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The interplay between social and linguistic knowledge in perspective-taking by autistic children

Geller, Elaine Fleisher, Ph.D.

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300 N. Zeeb Rd.
Ann Arbor, MI 48106

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THE INTERPLAY BETWEEN SOCIAL AND LINGUISTIC KNOWLEDGE IN PERSPECTIVE-TAKING BY AUTISTIC CHILDREN

by

ELAINE FLEISHER GELLER

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

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April 25, 1989
Date

Margaret M. Lahey
Chair of Examining Committee

April 25, 1989
Date

Irving Hardesty
Executive Officer

Dr. Judith Duchan

Dr. Joel Stark

Dr. Louis Gerstman

Supervisory Committee

The City University of New York

Abstract

THE INTERPLAY BETWEEN SOCIAL AND LINGUISTIC KNOWLEDGE IN PERSPECTIVE-TAKING BY AUTISTIC CHILDREN

by

Elaine Fleisher Geller

Advisor: Professor Margaret Lahey

The primary purpose of this investigation was to explore dimensions of social-cognitive knowledge in verbal autistic children. Specifically, linguistic (deixis and presuppositions) and non-linguistic (perceptual) perspective-taking skills of five school-aged autistic children were studied. The children were studied in a range of communicative contexts which included modifications in the listener (i.e., naive versus knowledgeable), physical-perceptual (i.e., presence and absence of physical supports) and linguistic context.

The children selected for this study were verbal autistic children whose MLUs were beyond 3.0 morphemes and who evidenced non-verbal cognitive skills within borderline to normal limits.

The results of this study revealed that the autistic children exhibited varying degrees of competence in aspects of linguistic and non-linguistic (perceptual) perspective-taking performance.

In terms of linguistic perspective-taking, the autistic children produced a range of person, object and place deictic categories. All children demonstrated the ability to clearly code non-contrastive and contrastive person deictic forms and non-contrastive object and place deictic forms. The children's communicative deictic performance reflected their ability to establish joint attention and reference with the listener, their knowledge of conversational roles and awareness of self versus other within these roles.

The children's presuppositional skills varied relative to the particular language index being assessed. All children made some modifications in language relative to naive versus knowledgeable listener contexts. Differentiation of the disparate listener contexts was seen on quantitative measures (such as increased frequency of talk with the naive listener) and on some qualitative measures (such as increased use of new nouns with the naive listener). All children demonstrated difficulty in being informative when sharing experiences with naive and knowledgeable listeners.

In terms of non-linguistic perspective-taking, a continuum of skills were seen with excellent to minimal visual perspective-taking performance. When language was introduced on one visual perspective-taking task,

the presence of language enhanced some children's perspective-taking performance and it hindered other children's performance.

Finally, intra-subject and inter-subject variations were seen in all dimensions of perspective-taking studied. The considerable variation found in the children's performance indicates that individual differences need to be carefully considered in future research studies.

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CHAPTER I

INTRODUCTION

Social cognition can broadly be defined as the study of how children conceptualize other people and how they come to understand other's feelings, viewpoints and intentions (Shantz, 1975). One of the classic features of childhood autism is a pervasive social-cognitive impairment. It has been hypothesized that one crucial social-cognitive deficit in autism involves a lack of knowledge of other people characterized by an inability to take another's perspective or have a "theory of mind" (e.g., Baron-Cohen, 1988; Volkmar, 1987).

To date, only a few studies have explored autistic children's social-cognitive knowledge (e.g., Baron-Cohen, Leslie & Frith, 1985; Hobson, 1984). Researchers have postulated that an understanding of autistic children's perspective-taking abilities may shed light on these children's underlying social-cognitive deficits (Hobson, 1984; Rutter, 1983).

A second characteristic feature of childhood autism involves pervasive linguistic and communicative impairments. In spite of growth in certain language domains over time, aspects of language that are highly dependent on social knowledge (such as deixis and presuppositions) appear to remain poorly developed in

autistic individuals (Baltaxe, 1977; Rees, 1984). It appears that deficits in social-cognitive development may interface with, and be reflected, in language impairments in autism, or vice versa.

Perspective-taking affords researchers a framework in which to assess dimensions of autistic children's social-cognitive knowledge of other people. The primary purpose of this research was to explore linguistic and non-linguistic domains of perspective-taking performance in autistic children and further, to assess how perspective-taking abilities interrelate with autistic children's social-affective relatedness and communicative functioning.

CHAPTER II

REVIEW OF THE LITERATURE

An interest in children's communicative abilities naturally leads to an interest in understanding their social-cognitive knowledge of the world. The study of pragmatics broadens the view of communication toward the social dimension (Prutting, 1982) and in fact, (pragmatics) prioritizes one type of cognition--namely, social knowledge (Craig, 1983).

Social cognition can broadly be defined as the study of how children conceptualize other people and how they come to understand the thoughts, feelings, intentions and viewpoints of others (Shantz, 1975). Within the domain of social cognition, children's perspective-taking is considered a prototypical social-cognitive skill (Selman, 1971) that has been postulated to be inherently related to communicative knowledge (Flavell, Botkin, Fry, Wright & Jarvis, 1968; Krauss & Glucksberg, 1969; Piaget, 1926).

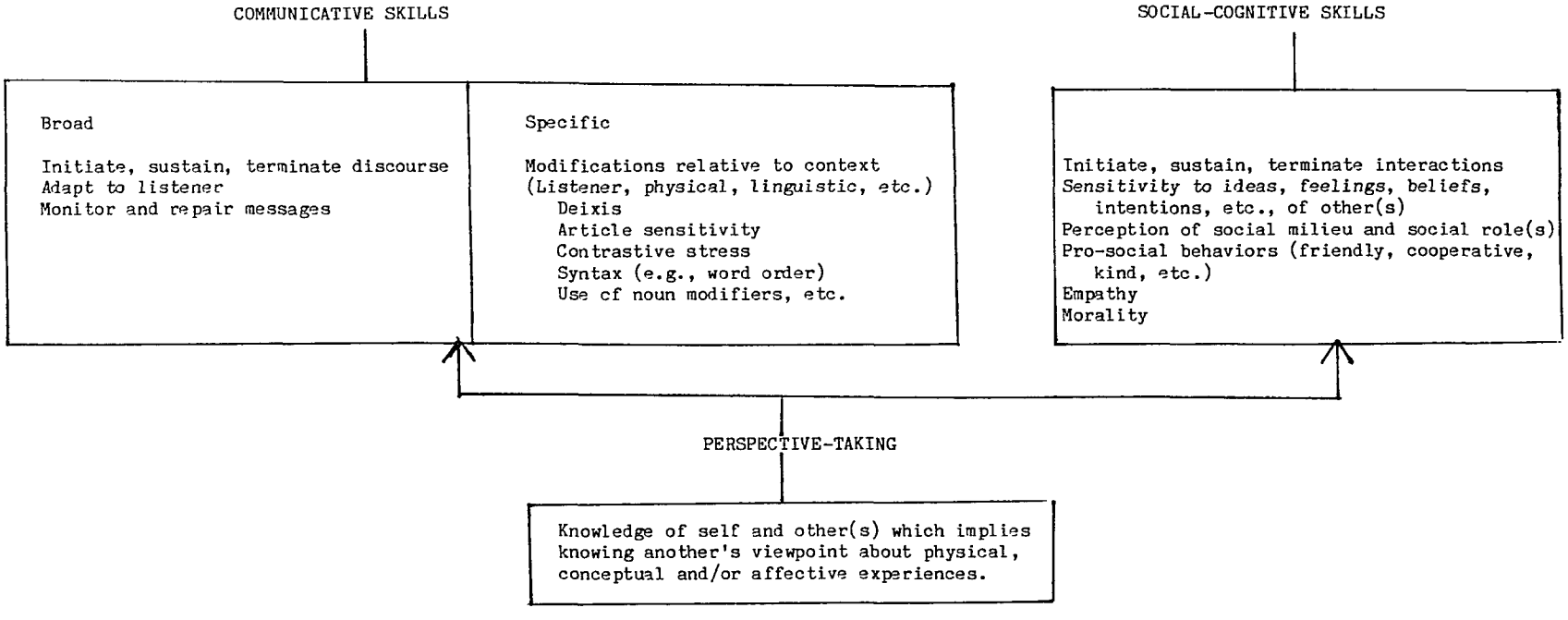
Broadly, perspective-taking can be defined as an understanding of the nature of the relationship between the self's and other's viewpoint (Selman, 1974). It is "explicitly social-interpersonal in that it requires the ability to infer another's capabilities, attributes, expectations, feelings and potential reactions" (Selman, 1971, p. 1722). Of further

importance, perspective-taking implies not only the ability to differentiate another's viewpoint from one's own but also the ability to shift viewpoints. Phenomena that have been studied and labelled as perspective-taking include egocentrism, role-taking, person or social perception and empathy (Shantz, 1975). More recently, perspective-taking phenomena have been viewed as individuals having a "theory of mind." That is, the ability to impute mental states to oneself and others which implies knowing that other people know, want, feel or believe things (Baron-Cohen et al., 1985).

Perspective-taking abilities appear to be integrally related to varied communicative and social skills. In fact, it has been hypothesized (Bates, 1975; Flavell et al., 1968; Krauss & Glucksberg, 1969) that perspective-taking influences, and interacts with, the development of broad and specific communicative and social-cognitive knowledge (see Figure 1). That is, children's knowledge of self and other and the ability to differentiate another's viewpoint from one's own is implicit in the ability to engage in effective communication and social interactions. Complex relationships exist across domains of perspective-taking and social and communicative abilities. Although no one to one relationships have been mapped between perspective-taking and social and

Figure Caption

Figure 1. Dimensions of communication and social-cognition that interrelate with perspective-taking.


COMMUNICATIVE SKILLS
Broad
Initiate, sustain, terminate discourse
Adapt to listener
Monitor and repair messages
Specific
Modifications relative to context
(Listener, physical, linguistic, etc.)
Deixis
Article sensitivity
Contrastive stress
Syntax (e.g., word order)
Use of noun modifiers, etc.
SOCIAL-COGNITIVE SKILLS
Initiate, sustain, terminate interactions
Sensitivity to ideas, feelings, beliefs,
intentions, etc., of other(s)
Perception of social milieu and social role(s)
Pro-social behaviors (friendly, cooperative,
kind, etc.)
Empathy
Morality
PERSPECTIVE-TAKING
Knowledge of self and other(s) which implies
knowing another's viewpoint about physical,
conceptual and/or affective experiences.

communicative abilities, it has been suggested that perspective-taking knowledge is necessary (i.e., a pre-requisite or co-requisite) to the development of broad as well as specific communicative skills (Bates, 1976; Flavell et al., 1968; Tanz, 1980).

For example, for communication to proceed meaningfully and effectively, speakers and listeners need to take into acccount each other's perspective, and needs. Inferences about one's communicative partner occur constantly during conversational exchanges. In fact when discourse proceeds effectively, the speaker has made the appropriate inferences about the listener; conversely, when communication breaks down, the speaker has failed to make the appropriate inferences about the listener. The facility with which one functions in either social-cognitive or linguistic domains has repercussions for the display of knowledge in the other domain (Shatz, 1977, p. 4). Children's underlying social-cognitive knowledge about other people is closely tied to their linguistic knowledge; and subsequently is reflected in their use of language for communication. Similarly, since many listener adaptations require knowledge of language, children's underlying language knowledge influences their display of social-cognitive knowledge in communication.

Social Cognition and Perspective-taking

Domains of Perspective-taking

Perspective-taking abilities have been studied according to the kind(s) of inferences children are asked to make about another person's viewpoint. Regardless of type, perspective-taking involves children's representations of other people which are covert (or inner) psychological processes. Generally, perspective-taking can be categorized into several broad areas according to the types of inferences that the child must make - perceptual, cognitive (or conceptual), affective and linguistic.

Perceptual Perspective-taking

Perceptual perspective-taking involves children's inferences about another person's perceptual experience(s). This form of perspective-taking reflects children's judgments about what another individual sees, hears, etc., as compared to their own perceptual perspective. Visual perspective-taking is the most frequently studied form of perspective. Researchers are concerned with the child's ability to determine what another person sees and how it is seen when the other person is in a different location than the child (Shantz, 1983).

Conceptual, or Cognitive, Perspective-taking

Conceptual perspective-taking involves children's inferences about another person's thoughts, beliefs and/or intentions. Children's inferences about other people's feelings can be further categorized as affective perspective-taking. In general, these forms of perspective involve individuals making judgments about the internal psychological state(s) of another person.

Linguistic Perspective-taking

Linguistic perspective-taking involves children's inferences about their changing role as speaker and listener that is reflected in their use of a range of language devices. It includes children's ability to modify the form, content and/or use of language relative to the listener. For example, Tanz (1980) suggests that the use of deictic forms in both their microstructure (alternation of forms relative to context) and macrostructure (alternation of speaking turns) reflect demonstrations of perspective-taking skill. Similarly, children's ability to make presuppositions about their listener's needs reflects underlying role-taking skill (Bates, 1975).

Language forms which mark another person's perspective do not fall conveniently into discrete categories of perceptual or conceptual perspective-taking (Tanz, 1980). For example, in the

use of certain language forms (such as deixis) components of the physical context lack constancy as would be seen on perceptual perspective-taking tasks (Tanz, 1980). Further, linguistic perspective-taking does not depend on inferential judgments of the inner state of another person (Tanz, 1980). Thus, linguistic perspective-taking can be viewed as a domain of perspective that is different from, but related to, perceptual, cognitive and affective perspective-taking since it primarily involves the linguistic mapping of speaker versus listener perspectives.

Although theoretical distinctions can be made regarding different domains of perspective-taking, it is clear that perspective-taking involves interrelationships within, and across, domains. For example, visual perspective-taking involves a degree of role-taking as well as knowledge of spatial relations. Conceptual perspective-taking clearly includes skills which are at the core of communicative interactions. For example, barrier communication game contexts (Krauss & Glucksberg, 1969) have been commonly used to assess children's inferences about others (Shantz, 1975). In this context, the speaker-child's ability to clearly, and effectively, enable his listener to identify referent(s) is viewed as a measure of adequate conceptual as well as linguistic perspective-taking skill.

Language is often used as the vehicle to assess perspective-taking abilities. That is, children's viewpoints of others are inferred from their verbalizations. These inferences may under, or over, estimate children's social understanding of others.

Relationships Between Domains of Perspective-taking

One question that has been briefly addressed in the social-cognitive literature involves the developmental relationship among domains (or types) of perspective-taking. Flavell et al. (1968) have hypothesized that visual perspective-taking is evidenced prior to other types of perspective-taking. They have stated that nonegocentrism, or role-taking, emerges first in the concrete sphere of visual perspective relative to objects in the environment. Subsequently, it extends to perspective in the conceptual sense (which depends on less concrete inferences from observations).

Loveland (1984) suggested that knowledge of another's spatial point of view is prerequisite to young children's use of certain language forms. She studied normal children's acquisition of visual (spatial) perspective-taking relative to their acquisition of person deixis and found that a breakthrough in person deixis (I/you) comes about at the time when children learn points of view can differ. She observed a link between children's growing

understanding of visual perspective among persons and their emerging ability to understand speaker's point of view and use certain pronouns to refer to persons. She concluded that understanding spatial points of view is a cognitive prerequisite to children's understanding a speaker's point of view which then governs the correct use of I/you pronouns. She further observed that children stopped making pronominal errors when they understood that visual points of view can differ.

Similarly, Bates (1975) hypothesized that specific aspects of language are dependent upon perspective-taking abilities. That is, that other domains of perspective precede linguistic perspective-taking. Although Bates has not specified a particular type(s) of role-taking, she suggested that role-taking skill is prerequisite to the development of certain language skills such as presuppositions.

In contrast, Tanz (1980) has postulated that language may contribute to children's emergence from egocentrism, and in fact, certain nonegocentric operations are performed in language before they are performed in other spheres (such as visual perspective-taking). Tanz has suggested that language may assist in children's discovery of visual perspective as well as other forms of perspective. Likewise, deVilliers and deVilliers (1974) note that the ability to consider what objects look like from

another's perceptual perspective may not be as important as the child's interactions with others and with objects in the world. That is, dimensions of linguistic perspective-taking may emerge before perceptual perspective-taking and such factors as functional importance may determine which perspective-taking abilities children acquire before others.

In sum, the developmental order and interrelationship(s) among domains of perspective-taking is still unclear. That is, some researchers (Flavell et al., 1968) suggest that perceptual perspective-taking emerges earlier than other forms of perspective. Conversely, other researchers (deVilliers & deVilliers, 1974; Tanz, 1980) suggest that aspects of linguistic perspective-taking may precede the emergence of other domains of perspective-taking.

Perspective-taking and Childhood Egocentrism

One cannot talk about the perspective-taking abilities of children without addressing the concept of egocentrism. Historically, it was within the domain of language that Piaget (1926) first discussed children's cognitive egocentricity. Egocentrism is a state of undifferentiation between self and non-self (Shantz, 1983). Piaget characterized infancy as a period of

"profound" egocentrism. During the pre-school period, Piaget saw children as evidencing less profound egocentrism than in infancy but still exhibiting a lack of differentiation between self and other. Specifically, he argues that there is a lack of differentiation between the child's psychological states (feelings, thoughts) and those of others and assumes that the young child attributes his own thoughts, ideas, feelings, etc., to others. At approximately, six to seven years, Piaget found decreased egocentrism characterized by children recognizing that other people have different thoughts, perspectives, etc., from themselves.

Generally, childhood egocentrism is characterized by Piaget and his followers as children being constrained in their own viewpoint in a narrow and constricted fashion. They are limited by their own thinking so they do not recognize, nor coordinate, different perspectives. It is only when thought becomes more reversible in all cognitive domains, that children move from this subjective centering (namely, egocentrism) to decentering (namely, nonegocentrism) (Hobson, 1980).

In recent years, Piagetian notions about childhood egocentricity have been challenged. A substantial body of literature has accumulated that demonstrates young children's ability to adapt their linguistic and

communicative style based on characteristics of their listeners such as age, role relationship and shared experiences (Maratsos, 1973; Peterson, 1974; Shatz & Gelman, 1973). Thus, from a pragmatic perspective, one might say that from early on young normal children appear to be sociocentric rather than egocentric (Rees, 1978).

Researchers studying infant development have postulated that infants have a differentiated sense of self versus other (and self with other) from the earliest months of life and further, infants can transcend egocentrism during the first year of life (Stern, 1985). Looking at slightly older (pre-school) children, researchers have re-examined Piaget's original perspective-taking tasks which led to his ideas regarding egocentricity. Based on modifications in the content and context of perspective tasks, changes in task procedures have yielded improved performance in pre-schoolers ability to perform nonegocentrically. It has been clearly shown that when the cognitive demands of perspective-taking activities match the child's cognitive level, egocentric responding decreases (Donaldson, 1978). Hence, young children have demonstrated degrees of perspective-taking skill at much earlier ages than Piaget had originally proposed.

To summarize, several important points can be made regarding egocentrism and perspective-taking skill. First, states of nonegocentrism (or decentering) have been observed during infancy (Stern, 1985). For example, infants have some sense of their own versus another's attentional focus and that these two mental states can be similar or different. Thus, appreciating another's visual line of regard and deciphering another's intentional state transcends egocentrism (Stern, 1985, p. 129). Second, normal children's ability to take another person's perspective on perspective-taking tasks is evident in the pre-school years. Egocentricity is not an all or none phenomena. That is, it is not absent and then suddenly present at a certain developmental period. Rather, it is a complex ability that develops gradually (Gelman, 1978).

Third, researchers have found wide variations in young children's performance on perspective-taking activities (Gelman, 1978; Shatz, 1977). Variations in children's performance are related to multiple factors which include: task complexity, familiarity of stimuli, context (experimental and/or naturalistic), type of linguistic input, and nature of response requirements (non-linguistic or linguistic).

Fourth, children's failures on some of Piaget's original perspective-taking tasks (such as the classic Three Mountain Task) cannot solely be explained on the

basis of an inability to switch perspectives. Multiple factors (a lack of perspective being only one) affect children's overall performance (Donaldson, 1978; Shantz, 1975; Shatz, 1977).

Although some Piagetian notions about egocentricity have been seriously questioned, Piaget's ideas have inspired further investigations of the social-cognitive roots of communicative competence. As Hobson (1982) states "it is no longer a matter of whether the young child can appreciate the existence of other perspectives--he clearly can--but rather, what is the quality of this awareness, how fragile is it, and to what extent does it influence behaviour" (p. 44).

Flavell et al. (1968) have proposed a model which outlines a series of cognitive acts involved in learning to infer another's perspective. These cognitive acts include:

1. recognition that child and other have different viewpoints (this is the only phase of perspective-taking skill that has been studied in great detail);

2. recognition that there is a need to make inferences about another person's viewpoint (e.g., usually for some goal such as persuading, winning a game, etc.);

3. making inferences about the other person which "go beyond" the observable social situation; and,

4. application of this knowledge using inferential information to modify one's behavior.

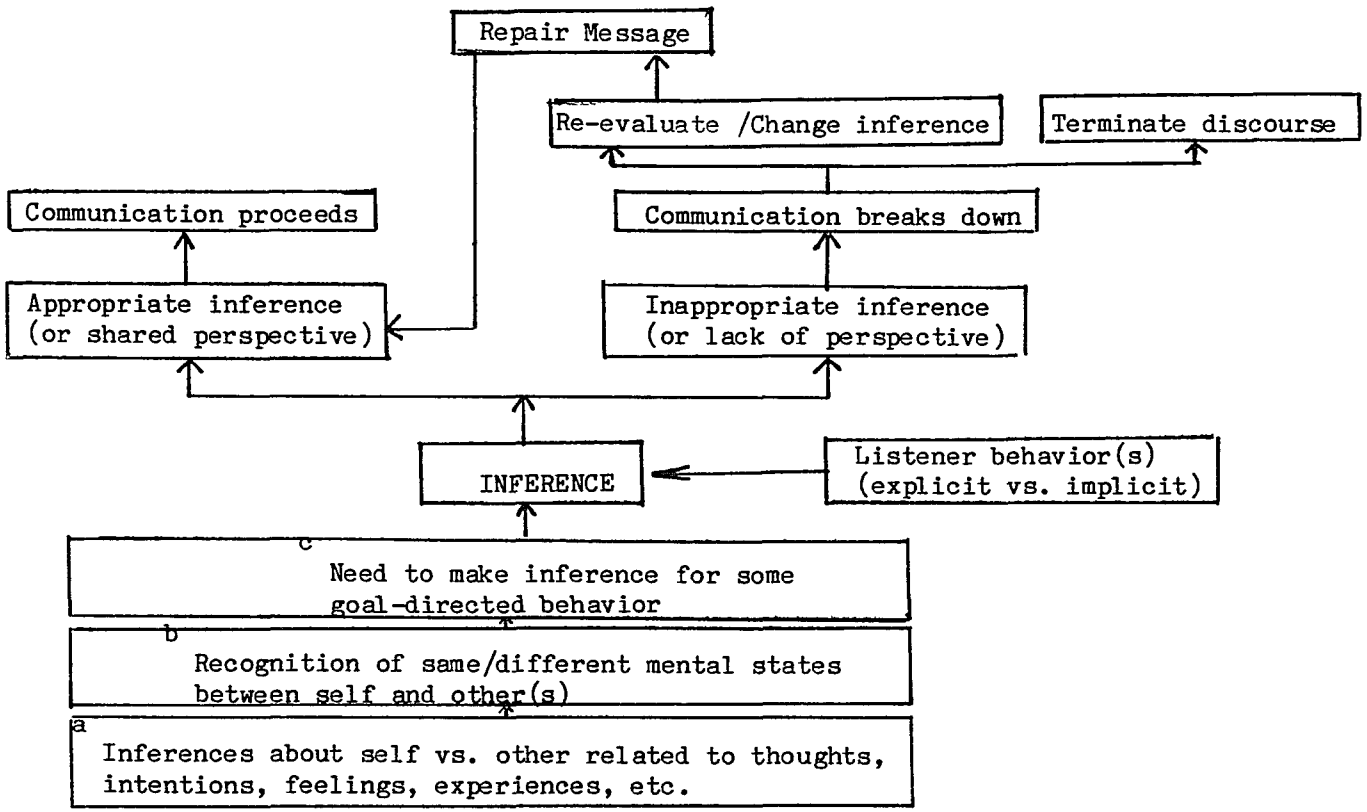
Figure 2 is an outline of this model as it relates to the communication process. As can be seen, the bottom of the figure includes Flavell's sub-categories resulting in a child making an inference about another person. Once the child makes an inference about the listener, a communicative interaction may follow. One important variable which influences inferencing skills relates to the explicitness (or implicitness) of the listener's behavior(s). That is, listener characteristics (such as gestures, actions, etc.) are easier to understand than more implicit behaviors (such as ideas, beliefs, feelings, etc.). Shantz (1983) suggests that taking into account more covert listener behaviors is a later developing phenomena. In sum, children's ability to make inferences about another person relates to recognition of the need to make an inference, the desire to make an inference, the ability to use language effectively to convey an inference, and the type of inference that has to be made about the listener.

Perspective-taking in Childhood Autism

One of the defining features of childhood autism involves pervasive social impairments characterized by problems understanding and coping with the social

Figure Caption

Figure 2. Cognitive processes involved in perspective-taking leading to effective communication.



[a,b,c]Bottom of diagram based on Flavell et al., 1968.

environment regardless of IQ (Baron-Cohen et al., 1985). Although social deficits have been recognized as a major symptom of autism, the study of social features were either neglected or less frequently studied in comparison to cognitive or linguistic aspects of development (Volkmar, 1987).

In recent years there has been increased interest in studying specific dimensions of social functioning in autistic individuals (e.g., Baron-Cohen et al., 1985; Hobson, 1984). In particular, perspective-taking knowledge has been used as a vehicle to delineate aspects of autistic children's social-cognitive impairments. The underlying assumption is that role-taking may offer a measure of particular conceptual skills related to the capacity to engage in social behavior (Hobson, 1984). With this framework (which uses conceptual perspective-taking tasks to see if children can impute other's mental states), researchers can more directly explore patterns of sociocentric development in autistic individuals.

It has been hypothesized that the kind of social knowledge that is impaired in autism is most critical of all--namely, knowledge of other people. More specific information is emerging in the literature regarding specific dimensions of autistic children's social-cognitive understanding of other people. Current research findings seem to fall into three

areas: (a) autistic children display dimensions of social-cognitive knowledge; (b) autistic children lack social-cognitive knowledge; and (c) autistic children attempt to be socially involved but are hindered by other deficits.

From a positive perspective (and similar to young normal children), young autistic children have been found to show appropriate social attachment as evidenced by looking, vocalizing and being in close proximity to their caretakers (Sigman, Mundy, Sherman, & Ungerer, 1986) and direct more social behaviors to mothers than strangers (Sigman & Ungerer, 1984). It has also been observed that young (four-six years) autistic children demonstrate knowledge of self as reflected in their ability to complete self-recognition experimental tasks (Dawson & McKissick, 1984).

In contrast, other studies highlight more pervasive social deficits in autistic children's knowledge of others. Joint attentional deficits have been reported in younger autistic children (Loveland & Landry, 1986; Sigman et al., 1986). On a conceptual perspective-taking task (Baron-Cohen et al., 1985), autistic children's ability to impute beliefs and to predict another's (a doll) behavior were studied. In comparison to normal and mentally retarded children, the autistic children (with a mean non-verbal mental age of 9.3 years which was higher than retarded control

group) could not complete the conceptual tasks accurately. That is, the children were unable to appreciate differences between a doll's perspective and their own. Baron-Cohen et al. hypothesize that autistic children fail to employ a "theory of mind" as evidenced by their inability to infer other's mental states. Similarly, Dawson and Fernald (1987) observed conceptual role-taking deficits (as evidenced by difficulty selecting gifts for different-aged people) in somewhat younger autistic children with lower non-verbal mental ages (mean non-verbal mental age of 5.8 years).

In terms of other domains of perspective, Hobson (1986) found that older autistic children (with a mean age of 14.9 years) lacked the ability to experience empathy as reflected by their inability to appreciate emotional expressions of other people. He suggests that autistic children remain "dimly" aware that other people have feelings (p. 339). Thus, aspects of affective perspective-taking were impaired in this population of autistic individuals. Similarly, others (Langdell, 1978; Rutter, 1983) have also observed a lack of empathy and failure to perceive other's feelings and viewpoints in autistic individuals.

In contrast to the above-mentioned studies, other research highlights autistic individual's apparent social interest in other people but weaknesses in

carrying out specific social/communicative activities. For example, Paul and Cohen (1984) observed that autistic adults responded to clarification requests (similar to matched mentally retarded adults) but were less likely to add additional information that might help the listener. They suggested that their autistic subjects had difficulty grasping what information was relevant for the listener. Geller and Lang (1987) observed that an autistic child modified aspects of language relative to different listeners; but, when the child could not understand the complexity of the listener's input, he fell back on more rudimentary social and linguistic skills (such as maintaining interactions and topics through the prevalent use of imitation). In sum, recent efforts to understand the very nature of the autistic syndrome are concentrating on the interactions among impairments in communication, social and cognitive development (Rutter, 1983).

This study explored two domains of perspective-taking ability in verbal autistic children. Specifically, linguistic and non-linguistic (perceptual) domains of perspective-taking were used as the means to assess aspects of autistic children's social-cognitive understanding of the world.

This review of the literature is organized as follows. Within the linguistic perspective-taking domain, the literature on normal and autistic

children's use of deixis and presuppositions is reviewed. Within the social-cognitive domain, the literature on normal and autistic children's perceptual perspective-taking abilities is explored. Interactions between autistic children's linguistic and perceptual perspective-taking skills are also explored as well as how perspective-taking performance relates to their overall communicative and sociocentric functioning. Finally, the effect of context (listener, physical-perceptual and linguistic) on perspective-taking performance is directly addressed in all of these areas.

Linguistic Perspective-taking

There are few features of language that are not influenced by social factors. Specifically, aspects of syntactic-semantic rules such as the pronominal system, tense markers, article sensitivity, demonstrative and locative features are affected by pragmatic considerations (Prutting, 1982). Two of these linguistic-pragmatic features (deixis and presuppositions) were studied since they are prototypical language areas where usage is highly dependent upon social-cognitive knowledge.

