presence. For Birdwhistell, communication is to be viewed as a system with a structure...By this systemic view of communication, anything that anyone does in the presence of another must be considered as potentially part of the system. Speech and gesture, posture and orientation, touch and relative position in space--all must be taken into account. (p.442) (see Footnote 4)

Birdwhistell also believes that full meaning of behavioral display must include the usage of that display. In

explaining this requirement of Birdwhistell (1970), Kendon (1972) explains:

For him, to ask what a given unit of body motion "means" is to ask what its "use" is. Questions such as, What does it mean when a person smiles? or What does it mean when a person raises his fist and shakes it back and forth? can only be answered by giving a list of the environments in which these forms are generally seen. In other words, we can answer these questions in terms of the range of use. (p.446)

(see Footnote 4)

The third theorist, Bruner (1983). describes a format:

A format formally entails a contingent interaction between at least two acting parties, contingent in the sense that the response of "each" member can be shown to be dependent upon a prior response of the "other." Each member of the minimal pair has a goal and a set of means for its attainment...It is the goal-directed aspect of formats that makes the signalling of intention (and the signalling of uptake) so simple. This is greatly aided by the fact that early formats are so overt, as in games like hide-and seek, give-and take, peek-a-boo, and where's the X?...Infants learn early to signal intended action formats and to expect uptake. (p.36-37)

(see Footnote 7)

The definition of routine is given by the theorist Savage Rumbaugh (1991):

Routines are defined as a "more or less regularly sequenced set of interindividual interactions that occur in a relatively similar manner across time, or at different times" (p.215). Some examples of routines would be changing diapers, getting ready to go outdoors, taking a bath, riding in the car, packing a backpack, blowing bubbles, etc. The chimpanzee may be a willing or unwilling participant or observer. When the young ape is learning a routine, the routine is inevitably accompanied by gestural, lexical, or vocal markers by the caretakers to convey the intended action to the ape. However, Savage-Rumbaugh (1991) states:

Once the routine is understood, it will be initiated by the ape. At first, such initiations will be rather primitive in the sense that they will be action based and context dependent. For example, the chimpanzee may see the bottle of bubbles among other toys and pick it up and look at the caretaker. By selecting the bubbles from among other things, the chimpanzee thus has conveyed its desire to execute the "bubble-blowing" routine. Later, it may simply point to the bubbles and look at the caretaker. Still later, it will point to the BUBBLES lexigram and turn to the caretaker. (p.217) (see Footnote 9)

Savage-Rumbaugh also provides details for the interaction between the caretaker and the young ape concerning the learning of routines in the example of the "going outdoors routine":

As this routine is initiated, the chimpanzee may be asked to retrieve a shirt to wear outdoors. After this routine is well established and the components are behaviorally anticipated by the chimp, the routine will be initiated only by symbolic markers (or words). If the chimpanzee does not link these vocal markers to the next expected component of the "going outdoors routine," it will not respond. The caretaker then will produce more elaborate and direct action-based markers, such as looking toward the shirts, putting a shirt in the chimp's hand, and if necessary, returning to the original action of the routine, that of putting the shirt on the chimp. (219) (see Footnote 9)

Formats, identified as "language-games" by Wittgenstein (cited in Hartnack, 1986) must include understanding of usage in addition to vocabulary or merely naming. This has been described previously in his discussion of the workman's use of the word "hammer" without any explanation for its use. This usage structures the meaning of communication.

This structure of meaning is seen by Scheflen (1968) as patterns within patterns which comprise a "program" of communication with implicit instructions. Although Scheflen

may see patterns as overlapping components of different routines or formats, we can also see this idea of patterns within patterns as formats within formats when applied to preschool children. We can see a hierarchical arrangement of formats for each individual child. For instance, an overriding format would be the one of the parents' taking the child to school each day. This might be called the "going to school" format, or, from the child's point of view, "Each day, I go where my parents take me." Once at school, a second level of formats would be entered into with the rest of the children and the teachers. This format would be, "Working in the classroom." or "I work with the exercises in the area where my teacher directs." This brings us to the final level of the individual child working with individual exercises and other children. It is at this level we find the episodes of the observation study. In the evaluation of each episode, the condition required in the theory of McDermott et al. (1981) is noted. That is, that the initiating signal for contextualization must be responded to by another, either accepted or challenged, to establish the format. Each interaction is identified as being part of a format, and the format is named. Other aspects of the formats are identified in the evaluation according to the other theorists.

Episode I.

Cleaning-up time is taking place in the classroom.

Children are putting their things away.

The teacher is walking behind a child with her hands on the child's shoulders. She is "walking him" to the shelf where puzzles are kept. The child is holding a puzzle with his two hands in front of him.

Analysis:

A. Phase III

B. Known information - The child has a puzzle.

New information -The child won't replace it.

C. The teacher is in control.

The teacher is forceful.

The teacher is sending information to the child.

D. Format - Putting work away.

Initiating signal	The teacher's placement
	of the puzzle in
	the hands of the boy
	and direction by the
	hands of the teacher
	on the boy's shoulders

Evaluation:

Evaluation: A. Phase III is the phase of conflict between child and adult. In this case, the teacher's forceful nonverbal communication indicates that the child cannot or will not obey the rule of putting puzzles away.

Putting work away when finished is one of the basic rules of the classroom, and all the students must learn to obey.

B. Since the children have been told verbally to put their things away (as they are told each time by the teachers), and the child does not comply, the teacher communicates to him nonverbally to clearly direct the message to him in a way that he can understand. Just as a 10-12 month old might tug at a parent's leg to direct attention, the teacher directs his movements with the puzzle.

C. It is the teacher's role to enforce the rules of the classroom. Putting things away is part of the social order that must be taught.