Linguistic Deixis

The single most obvious way in which the relationship between language and context is reflected in the structures of languages themselves, is through the phenomena of deixis (Levinson, 1983). Deixis concerns the ways in which languages encode or grammaticalize features of the context of an utterance, or speech event (Levinson, 1983). Deictic forms directly anchor utterances to the communicative context and provide information that allows the listener to relate the content of the utterance to the relevant context (Rees, 1984). Deictic forms are closely related to definite reference and are important for carrying out discourse related events (Shatz, 1983). Thus, deictic expresssions serve as a meeting point for semantic, syntactic, and pragmatic aspects of language (Wales, 1986).

Traditionally, three categories of linguistic deixis have been explored including: (a) person deixis that involves terms that identify participants in a communicative act; (b) place deixis that involves terms that specify the location(s) in which participants in a communicative act are situated; and (c) time deixis that involves terms relative to the the time at which a communicative act is performed (Fillmore, 1975).

Deictic elements can be expressed in three different ways: gesturally, symbolically, and

anaphorically (Fillmore, 1975). Gestural (or exophoric) usage of deictic expressions means that the deictic form can only be interpreted by monitoring the physical context of the communicative act. Symbolic use of deixis implies that one can interpret a deictic expression by knowing certain aspects of the speech-communication situation. For example, I-you are indices of speaker/listener; this-that are indices of objects; and here-there are indices of place. However, the full meanings of some deictic distinctions involve other contrasts along different variables (e.g., proximity to speaker with place forms). Anaphoric use means that a deictic expression can be interpreted by knowing what other portion of the same discourse the expression is co-referential with (Fillmore, 1975). From a developmental perspective, children move from gestural signalling of referents in the physical context to more anaphoric use of deictic forms relative to the linguistic context.

In addition to the ways deictic reference is conveyed, there are other broad features of deixis. First, all deictic forms are used to direct attention of a listener or observer of a communicative act toward some object or event (Wales, 1986). Second, in communicative use of deixis, the speaker is the central, or pivotal, reference point (Rees, 1984). For example, I denotes the speaker in contrast to the

listener, or some other person; this denotes an object is close to the speaker while that implies an object distal from the speaker. Third, all deictic forms involve shifting reference (e.g., the use of I changes dependent upon who the speaker is at the moment of a communicative act). That is, the conceptual meanings of deictic expressions cannot be tied to any fixed person, place or object (Sharpless, 1985). Fourth, certain deictic forms involve shifting boundaries (e.g., here can be a place next to the speaker, or in the room in which a speaker is talking, etc., while there cannot include the place where the speaker is at the moment of a communicative act). In sum, inherent in all deictic usage is the use of non-linguistic or linguistic forms to direct a listener's attention to a person, object(s), etc., in the context, flexibility in marking changing aspects of the communicative context, and the ability to shift language relative to context.

Deixis and Childhood Egocentrism

One more aspect of deixis is of particular interest--namely, the relationship between deictic usage and childhood egocentrism. As previously mentioned, deictic usage in communicative interactions emanates from the speaker's perspective and involves

directing the attention of the hearer to some aspect of a communicative act (Wales, 1986). It has been hypothesized that the deictic system is the basic linguistic expression of the self-other distinction (Rees, 1984).

Tanz (1980) postulated that "to use deictic terms correctly, children must incorporate perspective as a component of meaning" (p. 7). She proposed that children's use of deictic terms without sufficient linguistic, or extra-linguistic, anchoring is one of the clearest signs of egocentrism. Conversely, children's comprehension of deictic pairs clearly reveals the rudiments of decentering, or nonegocentrism (Tanz, 1980, p.163). Similarly, deVilliers and deVilliers (1974) proposed that children's comprehension and production of deictic pairs reflects their knowledge of another's perspective.

Tanz (1980) further suggests that aspects of language, such as deixis, offer demonstrations of, and exercises in, decentering and role-switching. Thus, children's deictic usage enables researchers to observe children's linguistic mapping of underlying degrees of egocentrism, or nonegocentrism. deVilliers and deVilliers (1974) found early decentration (or nonegocentrism) in children's early use of deictic expressions and suggest that the crucial factor leading to early understanding of other's viewpoints (as

reflected in deixis) may relate to their importance for communication (p. 446).

Loveland (1984) also suggests that a kind of nonegocentrism, disentangling differences between one's own and another's viewpoint, is necessary for children to grasp shifting reference of person terms like I/you. In sum, early pronoun mastery has been seen as evidence of nonegocentrism based on the assumption that the child has transcended his own experiences as participant in the dialogue since he is able to see others in roles he takes as well as seeing himself in other roles (Charney, 1980).

Deixis in Normally Developing Children

Developmental information regarding normal children's acquisition and use of deixis is summarized below relative to person, object and place deixis. Unlike Fillmore's (1975) breakdown of deictic categories, in this study object deixis was distinguished from place deixis. Object deixis involves children's references to objects within or external to the communicative context and place deixis involves references to the location of objects (or people) at the moment of a communicative act. Time deixis was not studied since it did not directly involve speaker/listener perspective.

Person deixis.

The development of person deictic forms has been the most frequently studied area of deixis and has been of interest in many different disciplines. From a psychoanalytical perspective, the emergence of personal pronouns has been viewed as an important index of children's developing sense of self, or identity (Sharpless, 1985). As Mahler, Pine and Bergman (1975) have commented, "we followed children ... to a point where they emerged as individuals in their own right, with a definite sense of 'I,' 'me,' and 'mine'" (p. 220). It has been postulated that the development of identity formation can be illuminated by exploring children's linguistic knowledge underlying pronoun use at different developmental stages (Sharpless, 1985).

From a psycholinguistic perspective, there have been many syntactic studies exploring the emergence of pronouns in young children (Bloom, Rocissano & Hood, 1976; Huxley, 1970). More recent psycholinguistic studies have explored children's acquisition and use of personal pronouns from a pragmatic perspective-that is, relative to children's developing social roles in discourse. In this view, children's knowledge of person forms (such as I/you) is seen as reflective of their underlying knowledge about speaker-listener roles.

Sharpless (1985) suggests that psychoanalytic and psycholinguistic perspectives can be integrated and that person pronouns have a dual function in language. They express concepts of conversational roles (such as speaker, listener and third party) and notions of intrapsychic self and others which are acquired simultaneously. Thus, Sharpless suggests that one's attachment to first person involves a recognition of one's individuality as well as separateness and also a desire to be assertive through communication. Conversely, she suggests that avoiding first person pronouns in referring to self implies that one not only disavows one's selfhood to a degree but also one's wish to assert a personal viewpoint. Further, children's personal pronoun usage may also signal their movement from a dyad to the larger social milieu (Sharpless, 1985).

Numerous studies (see review in Chiat, 1986) have charted children's acquisition of personal pronouns and have found that first person singular evolves early and is closely followed by second person singular. In a longitudinal study of nine children (19-22 months of age), Sharpless (1974) found that by 23-24 months, children appreciated that person pronouns express conversational or social roles (e.g., first person expresses concept of speaker; second person expresses concept of listener; and third person expresses concept

of third party outside the conversational discourse). In sum, young children were coordinating notions of self with others and with conversational roles.

Charney (1980b) found that normal children (1.6 to 2.6 years) learned person pronouns within a dialogue and in relation to their speech-role referring function. She hypothesized and found that children learned pronouns most relevant to themselves as they participate in dialogues. For example, the order of acquisition of pronouns differed relative to the child's speech role. In each role, the child initially learned which pronouns referred to self (i.e., as a speaker, first person preceded second person and as a listener, second person preceded first person). For third person, the child did not code (doll) referents speech role. Early use of third person was doll-referring (or anaphoric) and the child did not understand deictic third person (i.e., as a non-addressed listener).

Based on comprehension and production data, Charney (1980b) concluded that in pronouns children take into account the social context but it is only centered on themselves (i.e., they are aware of speech roles but only when they themselves occupied these particular speech roles). Initially, the child is not aware of the reciprocity of the speech roles that he occupies.

He learns his position relative to others before he learns speech roles can be reversed.

Although normal children acquire person deictic distinctions without much difficulty (Huxley, 1970; Loveland, 1984) instances of pronominal reversals have been seen in some normal children and may reveal important hypotheses about the processes involved in learning the person deictic system. Based on a detailed study of one normal child who exhibited pronoun reversals, Chiat (1982) proposed that children's pronominal use may be plurifunctional. That is, involve not only the normal adult deictic function of pronouns (which are speech role referring) but also some non-adult deictic pronouns which have idiosyncratic functions (i.e., are not simply speech role referring). For example, the child uses you (and yours) to refer to self which probably relates to references made to child heard from other people. As the child is in transition to learning the full adult deictic system, he may reverse certain pronouns in a novel function of shifting from speaker to listener perspective. The phenomena of inconsistent pronoun reversing (e.g., you-your/I) may indicate the child's appreciation of the different speech-roles which pronouns refer to as well as reflect the fact that the child has not developed the full adult perspective-shifting system.

Although this is a rare phenomena, more detailed analyses of the processes of learning pronominal discourse roles in normal development may be of particular relevance to better understanding autistic and blind ((Fraiberg, 1977) children's pronominal problems.

Object and place deixis.

In comparison to person deixis, object and place deixis have received less (longitudinal) attention in the developmental psycholinguistic literature. However, there have been several experimental studies which explored normal children's development of object deixis characterized by the use of demonstrative pronouns (this-that) and place deixis characterized by the use of locative adverbs (here-there). These deictic forms are prototypical in that they highlight two important aspects of linguistic deixis namely, their attention-directing and contrastive spatial functions (Wales, 1986).

In this study, object deixis was defined as the use of specific language forms (such as this and that) to refer to an object in a given context where the meaning of these forms primarily identifies the object; the secondary meaning is a proximal/non-proximal distinction between speaker and object. Place deixis primarily involves specification of the location of an object (or person) relative to the speaker's position

and the spatial distinction is primary to the meaning of these forms (such as here and there).

Developmentally, it has been suggested that deixis originates pre-linguistically on a gestural level (Bates, 1976; Bruner, 1975). Early on infants use pointing, gazing, and showing to get the listener (namely, the caretaker) to attend to an object or place of interest in the environment. This could be interpreted as direct evidence of infants nonegocentric behavior during the first year of life.

Bruner (1975) has postulated that linguistic deixis (or reference) has its beginnings in the infants use of gestural, postural, and vocal procedures which evolve out of prelinguistic capacities for sharing attention. Infants use these primitive forms of indicating to accomplish joint attention and focus between themselves and their caretaker. Further, Bruner sees spatial deixis (as well as person deixis) as originating in the infants learning how to follow the mother's line of regard to jointly reference an entity. According to Bruner, a mastery of this mutual referencing system between mother and infant is necessary for the later development of linguistic reference.

Children's early notions about linguistic reference and deixis emerge during the first year of life and appear to be based on infant-mother reciprocal exchanges. In these social contexts, infants learn:

(a) to gain and direct another's attention with gestures; (b) the reciprocal roles of speaker-listener; (c) to separate self from other; and (d) some rudimentary notions about taking another person's perceptual standpoint, or perspective. The sort of referential activity that would be most compatiable with the emergence of linguistic deixis would relate to exophoric reference (Shatz, 1983).

Young children's earliest words contain object and place deictic expressions. These early forms (such as this, that, there) are semantically encoded as existence, or nomination. However, early use of these deictic forms serves an attention-directing, or quasi-referential, function and children are not making true deictic distinctions such as proximal/non-proximal contrasts (Lund & Duchan, 1983). Although these deictic forms are not fully developed in meaning, they are an important presence in language from the start (Wales, 1986). In time, children use these forms not only to name but also to refer to entities.

Early language use is highly dependent on the immediate physical-perceptual environment and these early developing forms are used in a highly contextualized manner (i.e., exophoric in nature). To interpret these forms, the listener has to explore the immediate physical context. As children's language becomes less situationally contingent, their deictic

expressions need to become more linguistically contingent (i.e., decontextualized from the current "here and now"). Both forms of contingency, situational and linguistic, are evident with deictic use.

Several researchers have explored children's early development of linguistic contingency, or what Fillmore (1975) defines as discourse deixis--communicative acts which refer to portions of an ongoing discourse. Most notably is the classic study by Bloom, Rocissano and Hood (1976). The children's earliest forms of linguistic contingency were repetitions (the child repeats part or all of a prior adult utterance) with recodings (that is, a change in form without a change in meaning). Early recodings (M.L.U. <2.0) involved shifts from nominal coding (in adult's utterance) to pronominal codings (in child's utterance). At 2.0-2.75 morphemes, shifts for person pronouns occurred; later (4.0 morphemes), demonstrative (this, that) and locative (here, there) shifts occurred.

In contrast to developmental observations described above about single term noncontrastive pronoun forms, researchers have focused on when children learn to completely comprehend (and produce) contrastive deictic meanings. deVilliers and deVilliers (1974) were among one of the first researchers to explore pre-school children's comprehension and production of particular

deictic pairs. Within deictic tasks, they found that three-four year olds comprehended the speaker's perspective with those deictic terms that required translation from another's to one's own perspective while four year olds produced deictic contrasts appropriate to the listener's perspective. From three years and up, the children easily comprehended and produced the deictic forms my-your; production of this-here was better than that-there. By three and a half to four years, the children produced object and place contrastive pairs at least .75 - 1.00 correctly. At four to four and a half years, comprehension of distal pairs was better than proximal pairs.

Similarly, Tanz (1980) explored pre-school children's (2.6 to 5.3 years) comprehension of object and place deictic pairs. Unlike deVilliers and deVilliers (where only one correct response for a pair was considered mastery), Tanz criterion for mastery was a perfect score on comprehension of both terms of a deictic pair (in two responses). With this criterion, only a small proportion of Tanz' youngest subjects comprehended all deictic meanings. The oldest subjects (4.9 to 5.3 years) usually comprehended at least one deictic pair but not all the pairs presented. In terms of object contrasts, .60 of 4.1 to 4.8 year olds and .50 of 4.9 to 5.3 year olds comprehended the full contrast (this versus that). For place deixis, .30 of

4.1 to 4.8 year olds and .60 of 4.9 to 5.3 year olds comprehended both place forms (here versus there).

Unlike deVilliers and deVilliers, Tanz found that her subjects made more errors in the comprehension of distal rather than proximal members of each pair. She postulated that object-place deictic pairs are acquired over a lengthy period of time which seems to stretch to at least eight years. Although children learn person deictic forms early on, their difficulties with other deictic categories is probably a result of the increased semantic and pragmatic complexities involved in using object and place terms.

Tfouni and Klatzky (1983) also studied children's comprehension of the deictic pairs this-that and here-there. Unlike the experimental designs used in the above studies, these researchers looked at children's comprehension of deixis under different contextual influences. They assessed children's comprehension of deictic forms: (a) where the experimenter used a pointing gesture (pragmatic condition); (b) without accompanying gestures (semantic condition); and (c) in different conversational roles (such as listener-addressee versus listener-spectator). Their subjects ranged in age from 2.11 to 4.2 years (with a mean age of 3.6 years) and they found that the pointing gesture facilitated children's comprehension of all deictic terms; thus, in their pragmatic

condition, deictic terms were comprehended even earlier than 3.6 years. However, within the semantic condition (no gestures), these deictic terms were not fully acquired at the mean age (3.6 years) of the children studied. Similar to deVilliers and deVilliers (1974), they also reported that this and here were more difficult to comprehend than that and there. In sum, they concluded that the rule for use (i.e., their pragmatic condition) is acquired before linguistic knowledge (i.e., their semantic condition).

Finally, Clark (1978) and Clark and Sengul (1978) studied children's mastery of object and place contrastive deictic forms in comprehension. They postulated that children's development of a deictic system emerges in three stages. In the first stage, there are no contrastive meanings involved in deictic comprehension. Young children comprehend one member of a deictic pair for both meanings of the pair (e.g., that indicates any object close and far from child). During the second stage, partial contrastive deictic comprehension emerges. Children start to make incorrect (or inconsistent) hypotheses about how the meanings of a deictic pair are related or non-related. In the third stage, children comprehend contrastive deictic pairs meaningfully and appropriately (e.g., that only refers to distal objects).

Mastery of specific deictic categories in comprehension relates to the degree of boundary of the deictic category (Clark, 1978; Clark & Sengul, 1978). That is, person deictic categories have more definite meanings and absolute boundaries in comparison to object and place categories which have more indefinite (or shifting) meanings and less absolute boundaries. Person forms are comprehended early, followed by mastery of contrasts between place deictic forms (here and there) at around five years of age and contrasts for object deictic forms (this and that) shortly afterwards. The literature on comprehension of proximal-distal distinctions reveals differences across studies and warrants continued investigation.

Finally, it should be mentioned that the locative forms front and back have also been explored in deictic research. These locatives have both non-deictic meaning (relative to the nature of an object itself) and deictic meanings (relative to speaker-listener positions in space). Generally, children learn the non-deictic meanings of these lexical items prior to learning their deictic meanings. Both meanings are used by four years of age (Johnston & Slobin, 1979; Kuczaj & Maratsos, 1975; Tanz, 1980).

To summarize, Clark and Sengul (1978) found that children's comprehension of deictic contrasts involved mastery of person pronouns, followed by

locatives, followed by object-demonstratives. Tfouni and Klatzky's (1983) work supports these findings relative to object and place forms. Tanz (1980) found that the order of deictic acquisition was person pronouns, followed by deictic front and back, followed by demonstratives and locatives. deVilliers and deVilliers (1974) did not address the issue of order of acquisition but found earlier production as did Bloom et al. (1976) regarding deictic shifts. For production, children move from pointing gestures to production of deictic words but when they master full deictic contrasts is not clearly documented in the literature.

One criticism that applied to all the above-mentioned studies is the limited contexts in which deictic comprehension was assessed. Only Tfouni and Klatzky studied children's deictic comprehension in varied contexts. Deictic development (both comprehension and production) should be explored in natural discourse as well as in experimental contexts. Only Bloom et al. (1976) reported data on deictic shifts that involved naturalistic and non-elicitation contexts. As Lund and Duchan (1983) state, the contexts in which deixis is assessed and/or used affects children's display of knowledge--at least at young ages before mastery is complete. Similarly, Warden (1976) has noted that the physical presence of

referents and audience may encourage use of different types of reference (namely, indefinite and definite). Extending Warden's observations to the study of deixis, young children's use of different types of deixis might more readily be seen when the referent is both present and absent and/or the listener-audience is both present and absent.

Deixis in Childhood Autism

The same specific deictic domains such as pronominal use, demonstrative and locative features, article sensitivity, etc., which are affected by pragmatic factors (Prutting, 1982) have been hallmarked as classic characteristics of autistic language impairment. Further, in spite of growth in certain language areas, autistic children continue to struggle with the use of these linguistic elements (Baltaxe, 1977; Caparula & Cohen, 1983; Yudkovitz, Lewison & Rottersman, 1975).

Person deixis.

One of the classic features, or symptoms, of autistic language has been difficulties with the acquisition, and use of, person deixis. Historically, problems with person deixís have been viewed as reflective of underlying social, or psychological, versus cognitive and/or linguistic deficits in autistic children (Bettelheim, 1967; Charney, 1980; Churchill, 1972; Fay, 1979). Dependent on one's theoretical

perspective, this feature of autistic language has been used to support or refute theoretical viewpoints on the nature of autism. [1]

From a psychoanalytic perspective, person pronominal difficulties were viewed as evolving from a severe psychopathology and/or faulty ego development. Bettelheim (1967) proposed that autistic children consciously avoided pronouns as a defensive reaction to the world. Weiland and Legg (1962) noted that psychotic children used significantly smaller percentages of first person plural pronouns (we) and suggested that shared social experiences have less significance for these children; and therefore, the authors argue that the children are less prone to use language forms to identify such experiences. Generally, "these early theories emphasized psychogenic etiologies and social deficits were viewed as attempts to avoid painful or distressing life experiences" (Volkmar, 1987, p. 54).

More recent social perspectives (somewhat similar to psychoanalytical viewpoints), view person deictic difficulties as representative of problems with self-other differentiation. That is, autistic children are said to have deictic problems because they are impaired in social relationships and particularly, in their perception of self within these relationships.

Several researchers have argued that this social deficit, characterized by a lack of individuation, directly interferes with autistic children's development of person deictic elements (Charney, 1980). Rees (1984) proposed that the origins of self-other differentiation may also be the origins of deixis. Thus, children whose development of self is uncertain, or unstable, may fail to develop complete control of the linguistic deictic system. Perhaps, variations in children's degree of self-other involvement will be reflected in variations in degree of language impairment (Rees, 1984).

Similarly, person deictic difficulties may evolve from an inability to appreciate another's social point of view (Fay, 1979; Ricks & Wing, 1975). More specifically, Loveland (1984) proposed that the social unresponsiveness of autistic children may make it particularly hard for them to grasp reciprocal relations involved in core use of person deictic forms (such as I/you). She suggests that the basis for children's acquisition of person deixis may be sought in children's efforts to disentangle the differences in their own versus another's point of view on the concrete spatial level.

In sum, some researchers highlight the social (or psychological) underpinnings of autism, that are in turn, reflected in these children's difficulties with

person deixis. Other theorists have highlighted the non-social underpinnings of autism again using pronominal deficits as support for their viewpoints. For example, early on, Bartok and Rutter (1974) found that use of pronoun reversals was based on the sentence position of pronouns and the tendency of autistic children to be echolalic. Thus, they pointed out that a language deficit was a key factor in these children's pronominal difficulties.

Fay (1980) took this one step further and suggested that autistic children's echolalic behavior was the end-product of a basic underlying comprehension deficit. Other researchers have proposed an underlying severe language deficit (Churchill, 1972) or a more central cognitive deficit (in coding, extraction and/or organization of incoming information) that impairs all behavior (Hermelin, 1976; Hermelin & O'Connor, 1970; Rutter, 1978).

Fay (1979) incorporates both social and non-social hypotheses suggesting that pronominal usage requires both self-other differentiation and the ability to maintain joint attention both of which are lacking in autistic children. To summarize, autistic children's problems with person deixis have been viewed as reflective of (a) a lack of self-other differentiation; (b) problems in perspective-taking; and/or (c) underlying cognitive or linguistic deficits. Support

for some of these hypotheses may be found by studying dimensions of autistic children's perspective-taking knowledge in relation to their use of person deixis.

Object and place deixis.

One of the earliest studies demonstrating deictic deficits in autistic children was completed by Bartolucci and Albers (1974). Although they did not study person, object or place deixis, they found significant differences between autistic children's coding of time deixis (past tense) relative to normal and mentally retarded children. The importance of this early work was the notion that autistic children's problems in mastering pronouns was only one aspect of a more general problem--namely, the development of deictic syntactic categories. That is, since pronouns are not a self-sufficient syntactic system, they should not be looked at in an isolated manner.

In a later study, Bartolucci, Pierce and Streiner (1980) found that autistic children had difficulty using grammatical morphemes (such as time markers, articles, third person forms, etc.) in different social contexts. In both studies, they suggested that autistic children's atypical development and use of morphological forms resulted from a semantic deficit particularly in the area of deixis. That is, the children could not make the connection between specific

semantic aspects of language (such as coding time) and the appropriate morphological markings.

Other researchers have observed pronominal problems in autism beyond problems with person pronominal forms. Cunningham (1968) noted psychotic children's pronominal problems (not specific to person elements) that resulted in doubtful recodings by a listener. He further observed that psychotic children had problems with clear referential language use that relates directly to appropriate use of deictic elements.

Based on longitudinal observations of a small group of bright, and verbal, autistic individuals, Caparula and Cohen (1983) hypothesize that "the disturbances in understanding prepositions and other spatial relationship terms, and in understanding personal pronouns, are epiphenomenal to more basic disruptions involving, ... the recognition of significance of human action and states of feeling" (p.452). Based on extensive observation of autistic individuals over time, they suggest that autistic children do not understand meanings of events, people, etc., that are different than physical understandings about the world. The lack of early understanding of the meanings of human acts and intentions are subsequently reflected in their lexicon and grammar. They further note that many autistic individuals never appear to reach a level of sophistication and flexibility in language that is

reflected in their difficulties with constantly shifting language forms that code people and social situations.

In analyses of the dialogues of seven verbal autistic adolescents, Simmons and Baltaxe (1975) reported impairments in semantic and situational aspects of their linguistic performance. Among the language problems still evident in autistic adolescents were use of vague, and inappropriate antecedent, reference.

In terms of more specific deictic forms, Fay (1980) observed that autistic children exhibit difficulty with the shifting boundaries of place deixis, temporal adverbs and articles (in addition to person deixis). Similarly, Ricks and Wing (1975) noted that autistic children exhibit slowness in learning small words such as prepositions, conjunctions, and pronouns and even when these words have been learned they are omitted.

In school-aged psychotic children, Yudkovitz et al. (1975) observed referential unclarity (defined as difficulty in assuming and maintaining clear indicators of agent, action and/or event) that encompassed language errors involving pronouns and indefinite nominals. They found that these psychotic children failed to maintain pronoun agreement and consistency within an utterance and failed to produce referential

antecedents by using indefinite nouns, or undefined pronouns.

No specific experimental studies have been completed on autistic children's acquisition and use of object or place deictic elements. However, researchers have alluded to autistic children's difficulties with these categories of deixis. Although Bartolucci and Albers (1974) hypothesized that autistic children have difficulty with semantic development, and in particular with language forms that shift in meaning, there has been little follow-up research in this area.

To summarize, observations of person, object and place deictic use in autistic children raises several concerns. First, statements about autistic children's deictic deficits are usually based on anecdotal and impressionistic data with a lack of descriptive, or experimental, data. Explorations of when, how, and if deictic usage emerges, and develops, over time is missing.

Second, varying subgroups of autistic children (dependent on their cognitive, social and linguistic levels) evidence varying degrees of language difficulty with deixis. Researchers have defined subgroups of children poorly relative to their overall social, cognitive and linguistic sophistication. Thus, there is a need for studying deictic use in different groups of autistic children at different developmental stages.

Third, there are few studies that explore autistic children's deictic usage in varying discourse contexts. Although accounting for the dimensions of context is "awesome" (Ochs, 1979), children's linguistic-pragmatic knowledge can only be fully appreciated if their performance is studied in varied communicative contexts. This would include observations of language use relative to different physical-perceptual, linguistic and listener contexts.

Fourth, there are few studies that directly attempt to correlate autistic children's deictic usage relative to other variables such as cognitive, linguistic or social level(s).

Finally, as Prizant and Wetherby (1985) state, research on children with autism functioning at higher cognitive and linguistic levels is limited. There is a paucity of data (with the exception of the work of Baltaxe (1977) and Caparulo and Cohen (1983) on verbal autistic individuals whose language emerges over a protracted period of time.

Presuppositions

Presuppositions are the background assumptions on which people base their behavior and speech--namely, the things that are taken for granted at the outset of a communicative act (deHart & Maratsos, 1984). Bates (1976) described presupposing as the act of using a

sentence to make a comment about some information assumed to be shared, or verifiable, by the speaker and listener (p. 439).

Similar to deixis, presuppositions involve psychological operations; they are integrally linked to different aspects of the communicative context and involve speaker's inferences about the listener's knowledge (Bates, 1976).

deHart and Maratsos (1984) have proposed that young children understand some basic communicative presuppositions and these elements of presupposition are present from the very beginnings of children's language use; thus, they are not tied to particular linguistic expressions. Similarly, Bates (1976) states that psychological presuppositions may exist prior to their syntactic expression. deHart and Maratsos (1984) further comment that using language for communication implies some rudimentary assumptions about the roles of speaker and listener and the shared meanings of the words being used.

deHart and Maratsos (1984) make a distinction between different types of presuppositions that include: (a) basic presuppositions associated with communication; (b) presuppositions carried by particular linguistic forms; and (c) presuppositions carried by general linguistic devices.

Briefly, basic presuppositions of communication involve assumptions of speakers and listeners about rules that underlie conversations and the social use of language. This type of knowledge is inherently linked to communicative language as it emerges and is evident at the earliest stages of language acquisition.

The second type of presuppositions are tied directly to the use of particular words and linguistic forms (e.g., words of definite reference such as definite articles, definite pronouns, negation, etc.). Similar to deictic forms, the use of these forms presupposes the existence of a particular referent that can be identified by both participants in a conversation. The speaker has to explicitly or implicitly encode a referent so that the listener can identify it unambiguously so that the discourse can proceed.

The third category of presuppositions involve presuppositions carried by general linguistic devices such as word order and stress. For example, the distinction between topic and comment in an utterance parallels the distinction between presupposed and asserted information. These presuppositions are not marked by specific linguistic forms but rather by syntactic rules (e.g., the order in which information is presented).

Presuppositions and Childhood Egocentrism

The issue of childhood egocentrism has been linked to children's presuppositional knowledge. Early on, Bates (1975) proposed that children's egocentricity will have a specific effect on certain semantic structures of children's speech with the greatest impact on language requiring mastery of presuppositions. Bates (1976) suggested that the development of awareness of presuppositions is tied to the decline of egocentrism in early childhood. As children learn to distinguish their own versus another person's viewpoint, they realize that their presuppositions may not be readily available to the listener. Subsequently, they learn to expand and re-arrange utterances so that the listener's needs are met.

Bates (1976) points out that communication failures in young children can be traced to pre-school children's lack of skill in predicting or constructing the listener's perspective. Further, when communication misunderstandings occur, young children have difficulty locating the source of the communication breakdown. They often repeat or paraphrase their original utterance without adding more background information that the listener probably needs.

Bates (1976) suggests that a fruitful area of study would involve exploring the relationship(s) between role-taking, egocentrism and both the production and comprehension of messages with presupposed information. Future research might include correlations between successive levels of role-taking and increasingly complex use of presuppositions (Bates, 1975). As of yet, this line of investigation has not been explored in the normal child language, or autism, literature.

Several research findings (Maratsos, 1973; Peterson, 1974) clearly challenged the notion of childhood egocentrism. These studies (to be discussed below) highlight children's sociocentric, rather than egocentric, behaviors and have demonstrated young pre-school children's skill at presupposing their listener's needs.

Since linguistic phenomena have been the basis of inferences about children's underlying presuppositional knowledge, it is important to clarify which dimensions of language reflect varying degrees of presuppositional skill. There appears to be a range of quantitative as well as qualitative linguistic indices which reflect children's underlying knowledge of another person's perspective. Further, it it not surprising that children can predict their listener's needs on some presuppositions with ease although they fail to account adequately for others. Thus, there are probably

differing levels or degrees of egocentrism that relate to different kinds, and levels, of presuppositions (Bates, 1975). Similar to deixis, an understanding of children's mastery of language that is inherently sociocentric should contribute to knowledge of children's emergence from a state of relative egocentrism (Tanz, 1980).

Presuppositions in Normally Developing Children

Developmentally, rudimentary presuppositional abilities are evident at the beginning of language acquisition (Bates, 1976; deHart & Maratsos, 1984). The developmental question is not how do children learn to presuppose but rather how do children learn to understand and produce particular presuppositions that are marked in certain words and linguistic devices (deHart & Maratsos, 1984). The later instantiation of complex linguistic presuppositions depends on relevant semantic and syntactic development while presupposition itself doesn't undergo any marked changes over the course of the child's development.

Research on normal children's presuppositional knowledge has concentrated on both broad qualitative aspects of language (such as children's use of specific and deictic reference, informativeness, etc.) as well as more quantitative aspects of language use (such as frequency of talk, MLU, etc.). With quantitative measures, the assumption is that children will shift

language (i.e., talk more, be more specific, etc.) relative to their listener's background or informational needs. With qualitative aspects of presuppositions, the assumption is that the speaker will shift the amount of information shared with listener's dependent on listener's needs; or, degree of specificity of reference will change dependent on listener's needs.

In terms of qualitative presuppositional analyses, children's use of referring expressions (such as deictic forms, articles, etc.) has been one index of their presuppositional skill. Children's use of these particular language forms is taken as evidence of the ability to distinguish what is given (or shared) versus new (or unshared) between speaker and listener. For example, the differentiation of definite/indefinite reference reflects children's knowledge of whether, or not, a referent has a unique status to the listener.

Forms of definite reference have been one of the most frequently studied aspects of presuppositions. Several researchers (Karmiloff-Smith, 1979; Peterson, 1974; Warden, 1976) have found that, early on (three-four years), children produce both indefinite and definite forms of reference (as marked by articles). Similarly, children's use of deictic forms also signal the uniqueness of a referent (as well as signalling other features such as animacy, gender,

number). As previously discussed, children are able to use varied deictic pronominal forms to indicate, or refer to, specific people, objects or places in the communicative context.

In terms of specificity of reference, Peterson (1974) studied pre-school children's (3.6-to-5 years) modifications of linguistic behaviors in conversational and narrative communications with knowledgeable and naive listeners. In one of many analyses, she looked at how the children introduced new elements to each listener and their specificity of reference. Her results indicated that a significantly larger proportion of the children's use of reference was more appropriate in the presence of the naive rather than knowledgeable listener. That is, they introduced more new nouns and used greater proportions of specific reference when talking to the naive listener. However, the children did not yet make clear and consistent distinctions between definite and indefinite reference when producing articles. Similarly, Warden (1976) found that children's use of articles relative to listener knowledge did not emerge until eight to nine years of age.

In sum, children's early use of specific linguistic forms (such as definite/indefinite reference) imply basically correct usage of most constructions followed by gradual mastery of whatever semantic and social

subtleties are involved. Children may recognize that pronouns and articles refer to already established referents but are unable to tell when the referent has not achieved a unique discourse status.

Through middle childhood, errors in presuppositional constructions tend to be in the direction of erroneously assuming shared presuppositions with the listener (deHart & Maratsos, 1984). Although some researchers hypothesized that children's difficulty with specific linguistic forms reflects egocentrism (Piaget, 1926), deHart and Maratsos (1984) point out that more complex, and subtle, semantic-syntactic distinctions are needed to appropriately use particular linguistic devices. That is, children's problems with particular linguistic devices (like articles) seem to arise from the more complex analyses required for appropriate use of these forms relative to conversational partner's knowledge rather than from some generalized inability to take the listener's viewpoint.

Other qualitative indices of presuppositional abilities such as informativeness, have been explored. Early on, children's one word utterances have been looked at relative to presuppositional knowledge. For example, Greenfield and Smith (1976) and Greenfield and Zukow (1978) observed that young children encode the novel, or changing, aspects of a situation and do not

encode unchanging, or already given, aspects of a context. This has been described as children making a distinction between old (or presupposed) versus new (or asserted) information.

In comparing children's responsiveness to varied listener needs, Peterson (1974) found that pre-school children talked more, and needed less prompting, when talking about prior experiences with a naive as opposed to a knowledgeable listener. In spite of difficulty with article usage, she concluded that pre-schoolers were able to tailor their behavior in accordance with the perspective of the listener. That is, children gave more information to naive rather than knowledgeable listeners and differentiated a subtle listener characteristic (not sharing prior experiences).

Similarly, Maratsos (1973) explored pre-school children's (aged three to five years) ability to share information with a non-sighted (naive) versus sighted (knowledgeable) listener. In a game-like situation, children were asked to encode various distinctions among object arrays (from naming different objects, to describing one different attribute of the same objects, to describing the location of objects relative to a fixed referent). In the non-sighted (naive) listener context, the children were more explicit and gave more adequate codings than to the sighted (knowledgeable)

listener. All children had difficulty with the locative array where spatial locations had to be explicitly encoded. However, even here the children attempted more verbal encodings with the naive listener although they did not make the relevant locative specifications.

In sum, Maratsos concluded that pre-school children were sensitive to the disparate communicative situations posed by the different listener conditions. Similar to Peterson's findings, three-to-five year old children made quantitative and qualitative modifications in language relative to listener needs.

In another classic study, Shatz and Gelman (1973) observed how four-year-olds talked to adults, to two-year-olds and to peers. Among their findings were that four-year-olds modified their utterance length and syntactic complexity relative to their listeners. For example, when talking to two-year-olds, the four-year-olds decreased utterance length, increased use of attention-getters and avoided complex syntactic constructions.

In a more recent study, Perner and Leekam (1986) explored three to four-year-olds ability to adjust the content of their verbal responses to their listener's needs. Children's level of informativeness was judged as they talked to a fully ignorant partner (i.e., a naive listener) and with a partially ignorant partner

(i.e., the listener shared some but not all actions with the child). (These conditions differed from the all or none knowledge of the listeners used in Peterson and Maratsos' work).

Perner and Leekam (1986) found that the children were able to discern what the listener knew and did not know and adjusted their responses accordingly. That is, they were able to give the listener new (rather than reduced) information. Further, the subjects younger than three years, tended to be underinformative (i.e., less complete in giving the listener all the needed information). They found that three-year-olds gave .37 complete information to a fully naive partner while four-year-olds gave .75 complete information to a fully naive partner. Thus, by four years of age children made modifications in language relevant to another person's informational needs.

In sum, although certain linguistic distinctions (such as differential production of articles according to listener needs) are not consistently marked early on, other analyses of language (such as use of informative language) reveal young children's sensitivity, and ability to adapt language, to their listener's perspective. Appropriate contrastive use of particular linguistic markers seems to involve complex semantic-syntactic and pragmatic skills that take a longer time to develop. The failure to make some

subtle linguistic distinctions in forms that carry presuppositions may relate to the fact that some forms are not very salient; presuppositional meanings are complex (i.e., the child has to have primitive analytic and combinatorial devices); and the child has to construct notions of discourse and conversational universals (deHart & Maratsos, 1984). Thus, children move from general skills with some language forms to more specific term-by-term refinements. This implies that a range of language indices should be tapped when assessing children's presuppositions about the listener.

Presuppositions in Childhood Autism

Historically, there have been anecdotal descriptions of specific features of autistic language that would fall under the category of presuppositional deficits. Returning to Kanner's (1943, 1946) earliest descriptions of autistic language, the following comments allude to autistic children's problems communicating presuppositions. These included: (a) saying things which seem to have no meaningful connection with the situation in which they are voiced; (b) utterances impress audience as non-sensical, silly, incoherent or irrelevant; and (c) their metaphorical language is not directly communicable. That is, it is not intended as a means of inviting

other people to understand and share the child's symbols.

To put this within a more pragmatic perspective, Kanner's observations can be re-stated: (a) there is a mismatch between the autistic child's comments and the extra-linguistic context (perhaps, the children's comments are not related to salient aspects of the situational context); (b) utterances appear unrelated and/or non-informative relative to the context; and (c) utterances do not appear to be directed to a listener nor are they clearly used to engage listeners in ongoing conversational exchanges.

Baltaxe (1977) studied verbal autistic adolescents and described these individual's role-taking problems as they related to presuppositional deficits. Specifically, Baltaxe observed impairments in the foregrounding and backgrounding of information and she found that the dialogues of autistic individuals did not involve linguistic distinctions between old and new information. This lack of differentiation between given and new lent a sense of literalness and redundancy to the autistic adolescents' discourse. Baltaxe further noted that the syntactic devices used to mark old information (such as use of anaphoric pronouns, definite articles, relative clauses) and the syntactic devices used to mark new information (such as fully specified noun phrases, indefinite articles, and

cleft constructions) were absent and/or not used appropriately by these individuals. For example, when anaphoric pronouns would be expected, the subjects used fully specified noun phrases. deHart and Maratsos (1984) observed that the patterns seen in autistic individual's incorrect use of presuppositions are not found in normal children.

In sum, Baltaxe (1977) attributed autistic adolescents' presuppositional difficulties to two underlying problems. First, a cognitive problem that relates to basic impairment in discriminating relevant/irrelevant stimuli. Second, a social problem in which autistic individuals may not hold the same assumptions shared by normal speakers and hearers about linguistic and extra-linguistic context. These deficits result in an inability to clearly mark new and old information in a conventional manner with a conversational partner. These social and cognitive deficits are reflected in autistic individuals' violation of the basic discourse principle of relevancy (Grice, 1975) and their failure to perceive the set of background assumptions shared by normal speakers and hearers.

Similar to Baltaxe, Yudkovitz and her colleagues (1975) observed specific presuppositional deficits in school-aged psychotic children. They found a dysynchrony between the topic defined by the (adult)

speaker's sentence and the focus of the psychotic child's comments. Often the children's comments reflected a different presupposition that was only slightly related to the adult's comments. They further reported that their subjects did not take into account the information conveyed by stress, intonation, and the context of the adult utterance. Similarly, Goldfarb, Braunstein and Lorge (1956) observed that psychotic children did not make sufficient changes in volume to differentiate old from new information adequately within a stream of thought. This could be interpreted as the children's failure to mark new information in ways that are interpretable by adults.

Yudkovitz et al. (1975) also observed that the psychotic children exhibited problems in handling abstractions. These problems were manifested in their concrete and literal interpretation of both environmental and linguistic stimuli and involved a failure to tie their comments to linguistic and/or extra-linguistic situation as well as their inability to use world knowledge. Early on, researchers (such as Frith, 1971; Hermelin & O'Connor, 1970) pointed out that autistic children had feature extraction problems. This type of problem may be reflected in psychotic children's linguistic output where comments are not related to aspects of a situation which are conventionally salient from an adult viewpoint.

Other types of presuppositional problems have also been commented on in the autism literature. For example, Ricks and Wing (1975) described how some verbal autistic individuals talk "ad nauseam" about topics which interest themselves. This can be reinterpreted as the redundant coding of old information, with a lack of new, or informative, codings. Greenlee (1981) noted that the listener was unable to discern the presuppositions underlying a psychotic child's utterances during discourse.

More recently, McCaleb and Prizant (1985) directly investigated the coding of new versus old information by autistic children. They videotaped four autistic children (with MLUs of 1.96 to 2.82 morphemes) in interactions with their teacher and speech-language pathologist. They studied two linguistic devices that code new versus old information: (a) single word utterances (lexicalization strategy) and (b) contrastive stress (which highlights new information) in multi-word combinations.

They found that all the children coded new information as often as they coded old information. Analysis of referential utterances revealed that in approximately .47 of their utterances, the subjects provided old (or redundant) information as if it were new. Interestingly, when the children could not offer new comments, they repeated previous comments. The

subjects infrequently marked a new action or state change. Generally, they coded non-transient information such as information about objects or pictures. The children's frequency of encoding of old information through repetitions was found to be an inverse function of the subjects level of expressive language as measured by MLU-morphemes.

They also reported that their subjects produced multi-word utterances containing additional information about a topic but they did not consistently mark additional, or new, information through the use of contrastive stress. In sum, McCaleb and Prizant hypothesized that autistic children may process information in a gestalt manner and thus, may not make distinctions between conventionally relevant and irrelevant information. This may result in a limited conceptual basis from which to identify shared versus new information, and subsequently, to code new information in a communicative manner.

McCaleb and Prizant (1985) suggest that future research should be completed where autistic children are presented with social/dynamic features (people and their actions) as compared to object/static features to see how systematic changes in social aspects of the context influence their marking of new versus old information. This more social/dynamic context seems to have been studied by Langdell (1980, as cited in

Baron-Cohen, 1988) where autistic children had difficulty in the ability to modify accounts of events when talking to someone who had, or had not, been present during the events. Finally, McCaleb and Prizant suggest the need to study presuppositional skills in autistic children at higher expressive language levels than their subjects and they speculate that autistic children's ability to encode more new information should improve as their expressive language skills improve.

To summarize, similar to deixis and autism, presuppositional problems have been described, or alluded to, but there have been few direct studies (with the exception of McCaleb & Prizant) exploring specific dimensions of presuppositional knowledge in verbal autistic children. Further, it is difficult to compare anecdotal impressionistic data since varying subgroups of autistic children are not clearly differentiated as to cognitive, social and linguistic levels. Again, the issue of context is not directly addressed and there is a need to look at autistic children's presuppositional skills in varying discourse contexts. Generally, one is left with impressions that autistic children lack the ability to be informative, lack interest and involvement with their listeners, and fail to make inferences related to their listener's

needs (Paul, 1987; Snyder, 1984). All these areas need to be studied in a more rigorous manner.

Non-linguistic Perspective-taking

Perceptual Perspective-taking

Within the domain of perceptual perspective-taking, visual perspective-taking has been the most frequently studied area. Most researchers (e.g., Flavell, 1977; Flavell et al., 1968) have concentrated on studying normal children's developing ability to determine what another person sees and how it is seen when the child and other person have different positions in space. Some researchers have postulated that visual perspective is the easiest, earliest developing, and least social type of perspective-taking (Flavell, 1977; Shantz, 1983). Thus, this domain of perspective-taking allows researchers to look at rudimentary levels of role-taking skill in young children whose language development is not advanced. Further, perceptual tasks afford an opportunity to study one domain of perspective in isolation from other domains.

Perceptual Perspective-taking in Normally Developing Children

Three levels of visual perspective-taking have been proposed and substantiated in research studies (Flavell et al., 1968; Masangkay, McCluskey, McIntyre, Sims-Knight, Vaugh & Flavell, 1974). Level I involves the child's ability to correctly infer what another person sees and Level I understanding is evident in late infancy and is well-established by three years (Masangkay et al., 1974).

Level II understanding involves the child's ability to infer how another person views an object(s) position in space. Level II understanding is more complicated, takes longer to emerge and indications of Level II understanding have been found in three-to-four year olds. Different researchers have found different developmental ages. For example, Masangkay et al. (1974) reported that three-year-olds could not determine when an object appeared right-side up/upside down to an experimenter while this skill was evident in all four year olds. In a similar (Level II) task, Fishbein, Lewis and Keiffer (1972) found that most three-year-olds indicated another's visual perspective by turning an array of objects to produce what the child inferred the other person was seeing.

Level III understanding involves the child's ability to infer another person's exact retinal image

percept and this knowledge is acquired by seven years of age (Flavell, 1977; Flavell et al., 1968). Differences in perspective-taking tasks (relative to context, content, linguistic input, response requirements, etc.) yield similar, but different, developmental age achievements; thus, only broad developmental levels of attainment of perspective-taking skill can be inferred from this research literature.

Perceptual Perspective-taking in Childhood Autism

Baltaxe (1977) was probably one of the earliest researchers to hypothesize that autistic individuals exhibit underlying role-taking deficits. Although Baltaxe did not explore perspective-taking deficits in autism, she clearly noted the impact of perspective-taking problems on these children's social and communicative performance. To date, two studies have explored perceptual perspective-taking abilities in autistic individuals.

Hobson (1984) studied the ability of older (9.9 - 16.1 years) autistic individuals (with high cognitive levels) to engage in several visual perspective-taking tasks. Hobson found that the autistic individuals performed with a high degree of success on all visual tasks presented. They were able to indicate the viewpoints of another (namely, a doll) as well as co-ordinate different visual perspectives.

In discussing his findings, Hobson states that it was striking that the autistic children were able to recognize that, in a literal sense, others see things differently. He concluded that studies to date provide little evidence for a relationship between social disabilities of autistic subjects and their performance in tests of coordination of perspectives. However, he qualifies his statement by noting that his subjects were relatively advanced, and perhaps, the deficits under study were a feature of earlier phases of cognitive development. That is, perceptual perspective-taking deficits may have played a role in distorting the course of autistic children's socialization at earlier phases of development.

Hobson (1984) concludes that judging what another person sees is very different from judging another's thoughts, intentions or feelings (namely, conceptual and affective perspective-taking). As has been pointed out by Baron-Cohen et al. (1985), a crucial distinction may exist between understanding another's visual experience (a more concrete level of perspective-taking) versus understanding another's higher level mental states (a more covert level of perspective-taking) and all areas would have to be explored.

In a recent study, Dawson and Fernald (1987) addressed the question of whether there is a positive

relationship between perspective-taking ability and the interpersonal skills (as measured on the Vineland Scale and a social scale devised by authors) of autistic children. These researchers administered perceptual, cognitive, and affective role-taking tasks to a group of autistic children who varied in chronological age (6.1 - 14.7 years), IQ (M.A.s of 3.6 - 8.3 years), and language ability. They found positive correlations between degree of autistic children's social impairments and aspects of their perspective-taking performance. In terms of perceptual perspective-taking, they found that the autistic children did poorly on perceptual perspective tasks. This contradicts Hobson's (1984) findings on older autistic individuals.

To summarize, these two studies explored perceptual perspective-taking skills in different subgroups of autistic children who exhibited differences in age, cognitive, linguistic and social levels. Future studies should continue to explore domains of perspective-taking with autistic children at different developmental levels. Further, the interrelationship(s) across perspective-taking domains as well as in relation to communicative and social functioning need to be addressed to gain greater understanding of the impact of perspective-taking

skills on children's communicative and social skills and vice versa.

Conclusion and Need for Study

One of the defining features of childhood autism is a pervasive impairment in the social-cognitive domain of development. Autistic children's social deficits have been characterized in a rather global and anecdotal manner with descriptions such as pervasive lack of interest in people, lack of sensitivity to others, inability to meet the listener's needs, etc. (Cunningham, 1968; Kanner, 1943; Rutter, 1978, 1983; Wing, 1981).

To date, there are a paucity of studies that directly attempt to analyze specific dimensions of autistic children's social-cognitive impairments. The study of one social-cognitive area, perspective-taking, allows researchers a framework in which to explore autistic children's responsiveness to others. Further, perspective-taking skills have been described as inherently related to communicative skills and thus, deficits in one domain may be reflected in the other domain (Shatz, 1977).

A second defining feature of childhood autism involves severe language and communication impairments. Historically, certain language features (such as pronominal confusions) have been hallmarked as major

characteristics of autistic language. In particular, areas of language that are dependent on social-cognitive knowledge are particularly troublesome for autistic individuals. In spite of changes in some aspects of language over time, these linguistic-pragmatic elements of language remain troublesome for autistic individuals. The use of deixis and presuppositions are both prototypical elements of language where social and linguistic domains are highly dependent on each other; these skills are continually reported as poorly developed in autistic individuals.

Similar to the paucity of research in the social-cognitive domain (Volkmar, 1987), there have been few studies that have directly explored verbal autistic children's linguistic-pragmatic deficits in varying discourse contexts. Again, most of the literature alludes to deictic and presuppositional problems without direct evidence (Baker, Cantwell & Bartok, 1976).

To summarize, in both social-cognitive and linguistic-pragmatic domains, the experimental and descriptive literature on autism is sparse. Further, subgroups of autistic children are poorly defined relative to cognitive, social and linguistic levels; thus, making it hard to compare and contrast research findings. Autistic children whose language emerges

over a protracted time period have not been sufficiently studied. Thus, researchers are often left with more data on non-verbal and/or less advanced autistic language-users and less data on more linguistically advanced autistic individuals.

Finally, it is clear that autistic children can best be understood by addressing mutual influences among domains of development and the profound effects of impaired development in one or more domains on all aspects of development (1985, Nurcombe cited in Prizant & Wetherby, 1985).

In the present study, two domains of perspective-taking were assessed in verbal autistic children. The primary objectives of this study included an interest in exploring aspects of social-cognitive knowledge in autistic children by analyzing (a) dimensions of linguistic and non-linguistic (perceptual) perspective-taking performance; (b) the interrelationship(s) between domains of perspective-taking relative to the children's overall social-affective and communicative functioning; and (c) the relationship(s) between perspective-taking and other aspects of development such as non-verbal intelligence (or mental age), chronological age and MLU.

Research Questions

1. Do verbal autistic children clearly encode categories of deixis and are there differences in deictic usage relative to the specific categories of person, object and place?

2. Do autistic children demonstrate similarities/differences in deictic usage relative to the presence (or absence) of the physical-perceptual context?

(a) do autistic children use gestural devices to accompany linguistic deictic forms? If so, are these forms used clearly and appropriately?

(b) do autistic children link deictic forms in a cohesive manner relative to prior (adult and/or child) utterances?

3. Are there specific aspects of autistic children's deictic usage which result in listener confusion and lead to breakdowns in communicative exchanges?

4. Do autistic children shift language use relative to different listener needs? In other words, are there quantitative or qualitative changes in children's non-verbal, or verbal, behaviors relative to varied listener conditions?

(a) do autistic children appropriately use definite and/or indefinite reference relative to their listener's needs?

(b) do autistic children generate informative propositions relative to their listener's needs?

5. Do variations in dimensions of the context (such as the presence of non-linguistic supports, listener knowledge, degree of structure) influence autistic children's performance in the areas of deixis and presuppositions?

6. Do autistic children demonstrate the ability to take their listener's perspective on various types of perceptual perspective-taking activities?

7. Are differences in autistic children's perceptual and perceptual/linguistic perspective-taking performance related to the type, and complexity, of the perspective-taking activity?

8. What relationship(s) exist between autistic children's linguistic (deixis and presuppositions) and perceptual perspective-taking performance?

9. What, if any, relationship(s) exist between autistic children's perspective-taking performance and their communicative functioning, social-affective relatedness, chronological age, language level (as measured by MLU), and non-verbal mental age (or performance IQ)?

Footnotes

[1] It is important to note that notions of self-other differentiation come from two disciplines. Knowledge of self-other can be explored from the cognitive or the psychoanalytic literature. These theoretical perspectives on self-other distinctions are not the same but may share some similar aspects. This study looked at the social-cognitive aspects of self-other knowledge and differentiation.

CHAPTER III

METHOD

Data Collection

This study explored selective features of linguistic and perceptual perspective-taking in verbal autistic children. Data collection was designed to observe the children's perspective-taking performance in varying discourse contexts. Dimensions of the children's linguistic-pragmatic and social-cognitive knowledge were assessed in the following three contexts:

1. one hour of free play (low structured observations) interactions between the researcher and the child that was conducted over two half-hour sessions.

2. pre-determined adult-directed activities (moderately structured observations) that were followed by re-telling of each activity to a naive and a knowledgeable listener.

3. non-standardized tasks (highly structured observations) that were designed to assess varying types of perspective-taking abilities in perceptual and linguistic domains.

As can be seen above, variations across contexts included modifications in the (a) situational context

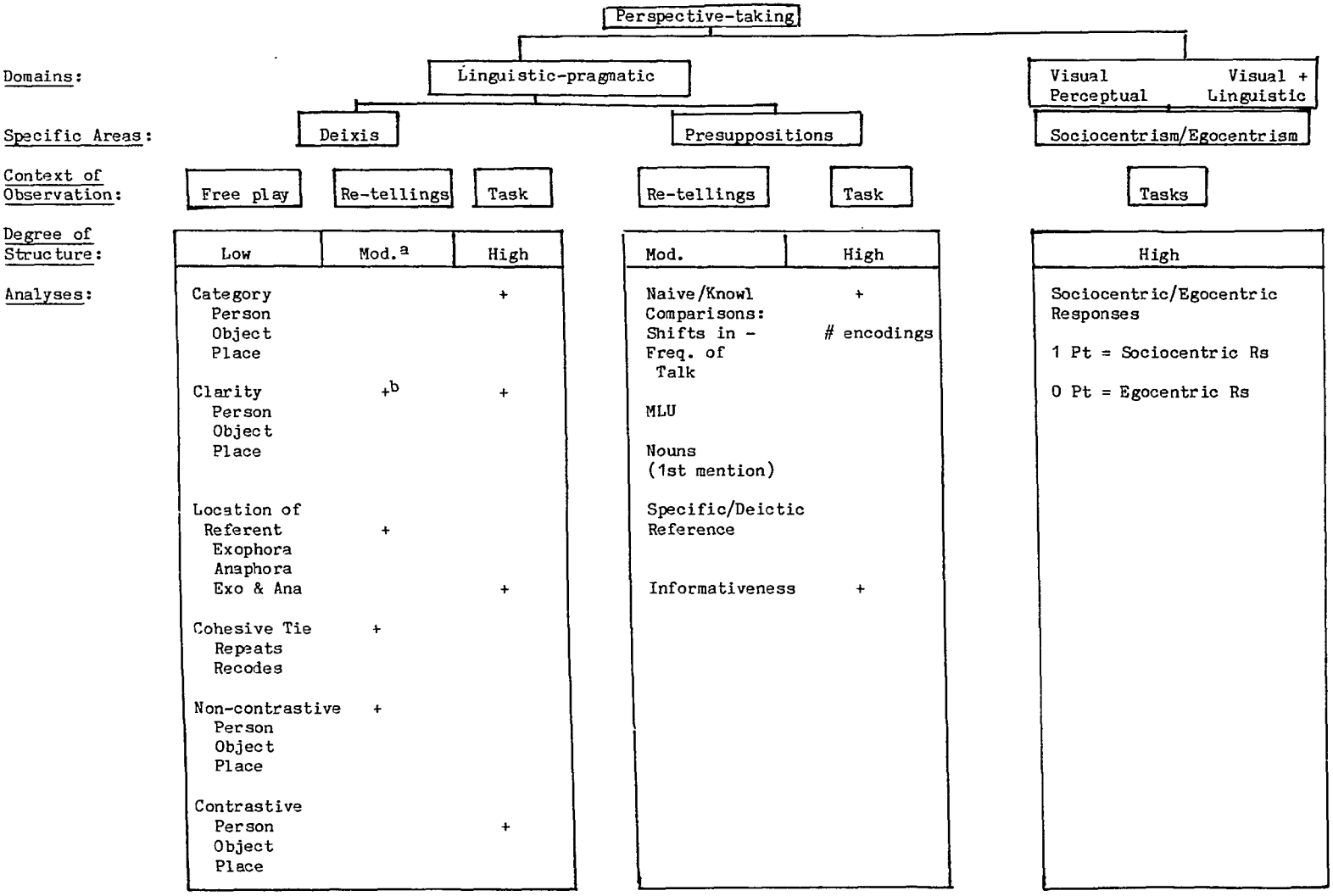
(highly contextualized to decontextualized); (b) listener context (presence of naive versus knowledgeable listeners); and (c) event structure (degree of structure of observation).

Within each of these contexts, analyses were completed on the children's linguistic-pragmatic, social and perspective-taking performance. Figure 3 summarizes the specific dimensions of linguistic, pragmatic and social-cognitive knowledge analyzed in each context. As can be seen, linguistic perspective-taking skills (deixis and presuppositions) were analyzed in at least two different contexts so that the children's language use relative to context could be explored. Also note that the investigator used low structured observations (free play) to complete several broad, descriptive analyses of the children's overall linguistic, social and pragmatic performance.

Most of this study involved non-standardized assessment procedures. One standardized language test was administered by the examiner. Selective subtests of the Test of Language Development (TOLD-P) devised by Newcomer and Hammill (1977) were used. This test assesses facets of semantics, syntax and phonology on both receptive and expressive levels. Four subtests were administered each at a different session over the course of the study.

Figure Caption

Figure 3. Dimensions of perspective-taking assessed relative to context of observation.



[a]Moderate structure.

[b]+ indicates that the same analysis was completed in another context(s).

General Procedures

Each subject was engaged in low, moderate, and highly structured activities. Each child was seen over a one month period and three sessions were scheduled for each child (on alternate days) weekly. These sessions ranged from forty-five minutes to one hour. Three subjects (S1, S3 and S5) were observed in their school-setting in a familiar room and two subjects (S2 and S5) were observed in their homes. With the exception of S5, all subjects were familiar with the investigator.

The order or presentation of contexts alternated between low structured sessions (i.e., free play) followed by moderate, or highly structured sessions (i.e., re-telling episodes or tasks). Thus, alternate sessions shifted in degree of structure. On the days when the children were presented with more structured activities, they were given short warm-up play periods. Between administration of perspective tasks and subtests of the TOLD, the children were given short breaks (2-5 minutes). No more than two tasks were administered within any one session. If a child appeared to be particularly negative, distractible and/or poorly focused during a particular session, the investigator re-scheduled the session. This occurred only once with one subject (S5).

At the end of each session, each child was presented with a tangible reinforcer. The children were given a choice of candy, soda, cookies, toy trinkets, etc. These reinforcers were shown to the children at the beginning of each session. Social reinforcement was constantly given throughout all sessions and was not based on correctness of response.

Low Structured Observations (Free Play)

All adult-child free play interactions were videotaped. The investigator served as the interactive partner for all subjects. Six free play sessions were videotaped over a one month period. Each free play session was conducted for thirty minutes. The first two free play sessions were used for the analysis of broad and specific linguistic perspective-taking abilities. Videotapes of the second free play sessions were also used as data for the analysis of each subject's social-affective relatedness and their pragmatic skills.

A social scale was devised by a certified psychotherapist/social worker (Burnett, personal communication, 1988) to evaluate each child's social and affective relatedness during free play interactions with an adult (the investigator). This psychotherapist viewed free play data and rated each subject's social-affective behaviors from normal to severely impaired (see Appendix A).

Twelve toys were selected for free play interactions based on the children's ages, interests, and motor abilities. Adults familiar to the children were queried as to what toys would be of high interest to the children (see Appendix B for the pool of toys used). At the beginning of each free play session, the investigator randomly selected three toys (from the pool of twelve toys) for the child. The child had the opportunity to choose one (or more) of these toys to play with during the session. If the child rejected (or finished playing with) the three toys, then the investigator removed the three toys and randomly selected another set of (three) toys.