D. From the systemic view of Birdwhistell (1970) reported by Kendon (1972), gesture, posture and orientation, touch and relative position in space must all be taken into account. The goal of the behavioral display of the teacher is the movement of the puzzle back to the shelf. This is pursued through the teacher's touch, orientation, and relative position in space to the pupil. From Wittgenstein's (cited in Hartnack, 1986) theory, we can see that the student's knowledge of the puzzle alone, or his appreciation of the puzzle, is not enough in this format. To understand the meaning of using puzzles in the classroom, its replacement to the shelf must be included. The teacher is holding the student accountable for this. As Bruner

(1983) would suggest, her signal is simple, and she expects uptake. The boy walks compliantly as the teacher's hands direct him. Savage-Rumbaugh (1991) would, no doubt, identify this as a routine that is not yet "agreed upon" The teacher found it necessary to produce "more elaborate and direct action-based markers" to hold the child accountable to the goals of the format.

Episode II.

Children are seated at the snack table. One child, Lindsey, serves snack to each child. She stops when one boy does not say, "Thank you." She tells him to say, "Thank you." The boy is silent. He shakes his head from side to side. The teacher tells her to go on serving. Lindsey looks puzzled, but continues.

- Analysis:
- A. Girl - Phase IV
 - Boy Phase III
 - B. Known information - People say "Thank you"
 - when you give them something.
 - New information - 1. This boy doesn't
 - have to say it.
 - 2. What teacher says is
 - more important than saying, "Thank you."

C. Teacher deals with conflict

D. Format - Serving and Receiving Snack

Initiating signal - Lindsey's request for
a verbal response,
"Thank you."

Evaluation: A. The girl, Lindsey, is evidently in White's "easier to live with" phase, capable of doing helpful chores and keeping rules. The boy, on the other hand, is still in the phase of conflict.

B. Lindsey signifies that she knows each person should say, "Thank you" by asking the boy to repeat the phrase. Everyone else at the table also says, "Thank you." However, the teacher's judgment in this case is the overriding rule. The boy does not say it. For Lindsey, to do "what the teacher says" is the stronger rule since she continues to serve.

C. The teacher chooses to ignore the boy's refusal rather than to increase the conflict between him and Lindsey by insisting that he say, "Thank you."

D. With Lindsey's request of the boy to say, "Thank you," she holds the student accountable for that part of the format. His challenge by shaking his head back and forth responds to her request. In this format, saying "Thank you" is included in the meaning of receiving snack in the classroom, as Wittgenstein (cited in Hartnack, 1986) would direct. Lindsey's puzzled facial response to the negative

head movement of the boy reveals that she does not understand the teacher's acceptance of the boy's response, but since "minding the teacher" is an overriding format, she leaves the boy's accountability for his actions to the teacher. This may be another case of an unlearned routine according to Savage-Rumbaugh (1991). The structure of this interaction is dependent upon the nonverbal head movement and facial expression of the interactants as Kendon's (1972) report of Birdwhistell (1970) would propose. The rest of the children complied with their responsibility to the format of snack time upon Lindsey's initiating signal that she was ready to serve (standing by the tray of snack and waiting for children to be seated). They showed their accountability by sitting together side-by side at the table, and each, in turn as s/he was served, by saying "Thank you." The simple initiating signal and uptake of Brunner can be seen in this group's snack time and also in the interaction where the format is challenged (Lindsey's request and the boy's shaking his head back and forth).

Episode III.

Nate and the teacher are at the snack table.
 Nate picks up the pitcher and starts to drink from it. Teacher puts her fingers on top of the pitcher and hands him a cup.

- Analysis:
- A. Phase III
 - B. Known information - Nate wants a drink.
New information- Nate can't drink from
a pitcher; he must use
a cup.
 - C. The teacher protects the group of children
from contagious germs by communicating that
one must use an individual cup for
drinking.
 - D. Format - Getting a drink by myself
Initiating signal - The teacher's placement
of her hand on top
of the pitcher

Evaluation: A. Phase III, the phase where the young
"feel free to stray" is evident in Nate's ignoring the cups
which everyone else always uses for drinking.

B. It is evident that Nate wants a drink. The teacher
communicates the improper and proper manner of drinking by
placing her fingers over the top of the pitcher and handing
Nate a cup.

C. It is the teacher's responsibility not only to
teach the social rule for getting a drink, but also the
dangers of drinking from a community pitcher. It is her
duty to enforce such health rules.

D. The teacher is holding Nate accountable to the
format of the drinking water exercise by placing her hand on

top of the pitcher. Nate accepts her challenging direction by taking the cup she hands him and using it appropriately. The signals of initiation and uptake are simple (Bruner, 1983) and may be another case of an unlearned routine (Savage-Rumbaugh, 1991). Wittgenstein's (cited in Hartnack, 1986) usage of pitcher and cups in this format is evident.

Episode IV.

I look at a boy who is yelling and pulling on a toy held by another child. He stops yelling, but continues pulling on the toy.

- Analysis:
- A. Phase III
 - B. Known information - The boy, giving a shrieking yell, wants the toy.
New information - The boy, quiet, still wants the toy.
 - C. The teacher is not looking.
 - D. Format - Working in the classroom.
Initiating signal: Placing a holding grasp on the toy

- Evaluation:
- A. The boy is screaming and in conflict with another child, in the conflict phase

B. By looking at the boy as he yells, I evidently show my discomfort which signals him to stop yelling. However, he continues to pull with all his might, his face strained in effort, but not making a sound. To analyze my facial expression, we could say:

B. Known information - You are yelling.

New information - You are giving
me discomfort.

C. The boy might be yelling to get the teacher's help, but she is occupied elsewhere.

D. Working in the classroom includes taking turns with the toys obtained from the shelf. Reaching out for a toy held by another child is not an option in this format. Holding onto the toy was the initiating signal of the first child to hold the second accountable for his actions. The second child's attempt to take a toy not on the shelf shows the lack of understanding of the format of working in the classroom (Wittgenstein cited in Hartnack, 1986). The meaning found in knowing how the toys are to be used is also found in the theory of Birdwhistell (1970) reported by Kendon (1972)). Also, this theory's proposal that the structure of communication in interaction is constructed through behavioral display is shown here. The second child, not having learned the proper format (Savage-Rumbaugh, 1991), was evidently initiating a simple format of "I want a

toy," and since the teacher was not there to hold the second child accountable, it was up to the first child to challenge him. Scheflen (1968) might propose that the instructions for this program for the first child include, "If someone tries to take your work, yell and hold on tight; don't let go," and if someone doesn't like your yelling, quit yelling, but hold on anyway."