During the sessions, the investigator did not directly manipulate the child's play. Occasionally, the investigator made more direct attempts to engage a child in toy play. This only happened with one subject (S5) who often needed more encouragement to play. The investigator was responsive to all of the child's self-initiated non-verbal, and verbal, behaviors. She engaged in parallel and/or joint play with the child and attempted to be non-directive and follow the child's topics, actions, etc.

One exception to the investigator's interactive style occurred during free play sessions. Two of the toys selected for the pool of toys had the potential of eliciting a different interaction between the

investigator and child. Specifically, the movie projector and the viewmaster toy were incorporated into the study to create a non-shared physical context within free play. If the child chose one of these two toys, the investigator encouraged more turn-taking during play. When the investigator had a turn, she described the events depicted in the movie, or on the viewmaster. If the child became uninterested in these particular toys, the investigator encouraged the child to continue playing with these items. However, if the child could not be engaged with these toys, they were removed. This was the only toy context in which the investigator was more directive.

Moderately Structured Observations (Re-telling Episodes)

The children were engaged in three pre-planned activities which were videotaped. These activities usually lasted from ten to fifteen minutes and were presented after alternate free play sessions. These shared activities involved the investigator and child: (a) painting an E.T. model figure, (b) making Shrinky Dink figures and (c) cooking (and eating) popcorn. Each activity involved several simple, and discrete, events which had an inherent order. Subsequent to each activity, the child was asked to re-tell his/her experiences about the activity to a naive and knowledgeable listener.

In the naive listener conditions, the child was asked to immediately re-tell each activity to a listener who was not present during the activity. After the child and investigator completed and removed the activity, a naive adult-listener (who was familiar to the child) was called into the room. In the knowledgeable listener conditions, the investigator (i.e., the knowledgeable listener who had shared the activities with the child), encouraged the child to re-tell his experiences about the prior activity during the next immediate free play session (i.e., two-three days later).

During re-tellings, the naive and/or knowledgeable listener (the investigator) encouraged the child to talk about the prior activity. Either the investigator and/or the naive listener elicited the re-telling episodes from the children. Generally, the investigator only intervened when the naive listener was unsuccessful in engaging the child in re-tellings. The adult's input during re-tellings involved general requests for information which usually took the following form(s):

1. let's tell (listener's name) what we did/made
2. (child's name) tell me what you made
3. let's tell (listener's name) more

The function of these general requests for information was to encourage the child to spontaneously

share information about his/her prior experience(s). If the child was reluctant to talk, or gave minimal information, the adults tried to elicit more specific information from the child. In these instances, the adult listeners asked more specific requests for information and these specific requests were based on the child's prior utterance(s), and involved a more direct question. For example,

Child: I follow the numbers

Adult: Was it on paper?

Child: It was on clay

Specific requests for information were only used to elicit more language when the child did not spontaneously share information. Occasionally, the investigator had to tell the child the topic-referent of the prior activity. This only occurred when the child forgot which prior activity was to be discussed (i.e., the child talked about free play or E.T. rather than popcorn-making). The adult infrequently had to supply the name of the activity.

Highly Structured Observations (Perspective Tasks)

General procedures for the administration of all perspective tasks.

Five perspective-taking tasks were randomly presented to each child during alternate structured sessions (see Table 1). Within each structured session, the investigator presented two

Table 1

Non-Standardized Perspective-taking Tasks Relative to Type, Level, and Language Forms Assessed

Perspective Tasks	Adult's Linguistic Input	Child's Response	
1. Perceptual Tasks		Comprehension	Production
Picture Cards (Level I)	What + object questions		Name object
Turtle Task (Level II)	Either/or questions		Name location (upside-down or right-side up)
2. Perceptual/Linguistic Task			
Turning Task (Level II)	Directions (Show me____)	Front, back, side	
	Either/or questions		Front, back or side
3. Linguistic Tasks			
Deixis (Hide and Seek)	Either/or questions with contrastive deictic pairs	My - your This - that Here - there	My - your This - that Here - there
Presuppositions (Truck and Hill)	Directions (Tell me what to put in the truck)		Name object Name attribute Name location

perspective-taking activities. During these sessions, the child was given a short warm-up play period prior to, and between, the administration of each task. Also, social and tangible reinforcers were used as described above. The investigator socially reinforced all child responses during tasks and she did not differentiate input relative to the child's correct/incorrect performance.

All perspective tasks were administered by the investigator and were audiotaped. The children's responses were evaluated during the task. The investigator prepared coding worksheets on which to record each child's non-verbal and/or verbal behavior. When the first subject was evaluated, a second independent observer simultaneously recorded all child responses. Inter-observer reliability was 100 percent agreement for this subject. After the first subject was completely evaluated, the independent observer was discontinued. It was deemed to be unnecessary to have two observers since all perspective tasks involved discrete and simple responses with no ambiguity as to correctness.

At the end of all sessions, the investigator replicated one perspective task per child. Complete replication of all tasks was not feasible due to the children's attentional deficits, poor motivation, and time factors. Thus, each child's performance on one

task was observed twice in order to gain some response reliability.

Selection of perspective-taking tasks.

Several non-standardized social-cognitive perspective-taking tasks were selected for use in this study. The criteria for selection of perspective tasks included: (a) the existence of normative data that demonstrates that these tasks elicit different types, and levels, of perspective-taking knowledge; (b) the existence of normative data that demonstrates that these tasks have been successfully administered to, and completed by, normal pre-school aged children; and (c) the existence of tasks that require a minimal amount of verbal language skill.

All perspective tasks selected for this study involved replication of tasks from previous studies completed on normal children (Fishbein et al., 1972; Flavell et al., 1968; Maratsos, 1973; Masangkay et al., 1974; Tanz, 1980). See Appendix C for description of tasks and any modifications or adaptations from the original tasks. See Appendix D for scoring of perspective-taking tasks.

Prior to the administration of each task, the children's comprehension and production of all lexical items and key words (such as right side up, etc.) used in the task were assessed (see Table 1). For comprehension, the examiner presented pictures (or objects) to the child in three way discrimination tasks with the input "show me (item)." For production, the examiner presented one item at a time and asked "what's this?"

Data Analysis

Transcription Procedures

All analyses were completed using written transcriptions of videotaped adult-child interactions. A total of one hour of free play (obtained over two half hour sessions) was analyzed for each subject. In some instances, the initial part of a third free play session was transcribed. This only occurred when the total (combined) time of the first two sessions was less than one hour. In addition to free play, transcriptions were completed on each child's language in re-telling activities to naive and knowledgeable listeners.

All videotaped interactions were transcribed using standard orthography. Transcription procedures followed the format outlined by Bloom and Lahey (1978). Each child's sample was segmented into utterances based

on the non-linguistic and linguistic context, intonational contour and pause time between segments of speech.

All child utterances (partial and complete) were analyzed in each sample with the exception of utterances that were: (a) totally unintelligible and/or inaudible and (b) certain formulaic routines that included: songs, riddles, t.v. commercials, and other automatic rote sequences. All other formulaic routines were analyzed (see Appendix E). Partially unintelligible utterances were analyzed if they contained only one unintelligible word and the rest of the utterance was intelligible.

Linguistic Perspective-taking

Analysis of Deixis

Deixis involves the ways in which language encodes or grammaticalizes features of the context of an utterance, or speech event (Levinson, 1983). The interpretation of a deictic form depends upon the existence of a (specific) referent in the non-linguistic, or linguistic, context. This referent is referred to as the presupposed item. In order to interpret a speaker's use of deictic forms, the listener has to look elsewhere in the context to locate the presupposed referent.

Three categories of deixis were studied (person, object and place). The first step in the coding of deictic elements involved separation of each deictic form into one of these three deictic categories. Within each category, further analyses were completed. Each category of deixis will be discussed separately. Appendix F illustrates a coding worksheet that was used to code the children's use of each deictic form. All deictic forms are underlined in the examples below and all numbered examples are coded on Appendix F. Non-deictic forms were categorized and coded separately (see Appendix G for definitions and coding procedures).

Person deixis.

1. Definition. Pronominal linguistic forms that make reference to individual(s) involved in the ongoing communicative act and/or forms that make reference to other individuals (e.g., parents, friends, camera person, dolls) who may or may not be involved in the ongoing communicative act.

2. Types of Forms.

(a) Explicit linguistic forms that encode person deixis

1. Reference to speaker (I, me, mine, my)

2. Reference to listener (you, your, yours)

3. Reference to other(s) (he, she, they, her, his, them, theirs, somebody, someone, everyone, everybody, etc.)

(b) Non-explicit linguistic forms that encode person deixis. Certain generalized pronominal forms can be used in a general sense to reference non-specific, or generalized humans, or non-humans (Rochester & Martin, 1977). Specifically, the forms one, you or we may or may not be specific to particular individuals involved in the immediate communicative act. For example, "You turn it right side up this way" (child turns garage over)

3. Coding of person deixis.

(a) Explicit personal linguistic forms.

Within this category, the examiner coded the person being referenced at the moment of the communicative act. Appendix F illustrates that individuals could be referenced who were involved in the ongoing interaction (e.g., child or adult); and/or, the child could reference another person who may or may not have been involved in the ongoing interaction (camera person, parent, dolls, etc.). When the child referenced other individuals, a notation was made when the reference was to an inanimate other. For all person deictic forms, the (presupposed) person

referent was noted as well as whether or not it was explicitly mentioned in the prior context (e.g., ( ) = not stated).

The following examples illustrate the initial coding of person reference (see Appendix F).

EXAMPLE 1 "It's not what I want"
(child picks up/holds object)

EXAMPLE 2 "Are you hungry?"
(child points to adult)

EXAMPLE 3 "Ready or not here I come"
(child moves doll and pretends doll is talking)

EXAMPLE 4 "And you go back there"
(child points to doll)

In examples 3 and 4, the child talked for the doll and thus, the pronominal reference was coded under other(s) and the examiner noted if the child's talk was to/for the doll.

(b) Non-explicit (or generalized) person forms.

Two types of generalized person reference forms were observed in the data. The form we (occasionally, us) was used to refer to particular individuals involved in the communicative act and/or to refer to all general-other(s). Since it was difficult to evaluate the specific use of we, all of these forms were coded as general-person.

EXAMPLE 5 "What we gonna do in school?"
(child talks to doll and adult)

EXAMPLE 6 "Here we go"
(child starts to play with a toy)

EXAMPLE 7 "You turn it this way"
(child turns elevator knob)

Generalized pronominal forms could reference other deictic categories, since they referred to non-specific animate, or inanimate, items.

Object deixis.

1. Definition. Pronominal language forms and some indefinite nouns that make reference to physical objects within, or external, to the communicative context. Object deixis involves the simultaneous encoding of a referent as well as its location in space relative to speaker-listener positions.

2. Types of forms.

(a) Explicit linguistic forms that encode object deixis.

1. Demonstrative pronouns
(this, that, these, those)

2. Indefinite pronouns, indefinite nouns
(it, one, thing, something, etc.)

(b) Non-linguistic forms that encode object deixis.

A distinction was made between the use of specific versus non-specific gestural forms that accompanied the child's communicative act and also coded the location of an object in space. Gestural reference occurred within all deictic categories. It most often occurred with object or place deictic forms.

3. Coding of object deixis.

(a) Explicit linguistic (object) reference.

The examiner coded the object being referred to at the moment of the communicative act.

EXAMPLE 8 "This one parks"

(child picks up/places doll in car)

(b) Location of presupposed referent.

In addition to coding the object being referenced, a description was made of the location of the object relative to the speaker's position. Two broad measures of proximity were coded:

1. Close proximity was defined as the speaker holding the (presupposed) referent at the time of the communicative act; and/or, the (presupposed) referent being within the speaker's immediate arm reach (or grasp) but not in the hand of the other person.

EXAMPLE 9 "Put this away" (d = close)

(child holds movie projector)

2. Distal proximity was defined as the (presupposed) referent being beyond the speaker's reach (i.e., outstretched arm) at the moment of the communicative act; and/or, the item was being held by the investigator at the time of the communicative act.

EXAMPLE 10 "That don't open" (d = far)

(child looks at playdoh in examiner's hand)

The location of the (presupposed) object relative to the child-speaker's position in space was noted (next to the deictic form). If the location of the object was unclear, indefinite, or unmarked, empty parentheses were placed next to the deictic form. For a detailed description of gestural encoding see location of referent section below.

Place deixis.

1. Definition. Pronominal linguistic forms that make reference to the location(s) in which objects (and/or individual(s)) were positioned at the moment of the communicative act. Similar to object deixis, place deictic forms simultaneously encode a (presupposed) referent and its location in space relative to speaker and listener positions.

2. Types of forms.

(a) Explicit linguistic forms that encode place deixis.

1. Locative adverbs (here, there)
2. Prepositions (in front of, behind, at side of)

In this analysis, only locative adverbs were coded since these forms were truly deictic in nature and the locative prepositions listed above occurred rarely in the sample.

(b) Non-linguistic devices that encode place deixis.

Specific gestural coding of location involved the explicit use of a non-linguistic gesture. The child discretely marked (e.g., pointed to an object, picked up an object, etc.) the location of a referent at the moment of the communicative act.

For example, "Who is this now?" (d = close)
(shows adult figure)

Non-specific coding of location involved a general (or non-explicit) reference to the location of a referent at the moment of the communicative act. Here, the location of the

referent was referred to in a broad sense (e.g., no gestures).

For example, "Forget that" (d = far)

(looks at play doh in adult's hand)

3. Coding of place deixis.

(a) Explicit locative adverbial reference. Within this category, the examiner coded the locative deictic form and the presupposed place.

EXAMPLE 11 "Hey I there first" (d = close)

(child arranges dolls on slide)

(b) Location of referent.

The location of the presupposed referent (object or person) in relation to the child-speaker's position in space was noted as well as close versus distal proximity of the referent relative to the speaker.

EXAMPLE 12 "Over here" (d = close)

(child points to place on mat)

EXAMPLE 13 "up there" (d = far)

(child looks at, and vaguely points to, ramp beyond the child's reach)

(c) General versus specific coding of place.

Similar to other deictic categories, specific (discrete marking of location) versus a generalized (non-discrete) marking of a location was analyzed. If a specific location was clearly marked (e.g., example 12), it was noted.

Occasionally, the children referred to the general-place of a referent at the moment of the communicative act. Although unmarked (or non-specific), these generalized locative forms could be clearly interpreted. Thus, generalized place forms were noted as general-place.

EXAMPLE 14 "What's over here?"

(child moves the doll around garage)

If the child's non-specific reference to a location resulted in listener confusion, then the deictic form was coded as ambiguous.

EXAMPLE 15 "The car goes here"

(child looks around room)

Adult: "Where does car go?"

Identification of presupposed referent.

As each deictic form was categorized, the presupposed item was identified. If the presupposed element was in the non-linguistic context, it was placed within parentheses. This indicated that the presupposed element was not encoded linguistically (see Appendix F, examples 1-4). If the presupposed item was expressed in the linguistic context, it was recorded without parentheses (see Appendix F, examples 19 and 20). This distinguished linguistic versus non-linguistic presuppositions.

If two (or more) possible referents were identifiable, these were all recorded.

EXAMPLE 16 "Still gotta fix that up"

(child plays with plane and luggage)

If the investigator could not locate the presupposed referent in the non-linguistic or linguistic context, the term indeterminate was recorded. Also incomplete child utterances (where the presupposed referent was missing) and unintelligible referents were coded as indeterminate.

Location of the presupposed referent.

1. Exophora. The presupposed referent was concretely available in the immediate physical-perceptual context. Within this category, the examiner analyzed the children's use of gestural versus non-gestural deictic reference. Two types of exophoric deictic reference were coded:

(a) Gestural exophora (Exophoric 1).

The presupposed referent was identified by the child's use of a specific gesture(s). These gestures included: pointing, touching, picking up, and/or showing an object. These gestures had to occur at the moment of the communicative act.

EXAMPLE 17 "What are we gonna do with this?"

(child shows the adult a lego)

(b) Non-gestural exophora (Exophoric 2).

The presupposed referent (in the non-linguistic context) was not identified by the child's use of a specific gesture. Thus, the

child continued an ongoing action on an object, gazed at an object, was holding an object, etc., at the moment of the communicative act.

EXAMPLE 18 "Everybody look down"

(child moves many dolls around table)

Person deictic forms were usually coded as exophoric reference (unless also related to same prior person referent). Usually, person deixis involved non-gestural reference (i.e., exophora 2) since no gestures accompanied the use of the deictic form.

2. Endophora. The presupposed item being referred to was concretely available in the immediate linguistic context. One type of endophoric reference was analyzed:

(a) Anaphora. The item being referred to had been previously identified in the prior linguistic discourse. Identification of the referent was made by going back and finding the most recent mention of the referent.

EXAMPLE 19 A: "What's Red Baron doing?"

(adult watches child view movie)

C: "He's riding a plane"

(child looks at movie)

3. Exophora (1 or 2) and anaphora. The item being referred to was both a contextually specified referent (exophora) at the moment of the communicative

act as well as being explicitly mentioned in the prior linguistic context (anaphora).

EXAMPLE 20 A: "You know who that is? Ms. Piggy"

C: "I don't know her yet"

(child and adult play with Muppet colorforms)

Also coded under this category was person reference if the adult referred to the child with you and the child responded with I or vice versa (since both participants referred to the same referent).

EXAMPLE 21 A: Are you finished?"

C: I'm not"

(child continues playing)

4. Other-Indeterminate. The item being referred to by the deictic term was not present in the immediate physical context nor in the linguistic context. Included here were incomplete child utterances; utterances where the referent was out of view of the camera. All indeterminate referents were coded under location of referent.

Cohesion analysis.

Each child's use of endophoric and exophoric plus anaphoric reference was further analyzed in free play and re-telling contexts. Each deictic form was analyzed as to how it was linked to the most recent referent that was explicitly stated in the prior linguistic context. The (presupposed) referent (explicit statement of a noun phrase (NP) or pronoun)

could occur within a prior adult and/or child utterance.

This analysis only focused on the child's use of deictic forms relative to the immediate discourse context. Due to the nature of the free play context, first mention of a referent may have occurred much earlier in the discourse and subsequent re-mentions may have occurred much later. Based on observations of the children's discourse in play, most re-mentions seemed to be intimately tied to the immediate discourse context (heavily based on the non-linguistic context in free play) and did not appear to be linked (or related) to the original first mention of the referent.

For NP cohesive links, the most recent mention of the explicit NP was analyzed relative to the deictic form. For pronominal links, the most recent mention of the referent was analyzed (within five utterances). If the child's use of a deictic form was related to both a previously mentioned NP as well as previously mentioned pronoun (within five utterances), the cohesive tie was coded in relation to the NP and not the pronominal form. In anaphoric contexts, the very last noun mentioned is the most likely referent for the pronoun (MacWhinney, 1984). More specifically, the investigator coded the following information:

1. the speaker of the most adjacent (or recent) presupposed referent.

2. the explicit form of the presupposed referent (either NP or Pronoun).

3. the relationship between the form of the deictic element and the adjacent (or prior) presupposed referent. Here, distinctions were made between:

(a) Repeats - repetitions of a prior referent (e.g., a pronoun was repeated).

(b) Recodes - non-repetitions of a prior referent (within the same syntactic-semantic category with a revision in form only). This category would represent a deictic shift relative to a speaker's prior referent (see Appendix F, example 20).

4. whether the deictic form was used in a clear/unclear manner in relation to the presupposed referent (see section below).

Listener's interpretation of deictic forms.

The last part of the deictic analysis involved the investigator's ability to interpret the child's use of presupposed referents. Interpretations were coded as either clear or unclear (see Appendix F, column 8).

1. Clear interpretation.

(a) Absolutely clear. The investigator easily identified the (presupposed) referent in the non-linguistic and/or linguistic context.

EXAMPLE 22 A: "Here comes a ball"

(adult views movie)

C: "She catched that"

(child watches adult view movie)

(b) Language error(s). The investigator identified the presupposed referent but there was an error in the form of the deictic marker.

EXAMPLE 23 "He riding the wagon"

(child puts girl doll in car)

All language errors were coded as clear deictic usage if the investigator was able to easily identify the referent. The investigator also noted the type of linguistic error made by the child under other (e.g., gender, case, speaker-listener confusion, etc.).

2. Unclear interpretation.

(a) Ambiguous. Two or more discrete referents could be identified as presupposed elements.

EXAMPLE 24 "not that"

(investigator holds airplane, rope, and hook)

If several similar objects were present in the non-linguistic context (e.g., a set of doll figures) and the child did not specifically identify one item, then the deictic form was

interpreted as ambiguous (since the investigator had to identify one referent).

EXAMPLE 25 "I'm in front"

(child talks for dolls)

Occasionally, a deictic form seemed ambiguous because of a possible language error. In these instances, where the investigator was unclear if the confusion was related to ambiguous reference and/or a language error, the form was coded as ambiguous alone. Generally, when an ambiguous or uncertain interpretation of a deictic form was evident, the investigator's immediate non-verbal or verbal responses to the child (i.e., comprehension or confusion) were used to aid the researcher in interpreting the deictic form).

(b) Other. The presupposed referent was not present in either the non-linguistic or linguistic context. This category included incomplete child utterances (where the referent was omitted); interference from camera (where the referent was out of view); and unintelligible encoding of a referent (all coded under other). These forms were subsequently categorized as other-indeterminate.

See Appendix H for additional deictic coding procedures.

Analysis of Presuppositions

Presuppositions involve the background assumptions on which people base their behavior and speech (DeHart & Maratsos, 1984). The focus in this analysis was on the children's ability to distinguish shared versus unshared experiences with a naive and a knowledgeable listener; and how they adapted their language relative to their listener's background knowledge (and/or informational needs).

Each listener condition (i.e., naive and knowledgeable) was analyzed separately and in the same manner. These analyses involved a description of both broad and specific codings of presuppositional knowledge and included: (a) total number of utterances per listener condition (frequency of talk); (b) mean length of utterance per listener condition; (c) the form, content, and clarity of specific and deictic (non-specific) reference from the listener's perspective; (d) the children's use of informative and non-informative propositions from the listener's perspective; and (e) the nature of the child's output relative to the adult's input.

As can be seen, both quantitative (a and b) and qualitative (c and d) analyses of presuppositional performance were studied. More specific coding of the qualitative analyses will be described below.

Specific reference.

This analysis was based on the work of Peterson (1974). The following features of specific reference were coded for each listener condition.

1. total number of new nouns/total number of nouns.

2. introduction of new elements. The examiner coded each new noun-reference to an object that the child introduced during each re-telling activity.

3. appropriate use of new nouns (or specific reference). Two analyses were completed here which differentiated form from content. The analysis of form was based on Peterson's procedures (1974) whereas the analysis of content evolved from the data and was not related to Peterson's framework.

Form.

Each new noun introduced into the discourse was evaluated in terms of the child's use of a conventional linguistic form to introduce the noun. Appropriate introduction of new nouns was defined as the use of conventional linguistic forms which reflected underlying listener knowledge (e.g., use of articles, modifiers, etc.). Inappropriate introduction of new nouns was defined as the omission of

conventional linguistic forms and/or the use of incorrect forms (e.g., the/a to introduce a new noun to a naive listener).

The children's use of semantically inappropriate and/or unrelated nouns were not judged as to preceding linguistic markers. (See section b below).

Content.

The investigator coded whether or not each new noun was related to the prior topic-activity. The content of each (new) noun was judged as appropriate if it was related to a specific aspect of the prior activity or inappropriate, if it was unrelated to the prior activity and/or uninterpretable (e.g., the use of neologisms, semantically incorrect words, etc.).

Use of new nouns related to different prior activities were coded as other since they were not related to the child's immediate prior experience but they were used in an appropriate manner.

Deictic (or non-specific) reference.

For each listener condition, the children's use of non-specific reference was analyzed. Peterson (1974) defined non-specific reference as unidentifiable referents that included: pronouns

with no presupposed reference; non-specified nouns that imparted little information (e.g., thing); and deleted elements where a noun or pronoun was necessary but was omitted. These types of non-specific reference would be coded as unclear deictic usage in the analysis described above. Since the children also used deictic forms in a clear manner both types of deictic usage were analyzed. The same analysis of deictic forms described above was completed on all child utterances for all re-tellings.

Informativeness.

The informative analysis involved coding each child's utterances in relation to the entire discourse context (i.e., the re-telling episode). Although the content of each proposition was analyzed individually, the form and content of the proposition relative to the entire, prior discourse was assessed. Each child utterance was judged as to whether or not the child stated specific ideas (i.e., propositions) related to each specific directed activity. Child utterances were categorized as either fully or partially informative or non-informative (see Appendix I).

1. Fully informative utterances.

Informative utterances were defined as propositions in which the child gave the listener specific information about the people, objects and/or events which occurred during prior activities. An utterance was considered to be informative if it was new to the discourse and added a piece of information that had not been previously mentioned in the prior discourse. It was expected that the children would adjust the content of their verbalizations relative to what they thought the listener knew.

Fully informative utterances included one or more of the following features:

(a) a comment (or label) related to the topic-referent(s) of the prior activity.

EXAMPLE 1 "It's an E.T."

(b) a comment(s) about an event(s) that occurred in the prior activity.

EXAMPLE 2 "We color it and cut it and shrink it"

(c) a description of some aspect of the prior event(s).

EXAMPLE 3 "They (shrinky dinks) got small in a minute"

(d) a comment about the child's reaction (or internal state) during the prior activity.

EXAMPLE 4 "I laughed"

As can be seen in some examples above (such as 2), if an utterance involved the use of anaphoric reference, and the topic had been previously mentioned in the child's prior discourse, then the proposition was coded as informative.

Similarly, if a child utterance was elliptical in relation to a prior utterance (adult or child) and the child built-on his idea (i.e., added new information), these utterances were coded as informative.

EXAMPLE 5 "I made Skelator"
"Color and cut it"
"Shrink it"

Occasionally, the child repeated part of a prior utterance (adult or child) and then added a new piece of information. These new additions were coded as informative.

EXAMPLE 6 "We paint E.T."
"We paint his eyes, nose, his whole body blue body"

Syntactical errors were not evaluated. If the examiner interpreted the gist of the child's propositional meaning, then the utterance was considered to be informative (fully or partially).

EXAMPLE 7 "Five minutes it starts to pop"

2. Partially informative utterances.

Partially informative utterances were defined as propositions that contained partial, or incomplete, information about some aspect of the prior activity. (i.e., incomplete expression of an idea; lack of specificity). Partially informative utterances involved referential unclarity and/or elliptical responses to the adult-listener's specific requests for information.

(a) Referential unclarity.

The omission of a referent and/or the non-specific use of a referent that left the listener confused since the referent did not appear in the prior discourse context.

EXAMPLE 8 "We colored the whole thing
(indefinite reference)

EXAMPLE 9 "We painted the background"
"And blue on the side of the background frontground"
(referential omission)

Some utterances coded as partially informative had a piece of information that would have been coded as fully informative if the proposition had appeared alone (example 9 above). In these instances, the whole utterance was evaluated since the listener was left confused

because the child had never mentioned the discourse topic (i.e., the E.T. figure).

(b) Elliptical responses to the adult's input.

Elliptical responses to specific adult requests for information were coded as partially informative. In these instances, the child added a piece of information to a prior adult utterance but only did so after direct questioning.

EXAMPLE 10 Adult: "What did you paint on?"

Child: "It was on clay"

Elliptical utterances were coded as partially informative because: (a) the listener had to go beyond the elliptical response to gain a complete idea of the meaning of the utterance; and (b) if not directly questioned, the child would not have spontaneously shared this information with the listener. Elliptical responses which built-on prior utterances could be coded as fully, or partially, informative. This was dependent upon the amount and clarity of information as well as whether or not the proposition was spontaneous or responsive.

3. Non-informative utterances.

Non-informative propositions were defined as utterances that lacked specific information about people, objects and/or events in the prior activity; and/or, were unrelated to the prior

activity. Generally, non-informative propositions did not enable the listener to gain information (or knowledge) about the child's prior experience. Several types of non-informative categories emerged in the data and were coded in the following manner:

(a) Ambiguous utterances.

Propositions that were vague and unclear because they lacked either specificity of information and/or contained semantically unclear ideas.

EXAMPLE 11 "We spilled grams" (kernels)

EXAMPLE 12 "We threw popper in Novine"

(b) Redundant utterances.

Propositions in which the child repeated part or whole of a prior utterance within the entire discourse context (i.e., could be beyond five utterances). These utterances coded old, or given, information.

EXAMPLE 13 "And then the popcorn was gone/and then it was gone"

If an utterance was both redundant and formulaic, it was coded as redundant.

(c) Unrelated/irrelevant utterances.

Unrelated utterances were defined as propositions in which the child's utterance did not add any new information to the listener's

knowledge about the prior activity. Several types of utterances were categorized as unrelated and included: conversational starters, conversational fillers, formulaic routines, requests for objects (toys, food), etc.

EXAMPLE 14 "Can I have a twinkie now?"

EXAMPLE 15 "I did everything good/I helped you and you helped me"

4. Other.

(a) Topic expansions.

Propositions that expanded upon the prior activity by the addition of related and new information. There utterances were judged separately. They were excluded from the informative category since they did not add specific information about the child's experiences during the prior event(s). However, they demonstrated the child's ability to expand upon a given topic with new ideas, and information.

EXAMPLE 16 (E.T.) "He didn't die did he?/ He's only just a person inside E.T.?/ It's only just a man inside/ dressed up/ Guess whose playing E.T.?/ Mr. Etudie/ He plays E.T./ He's a man/ Boy that E.T. lives in outer space/ in flying sauces.

Within this category, utterances were further coded as redundant, ambiguous, non-informative, etc.

(b) Indeterminate. Child utterances that were totally unintelligible were coded as indeterminate. Partially unintelligible utterances were analyzed if the examiner could interpret the gist of the utterance.

EXAMPLE 17 "Then (UI) shrunk down" (D.B.)

Reliability

Inter-observer reliability was completed on several dimensions of the data. An independent observer was trained by the researcher for approximately fifteen hours. The observer was trained to code the following linguistic perspective-taking categories:

1. non-deictic versus deictic forms;
2. type of deixis, location of presupposed referent(s), and clarity of deictic usage;
3. informative versus non-informative propositions; and
4. types of non-informative propositions.

All codings were analyzed from written transcriptions of the second half-hour of free play and the last three re-telling episodes.

The proportion of data analyzed in the reliability study for deixis was relative to each child's

productivity within one hour of free play. Specifically, .05 of each child's total deictic use was analyzed for the breakdown of non-deictic versus deictic forms. For the more detailed deictic analyses (type, location and clarity), .10 of each child's total deictic use was analyzed. All categories of deixis were randomly chosen from the second half-hour sample and a total of 234 deictic forms were used for this reliability measure.

For the category of non-deictic versus deictic, .94 agreement was obtained between the researcher and the independent observer. For the more detailed deictic analyses, total combined group reliability was as follows: .96 agreement for deictic category; .90 agreement for location of presupposed referent; and .96 agreement for overall clarity of deictic usage.

For the analysis of presuppositions, the independent observer was given all propositions expressed by each child during the last three re-telling episodes. Sixty-two percent (or 184 propositions) of the total samples collected during re-tellings were analyzed. The observer coded three dimensions of informativeness (fully, partially, and non-informative) and then, sub-types of non-informative propositions.

Total group reliability for fully, partially, and non-informative propositions was .96 agreement. For

sub-types of non-informativeness, .90 agreement was found.

Subjects

Subject Selection

Five school-aged autistic children participated in this study. All subjects had been diagnosed as exhibiting pervasive developmental disorders of childhood, infantile autism (full and/or residual state). These diagnoses had been made by either psychiatrists or psychologists. All of the children selected for this study met the criteria outlined in the DSM III Manual (1980) for Developmental Disorders of Childhood, Early Infantile Autism. Each subject's early developmental history included all of the following DSM III criteria in varying degrees of severity:

1. pervasive lack of responsiveness to other people.
2. gross deficits in language development. If speech is present, peculiar speech patterns such as immediate and delayed echolalia, metaphorical language, etc.
3. bizarre responses to various aspects of the environment.
4. onset prior to thirty months of age.

In addition to the diagnosis of early infantile autism (full or residual state), further criteria for subject selection included:

1. mean length of utterance beyond 3.0 morphemes.
2. non-verbal intelligence scores within borderline to normal range as measured on either the Leiter International Performance Scale (1952) and/or the Wechsler Intelligence Scale for Children-R, Performance Scale (1974). All (but one (S5)) psychological evaluations were recently completed by certified psychologists within three years prior to this study. Subject 5 was evaluated four years prior to this study. He had an evaluation one year prior to the study but all tests were not fully scored.
3. a mental age of a least four and a half to five years as measured on either the Leiter Performance Scale (1952), WISC-R (1974), or Stanford-Binet (1960).
4. monolingual home environments with English as the primary language.
5. chronological ages of seven-thirteen years.
6. normal hearing as measured by school audiological screenings noted in school records.

General Subject Descriptions

The subjects ranged in age from 7.10 years to 12.9 years with a mean chronological age of 10.02 years (see Table 2). All subjects were enrolled in special educational programs for emotionally disturbed/ language-impaired children in the New York City area. Three subjects (S1, S3 and S4) were enrolled at the Ittleson Center for Child Research which is a day and residential psychiatric treament center. One subject (S5) was enrolled in a special Board of Education program for autistic children and one subject (S2) was enrolled in a special, private school for severely language-impaired children. Several additional subjects enrolled at the Ittleson Center were considered but were eliminated from this study due to lower cognitive levels, low mean length of utterance and/or lack of parental consent.

All the children who participated in the study had received speech and language therapy over the years and continued to receive language therapy at the time of this study. The areas being assessed in this study had never been directly addressed in therapy as indicated in records and verbal reports of speech-language pathologist.

Based on data collected in free play, several broad linguistic analyses were completed on all subjects in order to gain a general picture of each child's overall

Table 2

Summary of Subject's Age, Diagnosis and Most Recent Psychological Evaluation

Subject	Age	Diagnosis	Psychological Evaluation(s) Formal Testing		Observations by Psychologist
			WISC-R	Leiter	
S1 Michelle	12.9	Infantile autism (Residual state)	CA 12.4 Perf. 85 MA 10.5 Verb. 51 MA 6.3 Full 67 MA 8.3	-	Emotionally withdrawn and fearful Constricted affect Weaknesses in organization
S2 David	12.2	Infantile autism	CA 11.9 Perf. 93 MA 11.1 Verb. 58 MA 6.9 Full 74 MA 8.8	-	Timid, shy, tense, nervous Avoids interactions with others Autistic self-stimulatory movements
S3 Andy	9.4	Infantile autism	CA 9.4 Perf. 57 MA 5.4 Verb. 50 MA 4.7 Full 49 MA 4.6	IQ 71 MA 6.9	Serious problems establishing relationships Inappropirate and artificial affect Emotionally detached and withdrawn Disorganized thinking
S4 Jason	8.5	Infantile autism (Residual state)	CA 7.1 Perf. 84 MA 6.0 Verb. 60 MA 4.3 Full 70 MA 5.0	IQ 73 MA 5.1	Social isolation and fluctuating relatedness Disorganized, tangential and associative thinking Primitive and violent ideas Unstable boundaries
S5 Matt	7.10	Infantile autism (mild features)	CA 6.8 Stanford Binet MA 4.6	CA 3.8 IQ 105 MA 3.10	Symbiotic attachments predominant Mildly autistic features
Means	10.02		Perf. 80 Verb. 55 Full 65	IQ 83	

linguistic functioning. The subjects MLUs (see Table 3) ranged from 3.06 to 4.47 morphemes with a mean MLU of 3.62 morphemes inclusive of all child utterances produced during one hour of free play (see Appendix J for coding procedures for MLUs). When imitations and yes/no responses to questions were excluded, the subjects MLU scores ranged from 3.32 to 4.87 morphemes with a mean MLU of 4.02 morphemes. Regardless of how MLU was calculated, S2 and S3 had the highest MLU scores followed by S4. Subject 1 (the oldest child) and S5 (the youngest child) had the lowest MLU scores.

Two other dimensions of the children's language productions were quantified. Since autistic children can be highly imitative (or echolalic) as well as ritualized in their language, the proportion of non-imitative (spontaneous), imitative and formulaic language use was summarized (see Appendices K and E for definitions and coding procedures). As can be seen on Table 4, S4 produced the greatest proportion of non-imitative utterances (.70) while S2 used the greatest proportion of imitative utterances (.46). Subject 3 produced the highest proportion of formulaic language (.16) followed by Subject 1 (.14) and Subject 5 (.13).

In terms of group performance, .53 of the children's utterances were coded as non-imitative; .35 of their utterances involved some form of imitation;

Table 3

Number, Frequency and Mean Length of Utterance Based on One Hour of Free Play

Subject	# Utterances		MLU[a]	MLU[b]
	#	Freq.	Total Sample	Total Sample
S1 Michelle	332	(.14)	3.06 (327)	3.52 (205)
S2 David	721	(.30)	4.11 (700)	4.5 (515)
S3 Andy	849	(.36)	4.47 (839)	4.87 (707)
S4 Jason	269	(.11)	3.36 (261)	3.89 (194)
S5 Matt	208	(.09)	3.10 (200)	3.32 (145)
Means	476		3.62 (465)	4.02 (353)

[a]Inclusive of all child utterances.

[b]Exclusive of imitations and yes/no responses to questions.

Table 4

Proportion of Non-Imitative, Imitative and Formulaic Utterances in One Hour of Free Play

Subject	Non-Imitative	Imitative			Formulaic Routines
		Exact, Reduced, Recoded	Expanded	Total	
S1 Michelle	.58 (193)	.11 (36)	.17 (56)	.28 (92)	.14 (47)
S2 David	.43 (310)	.19 (138)	.27 (195)	.46 (333)	.11 (78)
S3 Andy	.53 (451)	.08 (66)	.23 (198)	.31 (264)	.16 (134)
S4 Jason	.70 (188)	.13 (36)	.13 (34)	.26 (70)	.04 (11)
S5 Matt	.54 (113)	.19 (39)	.13 (28)	.32 (67)	.13 (28)
Means	.53 (251)	.13 (63)	.21 (102)	.35 (165)	.13 (60)

Note. Imitations include both adult and child imitations.

and .13 of their utterances involved formulaic constructions (see Table 5 for types of formulaic utterances used by each child).

Formal language assessment (Test of Language Development-P) revealed the following results (see Table 6). On the Picture Vocabulary sub-test of the TOLD-P, the children's mean language-age equivalency score was 6.1 years. On the Grammatic Understanding sub-test, the children's mean language-age equivalency score was 4.7 years. On productive sub-tests, the children's mean language-age equivalency score for Oral Vocabulary was 4.5 years. On Grammatic Completion, four subjects (S2, S3, S4 and S5) obtained no language-age score while one subject (S1) achieved a language-age score of 4.8 years.

In general, better performance was observed on comprehension sub-tests than on production sub-tests. In terms of response patterns, Oral Vocabulary errors included imitations of the item to be defined, associative/tangential responses and/or difficulty in producing two pieces of information related to the lexical item (i.e., the children's definitions were often incomplete but related in meaning). On Grammatic Completion, errors involved not only problems with correct morphological use but also tangential and/or uninterpretable responses. For example,

Table 5

Proportion of Each Type of Formulaic Routine During One Hour of Free Play

Subject	Social Routines	Context-Related Routines	Partially Fixed	Memorized Sequences	Idiosyncratic Routines
S1 Michelle (47)	.40 (19)	.36 (17)	.11 (5)	.00 (2)[a]	.13 (6)
S2 David (78)	.04 (3)	.95 (74)	.00	.01 (1)	.00
S3 Andy (134)	.32 (43)	.46 (61)	.00	.05 (7)	.17 (23)
S4 Jason (11)	.45 (5)	.18 (2)	.00	.36 (4) (1)[a]	.00
S5 Matt (28)	.11 (3)	.46 (13)	.00	(1)[a]	.43 (12)
Means	.24 (15)	.56 (33)	.02 (1)	.04 (2)	.14 (8)

Note. See Appendix E for definitions of each type of formulaic routine.

[a]Sequences which were not counted as utterances included songs, alphabet and pledge of allegiance.

Table 6

Language-Age Equivalency Scores and Scaled Scores (SS) on Selected Sub-Tests of the Test of Language Development-Primary

Subject	MLU[a]	NVMA[b]	Picture Vocabulary		Grammatic Understanding		Oral Vocabulary		Grammatic Completion	
			Lang.-Age	SS	Lang.-Age	SS	Lang.-Age	SS	Lang.-Age	SS
S1 Michelle (12.9 yrs)	3.06	10.5	7.4	(8)	4.10	(8)	3.11	(4)	4.8	(5)
S2 David (12.2 yrs)	4.11	11.1	7.0	(7)	6.7	(6)	6.9	(7)	0.0	(2)
S3 Andy (9.4 yrs)	4.47	5.4	7.4	(8)	8.10	(10)	5.5	(6)	0.0	(2)
S4 Jason (8.5 yrs)	3.36	6.0	4.8	(4)	4.4	(2)	3.5	(3)	0.0	(2)
S5 Matt (7.10 yrs)	3.10	4.6	3.9	(3)	0.0	(1)	3.5	(4)	0.0	(4)
Means			6.1	(6)	4.7	(4)	4.5	(5)	.96	(5)

Note. For S1, S2 and S3, scaled scores (SS) were completed as if the child's chronological age was between 8.0 - 8.11 yrs.

[a]Mean length of utterance inclusive of all child utterances during free play.
[b]Non-verbal mental age.

Mary and Jane have a dress. They have two off with the head; or skirt.

Jay likes to play. Right now he is dumb.

Other language analyses were completed to gain a broad description of the form, content, speech acts (functions) and conversational skills expressed by the children (Bloom & Lahey, 1978; Lahey, 1988). These descriptions (see individual subject profiles below) were based on the first one hundred, non-imitative, child utterances produced during free play.

Individual Subject Profiles

SUBJECT 1

Michelle, a 12.9 year old autistic individual, was the oldest (and only female) child studied. Michelle's most recent psychological evaluation (completed at 12.4 years of age) described her as exhibiting infantile autism, residual state. Early developmental history reported by parents, and social workers, revealed the following information:

1. related to people in an undifferentiated manner; isolated, and seriously deviant, in interactions/relationships.
2. as an infant, she was unresponsive to her mother (poor molding, never cried).
3. language onset (single words) at four years of age; receptive and expressive language very

limited and autistic language deviances included echolalia, perseveration and stereotypic speech patterns.

4. behaviors appeared stilted and stereotypic and she manifested a constricted affect.

Psychological Profile.

A complete psychological evaluation was completed by a certified psychologist at 12.4 years of age (see Table 2). Results of the WISC-R revealed a performance score of 85 which fell into the low average range of functioning. Michelle's equated mental age was 10.5 years. Projective psychological testing was also completed at 12.4 years and Michelle was described as demonstrating weaknesses in organization and language; exhibiting great difficulty formulating responses; and as being emotionally withdrawn and fearful.

Language Profile.

Michelle's MLU (see Table 3) was 3.06 morphemes inclusive of all child utterances and her MLU increased to 3.52 morphemes exclusive of imitations and single word yes/no responses. Michelle would be placed at Brown's (1973) Stage IV (early to late) of language development dependent on which MLU calculation was used. Fifty-eight percent of Michelle's utterances were non-imitative while .28 involved some form of adult and/or child imitation. Fourteen percent of her

sample contained formulaic routines which primarily involved social routines (see Tables 4 and 5).

Form.

Michelle's productive language included primarily subject-verb-object constructions many of which were elliptical in nature (in relation to prior adult comments and/or requests for information). Michelle's morphological use consisted of inconsistent, but correct, productions of time markers, third person -s, articles (both indefinite and definite), and copula to be. Formulation of questions lacked obligatory do and subject-auxiliary reversals. Occasional instances of the conjunction and were observed but this complex form was not productive (i.e., did not occur four or more times in sample, see Lahey, 1988). Michelle's intelligibility of speech was good.

Content.

Michelle encoded a broad range of semantic relations and she encoded all semantic relations through Phase 5 (Bloom & Lahey, 1978) with the exception of causality. She most frequently encoded agent+action+object, notice, locative action and dative. In contrast, occasional instances of later developing semantic relations were observed (such as additive, state, mood, and antithesis) but were not productive.

Use.

Michelle expressed a broad range of speech acts including comments, responsives (which were primarily acknowledgements), requests for action, requests for information, emotives and many conversational routines. Michelle's speech acts were clearly interpreted by the investigator.

Conversationally, Michelle was a very passive partner. With some encouragement, she initiated and sustained topics during doll play. Most of her discourse involved interactions on and between doll figures. She often did not involve the researcher unless the researcher intruded on her play. Michelle's discourse often had a stereotypic quality due to the use of many formulaic routines (.14 of utterances) which kept the discourse flowing without much new, and changing, information.

Social Profile.

Michelle's social-affective relatedness was judged by a certified psychotherapist to be moderately to severely impaired (see Appendix A for social-affective scale). Michelle's interactions were described by the psychotherapist as lacking initiative and being passively related; lacking person gaze and visual contact; anxious when her control of toys was interferred with; emotionally constricted and lacking

animation; and minimally verbal and essentially failing to share her inner experiences.

Wing and Attwood 's (1987) categorization of the interactive styles of autistic children as aloof, passive or active-but-odd were used to further differentiate the subjects in this study. Michelle most clearly fell into the category of passive involvement with others. Although she made few spontaneous initiations toward the adult during play, she "appeared to enjoy" interactions with the investigator (Wing & Attwood, 1987, p. 8). Her passivity was reflected in lack of animation and spontaneity in all social interactions.

SUBJECT 2

David, the second oldest subject, was 12.2 years of age. Recent psychological evaluations (completed at 11.9 years) described David as evidencing autistic behaviors which would probably be categorized as infantile autism, residual state. David was the only subject who was highly familiar with the examiner over a lengthy time period. David's mother described his early developmental history as follows:

1. extreme social unrelatedness and lack of interest in other people.
2. speech and language severely delayed with language onset at three years of age.

3. language disorder characterized by prevalent use of echolalia and rapid, unintelligible speech pattern.

4. stereotypic and ritualistic behaviors.

5. history of seizure disorder.

Psychological Profile.

A complete psychological evaluation was administered by a certified psychologist at 11.9 years of age (see Table 2). On the WISC-R, David obtained a performance score of 93 which placed him in the average range of cognitive functioning. David's equated mental age was 11.1 years. At the time of the evaluation, David was described as a quiet, timid, shy, tense and nervous child who avoided interactions with other people whenever possible. It was further noted that considerable input was needed to keep David from withdrawing and hiding in silence in his classroom. Autistic self-stimulatory movements were still evident as well as some symptoms of hyperactivity.

Linguistic Profile.

David's MLU was 4.11 morphemes inclusive of all child utterances and his MLU increased to 4.5 morphemes exclusive of imitations and yes/no responses. David fell into Brown's (1973) Stage V of language development regardless of how MLU was calculated. Forty-three percent of David's sample was non-imitative and .46 of his language involved some form of

imitation. David exhibited the highest proportion of imitation across all subjects. Eleven percent of David's sample involved context-related formulaic routines (see Tables 4 and 5).

Form.

David produced primarily subject-verb-object constructions with many verb-object constructions (that were elliptical in relation to the non-linguistic and/or prior linguistic context). David used most morphological forms correctly (and consistently) including time markers, possessive and plural markers, third person -s, articles, and the copula to be. His formulation of wh-questions lacked reversal of auxiliary verbs and use of obligatory do. In terms of more complex forms, David used the conjunction and productively. David's speech intelligibility was poor and his speech was characterized by a rapid, staccato-like rhythm.

Content.

David encoded, and embedded, a broad range of semantic ideas through Phase 5 (Bloom & Lahey, 1978) with the exception of causality. He most frequently encoded agent+action+object relations. Some later developing semantic ideas such as additive and time were used productively. Other complex semantic relations were not used.

Use.

David expressed a broad range of speech acts with most frequent use of requests for action (primarily directed to doll figures) and comments. He also used requests for information (again, frequently directed to dolls), attention-getters, responsives and acknowledgements. David's speech acts were easily interpreted by the investigator.

Conversationally, David was an active conversational partner who both initiated and maintained conversational exchanges. He sustained elaborate sequences of talk with doll figures while including the investigator in these scripts. David's scripts had a ritualistic flavor as he re-enacted common events in a stereotypic manner. Imitation was often used as a discourse strategy to sustain dialogues resulting in output which was redundant in content.

Social Profile.

David was judged to be mild to moderately impaired in social-affective relatedness (see Appendix A). David's interactions were described by the psychotherapist as active play and decision making; involved with and directing researcher's participation in activities with toys; and telling stories and sharing fantasies. Though active in his play, showing detail and richness, it tended to be mechanical and stereotypic as it unfolded. David was described as

emotionally constricted and he exhibited a moderate to high level of anxiety. In terms of interactive style, David would be characterized as active-but-odd (Wing & Attwood, 1987). These children make "spontaneous approaches to others but in a peculiar, naive and one-sided fashion" (Wing & Attwood, 1987, p. 9).

SUBJECT 3

Andy, a 9.4 year old male child, was the third oldest subject. Early developmental history (based on observations of social workers) revealed the following information:

1. minimal social relatedness, shallow, non-interactive, self-absorbed and disoriented.
2. language deviances evident since 2.6 years of age that were characterized as echolalic, tangential, idiosyncratic, ritualistic and perseverative.
3. labile and variable affect.
4. preoccupation with certain objects.
5. poor impulse control, rote and ritualistic mannerisms, oppositional and manipulative.
6. interest in maintaining sameness in environment.
7. history of febrile seizures since 2.6 years of age.

Psychological Profile.

Andy received a complete psychological evaluation, administered by a certified psychologist, at 9.4 years of age (see Table 2). On the WISC-R, his performance score was 57 which placed him within the mildly retarded range of cognitive functioning. His equated mental age on the WISC was 5.4 years. On the Leiter Performance Scale, Andy obtained an IQ of 71 and a (higher) mental age of 6.9 years which fell within a borderline range of cognitive functioning. Thus, his Leiter scores met the criterion for inclusion in this study.

Projective psychological testing was also completed at 9.4 years. The psychologist described Andy as exhibiting serious problems in establishing relationships; having an affect that was inappropriate and artificial (as if he was acting); being emotionally detached, withdrawn and muttering to himself; demonstrating disorganized, tangential and confused thinking; and engaging in stereotypic behaviors.

Linguistic Profile.

Andy's MLU was 4.47 morphemes inclusive of all child utterances and his MLU increased to 4.87 morphemes exclusive of imitations and yes/no responses (see Table 3). He fell within Brown's (1973) Stage V of language development regardless of how MLU was calculated. Fifty-three percent of Andy's sample

contained non-imitative utterances and .31 of his utterances involved imitation (see Table 4). Sixteen percent of Andy's language contained formulaic routines which was the highest proportion used across subjects (see Tables 5). The majority of his routines were social and/or context-related (see Table 5).

Form.

Andy used both simple and complex language constructions. Elliptical utterances were also used frequently, and appropriately, relative to the non-linguistic and/or prior linguistic context. Most morphological forms were used correctly. Problems with subject-verb agreement and formulation of wh-questions were evident (similar to other subjects). Complex linguistic connectives such as and, but, then, and (be)cause were used appropriately frequently. Andy often emitted incomplete utterances and/or had false starts when expressing ideas. Occasional word order reversals were noted. Intelligibility of speech was good but intonational patterns were quite monotonic in pitch.

Content.

Andy encoded a broader range of semantic relations in comparison to all other children. He coded all semantic relations through Phase 8 (Bloom & Lahey, 1978). He productively encoded additive, time, and causality relations. Other relations such as

epistemic, mood, and state appeared in his sample but were not productive. Andy's more sophisticated language skills were also evident on some of his scores on subtests of the TOLD-P.

Use.

Andy encoded a broad range of speech acts including protests, requests for information, requests for objects and actions, responsives, acknowledgements, comments and conversational routines (especially polite forms). He most frequently coded protests and requests for objects/actions and information. Some of Andy's utterances could not easily be interpreted as to intentionality. In fact, the investigator frequently used request clarifications with Andy in order to interpret his intentions. However, Andy infrequently responded to these clarification requests.

Conversationally, Andy was a very active and controlling conversational partner. He initiated topics but could not sustain them with new and changing information. The topic-content of Andy's discourse was redundant, formulaic and non-informative. Andy often re-introduced the same topics. He was quite oppositional in his responses to the investigator's comments and/or attempts to be involved in his play.

Social Profile.

Andy's social-affective relatedness was observed to be moderately impaired (see Appendix A). Andy was described by the psychotherapist as anxious, rigid, controlling and oppositional during interactions. Frequently, Andy tried to master his anxiety by controlling the play and input from the investigator. However, there was some fantasy and creativeness in his play. His affect, though constricted, did at times reflect hostile and aggressive feelings. Similar to David (S2), Andy would be classified as active-but-odd (Wing & Attwood, 1987). Unlike David, he exhibited social behaviors including impulsivity, hostility and aggressiveness.

SUBJECT 4

Jason, an 8.5 year old male child, was the second youngest child in the study. His most recent psychiatric diagnosis (at 7.1 years) was of infantile autism, residual state. Early developmental history, reported by parents and social workers, was as follows:

1. as an infant, socially isolated and unrelated to other people; withdrawn; starring into space; and laughing with not apparent reason.
2. at two years of age, lack of response to the world.
3. no normal pre-verbal communicative skills (such as gestures); language onset was within

normal limits but no use of language for communication. Language disturbances included self-directed utterances, delayed echolalia, use of stereotypic forms, word salad (mixed up speech) and quotations from t.v. commercials.

4. poor impulse control; panic attacks; and bizarre behavioral patterns.

Psychological Profile.

A complete psychological evaluation was completed at 7.1 years of age by a certified psychologist (see Table 2). On the WISC-R, Jason obtained a performance score of 84 which fell into the low average range of cognitive functioning. His equated mental age was 6 years. On the Leiter Performance Scale, Jason obtained an IQ of 73 and a (slightly lower) mental age of 5.1 years. Projective testing was also completed at 7.1 years. The psychologist described Jason as exhibiting: disorganzied, tangential and associational thinking; primitive and violent ideas; difficulty differentiating reality versus fantasy; and unstable boundaries. Jason was also observed to be tentatively related and aloof.

Linguistic Profile.

Jason's MLU was 3.36 morphemes inclusive of all child utterances and his MLU increased to 3.89 morphemes when imitations and yes/no responses were excluded (see Table 3). Jason would be placed at Brown's (1973) Stage IV (early to late) of language

development dependent on which MLU calculation was used. Seventy percent of Jason's utterances were non-imitative and .26 of his utterances contained imitations (see Table 4). Jason used the greatest proportion of non-imitative speech and least proportion of formulaic language (.04 utterances) of the subjects.

Form.

Jason produced mainly simple subject+verb+object constructions. Utterances were often elliptical relative to the non-linguistic context and/or prior linguistic context. In terms of morphology, Jason correctly used time and plural markers, some indefinite articles, and the copula to be. Question formulations involved omission of obligatory do and a lack of auxiliary verb transpositions. Occasionally, word order reversals were seen. Speech intelligibility ranged from adequate to poor. Jason often whispered to himself and would repeat a lexical item two or three times to himself. At times, his low volume interferred with speech intelligibility. Jason also produced incomplete sentences (or ideas) in which he would start to talk but then change topics abruptly.

Content.

Jason encoded most early developing semantic relations and he expressed most semantic relations through Phase 4 (Bloom & Lahey, 1978). Jason did not encode most later developing semantic relations. While

there were occasions of additive, epistemic, dative and specification in non-formulaic utterances, they were not productive.

Use.

Jason expressed a range of speech acts and primarily used labels, comments, requests for actions, requests for information, responsives (with many acknowledgements), conversational devices (such as polite forms) and occasional protests. Jason's utterances were not always clearly interpreted as to intentionality. Similar to Andy, the researcher requested clarification of many of Jason's utterances. However, he infrequently repaired his unclear messages.

Conversationally, Jason was an active, and engaged, conversational partner who both initiated and responded to discourse topics. Generally, his utterances were concrete and stereotypic in content.

Social Profile.

Jason's social-affective relatedness was characterized as mild to moderately impaired (see Appendix A). Though more socially related relative to the other subjects, he demonstrated considerable anxiety, impulsivity and was emotionally labile. His anxiety would occasionally manifest in outbursts of highly charged laughter. During play, he was actively engaged with the researcher. Though his play was scattered at times, it reflected his fantasies and a

sharing of his inner world. Similar to David (S2) and Andy (S3), Jason's interactive style could be described as active-but-odd (Wing & Attwood, 1987). Similar to David and Andy, Jason was highly anxious; unlike David and Andy, Jason exhibited a high degree of emotional lability.

SUBJECT 5

Matt, the youngest subject, was 7.10 years of age. His most recent psychiatric evaluation (completed at 6.8 years) described Matt as exhibiting mild autistic features without cardinal signs of classical autism. Early development history, as reported by parents and social workers, included the following information:

1. lack of relating to external stimuli and/or relating to external stimuli in a "different" way.
2. totally engrossed in self-play by himself.
3. language onset at one year (occasional short sentences) but specific language impairment characterized by severe receptive and expressive delays and echolalia.
4. at three years, his language lacked spontaneous speech with the exception of t.v. commercials. He hummed and muttered to himself.
5. ritualistic behavioral patterns and little person gaze.

Psychological Profile.

Matt was the only subject who had not received a complete psychological re-evaluation within the past three years (see Table 2). At 3.8 years, Matt obtained an IQ score of 105 and a mental age of 3.10 years on the Leiter Performance Scale. At that time, chronological and mental age were closely related. All psychological reports consistently described Matt as exhibiting normal non-verbal intelligence. One report stated that Matt's IQ scores were a minimal estimate of his intellectual potential. At 6.8 years of age, Matt received a Stanford-Binet but his test scores were not completely quantified. A certified psychologist reported that he passed all items at a four year level and had partial success on items at five and six year levels. Although an exact mental age was not calculated, Matt was described as functioning at a mental age of 4.6 years. Based on these reports, Matt appeared to be an appropriate candidate for this study.

During Matt's most recent psychological re-evaluation (6.8 years), Matt was described as exhibiting: symbiotic attachments which were still predominant; verbal language deficits; and mildly autistic features.

Linguistic Profile.

Matt's MLU was 3.1 morphemes inclusive of all child utterances and his MLU increased to 3.32 morphemes

exclusive of imitations and yes/no responses (see Table 3). Regardless of how MLU was calculated, Matt's MLU placed him in Brown's (1973) early Stage IV of language development. Matt's MLU scores were the lowest in comparison to all other subjects with the exception of S1 (the oldest child). Fifty-four percent of Matt's language was non-imitative and .31 of his utterances involved some form of imitation (see Tables 4 and 5). Thirteen percent of his utterances were coded as formulaic and he primarily used idiosyncratic and context-related routines.

Form.

Matt produced primarily simple subject+verb+object constructions and elliptical utterances (relative to non-linguistic and/or prior linguistic context). Matt used time, plural and possessive markers, third person-s, copula to be, and occasionally, indefinite articles. Problems were noted with question formulations (lack of obligatory do and lack of auxiliary verb inversions). Intelligibility of speech was poor primarily due to low volume characterized by Matt whispering to himself. Occasionally, Matt emitted outbursts of grunts and noises which did not seem related to external events. He also hummed to himself while he played.

Content.

Matt coded, and embedded, a range of early developing semantic relations through Phase 4 (Bloom & Lahey, 1978). He did not code any later developing semantic relations.

Use.

Matt coded a broad range of speech acts including labels, comments, protests, requests for objects and actions, requests for information, responsives (mainly acknowledgements) and conversational devices (such as polite forms). Many of Matt's utterances were unclear as to intentionality (especially his requests for information). Similar to Andy and Jason, the researcher asked many requests for clarification which Matt rarely answered.

Conversationally, Matt was a passive conversational participant who had fleeting involvement with the investigator. Matt's communicative style did not feel directed to another person. Matt's initiation and responsiveness to discourse were poor and his topic sustaining skills were quite limited. Similar to David, imitations were used as a prevalent strategy to maintain contact with the investigator. Due to prevalent use of imitation, Matt's topics were redundant and lacked informative content.

Social Profile.

Matt's social-affective relatedness was judged to be severely impaired and this was the lowest rating of all children. Matt was described by the psychotherapist as extremely passive and very constricted emotionally. Occasionally, his aggressive feelings would manifest in outbursts of anger unrelated to the context. These inappropriate outbursts were followed by apologetic behavior and withdrawal. His play was very limited with a lack of ability to elaborate on the story context. There was little ability to share fantasy or inner experiences. In terms of interactive style, Matt exhibited an aloof interactive style most representative of the popular image of autistic children "most cut off from social contact" (Wing & Attwood, 1987, p. 5).