Episode V.

Two children, a girl and a boy, tug back and forth holding the same bead rack. They keep tugging until they fall over on the floor. The teacher notices them. "Oh what happened?" She leans over to them, helping them up. "You play with this together." The girl, walking away, leaves the bead rack to the boy.

- Analysis:
- A. Phase III
 - B. Known information Two children want the same toy.
 New information - Two children must work together (or one must leave.)
 - C. The teacher deals with conflict.
 - D. Format - Working in the classroom
 Initiating signal - "Oh what happened?"
-

Evaluation: A. The conflict phase is evident.

B. The children communicate to each other and to the teacher that each one wants the bead rack. The teacher communicates verbally that the two of them should work together, but she does not demonstrate nonverbally how to do this. The children are not able to follow the teacher's direction.

C. The teacher, who is occupied with other children also either does not have the time, or does not know how to direct the children to work together.

D. Before the teacher's intervention, the boy had been trying to challenge the girl's choice of the same bead rack he worked with. However, this bead rack was an exercise that could be shared and worked with by more than one person. The teacher holds them both accountable by her intervention. The girl knows that the teacher's direction must be followed or she must find something else to do. She evidently does not want to share the exercise or does not know how, so she chooses the latter. The instruction for the program (If you will not share, then find something else for yourself.) is upheld (Scheflen, 1968), and the girl accepts her responsibility in the format by choosing other work. Wittgenstein's (cited in Hartnack, 1986) concept that the two interactants must share knowledge of usage is shown here (that the exercise in question may be used by two persons).

Episode VI.

A new student has just finished her first day at school. She is leaving with her father. He points back into the classroom as they approach the door to leave. The teacher is watching from the middle of the classroom. The child turns around, smiles, and waves to the teacher.

Analysis:

A. Phase IV

B. Known information -It is time to leave
the teacher.

New information - Tell her, "good bye."

C. The teacher waves back. It appears that
it has been a good first day at school.

D. Format - Going home time

Initiating signal- Father's pointing
gesture

Evaluation: A. The child seems to exhibit the
confidence of this phase.

B. The father nonverbally communicates his direction
to the child to wave to her teacher. She complies.

C. The nonverbal parting is a positive one between
the student and the teacher.

D. The simple initiation and uptake (Bruner, 1983) are shown in the Father's directing the child's gaze back to the teacher and the child's wave. Telling the teacher, "Good-bye." is part of the format of going home. The child acknowledges her understanding of this format by waving, not merely looking in the direction of the gesture at the teacher (Wittgenstein cited in Hartnack, 1986). The format is initiated and identified by the father and accepted in the response of the child. Their actions construct this system for communication (Kendon's (1972) discussion of Birdwhistell (1970)).

Episode VII.

An Asian child, who has been cutting paper, holds out her hands, palms up, one holding the other. "Did you cut your finger?" the teacher asks. The little girl nods, "yes." Let me see." The teacher looks. "You just pinched it."

- Analysis:
- A. Phase II
 - B. Known information - The child has been using scissors.
New information - The child has hurt her finger.
 - C. The teacher helps.
-

D. Format - I hurt myself

Initiating signal - Child's holding up
her hands, one cupped
in the other

Evaluation: A. The phase in this episode does not seem to be clearly identified. The mutual negotiation seems to indicate Phase II.

B. The child communicates nonverbally to the teacher that she has hurt her finger.

C. The teacher and the child work together mutually to solve the little girl's problem.

D. The child who has been involved in the paper-cutting format has pinched her finger with the scissors. The adult's reassurance is part of every child's format when hurt. The child initiates the interaction by holding up the hurt hand held by the other hand for the teacher to see. The teacher accepts responsibility with reassurance. These actions are simple (Bruner, 1983) and well understood (Savage-Rumbaugh, 1991). The interaction constructs the communication as Birdwhistell (1970) would propose according to the description of Birdwhistell's theory by Kendon (1972)). The teacher responds appropriately with reassurance. She understands that in this format, it is required that a statement of reassurance be given ("You just pinched it"), not merely acknowledgement or acceptance (Wittgenstein cited in Hartnack, 1986).

Episode VIII.

Debbie is saying, "Uh, oh. Uh, oh. Uh, oh.!"

The teacher asks her what the matter is. "What are you trying to tell me, Deb." Debbie points to the broken crayons and crumbs on the table, left from pounding the crayons on the table instead of coloring with them. The teacher says, "That's o.k."

Analysis:

A. Phase II

B. Known information -Children have been
pounding with crayons.

New information - The crayons are broken.

C. The teacher helps end the crisis.

D. Format - Our crayons are hurt.

Initiating signal -"Uh, oh. Uh,oh."

Evaluation:

A. The mutual negotiation seems to indicate Phase II.

B. The child communicates nonverbally to the teacher what has happened to the crayons. The teacher responds verbally.

C. The teacher reassures the child that everything is o.k. Debbie has seemed upset by the incident.

D. Just as when a child is hurt, s/he needs and expects reassurance, so when part of the environment is disrupted, the child also needs reassurance. Since the

crayons have been broken, order has been broken, and Debbie initiates the vocal signal to which the teacher responds. Just as in the previous episode, the teacher accepts the expectation of Debbie who holds the teacher accountable for the goal of this format.

Episode IX.

The children are outside gathered around a table set up with equipment for making soap bubbles. A little girl holds a bubble loop full of soap very still as she looks at the teacher. The teacher says, "O.K., I'm watching." The girl lets the bubble go by waving the loop through the air.