CHAPTER IV

RESULTS

The broad objective of this research was to analyze selective features of linguistic and perceptual perspective-taking knowledge in autistic children. This chapter shall be organized in the following manner. First, the children's overall group performance will be discussed relative to linguistic (namely, deixis and presuppositions) and perceptual (or non-linguistic) perspective-taking. Within each area, group profiles and individual differences will be analyzed. Second, the children's overall performance across areas will be analyzed relative to contextual influences (such as degree of structure, presence of physical-perceptual context, listener condition, etc.) on linguistic-pragmatic and social-cognitive performance. Third, the interrelationship(s) between the children's individual and group performance across perspective-taking domains will be explored.

Linguistic Perspective-taking

Linguistic Deixis

Low Structured Observations (Free Play)

A detailed analysis was completed of the children's deictic usage during low structured observations. The

broad objective of this analysis was to evaluate autistic children's performance using linguistic deictic forms that reference person, object and place. The appropriate use of deixis reflects the fact the speaker can modify his language relative to the situational and listener context. Thus, one index of perspective-taking skill would be the clear use of deictic forms relative to a listener's needs.

Frequency and clarity of deictic use for person, object and place forms.

The first research question explored the frequency (see Table 7) and clarity of autistic children's deictic usage within and across person, object and place categories. Results will first be presented for frequency, then clarity. With regard to frequency, the mean number of deictic forms used by the children during free play was 286 forms (with a range of 57 to 696 forms). In terms of individual variations (see Table 7), it can be seen that wide differences occurred across subjects relative to frequency of talk and total deictic use. For example, Andy (S3) talked most frequently and used the greatest proportion of deictic forms (.49). David (S2) also talked frequently and his overall proportion of deictic use was .27 (relative to other subjects). Michelle (S1) and Jason's (S4) overall frequency of talk was similar although Michelle's proportion of deictic use (.12) was slightly

Table 7

Proportion and Frequency of Person, Object and Place Forms During One Hour of Free Play

Subject	Total	Person	Object	Place
	(#) (%)			
S1 Michelle	171 (.12)	.71 (122)	.18 (31)	.11 (18)
S2 David	383 (.27)	.68 (262)	.23 (89)	.08 (32)
S3 Andy	696 (.49)	.67 (467)	.27 (186)	.06 (43)
S4 Jason	124 (.09)	.66 (82)	.27 (33)	.07 (9)
S5 Matt	57 (.04)	.49 (28)	.32 (18)	.19 (11)
Means	286	.67 (192)	.25 (71)	.08 (23)

greater than Jason's (.09). Finally, Matt (S5) talked least frequently and used the smallest proportion (.04) of deictic forms relative to the other children.

An analysis of the frequency of use of each deictic category (regardless of clarity) revealed that the most frequently encoded deictic category involved person reference (see Table 7). A mean of .67 of the deictic forms coded person deixis (with a range of .49 to .71 person forms). The second most frequently encoded deictic category involved object reference; a mean of .25 of deictic use coded object deixis (with a range of .18 to .32 forms). The least frequently coded deictic category for all subjects involved place deixis ($\bar{X}$=.08 with a range of .06 to .19 place forms).

In looking at individual differences, the subject's overall proportion of use of person deixis was similar with the exception of Matt (S5). Matt used a smaller proportion of person forms (.49) in comparison to all other children. The children's overall proportion of use of object deixis was similar with Matt exhibiting greater use of object deixis (.32) and Michelle (S1) exhibiting the smallest proportion of object deixis (.18) relative to the other children. Place deixis was used least frequently by David (S2), Andy (S3) and Jason (S4). Similar to object deixis, Matt (S5) used a greater proportion of place deixis than the other children.

An analysis of the listener's (i.e., the investigator's) ability to clearly interpret the children's deictic usage can be seen on Table 8 (see methods section for definitions of clear/unclear usage). A mean of .80 (with a range of .70 to .86) of the children's deictic use was clearly interpreted by the listener while a mean of .17 (with a range of .12 to .25) of total deictic use led to unclear listener interpretations.

In looking at individual differences, David (S2) exhibited the highest proportion of overall clarity of deictic use (.86). Michelle (S1), Andy (S3) and Jason (S4) exhibited the same and/or similar proportions of clear deictic use (.80, .78, .80, respectively); Matt (S5) exhibited the least clear overall deictic performance (.70 clear use) relative to the other children. All children produced similar proportions of unclear forms with the exception of Matt (S5).

Person deixis.

In comparing clarity of deictic use across each category, person deixis was the most clearly, and frequently, used category across all subjects (see Table 8). A mean of .83 (with a range of .79 to .88) clear person use was obtained for all subjects and a mean of .16 (with a range of .11 to .18) of person forms were found to be unclear. For person deixis, the children's individual performance was quite similar and

Table 8

Proportion of Person, Object and Place Deictic Forms According to Clarity of Use During One Hour of Free Play

	All Categories Total & Mean Props.			Person			Object			Place		
Subject	Clear	Unclear	Indetermin	Clear	Unclear	Indetermin	Clear	Unclear	Indetermin	Clear	Unclear	Indetermi
S1 (171)	.80 (137)	.18 (30)	.02 (4)	.82 (100)	.16 (20)	.02 (2)	.71 (22)	.26 (8)	.03 (1)	.83 (15)	.11 (2)	.05 (1)
S2 (383)	.86 (331)	.12 (46)	.02 (6)	.88 (230)	.11 (28)	.02 (4)	.81 (72)	.17 (15)	.02 (2)	.91 (29)	.09 (3)	.00
S3 (696)	.78 (544)	.18 (127)	.04 (25)	.80 (325)	.18 (86)	.01 (6)	.71 (132)	.21 (139)	.08 (15)	.86 (37)	.05 (2)	.09 (4)
S4 (124)	.80 (99)	.16 (20)	.04 (5)	.82 (67)	.17 (14)	.01 (1)	.79 (26)	.15 (5)	.06 (2)	.66 (6)	.11 (1)	.22 (2)
S5 (57)	.70 (40)	.25 (14)	.05 (3)	.79 (22)	.18 (5)	.04 (1)	.61 (11)	.28 (5)	.11 (2)	.63 (7)	.36 (4)	.00
Means	.80 (230)	.17 (47)	.03 (7)	.83 (159)	.16 (31)	.01 (3)	.74 (53)	.20 (14)	.06 (4)	.83 (19)	.11 (2)	.06 (1)

the range of differences across subjects was narrow. All children performed well in clarity of use of person deixis and shifted person forms relative to self versus other(s).

One further analysis of the frequency, and clarity, of all children's use of person reference relative to self, listener (investigator) and other (inanimate figures), was completed (see Table 9). Two interesting findings emerged in this analysis. First, a mean of .08 (clear and unclear) of person deictic forms referred to the adult participant. This was the least frequently coded person category for all children. Second, the most frequently coded person categories involved self ($\overline{X}$=.30) and inanimate other(s) ($\overline{X}$=.61).

Two subgroups of children emerged in the data. For Michelle (S1), David (S2) and Andy (S3), most ($\overline{X}$=.63) of their person forms referenced inanimate other(s) while they coded self-reference less frequently ($\overline{X}$=.26). For Jason (S4) and Matt (S5), a different pattern was observed; most frequently coded category of person reference involved self ($\overline{X}$=.61) rather than other ($\overline{X}$=.33). Such differences may reflect degrees of egocentricity. Of course, most striking was the finding that all subjects infrequently used person forms to refer to the investigator. Eight occasions of the children using the investigator's (proper) name were observed (Jason (1) and Matt (7)).

Table 9

Proportion of Person Reference to Self, Adult-Partner and Others During One Hour of Free Play

Subject	Self		Adult-Partner		Other (Inanimate Figures)	
	Clear	Unclear	Clear	Unclear	Clear	Unclear
S1 Michelle (120)	.17 (20)	.06 (7)	.11 (13)	.00 (0)	.55 (67)	.11 (13)
S2 David (258)	.18 (48)	.01 (3)	.08 (20)	.003 (1)	.62 (162)	.09 (24)
S3 Andy (461)	.27 (124)	.04 (21)	.08 (36)	.01 (7)	.46 (215)	.12 (58)
S4 Jason (81)	.48 (39)	.07 (6)	.02 (2)	.01 (1)	.32 (26)	.09 (7)
S5 Matt (27)	.68 (19)	.11 (3)	.04 (1)	.04 (1)	.07 (2)	.04 (1)
Means	.26 (50)	.04 (8)	.08 (14)	.01 (2)	.50 (94)	.11 (21)

Listener confusion in interpretation of clarity of person deictic use was usually the result of: (a) the child's use of non-specific reference when referring to a particular doll figure; (b) confusion as to whom the child was referencing at the moment of a communicative act (i.e., doll or investigator); and (c) during pretend play sequences, confusion as to whether or not the child was talking for herself/himself or for the doll.

In looking at language errors (that were coded as clear since the referent was easily identifiable), good knowledge of form was observed. In the total samples, only 9 person errors were noted that involved gender confusion (4) and I/you confusion (5). Only in Matt's (S5) sample did poor knowledge of form seem more evident as he exhibited some speaker/listener pronominal confusions. However, in the coding system described above, these forms were coded as ambiguous (and not as language errors) since the referent was not easily interpreted. Thus, Matt seemed to have more problems with person reference than the data suggests.

Object deixis.

An analysis of the children's clarity of object deictic use revealed that a mean of .74 (with a range of .61 to .81) object forms were clearly interpreted by the listener (see Table 8); .20 (with a range of .15 to .28) of object deixis was unclear to the listener. In

looking across deictic categories, the children's overall ability to clearly code object deixis resulted in the lowest mean scores for clear usage.

In terms of individual differences, similar to person deixis, David (S2) exhibited the highest proportion of clear object deictic use in comparison to the other subjects. Jason's (S4) overall clarity of object deixis (.74) was higher in comparison to Michelle (S1), Andy (S3) and Matt (S5). Similar to person deictic use, Jason maintained a rather high proportion of clear use unlike Michelle (S1) and Andy (S3) whose proportions of clear object use decreased relative to their proportions of clear person use. As with person deixis, Matt (S5) produced the lowest proportion of clear use of object deixis. Unclear object deictic use primarily resulted from a lack of specificity of the referent. Similar to person deixis, infrequent (9) language errors were observed across all children and included difficulties with singular/plural demonstrative forms.

Place deixis.

A mean of .83 place forms were coded as clear while .11 of place forms were coded as unclear (see Table 8). The broadest range of differences across all subjects was found for clear place deixis (.63 to .91 clear use).

In analyzing individual patterns, David (S2), Andy (S3) and Michelle (S1) exhibited a high proportion of clear place reference. Similar to other categories of deixis, David (S2) again used the highest proportion of clear place deixis. Michelle (S1) and Andy's (S3) performance for clear place reference was similar to their good performance for person deixis. Jason (S4) and Matt (S5) exhibited lower proportions of clear place use relative to the other children. Matt (S5) performed the poorest on place deixis similar to his poor performance with person and object deixis.

Unclear place deictic use resulted from a lack of specificity in the marking of locations of objects in the non-linguistic context. No language errors were noted for this category of deixis.

Object and place contrastive pairs.

One further analysis was completed on the children's use of object and place deixis (see Table 10). As previously mentioned, these categories not only reference an object (or person) but also specify the location of the referent relative to speaker/listener positions in space. Certain linguistic forms encode proximal/distal locations and include the demonstrative pronouns (this, that) and the locative adverbs (here, there).

All children demonstrated limited ability to consistently, and appropriately, code object and place

Table 10

Proportion of Object and Place Deictic Forms Relative to Proximal - Distal Distinctions During One Hour of Free Play

	Distance of Referent Relative to Child-Speaker's Position													
	Close				Far				Unmarked				Indeterminate	
Subject	Proximal		Distal		Proximal		Distal		Proximal		Distal		Proximal	Distal
	Clear	Unclear	Clear	Unclear	Clear	Unclear	Clear	Unclear	Clear	Unclear	Clear	Unclear		
S1 (25)	.40(10)	.08(2)	.12(3)	.00	.00	.04(1)	.08(2)	.00	.08(2)	.00	.04(1)	.00	.16(4)	
S2 (70)	.54(38)	.09(6)	.23(16)	.03(2)	.00	.00	.06(4)	.00	.00	.03(2)	.00	.01(1)	.01(1)	
S3 (108)	.42(45)	.06(7)	.10(11)	.04(4)	.01(1)	.00	.10(11)	.04(4)	.06(7)	.01(1)	.04(4)	.04(4)	.08(9)	
S4 (19)	.53(10)	.00	.16(3)	.05(1)	.00	.00	.00	.00	.16(3)	.00	.00	.05(1)	.05(1)	
S5 (14)	.71(10)	.14(2)	.07(1)	.07(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	
Means	.48(23)	.07(9)	.14(7)	.03(2)	.004(.2)	.004(.2)	.07(3)	.02(.82)	.05(2)	.01(.6)	.02(1)	.03(1)	.06(3)	

Note. Proximal forms included this and here; distal forms included that and there.

contrastive pairs. Although the children clearly referenced objects in space (as described above), their coding of distance relative to themselves was not well developed.

In terms of individual differences, Michelle (S1) did not consistently use contrastive deictic forms relative to speaker/listener positions. Use of proximal forms (this, here) relative to place were evident but contrastive use of proximal versus distal forms (that, there) was not observed. Similarly, David (S2) consistently used proximal forms to code referents close to himself while distal forms were used much less frequently. David infrequently used that and there relative to distant objects. For David and Michelle, there were only minimal occurrences of distal objects in the context.

Andy (S3) used proximal forms to code referents close to himself. Andy used distal forms equally to code objects far and close to himself and he was the only subject who demonstrated some skill at using proximal and distal forms relative to location. Jason (S4) clearly coded proximal referents with proximal forms. However, he also used distal forms to code objects in close proximity to himself. There were no occurrences of encoding distal referents. Matt (S5) only used proximal linguistic forms. Similar to Jason

(S4), Matt evidenced no use of distal forms and no ability to code contrastive deictic pairs.

Location of presupposed referent.

The next research question addressed the issue of deictic use relative to the presence and absence of the physical-perceptual context. A broad breakdown of the children's use of exophora and endophora (see Table 11) revealed that .63 of the children's overall deictic use involved exophoric reference (with a range of .56 to .65 exophoric forms); .32 of the children's deictic use involved exophoric and anaphoric reference (with a range of .30 to .40 exophoric/anaphoric forms). Only .01 of all deictic forms involved (textual) anaphora alone, without situational support. The children performed rather similarly in their use of all three types of reference and a narrow range of differences was observed across all subjects. For all children, the presence of the physical-perceptual context seemed to increase frequency of exophoric and exophoric/anaphoric reference both contextually bound to the situation.

Exophora.

Analysis of the children's use of exophora alone (see Table 12) revealed a mean of .80 (with a range of .76 to .86) of all exophoric deictic reference was clearly interpreted by the listener. Individual differences in group performance were not evident with

Table 11

Proportion and Number of Deictic Forms Relative to Location of Referent During One Hour of Free Play

Subject	Location of Referent			
	Exophora	Exophora Plus Anaphora	Endophora (Anaphora)	Indeterminate
S1 Michelle (171)	.56 (95)	.40 (69)	.02 (3)	.02 (4)
S2 David (383)	.65 (250)	.30 (116)	.03 (11)	.02 (6)
S3 Andy (696)	.65 (453)	.30 (212)	.01 (6)	.04 (25)
S4 Jason (124)	.62 (77)	.33 (41)	.01 (1)	.04 (5)
S5 Matt (57)	.58 (33)	.37 (21)	.00 (0)	.05 (3)
Means	.63 (182)	.32 (92)	.01 (4)	.03 (9)

Table 12

Proportion and Number of Exophoric Deictic Forms Relative to Category and Clarity of Use During One Hour of Free Play

Subject	Person		Object		Place		Totals[a]	
	Clear	Unclear	Clear	Unclear	Clear	Unclear	Clear	Unclear
S1 Michelle (95)	.54 (51)	.17 (16)	.09 (9)	.04 (4)	.14 (13)	.02 (2)	.77 (73)	.23 (22)
S2 David (250)	.62 (156)	.10 (24)	.14 (35)	.03 (8)	.10 (25)	.01 (2)	.86 (216)	.14 (34)
S3 Andy (453)	.57 (256)	.16 (73)	.13 (61)	.05 (24)	.08 (37)	.004 (2)	.78 (354)	.22 (99)
S4 Jason (77)	.53 (41)	.17 (13)	.18 (14)	.04 (3)	.08 (6)	.00	.79 (61)	.21 (16)
S5 Matt (33)	.36 (12)	.06 (2)	.18 (6)	.06 (2)	.21 (7)	.12 (4)	.76 (25)	.24 (8)
Means	.57 (103)	.14 (26)	.14 (25)	.05 (8)	.10 (18)	.03 (2)	.80 (146)	.20 (36)

[a]Indeterminate omitted since do not know type of reference.

the exception of David (S2) who, once again, performed at the highest end of the continuum.

Further analyses were completed on the children's overall use of gestural versus non-gestural exophoric reference (see Table 13). It was hypothesized that gestural use may reflect degrees of sensitivity to the listener's needs and relate to overall communicative effectiveness. A mean of .19 of explicit gestures accompanied the children's deictic forms with .17 of these gestures coded as clear (with a range of .09 to .28 clear use). Unclear gestures (.03) involved vague and/or idiosyncratic hand movements.

Individual variations revealed that Michelle (S2), David (S2) and Matt (S5) demonstrated the highest proportions of gestural use while Andy (S3) and Jason (S4) had the lowest proportions of gestural use.

Eighty-one percent of the children's exophoric use was non-gestural; .63 (with a range of .55 to .69) of non-gestural use was clear to the listener. The range of performance was rather narrow across all subjects relative to non-gestural exophoric use. This was in contrast to a wider range of individual differences in gestural, exophoric use.

Exophora and anaphora.

Looking at the children's overall use of exophora and anaphora (see Table 14), only .04 of anaphoric reference was used while .96 of forms included

Table 13

Proportion and Number of Gestural and Non-Gestural Devices Accompanying Exophoric Deictic Reference During One Hour of Free Play

Subject	Gestural (Exophoric 1)		Non-Gestural (Exophoric 2)	
	Clear	Unclear	Clear	Unclear
S1 Michelle (95)	.24 (23)	.03 (3)	.53 (50)	.20 (19)
S2 David (250)	.28 (69)	.02 (5)	.59 (147)	.12 (29)
S3 Andy (453)	.09 (43)	.004 (2)	.69 (311)	.21 (97)
S4 Jason (77)	.17 (13)	.01 (1)	.62 (48)	.19 (15)
S5 Matt (33)	.21 (7)	.09 (3)	.55 (18)	.15 (5)
Means	.17 (31)	.02 (3)	.63 (115)	.18 (33)

Note. Indeterminate omitted.

Table 14

Proportion and Number of Anaphoric and Exophoric & Anaphoric Forms Relative to Category and Clarity of Use During One Hour of Play

Subject	Person				Object				Place				Totals			
	Ana		Exo & Ana		Ana		Exo & Ana		Ana		Exo & Ana		Ana		Exo & Ana	
	Cl	Uncl	Cl	Uncl	Cl	Uncl	Cl	Uncl	Cl	Unc	Cl	Uncl	Cl	Uncl	Cl	Uncl
S1	.03 (2)	0	.65 (47)	.06 (4)	0	0	.18 (13)	.06 (4)	.01 (0)	0	.01 (1)	0	.04 (3)	0	.85 (61)	.11 (8)
S2	.06 (7)	0	.53 (67)	.03 (4)	.03 (4)	0	.26 (33)	.06 (7)	0	0	.03 (4)	.01 (1)	.09 (11)	0	.82 (104)	.09 (12)
S3	0	0	.55 (119)	.06 (13)	.03 (6)	0	.30 (65)	.07 (15)	0	0	0	0	.03 (6)	0	.84 (184)	.13 (28)
S4	0	0	.62 (26)	.02 (1)	.03 (1)	0	.26 (11)	.05 (2)	0	0	0	.02 (1)	.02 (1)	0	.88 (37)	.10 (4)
S5	0	0	.48 (10)	.19 (4)	0	0	.24 (5)	.10 (2)	0	0	0	0	0	0	.71 (15)	.29 (6)
Means	.02 (2)	0	.56 (54)	.05 (5)	.02 (2)	0	.26 (25)	.06 (6)	.002 (.2)	0	.01 (1)	.004 (.4)	.04 (4)	0	.84 (80)	.12 (12)

Note. Ana = anaphora; Exo = exophora; Cl = clear; Uncl = unclear.

exophoric plus anaphoric use. Within this combined category, .84 of the children's deictic use was coded as clear.

Cohesive ties.

The next question explored whether or not autistic children linked linguistic deictic forms (to their own or another person's referents) in a cohesive manner. This analysis was completed to see how the children shifted deictic use relative to speaker/listener interactions. Of interest here was: (a) the extent to which the children linked deictic forms to the most recently mentioned (prior) adult, or child, referent and (b) the nature of these cohesive links--namely, the use of repeats and recodes (non-repetitions of a prior referent within the same syntactic-semantic category with a revision in form only).

Several trends were observed in the data (see Table 15). First, the children's deictic forms were more often linked to prior adult referents ($\overline{X}$=.59) than to their own prior referents ($\overline{X}$=.41). Thus, demonstrating some awareness, and ability, to anchor their talk (i.e., use of deictic forms) to another person's talk. Second, regardless of speaker, a mean of .57 (with a range of .48 to .73) of the children's forms involved recodes while .31 (with a range of .18 to .42) of their deictic forms involved repeats of a prior deictic form. The greater use of recodes reflects the children's

Table 15

Proportion and Frequency of Recodes and Repeats Linked to Prior Referents During One Hour of Free Play

Subject		Recodes	Repeats	Totals	Recodes	Repeats	Totals		Prop. & Total Use of Recodes	Repeats	Ambiguous
	T[a]	(To Another Speaker Adult)			(To Child's Own Utterance)			T[b]	(Regardless of Speaker)		
S1 Michelle	(61)	.49 (30)	.26 (16)	.75 (46)	.20 (12)	.05 (3)	.25 (15)	(71)	.59 (42)	.27 (19)	.14 (10)
S2 David	(120)	.23 (28)	.23 (28)	.47 (56)	.30 (36)	.23 (28)	.53 (64)	(133)	.48 (64)	.42 (56)	.10 (13)
S3 Andy	(186)	.39 (72)	.16 (29)	.54 (101)	.29 (54)	.17 (31)	.46 (85)	(214)	.59 (126)	.28 (60)	.13 (28)
S4 Jason	(40)	.70 (28)	.15 (6)	.85 (34)	.10 (4)	.05 (2)	.15 (6)	(44)	.73 (32)	.18 (8)	.09 (4)
S5 Matt	(15)	.60 (9)	.20 (3)	.80 (12)	.07 (1)	.13 (2)	.20 (3)	(21)	.48 (10)	.24 (5)	.29 (6)
Means		.40 (33)	.19 (16)	.59 (50)	.25 (21)	.16 (13)	.41 (35)		.57 (55)	.31 (30)	.13 (12)

[a]Totals exclude indeterminate and ambiguous forms.

[b]Totals include ambiguous forms.

ability to shift language forms relative to listener context. A mean of .13 (with a range of .09 to .29) of deictic forms were ambiguous as to presupposed referent.

Summary of deictic usage during low structured observations.

To summarize, the children's deictic performance within low structured (free play) contexts revealed the following patterns.

1. The children's overall frequency of use of deictic categories was similar across subjects. Person deictic reference was the most frequently coded category, followed by object deictic reference. Place deixis was the least frequently coded category.

2. The listener was usually able to interpret the children's use of all deictic categories across subjects. More specifically, person reference was the most clearly encoded category. Place reference, although used less frequently, was the next most clearly encoded category. Object deixis presented the most difficulty for most subjects with four subjects exhibiting problems with clarity of object deixis with special problems indicating distal objects.

3. All children used primarily exophoric reference and exophora/anaphora in comparison to anaphora alone. Whether the physical-perceptual context influenced the type of reference and/or the children's overall

linguistic level (i.e., being grounded in the "here and now") remains unanswered.

4. Generally, the use of gestures accompanying linguistic deictic forms was minimal across subjects. However, three children used discrete gestures more frequently, and clearly, in comparison to two other children.

5. Within the category of person deixis, all children infrequently used pronouns to reference the adult participant. Three subjects most frequently used pronouns to reference inanimate other(s) while two subjects most frequently used pronouns for self-reference.

6. The children's ability to use contrastive deictic pairs was only evident for person reference but not for object or place reference.

7. The children linked deictic forms to prior adult, and child, forms and all children demonstrated some ability to recode, or shift, deictic use relative to the prior linguistic context.

Moderately Structured Observations (Re-tellings)

Location and clarity of deictic forms.

During re-tellings, the children's use of deictic (or non-specific) forms was coded (see Table 16). Since there was no non-linguistic context, use of deictic reference had to be endophoric. Unlike free play where anaphoric use was minimal (see Table 14),

Table 16

Clarity of Deictic (or Non-Specific) Reference During Re-tellings

Subject		Clear	Unclear	Indeterminate
S1 Michelle	(33)	.89 (29)	.09 (3)	.03 (1)
S2 David	(63)	.89 (56)	.11 (7)	.00
S3 Andy	(111)	.85 (94)	.14 (16)	.01 (1)
S4 Jason	(51)	.71 (36)	.27 (14)	.02 (1)
S5 Matt	(21)	.90 (19)	.10 (2)	.00
Means		.84 (47)	.15 (8)	.01 (6)

re-telling contexts were an opportunity to observe the children's deictic use with no situational (exophoric) support. Regardless of listener condition, .84 of the children's anaphoric forms were coded as clear while .14 of their forms were coded as unclear (see Table 16). Most subjects (S1, S2, S3 and S5) exhibited high proportions of clear anaphoric deictic use. Jason (S4) exhibited the lowest proportion of clear use in these contexts.

It should be noted that the content of re-tellings primarily involved the use of person and object deixis with occasional instances of place forms. Further, only a limited number of people and objects had to be referenced and these were used repeatedly. Thus, the children's performance may be an over-estimate of their anaphoric skill. For example, the high proportion of clear deictic use for Matt does not reflect the fact that he coded primarily person deixis.

Cohesive ties.

Similar to the cohesive analysis completed for free play, the children's use of deictic forms linked to prior adult and/or child referents for re-tellings was summarized (see Table 17). Dissimilar to their performance during free play, a mean of .51 (with a range of .44 to 1.00) of the children's deictic forms were linked to prior adult forms while .49 (with a range of 0 to .55) of their forms were linked to their

Table 17

Proportion and Frequency of Recodes and Repeats Linked to Prior Referents During Re-tellings

Subject		Recodes	Repeats		Recodes	Repeats			Total Prop. & Use of Recodes	Repeats	Ambiguous
		(To Another Speaker)			(To Child's Utterance)				(Regardless of Speaker)		
	T[a]			T			T	T[b]			
S1 Michelle	(28)	.25(7)	.32(9)	.57(16)	.25(7)	.18(5)	.43(12)	(31)	.45(14)	.45(14)	.10(3)
S2 David	(58)	.12(7)	.33(19)	.45(26)	.17(10)	.38(22)	.55(32)	(67)	.25(17)	.61(41)	.13(9)
S3 Andy	(77)	.35(27)	.09(7)	.44(34)	.10(8)	.45(35)	.55(43)	(91)	.38(35)	.46(42)	.15(14)
S4 Jason	(35)	.29(10)	.17(6)	.46(16)	.20(7)	.34(12)	.54(19)	(39)	.44(17)	.46(18)	.10(4)
S5 Matt	(19)	.58(11)	.42(8)	1.00(19)	.00	.00	.00	(20)	.55(11)	.40(8)	.05(1)
Means		.29(12)	.23(10)	.51(22)	.15(6)	.34(15)	.49(21)		.38(19)	.50(25)	.13(6)

[a]Totals exclude ambiguous and indeterminate forms.

[b]Totals include ambiguous forms.

own prior forms. Regardless of speaker, a mean of .38 of the children's deictic forms involved recodes while a slightly higher proportion ($\overline{X}$=.50) of their forms involved repeats. In comparison to free play (see Table 16), less recodes, and more repeats were used in this context. Similar to free play, .13 of their forms were ambiguous.

In terms of individual variations, the children's overall use of recodes and repeats fell within a rather narrow range. Similar to free play, David (S2) was the only exception with a higher proportion of repeats in comparison to the other children again reflecting his highly imitative style.

Highly Structured Observations (Hide and Seek Perspective Tasks)

One linguistic perspective-taking task (Hide and Seek) assessed the children's comprehension and production of deictic forms within a highly decontextualized situation.

Person, object and place contrastive pairs.

As can be seen on Table 18, overall means for comprehension of deictic pairs ($\overline{X}$=.65 for person; $\overline{X}$=.75 for object; $\overline{X}$=.55 for place) were slightly better than for production of deictic pairs (.45 for person; .50 for object; .50 for place). These tasks were most difficult for all subjects.

Table 18

Comprehension and Production of Contrastive Deictic Pairs During Linguistic-Perspective (Hide and Seek) Task

	Person		Object		Place		Total Means	
Subject	Compre.	Prod.	Compre.	Prod.	Compre.	Prod.	Compre.	Prod.
S1 (24)	.75	.50	.75	.50	.75	.50	.75	.50
S2 (24)	.75	.25	.75	.50	.50	.75	.67	.50
S3 (24)	.75	.75	.75	.25	.75	.50	.75	.50
S4 (24)	.50	.75	.75	.75	.50	.50	.58	.67
S5 (24)	.50	0	.75	.50	.25	.25	.50	.25
Means	.65	.45	.75	.50	.55	.50		

Analysis of the children's comprehension and production of proximal versus distal deictic forms (see Table 19), revealed that comprehension of proximal forms was slightly better than production of proximal forms ($\overleftarrow{X}$= .75 correct responses versus $\overrightarrow{X}$=.60 correct responses). For distal forms, comprehension and production were poor ($\overleftarrow{X}$=.50 and $\overrightarrow{X}$=.40 correct responses).

Individual variations in deictic performance were evident. Michelle comprehended and produced proximal forms (1.00 correct responding) but evidenced limited ability to comprehend (.50 correct responses) and produce (0 correct responses) distal forms (see Table 19).