- Analysis:
- A. Phase IV
 - B. Known information - The girl has a bubble.
New information - The teacher sees the bubble.
 - C. The teacher approves of the girl's action.
The teacher is smiling and watching.
 - D. Format - Soap Bubbles
Initiating signal - Looking at teacher

Evaluation: A. The teacher is not directing, only watching, allowing the child to direct her own activity. The child wants the teacher to see her activity and waits

for the teacher. There is a mutual cooperation of teacher and student involved. This is indicative of the fourth phase. Of the fourth phase, White (1982) writes: "This phase has to be postulated for primates (mother<=====>young, renegotiated). This phase is characterized by the growth of independence (or some modicum thereof) by the child. It involves continual adjustment on the part of the parents as the child grows, and on the part of the child as it becomes aware of the world around it" (p.24). (see Footnote 21)

B. The child communicates to the teacher that she wants the teacher to watch, that she is waiting (standing very still and ready to release the bubble). The child does this with her body posture and her direction of gaze toward the teacher. The teacher seeing this, understands, which is evident from her verbal reply, "O.K., I'm watching."

C. The teacher and the child are evidently pleased with one another's performance. They are both laughing and seem to be having fun following the release of the bubble which they both watch float through the air.

D. The teacher has set up the "Soap Bubbles" exercise for several children who take or wait for their turns with the bubble loop. Since the children know the format, they may expect the teacher to see and evaluate their performance. The girl shows this expectation by looking in the direction of the teacher and waiting in a state of readiness until the teacher looks at her. In this way, the

girl holds the teacher accountable for her role in the format, and the teacher accepts responsibility with her verbal reply. The signals are simple (Bruner, 1982) and well understood (Savage-Rumbaugh, 1991). Even though the relative position in space is from a distance, an important consideration of Birdwhistell (1970) reported by Kendon (1972), the nonverbal statement of the girl watching the teacher and standing in readiness with bubble loop held high is very clear. (i.e. I'm waiting on you, teacher, for your notice and approval.)

Episode X

Mary has been watching Justin who yelled, "Watch this!" then took off on his scooter in a circular direction around the designated play area.

After having heard the teacher praise Justin for his skill in guiding the scooter in a "perfect circle," Mary takes another scooter and performs the same skill, adding an additional difficulty of placing one foot upon the handle bars while very slowly coming to a stop. "Your balance has improved so much since school started," praises the teacher to Mary.

- Analysis:
- A. Phase IV
 - B. Known information - A boy rides skillfully;
the teacher praises.
New information - A girl rides just as
skillfully if not
more so.
 - C. The teacher gives equal praise.
The teacher is cheerful.
 - D. Format-Riding Scooters
Initiating signal - Justin takes a scooter

Evaluation: A. The mutual cooperation of adult and child is evident indicating the fourth phase.

B. Perhaps the girl really wants the same praise as Justin received, or perhaps she wants to ride a scooter better than Justin, but such interpretations are merely speculative. What is evident is that Justin wanted to be watched ("Watch this!"). The teacher and Mary both watched him. The teacher praised him. Mary's nonverbal response of riding her own scooter fits Carroll's (1986) rule of congruence.

Most utterances (verbal and nonverbal) can be divided into given information that the receiver already knows and new information that is being conveyed by the sender.
Formulating messages that are congruent

with the given information of listeners
is part of learning to communicate
effectively.²⁵ (p. 315)

D. Experienced students have learned that teachers praise good work. Justin appears to have this knowledge as he calls for the teacher to watch his scooter ride. Mary, seems to concur as she repeats the display of scooter-riding. Their nonverbal displays which seem to say, "I'm riding a scooter very well," hold the teacher accountable for responding with praise. The teacher accepts the format with her response. The teacher accepts the responsibility by praising each student individually in turn, understanding that her response is used for evaluation and praise in this format, paralleling Wittgenstein's (cited in Hartnack, 1986) requirement for usage and echoed by Birdwhistell (1970) as reported by Kendon (1972).

Results of Observation Study

Carroll's (1986) study:

These episodes show that children's activities in interaction can be identified as communication according to Carroll's (1986) divisions of information in his theory of congruence.

Children's behavior portrays White's (1982) phases of communication.

Phase II: two years old

These children demonstrate the mutual initiation phase.

Phase III: three to four years old

The child is shown to be the initiator in this phase. Conflict may result from determination and aggression.

Phase IV: four to five years old

The renegotiation phase is shown in this phase during the growth of independence and accomplishment.

Formats are identified:

Each episode has been identified as part of a format for communication. The format has been named; the initiating signal of one interactant and the response of the other have been designated according to the theory of McDermott et al. (1981) as explained in their description of a nonverbal dance in a children's reading group. Other aspects of the formats have been identified according to the other structural theories reviewed.

Discussion

That nonverbal communication is abundant in early childhood has been shown here in the laboratory study. This nonverbal communication has been shown to exhibit congruence and a relative connection to the communicational maturation of the child.

White (1982) has proposed that human beings have phylogenetically developed verbal speech from nonverbal communication. Carroll (1986) has shown how this may happen ontogenetically in the speech development of the child.

In these episodes, each shown to be part of a communication format, can be seen, as discussed in the preview of "Observation categories," a level of formats within a hierarchy of formats learned by the child. There is also a further aspect of formats within formats which must be pointed out. Within some episodes, more than one format may be seen. For instance, in Episode III, the initiating action for the "Getting a drink" format would be the teacher's having set up the exercise so that each child could get a drink by her/himself, and having demonstrated the exercise to the children. As each child takes a cup to pour a drink of water, s/he is contextualizing and confirming this agreed-upon format. But the initiating action for the contextualizing repair work of interruption or misbehavior, or holding another accountable to the original format, would be the placement of the teacher's

hand over the pitcher. This same dimension in the "Paper cutting" format, Episode VII, (where the teacher initiates the format by setting up the exercise for cutting paper and demonstrating it) includes an additional format or a subformat, "I hurt myself." The resolution of this latter format calls the child back to the original format of paper cutting. This same process can be seen in all the episodes in formats where rules of the format are broken or changed.

From this intermesh of formats, it appears that if the history of formats is known, it may be that the contextualizing repair work (e.g., that described by McDermott et al. (1981) in the nonverbal dance in the children's reading group) is actually interaction learned and transferred from previous formats, now embedded within a new format. A format, "Teachers praise." can be seen in Episodes IX and X in this same way although rules are not broken, the students add to their performance their own various creative techniques, probably not included in the regular format, but requiring an additional response from the teacher. Mary is very creative in adding a new difficulty to her scooter ride. In Episode IX, where the teacher is actually supervising the activity from a distance, the girl calls upon the teacher to uphold the teacher's responsible role in that format as supervisor, and the teacher's praise, not simply acknowledgment, seems to be part of that role.

In Episode X, Justin, who is acting independently and could have chosen to ride the scooter without comment to or from a teacher, chooses to initiate a format by eliciting a response from the teacher. His pleasant, mildly aggressive manner and his exclaiming vocal tone express an attitude of self-confidence which points to an expectation of affirmation by the teacher, not only by her watchful acknowledgment, but also by her praise.

In all of the supervised activities of students with their teachers, the role of the teacher in the format seems to be characterized by the teacher's attention and evaluation. The working consensus of the participants is that they are involved in a learning experience together. When this experience is changed from its regular routine, it usually happens from unexpected interruption, misbehavior, or creative supplementation, additional requirements added by individual interactants. At this time, contextualizing repair work may be needed to call the group back to the original format. This seems to point to the term "working consensus" as explained by McDermott et al. (1981) in discussing Goffman's (1959) use of the term.

The term "working consensus" was originally used by Goffman (1959:9-10) to refer to a "kind of interactional modus vivendi. Together the participants contribute to a single overall definition of the situation which involves not so much a real agreement as to what

exists but rather a real agreement as to whose claims concerning what issues will be temporarily honored."

McDermott et al. (1981) explain their use of the term:

The term has been used by Kendon (1976:322) in much the same way we have been using it: "A central problem in the investigation of interaction...will be to see how, in terms of the functioning of observable behavior, the "working consensus" for a given behavioral system is established and maintained. In particular, this means that we must identify those aspects of behavioral function which serve to control or regulate the behavior of the participants in relation to the currently established pattern of relationship. This requires that we look for regularities in behavioral relationship, but that we look closely at places where these regularities change." (p.396-97) (see Footnote 3)

There seem to be three ways the regularities in the behavioral relationship in the format may change; these are through interruption, through misbehavior (rule-breaking), and through creative supplementation. This is the point at which an embedded or second format may be found. In both formats, the contextualizing work of the participants may be seen to form the working consensus as described above by McDermott et al. (1981) and illustrated in the observations of the laboratory episodes previously described.

Study 2

Application of Sign-sentences to a nonverbal dance

By applying verbal translations to nonverbal acts, coherence should remain the same or increase in clarity. Let us look at an example of such an application to McDermott, Gospodinoff, and Aron's (1981) description of a nonverbal dance in a children's reading group (Frazier, 1992).

The study of McDermott, Gospodinoff, and Aron (1981)

McDermott et al. (1981) describe four positioning units for a reading group of six children and their teacher.

Positioning I - the reading position

Positioning II - getting organized for a turn
to read

Positioning III - behaving anarchically

Positioning IV - waiting for teacher

In their study, McDermott et al. (1981) examine the positioning of the children and find that every movement is orderly in forming the positioning and the context of what they are doing. What appears to be chaotic behavior between reading turns is shown to be regularly sequenced with predictable consequences (see Illustrations, Appendix A).

The first unit constitutes a reading position, marked by each person's looking at his or her book. The teacher calls on Maria to read, and soon everyone is looking in different directions. This is because Rosa calls for a

turn, and the teacher tells her to wait. Again the teacher calls on Maria to read, but before she can begin, the teacher leans out of the group to speak to Audry sitting on the floor. Two children, Anna and Ted, also look toward Audry. Soon Perry and Rosa are also looking away from the group. Maria has the turn to read, but has no audience.

At this point, an incredibly precise dance takes place. The dance is made up of five movement clusters involving the members of the group. This is what happens:

First Cluster: The teacher begins to return her gaze to Maria. Maria stops reading. Anna and Maria move their books down to the table. The teacher orients to them by jerking her head back and up.

Second Cluster: Rosa and Maria move their bodies down to the table. Perry is looking away from the group. The teacher looks at Perry. Perry looks toward the teacher with eyes gazing downward.

Third Cluster: Rosa and Maria stop their movement. Rosa starts to move back, and the teacher starts to move her head away from Perry to her right. Perry begins to slump.

Fourth Cluster: Maria and the teacher begin to look at each other. Rosa moves to her right, down and away from the teacher. Perry

begins to further slump.

Fifth Cluster: Ted starts to reorganize his posture for reading. The teacher moves her head toward Maria, and Maria looks intently at the teacher. The teacher says, "A little louder please," as if the problem with the group was that Maria had not been reading loudly enough.

McDermott et al. point out that the group was committed to Positioning I, the reading position. They show that the order is formulated, oriented to, and used by the members to hold each other accountable. In this example, the teacher had called on a child to read. Although attention seemed to spread around the room, in this case the members of the group keep a careful watch on each other, and are sensitive to the movements of each other. During a waiting positioning (IV), Maria could put her book down, and no one would notice, or the teacher could turn to Perry, and he would not attend. But in the reading positioning (I), because the members understand what it is that they are doing with each other, the movements have different meanings, meanings to which they all respond. McDermott et al. call this contextualizing work to regenerate a particular social order.

McDermott et al. explain, "People achieve order in face-to-face behavior by formulating a working consensus of

Second Cluster: Rosa and Maria - "We shift positions; no one
is reading."

Teacher - "I'm looking at you, Perry. I see
you looking away."

Perry - "I may look at you." (eyes
downcast)

Third Cluster: Rosa and Maria - "We sit back into position."

Teacher - "I'm looking in Ted's direction."

Perry - "I'm settled."

Fourth Cluster: Teacher - "Maria, I'm looking at you."