David's (S2) ability to comprehend contrastive pairs (see Table 18) was greater for person and object deixis (.75 correct responses for each category) than for place deixis (.50 correct responses). Production of deictic contrasts was poorer for person and object deixis (.50 correct responses for each category) than for place deixis (.75 correct responses). David exhibited better production of proximal forms (.75 correct responses) than comprehension of proximal forms (.50 correct responses). Conversely, he comprehended distal forms (.75 correct responses) better than he produced these forms (.50 correct responses). Similar

Table 19

Comprehension and Production of Object and Place Deictic Forms Relative to Proximal - Distal Distinctions During Linguistic-Perspective Task (Hide and Seek)

	Proximal (This, Here)		Distal (That, There)	
Subject	Comprehension	Production	Comprehension	Production
S1 Michelle (16)	1.00 (4/4)	1.00 (4/4)	.50 (2/4)	.00 (0/4)
S2 David (16)	.50 (2/4)	.75 (3/4)	.75 (3/4)	.50 (2/4)
S3 Andy (16)	.75 (3/4)	.50 (2/4)	.75 (3/4)	.25 (1/4)
S4 Jason (16)	1.00 (4/4)	.25 (1/4)	.25 (1/4)	1.00 (4/4)
S5 Matt (16)	.50 (2/4)	.50 (2/4)	.50 (2/4)	.25 (1/4)
Means	.75 (15/20)	.60 (12/20)	.55 (11/20)	.40 (8/20)

to free play, David encoded proximal forms more frequently than distal forms.

Andy's (S3) comprehension of all three contrastive pairs was similar (.75 correct responses). Production of deictic contrastive pairs was better for person deixis (.75 correct responses) than object (.25 correct responses) or place (.50 correct responses) deixis. Andy comprehended both proximal and distal pairs equally (.75 correct responses) while production of proximal and distal pairs was poor. Andy's production of object-place forms on tasks was poorer than his use of these forms during free play.

Jason (S4) evidenced variable and inconsistent patterns on comprehension and production of contrastive pairs. Comprehension of object deixis was better (.75 correct responses) than comprehension of person and place deixis (.50 correct responses for each category). Production of person and object deictic pairs was better (.75 correct responses for each category) than production of place pairs (.50 correct responses). Unlike his difficulties with object deixis during free play, he exhibited better performance with object deixis during tasks. He comprehended all proximal forms (1.00 correct responses) but produced .25 of proximal forms. The reverse was found for distal forms with 1.00 production and .25 comprehension. This was

in contrast to his performance in free play where distal forms were not produced at all.

Matt's (S5) comprehension of object deixis (.75 correct responses) was better than comprehension of person and place pairs (.50 correct responses for person, .25 correct responses for place). Production of all deictic pairs was poor (0, .50, and .25 correct responses). Matt's comprehension and production of proximal-distal distinctions was .50 - .25 correct responses. Matt's production of proximal forms appeared better during free play than during tasks.

Summary of Deictic Performance Across All Three Contexts

In looking at the children's deictic performance across the three observations (low, moderate and high structure), similar patterns of behavior were seen.

First, analyses of the children's non-contrastive use of person, object and place deixis during low (free play) and moderately (re-tellings) structured observations revealed referents for deictic terms were usually clear to the listener.

Second, during low structured observations (free play), the children evidenced the use of contrastive person forms but not contrastive object or place forms. Similarly, during highly structured tasks, all the children demonstrated difficulty producing deictic contrastive pairs that shifted relative to

speaker/listener positions in space. Person deictic shifts were variable during tasks. All children performed poorer on the highly structured deictic tasks than in other contexts (low and moderately structured observations).

Third, all subjects most frequently coded exophoric and exophoric and anaphoric reference during low structured observations (free play); however, they clearly used anaphoric reference during re-telling episodes. Thus, the children demonstrated skill in deictic use in both the presence and absence of physical-perceptual supports.

In sum, similarities among children were evident in their deictic performance in that they demonstrated adequate to good non-contrastive deictic usage during low (free play) and moderately (re-tellings) structured observations (with the exception of good contrastive use of person forms); poor use of object and place contrastive pairs in all contexts. Clarity of deictic usage was better in highly contextualized (low structured) situations (free play) than in highly decontextualized situations (Hide and Seek tasks). The children's display of deictic skill seemed highly dependent upon the context in which deixis was assessed as well as whether or not the forms were evaluated non-contrastively or contrastively.

Presuppositions

Moderately Structured Observations (Re-tellings)

A detailed analysis was completed on selected quantitative and qualitative features of the children's presuppositional performance. This analysis was based on data obtained during moderately structured observations (i.e., re-telling episodes) where the children were asked to talk about their prior experiences to a naive and knowledgeable listener.

The broad objective of this analysis was to explore these autistic children's ability to make modifications in their language relative to their listener's background knowledge. The underlying assumption is that naive listener contexts create different communicative demands than knowledgeable listener contexts. A speaker has to give more elaborate, or specific, information to a person who has not shared experiences with him/her (i.e., a naive listener). More variability, and less specificity, of information would probably occur with a listener who has shared experiences with the speaker (i.e., a knowledgeable listener). It is the ability to shift language relative to listener needs that reflects underlying presuppositional skill; thus, differences in language use relative to different listeners can be considered as evidence of presuppositional ability.

Shifts in frequency of talk and MLU relative to listener condition.

The next research question focused on what quantitative changes occurred in the children's language relative to listener context. Several general trends in the children's overall linguistic use relative to listener condition were observed (see Table 20). The data for the presuppositional analyses was based on 299 child utterances (with a range of 39 to 101 utterances per child).

Similar to their patterns during low structured observations (free play), Andy (S3) and David (S2) spoke more than Michelle (S1), Jason (S4) and Matt (S5). As a group, the children used a greater proportion of utterances in the presence of the naive listener ($\overline{X}$=.57) as compared to the knowledgeable listener ($\overline{X}$=.43). This pattern held for all but David (S2) who used a greater proportion of utterances with the knowledgeable listener (.55) rather than the naive listener (.45).

The children's MLUs scores were similar in each listener condition (see Table 20). In the naive listener condition, the group mean MLU was 4.29 morphemes (inclusive of all child utterances) and 4.9 morphemes (exclusive of imitations and single word yes/no responses). Similarly, in the knowledgeable listener condition, the group mean MLU was 4.3

Table 20

Number of Utterances and Mean Length of Utterance Relative to Listener Condition During Retelling Episodes

	Total	Naive Listener Contexts		Knowledgeable Listener Contexts		Combined Contexts
Subject	# of Utterances	# of Utterances	MLU	# of Utterances	MLU	Mean MLUs
S1 Michelle	39	22 (.56)	3.59 (4.64)	17 (.44)	3.58 (4.16)	3.59 (4.4)
S2 David	67	30 (.45)	4.63 (5.37)	37 (.55)	5.0 (5.64)	4.82 (5.51)
S3 Andy	101	61 (.60)	5.39 (5.57)	40 (.40)	5.9 (6.13)	5.65 (5.85)
S4 Jason	42	26 (.62)	5.08 (5.72)	16 (.38)	4.06 (5.08)	4.57 (5.4)
S5 Matt	50	32 (.64)	2.76 (3.22)	18 (.36)	2.94 (2.94)	2.85 (3.08)
Totals	299	171		128		
Means	60	34 (.57)	4.29 (4.90)	26 (.43)	4.30 (4.79)	4.3 (4.85)

Note. MLU without parentheses includes all child utterances; MLU within parentheses excludes imitations and single word yes/no responses to adult questions.

morphemes (inclusive of all utterances) and 4.79 morphemes (exclusive of imitations and yes/no responses).

Analyses of each child's MLU inclusive of all utterances revealed that only Jason (S4) had higher MLUs with the naive (5.72 morphemes) rather than knowledgeable listener (5.08 morphemes). With the exception of Michelle (S1), all other subjects had higher MLUs with the knowledgeable rather than naive listener.

MLUs calculated exclusive of imitations (and yes/no responses) revealed that Michelle, Jason and Matt had higher MLUs with the naive listener. Again, Andy and David continued to evidence higher MLUs with the knowledgeable rather than naive listener.

In sum, Michelle, Jason and Matt talked more and used higher MLUs with the naive listener. This pattern suggests that they differentiated the two listener conditions and took the listener's perspective, changing language under shared and unshared contexts. Andy also talked more to the naive listener but unlike the other children, he had higher MLUs (regardless of calculation) with the knowledgeable listener. David's pattern was distinctly different in that he was the only subject who both talked more, and had higher MLUs (regardless of how MLU was calculated), in interactions with the knowledgeable listener. David was the only

subject who had a long standing relationship with the investigator. In sum, using frequency of talk and MLU, four out of the five children demonstrated awareness of different listener contexts.

Specific and deictic referencing.

The next research question related to whether or not autistic children made changes in certain dimensions of language relative to listener context. The form and content of the children's use of specific noun reference was analyzed relative to listener condition (see Table 21). The children's total use of nouns was greater with the naive listener ($\overline{X}$=.57 nouns) as compared to the knowledgeable listener ($\overline{X}$=.43 nouns). Sixty-seven percent of these nouns involved the introduction of new nouns (i.e., first mention). Group means reflected the use of slightly more new nouns (.53 nouns) in the naive as compared to the knowledgeable listener context (.47 nouns). This was not seen for two children (S2 and S4).

No group differences in the use of appropriate noun modifiers (articles, pronouns, etc.) relative to listener context were observed (.25 versus .26 use of conventional forms). Most of the children's use of nouns lacked preceding articles and/or inappropriate forms were used (such as the inappropriate use of the/a with the naive listener). Poor use of articles, modifiers, etc., seemed to better reflect the

Table 21

Proportion and Frequency of Noun Reference According to Form, Content and Listener Condition During Re-tellings

Subject	Total Nouns		Total # Nouns 1st Mention		Form (Appropriateness)				Content (Relatedness)					
					Appropriate		Inappropriate		Related		Unrelated		Other	
	N	K	N	K	N	K	N	K	N	K	N	K	N	K
S1	17	8	.68 (13)	.32 (6)	.31 (4)	.50 (3)	.69 (9)	.50 (3)	.54 (7)	1.00 (6)	.00	.00	.46 (6)	.00
S2	14	24	.41 (11)	.59 (16)	.45 (5)	.63 (10)	.55 (6)	.25 (4) .13 (2)[a]	1.00 (11)	.88 (14)	.00	.00	.00	.13 (2)
S3	33	18	.52 (13)	.48 (12)	.62 (8)	.42 (5)	.38 (5)	.58 (7)	.92 (12)	.75 (9)	.08 (1)	.17 (2)	.00	.08 (1)
S4	11	9	.47 (8)	.53 (9)	.38 (3)	.67 (6)	.63 (5)	.33 (3)	.88 (7)	.78 (7)	.00	.00	.13 (1)	.22 (2)
S5	17	11	.60 (12)	.40 (8)	.58 (7)	.50 (4)	.25 (3) .17 (2)[a]	.50 (4)	.17 (2)	.50 (4)	.75 (9)	.00	.08 (1)	.50 (4)
Means	.57 (18)	.43 (14)	.53 (11)	.47 (10)	.25 (5)	.26 (6)	.28 (6)	.21 (5)	.36 (8)	.37 (8)	.09 (2)	.02 (4)	.07 (2)	.08 (3)
Combined Contexts			.67 (21)		.51 (21)		.49 (11)		.73 (16)		.11 (6)		.15 (5)	

Note. N = Naive listener; K = Knowledgeable listener.

[a]Indeterminate.

children's linguistic level rather than some aspect of presuppositional skill since normal children do not work out this subtle distinction until higher language levels. Inconsistent use of these linguistic markers could not be clearly interpreted.

Differences in the children's use of nouns that related to the activity were observed for naive and knowledgeable listener contexts (see Table 21). David (S2), Andy (S3) and Jason (S4) used higher proportions of activity-related nouns with the naive listener. Michelle (S1) used all activity-related nouns with the knowledgeable listener (1.00) while with the naive listener she talked about other aspects of the free play situation as frequently as she talked about the re-telling activities. However, her noun use was semantically-related to her prior experiences. Matt (S5) was the only child who used a high proportion of nouns unrelated/irrelevant to the prior activity (.83 nouns with naive listener; .50 nouns with knowledgeable listener).

This measure also can be interpreted as reflecting some broader ability to use semantically-relevant language about prior experiences. In combined listener contexts, .73 of the children's nouns were activity-related; .11 of their nouns were unrelated/irrelevant; and .15 of nouns were related to other (i.e., different) activities.

One further analysis was completed on the children's overall ability to appropriately introduce, and refer back to (previously introduced), nouns (see Table 22). Appropriate reference was defined as: (a) the use of noun elements related in content to the prior activity and/or (b) clear specification of a previously introduced noun items (i.e., clear deictic use). Inappropriate reference was defined as (a) the use of non-specific nouns (e.g., thing); (b) the use of nouns unrelated to the prior activity and/or related to different activities (i.e., other category); and (c) unclear specification of nouns and/or non-introduced nouns (unclear deictic use). Thus, specific and deictic reference were evaluated as to appropriateness.

In comparing listener contexts, group means for appropriate (and clear) reference were slightly higher ($\overline{X}$=.52 forms) during naive than knowledgeable listener contexts ($\overline{X}$=.48 forms). Conversely, inappropriate reference was markedly higher ($\overline{X}$=.69 forms) with naive than with knowledgeable listener ($\overline{X}$=.31 forms).

In terms of individual performance, Andy (S3) was the only child who had the highest proportion of appropriate reference (.70 forms) with the naive rather than the knowledgeable listener (.30 nouns); David (S2) and Jason (S4) had slightly higher proportions of appropriate reference with the naive listener. In contrast, Michelle (S1) had slightly higher

Table 22

Number and Proportion of Appropriate References Relative to Listener Condition During Re-tellings

Subject		Appropriate (and Clear)			Inappropriate (and Unclear)			
		Specific Forms	Non-specific Forms	Totals	Non-Specific Nouns	Other	Non-Specific Deictic	Totals
S1	Naive L	7	4	11 (.48)	0	6	0	6 (.75)
	Knowl. L	6	6	12 (.52)	0	0	2	2 (.25)
S2	Naive L	11	8	19 (.51)	2	0	5	7 (.78)
	Knowl. L	4	14	18 (.49)	0	2	0	2 (.22)
S3	Naive L	12	21	33 (.70)	3	1	7	11 (.65)
	Knowl. L	9	5	14 (.30)	0	3	3	6 (.35)
S4	Naive L	8	8	16 (.53)	0	1	1	2 (.40)
	Knowl. L	7	7	14 (.47)	3	0	0	3 (.60)
S5	Naive L	2	1	3 (.27)	0	10	2	12 (.75)
	Knowl. L	4	4	8 (.73)	0	4	0	4 (.25)
Means	Naive L	8	8	16 (.55)	1	4	3	8 (.69)
	Knowl. L	6	7	13 (.45)	.6	2	1	3 (.31)
Means Combined Contexts				30 (.73)				11 (.27)

Note. Reference includes both specific nouns and deictic forms.

proportions, and Matt (S5) had very high proportions, of appropriate reference with the knowledgeable listener.

Similar to other codings of reference described above, the children's use of reference regardless of listener context was also of interest. In combined contexts, .73 of the children's reference was both appropriate (and clear); .26 of their reference was inappropriate (and unclear).

Informativeness.

The next question explored the children's skill at producing informative utterances relative to the listener's needs. Several trends were seen across all subjects as well as within subgroups of children (see Table 23). In naive listener contexts, .36 (with a range of .22 to .54) of the children's utterances were coded as fully or partially informative while .49 (with a range of .32 to .69) of their propositions were coded as non-informative. Similarly, with the knowledgeable listener, .37 (with a range of .18 to .53) of the children's utterances were fully or partially informative and .43 (with a range of .22 to .67) of their utterances were non-informative. No shifts in overall group performance were seen relative to listener context.

Looking at individual patterns, two subgroups of children were distinguished. Three children (Michelle,

Table 23

Number and Proportion of Informative and Non-Informative Utterances Relative to Listener Conditions During Re-Tellings

Subject	Listener Condition	Total # Utter.	Informative			Non-Informative	Other
			Fully	Partially	Total		
S1 Michelle	Naive L	22	.41 (9)	.09 (2)	.50 (11)	.32 (7)	.18 (4)
	Knowl L	17	.29 (5)	.24 (4)	.53 (9)	.29 (5)	.18 (3)
S2 David	Naive L	30	.37 (11)	.17 (5)	.54 (16)	.37 (11)	.10 (3)
	Knowl L	37	.46 (17)	.03 (1)	.49 (18)	.22 (8)	.30 (11)
S3 Andy	Naive L	61	.13 (8)	.11 (7)	.24 (15)	.56 (34)	.20 (12)
	Knowl L	40	.15 (6)	.03 (1)	.18 (7)	.60 (24)	.23 (9)
S4 Jason	Naive L	26	.31 (8)	.19 (5)	.50 (13)	.38 (10)	.12 (3)
	Knowl L	16	.44 (7)	.00	.44 (7)	.38 (6)	.19 (3)
S5 Matt	Naive L	32	.16 (5)	.06 (2)	.22 (7)	.69 (22)	.09 (3)
	Knowl L	18	.33 (6)	.00	.33 (6)	.67 (12)	.00
Means	Naive L	34	.24 (8)	.12 (4)	.36 (12)	.49 (17)	.15 (5)
	Knowl L	26	.32 (8)	.05 (1)	.37 (9)	.43 (11)	.20 (5)
Combined Contexts		60	.27 (16)	.09 (5)	.36 (22)	.46 (28)	.17 (10)

David and Jason) produced a greater proportion of fully (and partially) informative utterances (.48 to .52 of their total use) as reflected in the wider range of scores described above. In contrast, two children (Andy and Matt) produced extremely low proportions of informative utterances ($\overline{X}$=.21; $\overline{X}$=.28, respectively). Andy produced slightly more informative utterances with the naive listener. Similar to other analyses, Matt performed more poorly than some of the children. Although overall group means for informative use were poor, certain children performed better than others. In combined listener contexts, .36 of the children's utterances were fully or partially informative while a greater proportion ($\overline{X}$=.46) were non-informative.

A child's use of topic expansions was evaluated under category of <u>other</u> yet these may have reflected advanced ability to maintain conversations. However, the use of topic expansions (for more than two utterances) was only observed in David's (.11 utterances) and Andy's (.20 utterances) samples. They were the two subjects who exhibited highest frequency of talk and highest MLUs.

Table 24 summarizes the children's overall means for non-informative propositions and these primarily fell into two categories which were redundant or unrelated. Forty-seven percent of the children's utterances were coded as redundant (i.e., involved

Table 24

Proportion and Frequency of Non-Informative Utterance Types During Re-Tellings

Subject	Proportion Used Relative to Group	Non-Informative Types		
	# Utterances	Ambiguous	Redundant	Unrelated
S1 Michelle	.09 (12)	.08 (1)	.58 (7)	.33 (4)
S2 David	.14 (19)	.05 (1)	.89 (17)	.05 (1)
S3 Andy	.42 (58)	.12 (7)	.53 (31)	.34 (20)
S4 Jason	.12 (16)	.00	.13 (2)	.88 (14)
S5 Matt	.24 (34)	.06 (2)	.26 (9)	.68 (23)
Means		.08 (2)	.47 (13)	.45 (12)

previously mentioned, or old, information); .45 of their propositions were categorized as unrelated and/or irrelevant (i.e., contained formulaic routines, requests for food and toys, comments about other activities, etc.). These utterances did not add new information to the discourse and were usually empty in content.

Several patterns were evident in the children's non-informative propositional use. It should be noted that Michelle (S1), Jason (S4) and David (S2) exhibited smaller proportions of non-informative use (.09, .12, .14, respectively) while Andy (S3) and Matt (S5) exhibited greater proportions of non-informative use (.42 and .24). For David, the majority of non-informative utterances involved repetitions of old information. As expected, David maintained conversations through the use of imitations rather than by adding new information to the topic. For Michelle and Andy, the use of redundant and unrelated propositions were also relatively high. For Jason and Matt a different pattern was seen; the majority of their utterances involved unrelated/irrelevant language. Jason's utterances reflected his preoccupation with doing and/or repeating activities while Matt's utterances involved talking about his family or requesting toys.

In the presuppositional coding system, conversational devices were coded as non-informative. However, since these devices serve a discourse function, it was of interest to see how much of the children's non-informative utterances were appropriately used to maintain discourse. A brief analysis of the use of conversational devices was completed. While .20 of the children's non-informative utterances contained conversational devices, only .06 of these were used appropriately. The children used most of these devices in a redundant and/or inappropriate manner to seemingly fill-up the conversational space. This seemed particularly true for Andy (S3), Jason (S4) and Matt (S5) who also exhibited the greatest proportions of formulaic language during free play.

Adult input/adjacent child utterances.

The adult-listener's use of requests relative to each listener context, and adjacent child utterances, were summarized (see Table 25) to see if the adult's input influenced the children's output (see Appendix L for coding procedures). Eighty-six percent of the adult's input involved general requests for information; .09 of the adult's input involved specific requests for information; and .05 of the input involved requests for clarification. The total proportion of adult requests to each subject was similar for three

Table 25

Number and Type of Adult Request-Units Presented According to Listener Condition and Adjacent Child Utterances During Re-tellings

Subject	Listener Context	Adult General Requests	Child Utterances I	N-I	O	Adult Specific Requests	Child Utterances I	N-I	O	Adult Clarif. Request	Child Response Clarif. I	N-I	I	Total Adult Input
S1	Naive L	16	11	7	4	2	-	-	-	0	-	-	-	18
	Knowl L	7	7	5	3	4	2	-	-	0	-	-	-	11
														29 (.21)
S2	Naive L	10	16	11	2	0	-	-	-	1	-	-	1 RS	11
	Knowl L	8	18	8	6	1	-	-	-	5	-	-	5 RS	14
														25 (.18)
S3	Naive L	14	15	29	11	1	-	5	-	1	-	-	1 RS	16
	Knowl L	9	7	20	9	1	-	4	-	0	-	-	-	10
														26 (.19)
S4	Naive L	11	13	10	3	0	-	-	-	0	-	-	-	11
	Knowl L	7	7	6	-	3	-	-	3	0	-	-	-	10
														21 (.15)
S5	Naive L	23	7	22	3	0	-	-	-	0	-	-	-	23
	Knowl L	16	6	12	3	0	-	-	-	0	-	-	-	16
														39 (.28)
Total Prop. Input		121 (.86)				12 (.09)				7 (.05)				140

Note. I = Informative (fully and partially); N-I = Non-informative; O = Other.

children (Michelle, David and Andy). Since Jason spontaneously shared information without much prompting, the adult's requests were less (.15 of the total requests were directed to Jason). It will be recalled that Jason was judged to be one of the most socially-related children and this may be reflected in his increased ability to spontaneously share ideas. Conversely, Matt had the largest proportion of requests directed to him (.28 of total requests) and needed the most prompting of all subjects. This again may reflect Matt's limited ability to maintain attention, interest and/or relatedness in this particular situation.

In sum, the number of adult requests did not seem to directly influence the children's informative output since most requests served a comment-like rather than question-like function. Perhaps, only specific requests for information could have influenced the children's output. However, most of the children's partially informative utterances resulted from referential unclarity and not from elliptical responses to specific requests. (The only exception was Andy's use of two elliptical responses).

Summary of presuppositional usage during moderately structured observations.

To summarize, within moderately structured observations (re-tellings) the children's presuppositional performance, as reflected in

differentiation of listener contexts, revealed the following trends:

1. Overall frequency of talk varied according to listener condition with greater frequency of talk in naive listener conditions for all but one child. This quantitative measure suggests that the children made some modification in their talk to the naive listener.

2. Group (mean) MLUs were relatively the same across both listener contexts. However, individual differences were seen whereby some children had greater MLUs with the naive listener (dependent upon how MLUs were calculated). Thus, as a group, syntactic shifts, as reflected by MLU, in the complexity of utterances were not seen in the presence of the naive listener; however, such shifts in syntactic complexity with the naive listener were seen for some subjects.

3. Overall use of specific noun reference varied slightly with listener context, the children used a greater proportion of new nouns with the naive listener. Regardless of listener context, the children evidenced poor ability to use linguistic markers (such as articles, modifiers, etc.) preceding nouns and this use seemed to be related to their overall linguistic level rather than some aspect of perspective-taking skill.

4. Three children used a higher proportion of activity-related nouns with the naive listener.

Regardless of listener context, most children used semantically-relevant nouns to talk about prior experiences.

5. Overall ability to appropriately use (specific and non-specific) reference was slightly better with the naive in comparison to the knowledgeable listener. Conversely, more frequent inappropriate reference was evident with the naive listener. This suggests that as a group the children had some problems meeting the naive listener's needs.

6. Overall ability to be informative was poor regardless of listener context. Looking at individual subjects, three children exhibited greater ability to be informative in comparison to two children who exhibited minimal ability in this area. However, these data suggest that all the children's ability to share information about and elaborate on their experiences was restricted.

7. Use of non-informative propositions reflected different communicative patterns from highly redundant, to redundant plus unrelated, to highly unrelated and/or irrelevant.

8. The adult-listener's input was similar for four children and different for one child who needed more prompting. Generally, the adult's language did not seem to directly influence the children's output.

Highly Structured Observations (Truck and Hill Perspective Task)

Similar to deictic analyses, the children's presuppositional skills were evaluated in a highly structured context. The interest was to explore whether or not autistic children shifted non-verbal and verbal performance relative to listener context in a structured perspective-taking task.

Shifts in language relative to naive versus knowledgeable listener.

As a group, the children did not shift their use of non-verbal communicative acts relative to the naive listener's needs (see Table 26). The children used gestures (i.e., non-verbal communicative acts) with the sighted (i.e., knowledgeable) listener (.80) and continued to such gestures (.88) when the listener was non-sighted (i.e., naive). There was a slight increase in the overall proportion of gestures used with the non-sighted listener.

In contrast, some shifts in the groups use of verbal communicative acts were observed; .40 verbal acts with the sighted listener to .58 verbal acts with the non-sighted listener. Individual differences revealed that Michelle (S1) and David (S2) were the only subjects who demonstrated marked (two or more) shifts in their use of verbal language relative to the blindfolded listener condition (.50 to .75 verbal acts;

Table 26

Proportion of Verbal and Non-Verbal Communicative Acts With Sighted and Non-Sighted Listeners on Linguistic-Perspective Presuppositional Task (Truck and Hill)

Subject	Sighted Listener (Knowledgeable)				Non-Sighted Listener (Naive)			
	Non-Verbal Acts		Verbal Acts		Non-Verbal Acts		Verbal Acts	
	%	Rs	%	Rs	%	Rs	%	Rs
S1 Michelle	1.00	(8/8)	.50	(4/8)	1.00	(8/8)	.75	(6/8)
S2 David	1.00	(8/8)	.00	(0/8)	1.00	(8/8)	1.00	(8/8)
S3 Andy	1.00	(8/8)	.25	(2/8)	1.00	(8/8)	.25	(2/8)
S4 Jason	1.00	(8/8)	.50	(4/8)	1.00	(8/8)	.00	(0/8)
S5 Matt	.00	(0/8)	.75	(6/8)	.38	(3/8)	.88	(7/8)
Means	.80	(32/40)	.40	(16/40)	.88	(35/40)	.58	(23/40)

Note. Each adequate response equals one point.

0 to 1.00 verbal acts, respectively). Similar to some presuppositional behaviors observed during re-tellings, Michelle differentiated listener conditions while David demonstrated more clear distinctions of listener needs on this task.

Conversely, Andy (S3) and Jason (S4) demonstrated no differences in verbal language relative to the blindfolded listener. Andy's verbal acts remained the same (.25 with both listeners) while Jason's verbal acts decreased (from .50 to 0). Matt produced one more verbal act during the non-sighted condition in comparison to the sighted listener condition (from .88 to .94 verbal acts). He also demonstrated inappropriate use of gestures in that he used no gestures with the sighted listener and increased his use of gestures with the non-sighted listener. Similar to re-telling contexts, these three children performed poorly on qualitative presuppositional analyses.

Informativeness.

Similar to re-tellings, the children's ability to use informative utterances was evaluated (see Table 27). Group performance revealed that the children differentiated listener contexts. Unlike re-tellings, there was a greater proportion of fully and/or partially informative propositions used with the non-sighted listener ($\overline{X}$=.60) as compared to the sighted listener ($\overline{X}$=.44). In order to complete this analysis,

Table 27

Frequency of Use of Informative and Non-Informative Utterances Equated into Points on the Linguistic-Perspective Presuppositional Task (Truck and Hill)

Subject	Listener Context	Non-Informative	Informative		
			Fully	Partially	Totals
		# / Pts	# / Pts	# / Pts	% / Pts
S1	Sighted (8)	4 (0)	4 (2)	--	.50 (8/16)
	Non-Sighted (8)	2 (0)	6 (2)	--	.75 (12/16)
S2	Sighted (8)	8 (0)	0	--	.00 (0/16)
	Non-Sighted (8)	0	8 (2)	--	1.00 (16/16)
S3	Sighted (8)	5 (0)	2 (2)	1 (1)	.31 (5/16)
	Non-Sighted (8)	5 (0)	2 (2)	1 (1)	.31 (5/16)
S4	Sighted (8)	4 (0)	4 (2)	--	.50 (8/16)
	Non-Sighted (8)	8 (0)	0	--	.00 (0/16)
S5	Sighted (8)	0	6 (2)	2 (1)	.88 (14/16)
	Non-Sighted (8)	0	7 (2)	1 (1)	.94 (15/16)
Totals:	Sighted	21 (.58)	16 (2)	3 (1)	.44 (35/80)
	Non-Sighted	15 (.42)	23 (2)	2 (1)	.60 (40/80)

Note. Non-Informative = 0 (or no response); Partially Informative = 1 (insufficient encoding). Fully Informative = 2 (adequate encoding).

the children's propositions were equated into points (see Appendix D). Unlike re-tellings, there was decreased use of non-informative propositions with the non-sighted listener ($\overline{X}$=.42) and increased use of non-informative propositions with the sighted listener (.58).