Maria - "I see you, teacher."

Rosa - "I am getting in position."

Perry - "I am still ready."

Fifth Cluster: Ted - "I'm getting ready."

Teacher - "I see you, Maria."

Maria - "I am watching you, teacher."

Results

By looking at these verbal parallels of the nonverbal messages in the nonverbal dance, it is evident that each member of the group was acting appropriately to do his or her part to carry out the task they had set for themselves. First one member and then another responded in reciprocal fashion as though attuned together. As they did this, they

reconfirmed their purpose--their commitment to the reading lesson together.

This example shows that adding verbal translations to the nonverbal communication lends clarity to understanding. And although in supplying these verbal parallels, we want to avoid excessive overcoding (i.e., Teacher - "I'm frustrated," or Perry - "I'm bored."), we cannot deny that these verbal statements help bring the episode to life for the reader.

Study 3

Sentence-signs of the Pre-linguistic Child

Let us look at a nonverbal study by Braunwald (1983) as it was originally reported, then add the effects of translating the sentence-signs. The scene for the example includes a prelinguistic child sitting on her father's lap. The mother enters eating ice cream and sits next to them. Cheryl is 9 months old.

The Original Braunwald (1983) Study²⁶

Sequence of Communication	Child	Partner
C. Cheryl sees ice cream	Notice/knowledge of ice cream in dish.	Perceives child's notice.
C. Cheryl leans toward her mother	Use of space to establish topic.	Perceives shift in child's focus.
C. Ehhh!	Affect/intention Attention-getting	Interprets intention and meaning.
M. Mother gives Cheryl a taste of ice cream.		Acknowledges child's request.

Note the communication sequence in the first column. The normal turn-taking pattern is not recorded as such. The mother's turn is listed only once. In the other columns, nonverbal behaviors are interpreted for the child, and cognitive processes are described for the mother-partner (with the exception of the last item which merely describes the final movement of the mother.)

Application of Sign-sentences

Cheryl - "I see you eat ice cream."

Mother - "I see you watching me."

Cheryl - "I come to you, Mother."

Mother - "I'm watching you, Cheryl."

Cheryl - "Ehhh!"

Mother - "Have some ice cream, Cheryl."

Result

By revealing the sign-sentences, the communicative messages are revealed, and the accurate exchange of turns brings the whole transaction into its proper perspective. With this method, it can be seen that both partners share equal responsibility as communicators; whereas from the researcher's point of view, the whole episode is seen as almost totally dependent upon her understanding alone.

Braunwald explains the episode in the report:

...the communicative outcome is almost entirely dependent upon the listener's ability to interpret the child's intention on the basis of her knowledge of the situation. (p. 254)
(see Footnote 26)

A more accurate description would point to the fact that the child sent messages to the mother who received them and responded appropriately.

Discussion

Some might object that the application of sign-sentences to the Braunwald study (1983) is "putting words into an infant's mouth" who cannot speak. However, language is merely a tool for expressing knowledge and ideas more efficiently. Although Cheryl may not speak, research shows that infants may acquire much knowledge (Hetherington & Parke, 1986; Ingram, 1989; Kagan, 1987; Neisser, 1976; Worobey, 1989). Judging from her behavior, sign-sentences may already be established in Cheryl's "receptive language." The fact that Cheryl's ideas are unspoken should not deprive her of validation as a communicator. Observers of this episode would surely agree that Cheryl knew what she saw and saw what she wanted. How did these facts become known? Cheryl communicated them.

Braunwald's subjective perspective of nonverbal communication seems to be a common one for most researchers as well as laypersons. The nonverbal sender may be denied as such, which leaves the message denied also by fully or partially ignoring it. It is almost as if the listener or observer were feining ignorance or unawareness. DeVito (1985) explains "feining" by pointing to the instance of the teacher who ignores the student looking out the window. Of course, feining unawareness may be acceptable or even necessary in everyday interaction, but in studies of nonverbal communication, research must demand the greatest objectivity possible.

FINAL SUMMARY

White (1982) has supported her theory of the phylogentic inheritance of communication by identification of parallel phases of development in mammals including the human child. Her phases are corroborated in a general way by Gesell's (1946) descriptions of the developmental periods of growth in human children. These growth stages are still used today by child development specialists, and the episodes observed in the laboratory study have provided examples of these phases in preschool children. White's hypothesis that language develops from nonverbal communication has been demonstrated by Carroll (1986) with a synthesis of studies showing how nonverbal communication of the child develops into verbal communication (Clark & Clark, 1977; Greenfield & Smith, 1976; Scollon, 1976). Congruence of "Known information" and "New information" was analyzed in the laboratory study to explore the work of Carroll (1986).

More specific support for phylogentic inheritance of intentional communication ability in human children has been demonstrated by Savage-Rumbaugh (1991) in providing human cultural contextual formats with successful results in apes. The work of Savage-Rumbaugh (1991) not only supports White's (1982) ethological view, but also reinforces the theory of Ochs (1986) that cultural knowledge and linguistic knowledge are not separate, but parts of the same acquisition process

because it was in the cultural context of human routines such as "preparation of the bottle," "going outdoors," "diaper changing," etc. that the apes developed their communicative and language abilities.

The work of Savage-Rumbaugh (1991) also appears to have dispelled the hypothesis of Chomsky (1957, 1980, 1983) that the innateness of language is species-specific. Perhaps the upper level of development of language, the growth of language into more complicated transformational language is species-specific. But it certainly appears that the cultural context is the triggering facilitator for language development and, since anthropoids will never live in the human culture as human children do, except in experimental conditions, the full range of their developmental abilities may never be known.

Even without the provision of the learning process of cultural routines, Knapps and Hall's (1992) reports of the inborn sensitivity of newborns to language where babies 12 hours old tended to demonstrate correspondence of body movements to the rhythms of human speech (Condon & Sander, 1974) and the imitative abilities in facial expressions (Meltzoff & Moore, 1977, 1983a, 1983b) support the theory of predisposition for language and nonverbal communication. Also Knapp and Hall's acknowledgment of similarities in facial displays to primate relatives as shown by Pitcairn and

Eibl-Eibesfeldt (1976) and cultural universals based on phylogenetic adaptations (Eibl-Eibesfeldt (1987) and their link with emotions (Ekman & Friesen, 1969) are all in accord with the developmental perspectives of White (1982) and Savage-Rumbaugh (1991).

Deep structures, the innate essence of simple sentences, which are thought to be species-specific by Chomsky (1957, 1980, 1983), appear to be phylogenetically inherited. These structures which provide comprehension and production abilities for language have been demonstrated in the Preferential Looking Paradigm by Hirsh-Pasek and Golinkoff (1991). Their goal was to investigate the understanding of simple sentences in infants. They showed that, indeed, infants do understand verbal messages in simple sentences. And by so doing, they inadvertently also showed that infants do understand the nonverbal behavioral displays which correspond to those verbal sentential messages. Also, although they did not acknowledge it, they accepted the child's "nonverbal communication" (looking at the proper television monitor to match the verbal message) as the "correct answer."

It follows, then, that the comprehension of the verbal sentence can be supplied by the child for the corresponding behavioral display which acts as a sign for the sentence, and the child may send messages nonverbally as signs which

communicate. Translations for nonverbal behavior similar to the verbal sentences used by Hirsh-Pasek and Golinkoff (1991) have been provided by Frazier (1992) for the nonverbal dance of a children's reading group analyzed by McDermott et al (1981). Translations have also been provided for a nonverbal study by Braunwald (1983) for a prelinguistic child.

Although objections may be raised by linguistic followers of Chomsky (1957) who believe that language is species-specific and deny nonverbal communication as part of the language; and, in spite of objections of nonverbal researchers who advocate theories such as Wiener et al. (1972) (Burgoon, 1985; Ekman & Friesen, 1969), and who base meaning of behavior on vocabulary alone, such translations are offered as a viable decoding and encoding device for nonverbal communication. The structural meaning of formats as advocated by Kendon (1972), Birdwhistell (1970), Schefflen (1968), McDermott et al. (1981), and Wittgenstein (cited in Hartnack, 1986) cannot be denied. Though they individually view structure from their different perspectives, they all attest to the fact that true meaning is in the structure of behavior rather than in merely a nominal process. That the structure of the format is dependent upon the structure of communication has been shown by McDermott et al. (1981), Savage-Rumbaugh (1991), and Bruner (1983) from their different perspectives. On the basis of this theoretical

support, Sign-sentence theory proposes to provide a link which integrates verbal and nonverbal communication, a link which is vital to understanding human communication (Knapp et al., 1978). It is expected that sign-sentence translations can become the basis for further research in transformation of meaning of nonverbal communication.

Final Discussion

Sign-sentence theory proposes to translate nonverbal behavioral display by using the corresponding simple sentence for the display as its coded meaning. It is limited to face-to-face interaction in the context of a format. It is also currently limited because it does not provide for transformation of sentences into more complicated ones. However, based on the transformational approach to the description of the language provided by Chomsky (1957), it appears that once the basic meaning of the behavior is coded as a simple sentence, further transformations of upper levels or surface meanings may be revealed through organized transformational rules. These rules should be defined according to the context and functions or goals of the context. The patterns producing transformations may be as complex as Schefflen's (1968) configurations. Some directions for these organizational definitions may be ascertained from the various supporting theories already provided. A simple beginning point might be to look at the communication path for a child. In the beginning, there would be few

restrictions from the environment placed on the communicative processes of the child, but soon cultural and other format restrictions would become part of the interaction. To get an idea of how the communication process would work from birth, we may identify beginning knowledge of the child, add cultural constraints, and other requirements of formats; for instance, the functions of nonverbal communication as identified by Burgoon (1985) might be included. The developmental path might proceed in this manner:

1. Every human child is born with innate sentential knowledge which is phylogenetically inherited.
 2. Every human child is born with innate comprehension ability of nonverbal behavior.
 3. Shortly after birth, deep structural knowledge develops further through interpersonal interaction with others.
 4. Sometime during the first year, comprehension of simple sentences can be said to exist.
 5. Sensory reception (e.g., seeing an image of body movement {sentence-sign}) will produce in the receiver child the corresponding sentential meaning {sign-sentence}, or the child will produce sentence-signs to portray meaning and initiate communication..
 6. Additional sentence-signs may be combined to produce additional sign-sentences.
 7. Cultural knowledge will be noted as acceptable or unacceptable.
-

8. Functions will be identified. Burgoon (1985) lists:
"facilitation of cognitive processing and learning,
expression of emotions and attitudes, impression formation
and management, relational communication, deception, social
influence, and the structuring and regulation of
interaction." (p.382)
9. Formats or routines and goals will be identified within
the functional context (e.g., The goal of a reading group is
to have a reading lesson together).
10. An initiation or a response will be encoded or decoded in
sentences and/or sentence-signs.

A flow chart for communication for a child might be similar to the one shown in Figure 1. The directional path for deriving surface structures from deep structures and their further transformations should be the same or similar for encoding and decoding. As the child matures, the nature of the system components or elements would change (e.g., less cultural knowledge or more cultural knowledge), and more organizational components would be added. For an adult, if using Burgoon's functional elements, all might be included.

If research reveals the transformations made as the child matures, some will be, no doubt, obligatory and some optional. Some will be the same in all settings; others will be different in different settings. If these are developed according to the developmental stages in the child, it may be possible to see how the cultural knowledge develops along

with linguistic knowledge. For instance, what cultural rules does the child first learn? How do these transform with later learning? As the child matures and the decoding-encoding system matures, what elements change? What stages introduce new functional elements? Is there a stage in life where some functional elements are deleted? On what does the rate of growth depend? How do the systems at the end of the life span compare with those at the beginning? How do interactants' systems change through interaction? Some of these questions have already been answered from a sociological, educational, anthropological, or psychological point of view. But until they are answered from the perspective of communication development, the answers will be incomplete. And this perspective cannot be totally valid unless it begins with the communication development of the child from birth.

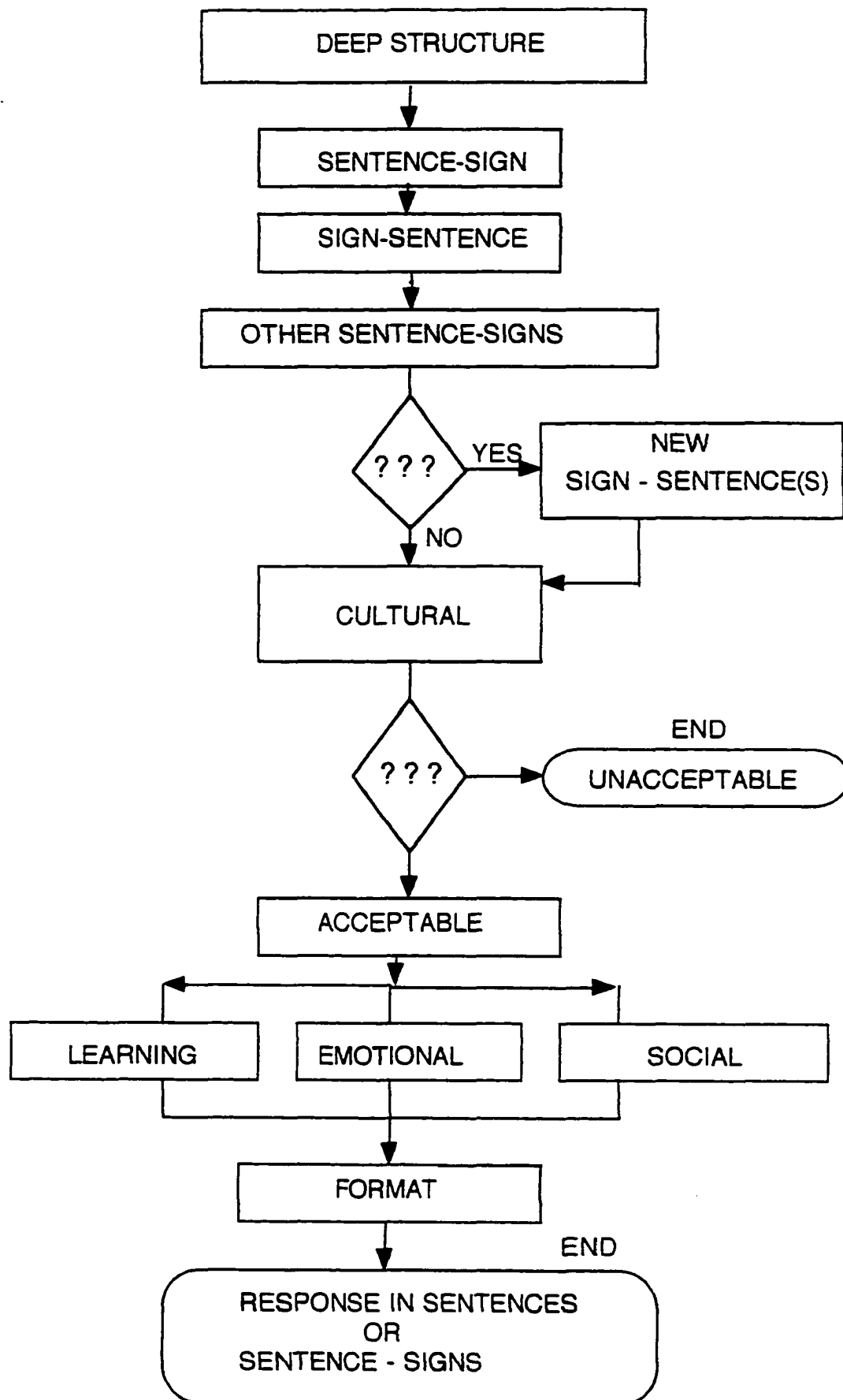


FIGURE 1:
CHILD'S COMMUNICATION SYSTEM -
From Deep Structure to Response

Footnotes

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¹²The definition of "translate" as used here will be the definition provided by The Oxford English Dictionary (2nd ed.). (1989). Oxford: Clarendon Press.

3. fig. To interpret, explain; to expound the significance of (conduct, gestures, etc.); also to express (one thing) in terms of another.

This definition is used in an effort to distinguish the use of the term as used from that of changing one language into another.

¹³From "Nonverbal Behavior and Communication" by M. Wiener, S. DeVoe, S. Rubinow, and J. Geller, 1972, Psychological Review, 79(3), pp. 185-214. Copyright 1972 by the American Psychological Association, Inc. Reprinted by request for permission.

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A P P E N D I X A

Note. From "Criteria for an Ethnographically Adequate Description of Concerted Activities and their Contexts" by H. P. McDermott, K. Gospodinoff and J. Aron, 1982, in R. W. Casson (Ed.), Language, Culture, and Cognition (pp.377-399), New York: Macmillan. Copyright 1982 by Macmillan Publishing.

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UMI

A P P E N D I X B

PATH OF CHILD'S DEVELOPMENTAL TRANSLATIONS

Scollon's (1974) example of Carroll's (1986) third stage is reproduced here. Probable antecedent stages are added to illuminate the child's translations from nonverbal language to verbal language as s/he matures. Given for each stage: 1. Known Information; 2. New Information.

First Stage (Nonverbal/Nonverbal)

1. Child waits until adult is looking at the fan.
2. Child points to the fan.

Second Stage (Nonverbal/Verbal)

1. Child points to the fan.
2. Child says, "Cool."

Third Stage (Verbal/Verbal)

1. Brenda: Fan (looking at the electric fan). Fan
Mother: Hm?
Brenda: Fan
Mother: Bathroom?
Brenda: Fan.
Mother: Fan! Yeah!
 2. Brenda: Cool!
Mother: Cool, yeah. Fan makes you cool.
-