Individual differences in performance revealed that only Michelle (S1) and David (S2) increased their use of informative propositions with the non-sighted listener. Unlike re-tellings, Michelle made more distinct differentiations of listener's needs. Similar to re-tellings, David used more informative language with the naive listener; thus, differentiating the listener contexts. Unlike re-tellings, Andy (S3) made no shifts in informativeness relative to the listener contexts; thus, he did not differentiate listener needs. Unlike re-tellings, Jason (S4) made no modifications in language and did not differentiate listener conditions. In fact, he stopped talking in the presence of the non-sighted listener. Matt (S5) demonstrated a slight increase (one verbal shift) in the use of informative propositions relative to listener context but a clear differentiation of listener contexts (similar to his behaviors during re-tellings) was not observed.

Summary of Presuppositional Performance Across Two Contexts

In comparison to deictic performance, more varied patterns of presuppositional behavior were observed across contexts and children.

First, quantitative analyses revealed that most subjects differentiated listener conditions. With the naive listener, some children exhibited increased frequency of talk (i.e., number of utterances); shifts in syntactic complexity (dependent on how MLUs were calculated); and greater use of new nouns. One of more of these changes were seen with four out of five children. Only one subject demonstrated a different pattern (on quantitative analyses) in that he talked more, had higher MLUs and introduced more new nouns, in the presence of the knowledgeable listener.

Second, more qualitative analyses revealed varying degrees of informativeness relative to different listener conditions. During re-tellings, the proportion of informative utterances used by all children was relatively poor. However, within subjects, greater/lesser degrees of informativeness were observed. Similarly, during the task situation, only two children evidenced clear differences in verbal language (or increased informativeness) while three children made no (or minor) modifications in verbal output.

Individual Differences in Children's Linguistic Perspective-taking Performance Across All Observations

In looking at individual patterns, each child's performance will be discussed, and ranked, relative to the group. Rankings were only completed on qualitative aspects of deixis and presuppositions. The children's rankings were ordered from highest (best) to lowest (worst) performance (see Table 28).

SUBJECT 1

Michelle, the oldest subject, had the second highest non-verbal mental age and the lowest MLU scores (similar to S5). Her use of non-contrastive deictic forms during free play and re-tellings was good; she ranked second (highest) relative to the other children in clarity of deictic use. Deictic use during re-tellings was ranked with some reservation since a limited number of anaphoric forms were used with much redundancy. On the deictic task, where contrastive use of deictic pairs was assessed, all children performed rather poorly. With this in mind, Michelle ranked first for comprehension of deictic pairs and much lower (mid-point) for production.

On presuppositional analyses, during re-tellings, Michelle demonstrated quantitative changes in language; thus, differentiating listener contexts. Michelle had a higher ranking for informative propositions relative to the other children (although all subjects did

Table 28

Rankings on Children's Linguistic Perspective-Taking Performance Across All Observations

	Deixis				Presuppositions	
	Non-Contrastive Use		Contrastive Use		Informativeness	
Rank	Free Play	Re-tellings	Task		Re-tellings	Task
			Comprehension	Production		
Highest Scores 1	S2	S5	S1/S3	S4	S2	S2
2	S1/S4[a]	S1/S2		S1/S2/S3	S1/S4	S1
3			S2			S5
4	S3	S3	S4		S3	S3/S4
Lowest Scores 5	S5	S4	S5	S5	S5	

Note. Children ranked in order from highest to lowest responses relative to each other.

[a]When two or more subjects had same proportion of responses, they are ranked at same level. Thus, rankings range from 5 levels and less.

poorly) but she did not differentiate listener contexts. In contrast, on the presuppositional task, Michelle ranked second highest and clearly shifted verbal language relative to the listener context. Similarly, she used more informative utterances (and ranked second) in the presence of the naive listener.

Within different listener contexts, Michelle shifted syntactic complexity with the naive listener (dependent on how MLU was calculated). Within the broader contexts of free play versus re-tellings, Michelle's MLUs increased during re-tellings (regardless of how MLU was calculated).

SUBJECT 2

David, the second oldest subject, had the highest non-verbal mental age and second highest MLU scores across subjects. He generally ranked the highest across most areas studied. His use of non-contrastive deictic pairs was ranked first (highest) during free play and second during re-tellings. Similar to all other subjects, David's use of contrastive deictic forms was poor (with the exception of person deixis) and he ranked second for comprehension and third for production on the tasks.

On presuppositional analyses, during re-tellings, David did not make quantitative shifts in language relative to the naive listener context. He produced more informative propositions than other subjects and

used slighly more informative utterances with the naive listener. Similarly, during the task, David clearly shifted verbal language, and was most informative, with the naive listener.

Shifts in MLU, expected in naive listener contexts, were not seen. However, within the broader contexts of free play versus re-tellings, David evidenced marked increases in syntactic complexity during re-tellings regardless of how MLU was calculated.

SUBJECT 3

Andy, the third oldest subject, had the highest MLU scores and a non-verbal mental age of 6.9 years on the Leiter Scale. His performance was more variable relative to himself as well as to the other children. During free play and re-tellings, Andy's non-contrastive use of deictic forms ranked third relative to the other children. Contrastive deictic use on tasks revealed that his comprehension was high (i.e., ranked first) while his production was poor (i.e., ranked at a mid-point). Andy's use of contrastive pairs during free play was better than most subjects.

Conversely, on presuppositional activities, Andy made one quantitative change (increased frequency of talk) in the presence of the naive listener. In terms of qualitative presuppositional use, he received the lowest ranks of all subjects. Slight modifications

were seen relative to listener condition during re-tellings and no shifts were seen during the task. In fact, Andy was the most verbal child (i.e, used the most utterances and had the highest MLUs), but he performed poorly on using language in an informative manner.

Similar to David (S2), Andy did not demonstrate shifts in MLU relative to naive listener contexts. However, his MLU scores markedly increased from free play to re-telling contexts (regardless of how MLU was calculated).

SUBJECT 4

Jason, the second youngest subject, had the third highest non-verbal mental age score (on the WISC-R) and the third highest MLU scores across subjects. His performance across most areas was variable. Jason ranked second on clarity of non-contrastive deictic use during free play; he ranked low on clarity of deictic use during re-tellings and comprehension of deictic pairs. On the production part of the deictic task, he ranked highest of all subjects. Similar to the other children, contrastive use of deictic pairs was poor during free play with the exception of person deixis.

On presuppositional re-telling activities, Jason made clear quantitative shifts in language relative to naive listener contexts. During re-tellings, informative use differentiated listener contexts.

Although the children's overall ability to be informative was poor, Jason ranked second relative to the group. On the presuppositional task, Jason's scores were at the lowest end of the continuum and he made no shifts in verbal language relative to listener context. In sum, on quantitative measures Jason differentiated listener contexts; on qualitative measures, more problems were seen.

Jason demonstrated higher MLU scores (i.e., increased syntactic complexity) relative to both naive listener contexts and across free play and re-tellings (regardless of how MLU was calculated).

SUBJECT 5

Matt, the youngest subject, had the lowest non-verbal mental age and MLU scores (similar to S1). Generally, Matt's performance across most areas was poor (with occasional exceptions). Matt ranked at the lowest, or next to lowest, level on most deictic and presuppositional analyses regardless of context. Specifically, Matt demonstrated less clear non-contrastive and contrastive deictic use (during free play and tasks) and the best deictic use (i.e., ranked first) during re-tellings. Again, note that deictic use during re-tellings involved Matt using many person forms with great redundancy.

On quantitative presuppositional analyses, Matt made some shifts; thus, he differentiatied listener

contexts. On all qualitative presuppositional measures, he ranked at the lowest (or one above the lowest) ranking. Matt demonstrated one modification in verbal language (and thus, increased informativeness) during the presuppositional task. Based on this one shift, plus his increased use of gestures with the non-sighted listener, it did not seem sufficient to conclude that he differentiated listener contexts during the task.

Similar to David (S2) and Andy (S3), Matt's MLU scores increased in syntactic complexity in the presence of the knowledgeable rather than the naive listener. Further, Matt was the only subject whose MLUs decreased from free play to re-tellings (regardless of how MLU was calculated).

Non-linguistic Perspective-taking

Perceptual Perspective-taking

Highly Structured Observations (Tasks)

Perceptual tasks.

The next research question explored the children's ability to take the listener's perspective on other types of (non-language) perspective-taking activities. The interest was to see if similarities and/or differences in the children's performance related to the type, level and/or degree of cognitive complexity of the tasks (see Table 1).

Each child's comprehension and production of lexical items on all tasks was evaluated prior to the administration of each particular task. All children comprehended and produced all lexical items in each task. Thus, errors in performance could not be attributed to lexical misunderstandings.

On the Picture Card task (see Table 29), all children were able to take their own perspective; .84 of the children's responses were accurate as to their own perspective. The children's scores decreased to .64 accuracy for taking another person's perspective.

In terms of individual differences, Michelle (S1), David (S2) and Andy (S3) achieved perfect scores while Jason (S4) and Matt (S5) scored equally poorly. This task has been described as tapping a rudimentary level of perspective-taking skill (Level I) and has elicited 100 % early perspective-taking behavior in young pre-schoolers (Masangkay et al., 1974).

On the Turtle task (see Table 29), all children received 1.00 accuracy in taking their own perspective while only .43 of the children's responses involved accuracy in taking another's perspective. Individual performances revealed that David (S2) and Andy (S3) again performed well (with .83 and 1.00 correct responses) while Michelle (S1) performed poorly (0 correct responses) and similar to Jason (.33 correct responses) and Matt (0 correct responses). Michelle's

Table 29

Proportion of Correct Responses on Perceptual Perspective-Taking Tasks Relative to Child Versus Other Perspective

Subject	Picture Cards (Level I)	Turtle Task (Level II)	Individual Total Means
S1 Michelle			
Child's Perspective (16)	1.00 (10/10)	1.00 (6/6)	1.00
Other's Perspective (16)	1.00 (10/10)	.00 (0/6)	.50
S2 David			
Child's Perspective (16)	.70 (7/10)	1.00 (6/6)	.85
Other's Perspective (16)	1.00 (10/10)	.83 (5/6)	.92
S3 Andy			
Child's Perspective (16)	1.00 (10/10)	1.00 (6/6)	1.00
Other's Perspective (16)	1.00 (10/10)	1.00 (6/6)	1.00
S4 Jason			
Child's Perspective (16)	.80 (8/10)	1.00 (6/6)	.90
Other's Perspective (16)	.10 (1/10)	.33 (2/6)	.22
S5 Matt			
Child's Perspective (16)	.70 (7/10)	1.00 (6/6)	.85
Other's Perspective (16)	.10 (1/10)	.00 (0/6)	.05
Means			
Child's Perspective	.84 (42/50)	1.00 (30/30)	
Other's Perspective	.64 (32/50)	.43 (13/30)	

difficulty with the Turtle task was striking in that all her responses were from her own visual perspective. This task was replicated at a later date and Michelle performed in exactly the same manner. The Turtle task has been described as eliciting a higher level (Level II) of perspective-taking and has been easily completed (96% correct responses) by young pre-schoolers (Masangkay et al., 1974).

Perceptual/Linguistic tasks.

On the perceptual/linguistic tasks (see Table 30), the children's comprehension of specific locative forms was assessed in non-social perspective contexts (i.e., the locative task) as well as in social contexts (i.e., the Turning task). These combined tasks offered a continuum in which to observe each child's use of specific language forms non-socially, and then, socially.

On the locative task (which involved only the child's perspective), group means for the comprehension of locative forms ranged from .65 to .80 correct responses dependent on the particular sub-task; .80 correct responses were found for production of locative forms (see Table 30).

On the Turning task, group means for perspective-taking were .69 correct responses for comprehension (with a range of .33 to 1.00 correct responses) and .64 correct responses for production

Table 30

Proportion of Correct Responses on Locative and Perceptual/Linguistic (Turning) Perspective Tasks Relative to Child Versus Other Perspective

Subject	Locative Task		Turning Task			
	Child Perspective		Child Perspective		Other Perspective	
	Comprehension		Comprehension	Production	Comprehension	Production
	Fronted Objects	Frontless Objects				
S1	.83 (10/12)	1.00 (12/12)	1.00 (3/3)	1.00 (3/3)	1.00 (9/9)	1.00 (9/9)
S2	1.00 (12/12)	1.00 (12/12)	1.00 (3/3)	1.00 (3/3)	1.00 (9/9)	1.00 (9/9)
S3	.58 (7/12)	.50 (6/12)	.66 (2/3)	.66 (2/3)	.33 (3/9)	.11 (1/9)
S4	.75 (9/12)	1.00 (12/12)	1.00 (3/3)	1.00 (3/3)	.66 (6/9)	.66 (6/9)
S5	.08 (1/12)	.25 (3/12)	.33 (1/3)	.33 (1/3)	.44 (4/9)	.44 (4/9)
Means	.65 (39/60)	.75 (45/60)	.80 (12/15)	.80 (12/15)	.69 (31/45)	.64 (29/45)

(with a range of .11 to 1.00 correct responses). A wide range of differences in the children's performance were evident.

Analysis of individual performance on the perceptual/linguistic task revealed interesting differences among children. Michelle (S1) and David (S2) did extremely well on all dimensions of this task. They comprehended and produced all locatives and could take another's perspective using these forms. Jason (S4) performed well on the comprehension and production of locatives in non-social contexts (.88 and 1.00 correct responses); his performance decreased markedly (.66 correct responses for comprehension and production) when perceptual, linguistic and social domains were integrated. Regardless of Jason's linguistic knowledge as demonstrated on the locative task, he lacked the ability to take another's perspective and his perspective-taking performance was poorer than what would be expected based on his linguistic performance.

Andy (S3) exhibited poor performance on comprehension and production of locatives in non-social contexts and even poorer performance in the social context. That is, his perspective scores were worse than would be expected based on his performance on the non-social, locative task. In analyzing Andy's response pattern, he evidenced good comprehension and

production of in front of and in back of in the non-social situation. However, in the presence of a listener, Andy did not correctly comprehend (.33 correct responses) nor produce (.11 correct responses) these forms. It was unclear whether the increased cognitive complexity of having to integrate perceptual, linguistic and social skills influenced his poorer performance; and/or, if Andy's problems related more specifically to the use of language for social purposes. Matt (S5) exhibited poor performance on the comprehension and production of locatives in non-social as well as in perspective-taking contexts.

Linguistic and Non-linguistic Perspective-taking

Sociocentric-Egocentric Analyses

In order to gain a broader picture of each child's degree of sociocentricity (see Appendix D), all perspective-taking tasks were scored (e.g., 1 if the child took another's perspective and 0 if the child did not take another's perspective and/or gave no response). A total score of 16 indicated optimum perceptual perspective-taking; a score of 18 indicated optimum perceptual/linguistic perspective-taking performance; and a score of 32 indicated optimum linguistic perspective-taking performance (see Table 31).

Table 31

Summary of Proportion of Sociocentric Responses on all Perspective-Taking Tasks

Subject	Perceptual Tasks	Perceptual/ Linguistic Task	Linguistic Tasks			
			Deixis	Presuppositions	Totals	Totals (All Tasks)
		Comprehension & Production	Comprehension & Production			
	Socio (CRs)	Socio (CRs)	Socio (CRs)	Socio (CRs)	Socio. (CRS)	Socio (CRs)
S1	.53 (10/16)	1.00 (18/18)	.63 (15/24)	.75 (6/8)	.66 (21/32)	.74 (49/66)
S2	.94 (15/16)	1.00 (18/18)	.58 (14/24)	1.00 (8/8)	.69 (22/32)	.83 (55/66)
S3	1.00 (16/16)	.22 (4/18)	.63 (15/24)	.25 (2/8)	.53 (17/32)	.56 (37/66)
S4	.19 (3/16)	.67 (12/18)	.63 (15/24)	.002(0/8)	.47 (15/32)	.45 (30/66)
S5	.06 (1/16)	.44 (8/18)	.38 (9/24)	.88 (7/8)	.50 (16/32)	.38 (25/66)
Means	.56 (45/80)	.67 (60/90)			.50 (91/160)	.59 (196/330)

Note. Scoring for sociocentric responses was 1 point for taking another's perspective and 0 for child taking own perspective.

Perceptual Tasks

In terms of group performance, .56 (with a range of .06 to 1.00) of the children's responses were sociocentric. Again, a broad range of differences was seen. On the two perceptual tasks, Andy (S3) exhibited the highest proportion of nonegocentric responding (1.00); followed by David (.94 nonegocentric responding); followed by Michelle (.53 nonegocentric responding). Jason (.19 nonegocentric responses) and Matt (.06 non-egocentric responses) achieved the lowest non-egocentric scores.

Perceptual/Linguistic Tasks

On the Turning task (combining comprehension and production subtests), .67 of the children's responses were nonegocentric. The presence of language seemed to enhance some children's perspective-taking performance (Jason and Matt) and decrease other children's (Andy) performance.

Individual variations revealed modifications in children's perceptual/linguistic perspective-taking performance when compared to perceptual tasks described above. On the perceptual/linguistic task, David (S2) and Michelle (S1) performed highest (1.00 nonegocentric responding) followed by Jason (S4) (.67 nonegocentric responding). Forty-four percent of Matt's (S5) responses were non-egocentric while Andy's (S3)

performance decreased markedly (.22 non-egocentric responding).

Linguistic Perspective Tasks

The children's overall performance on the deictic (Hide and Seek) and presuppositional (Truck and Hill) tasks were also scored for sociocentric/egocentric responses (see Table 31). Group performance for the linguistic perspective tasks decreased to .50 (with a range of .47 to .69) nonegocentric responding. On these measures, smaller ranges were seen across subjects. Individual variations revealed that David (.69) and Michelle (.66) exhibited higher proportions of sociocentric responding in comparison to Andy (.53), Matt (.50) and Jason (.47) who exhibited similar, and lower, proportions of sociocentric responses.

Total Sociocentric-Egocentric Scores

In combining the children's scores for all perspective tasks (see Table 31), David exhibited the highest proportion (.83) of sociocentric responding followed by Michelle (.74 sociocentric responding). Fifty-six percent of Andy's responses were sociocentric. Andy performed well on the perceptual tasks; however, his performance decreased markedly when linguistic demands were added to the tasks. Similar to all perspective tasks, Jason ($\overline{X}$=.45) and Matt ($\overline{X}$=.38) had the lowest proportions of sociocentric responding on combined tasks.

Summary of Perspective-taking Performance Across All Tasks

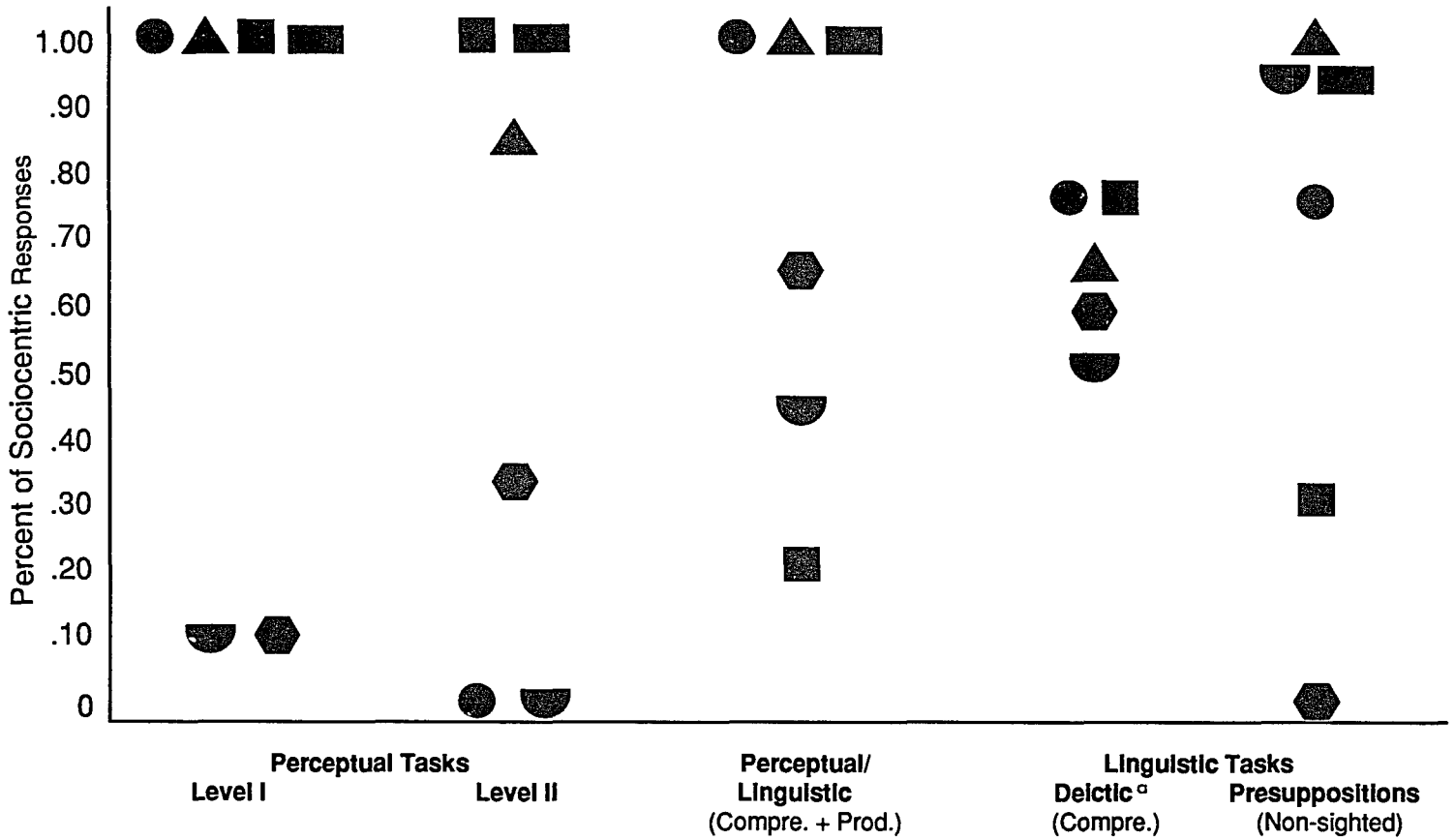
To summarize, the children's performance on all perspective-taking tasks seemed to differentiate them into subgroups and the following trends were observed (see Figure 4). Note that on Figure 4, the mean scores for a "prototypical" normal child of 4.6 years were plotted. These data were calculated from normal pre-schooler's performance on all (but one) of these tasks. This was done to compare the autistic children's performance to the perspective-taking task data reported on normal pre-schoolers. First, on the perceptual tasks, three children (S1, S2, and S3) performed adequately on the Level I task while only two of these children (S2 and S3) performed at or above .80 on the Level II task. Two subjects (S4 and S5) performed poorly on both Level I and Level II tasks.

Second, with the increased language demands introduced on the perceptual/linguistic task, a shift in the above subgroups of children was seen. Here only two children (S1 and S2) performed well; two children (S4 and S5) performed better, and one child (S3) performed poorer than on the perceptual tasks.

Third, on the linguistic (deictic) perspective task, all children's linguistic mapping of deictic forms relative to speaker/listener perspective was poor

Figure Caption

Figure 4. Comparison of the autistic children's sociocentric performance on all perspective-taking tasks with that of one "prototypical" normal 4.6 year old.



Note. S_1= ● ; S_2= ▲ ; S_3= ■ ; S_4= ⬢ ; S_5= ◡ ; S_6= ▬ [b].

[a] This task was presented differently than original so normative data could not be depicted.

[b] S_6 is a "prototypical" normal child (based on means scores of 4.6 year olds on the above tasks).

for all categories of deixis. Again, this was the hardest task for all subjects.

Fourth, on the linguistic (presuppositional) perspective task, two children (S1 and S2) made verbal modifications relative to the listener's needs; two children did not make any verbal modifications (and one subject made one verbal change) relative to the non-sighted listener's needs as compared to normal children (Maratsos, 1973).

Individual Differences in Children's Perspective-taking Performance Across All Domains

Similar to deictic and presuppositional analyses, each of the children's perspective-taking task performance was ranked relative to the group (see Figure 4). Figure 4 depicts each child's ranking on each task from highest to lowest performance.

SUBJECT 1

Michelle performed well on only one perceptual task and was ranked at the highest level; conversely, she performed at the lowest level on the Level II (Turtle) task. She ranked first on the perceptual/linguistic task; on the linguistic tasks, her rankings were variable. Michelle performed at the higher end of the continuum on rankings across all (but one) perspective-taking tasks and she ranked second on overall sociocentric responsiveness (see Table 32). Michelle's

Table 32

Rankings of Children's Performance Relative to Age, Sociocentric (Perspective) Scores, Social-Affective Scale, Non-Verbal Mental Age and MLU

Rank	Age	Total Perspective Score	Social-Relatedness Scale	NV-MA[a]	MLU
Highest	S1	S2	S2/S4	S2	S3[b]
	S2	S1		S1/S4	S2[b]
	S3	S3	S3		S4[b]
	S4	S4	S4	S3	S5 (S1)[c]
Lowest	S5	S5	S5	S5	S1 (S5)[c]

[a]Non-verbal mental age.

[b]Three subjects had the same MLU regardless of inclusion or exclusion of imitations.

[c]S1 and S5 had reverse rank orders when imitations were excluded from MLU calculations.

poor performance on the Level II task may reflect some rudimentary difficulty with a specific aspect of perspective-taking (i.e., how another views an object's position in space). However, she performed well on the Turning task which is also a Level II task. Thus, her performance on Level II type tasks needs further investigation.

SUBJECT 2

David performed well on most perspective-taking tasks and he ranked the highest across all tasks with only two exceptions; he ranked second on the Turtle task and he ranked mid-range on the Hide and Seek tasks. Generally, David performed at the higher end of the continuum in comparison to all other children and this was reflected in his highest scores for sociocentric responsiveness (see Table 32).

SUBJECT 3

On the two perceptual perspective-taking tasks, Andy ranked first (or highest). Conversely, he ranked the lowest on the perceptual/linguistic task and on the other language tasks he ranked at the lower end of the continuum with the exception of comprehension of deictic pairs. He demonstrated a distinct breakdown in performance when the linguistic complexity of the tasks changed. Andy ranked third in sociocentric responsiveness relative to the other children (see Table 32).

SUBJECT 4

In contrast to Michelle, David and Andy, Jason ranked low to lowest on perceptual and presuppositional tasks. However, on the production part of the deictic task, he ranked at the highest level; on the comprehension part of the deictic task, and on the perceptual/linguistic tasks, he ranked mid-level. Jason's overall sociocentric ranking was second from the lowest rank (see Table 32).

SUBJECT 5

Matt's ranking on most perspective-taking activities was at the lower or lowest end of the continuum relative to the other children. He ranked slightly higher (second to lowest rank) on the perceptual/linguistic task. Matt's overall sociocentric responsiveness was the lowest of all children (see Table 32).

Interrelationships Across Perspective-taking Domains

The next research question explored possible relationship(s) that existed across the children's performance on linguistic and perceptual perspective-taking domains as well as relationship(s) between linguistic perspective-taking and sociocentric performance. This discussion will exclude the children's performance on the deictic task since this particular task seemed difficult for all subjects and

their performance was variable and difficult to interpret. Similarly, analysis of deixis during re-tellings was based on limited, and redundant, use of person and object forms. This analysis lacked sufficient data on which to draw conclusions and thus, it will be excluded from this discussion.

Perceptual and Linguistic Perspective-taking

Looking across domains for these five subjects, only two children (Michelle and David) performed at the higher end of the group continuum on the perceptual and perceptual/linguistic tasks as well as on the deictic and presuppositional analyses. (Michelle performed poorly on one perceptual task). Conversely, two subjects (Jason and Matt) performed poorly on the perceptual tasks with better (but not good) performance on the perceptual/linguistic task. In terms of language, Matt was at the lower end of the continuum on deictic and presuppositional measures. Similarly, Jason was at the lower end of the group for his performance on qualitative presuppositional measures but did well on deictic performance. These children's poor perceptual performance did not clearly predict their poor linguistic performance. Andy did well on the perceptual tasks but poorly on the perceptual/linguistic task and even more poorly on qualititative presuppositional measures.

Only the children who performed well on perceptual and perceptual/linguistic tasks also performed well on the presuppositonal tasks. No clear relationship seemed evident between perceptual (and perceptual/linguistic) perspective-taking and quantitative aspects of presuppositional use.

In terms of the children's deictic performance (during free play) and perceptual (and perceptual/linguistic) performance, the children who scored high on clarity of deictic usage also performed better on the perceptual/linguistic task (with variable performance on the perceptual tasks alone). Perceptual perspective-taking alone did not seem related to deictic performance.

Linguistic Perspective-taking and Sociocentric Performance

Similar to other measures, two children (Michelle and David) exhibited high sociocentric responding and had higher scores on most language analyses. Conversely, two subjects (Jason and Matt) received low sociocentric scores and their performance across most language domains was depressed. Finally, one subject (Andy) performed at a mid-level on sociocentric responding but clearly could not perform linguistic perspective-taking tasks. Andy's perspective-taking skills showed a distinct breakdown when language was introduced. Andy had some sense of the listener on

perceptual tasks but he failed to meet the listener's needs when the language complexity of the tasks increased.

In sum, to put this another way, the proportion of each child's linguistic perspective-taking rankings at the highest (or higher) end of the continuum for these children were calculated. David (S2) was ranked highest 1.00 of the time; followed by Michelle (S1) (.75 of the time). A marked split occurred for Andy (S3), Jason (S4) and Matt (S5). These subjects were ranked highest .36 of the time (for Andy); .25 of the time (for Jason); and none of the time (for Matt). These rankings related to some of the children's overall sociocentric responsiveness (see Table 32).

Interrelationship(s) Between Perspective-taking Performance and Other Variables

The last research question addressed the overall issue of interrelationship(s) between the children's perspective-taking performance and their pragmatic performance, social-affective relatedness, chronological age, non-verbal mental age and MLU.

Communicative Performance

General observations were made of the children's communicative skills during low structured observations (free play). Particular attention was paid to the range of speech acts expressed, the listener's ability

to interpret intentionality and overall conversational style (see individual subject profiles).

Most children produced a range of speech act types; however, there were differences in the listener's ability to interpret the children's intentions. For Michelle (S1) and David (S2), clarity of speech acts was of no concern. For Andy (S3), Jason (S4) and Matt (S5), the listener had more difficulty interpreting the children's intentionality and more frequent requests for clarification were directed to these subjects.

In relating the children's pragmatic skills relative to perspective-taking performance (or sociocentric responsiveness), the following trends were seen. David (S2), Andy (S3) and Matt's (S5) overall perspective-taking performance corroborated observations of their communicative style during free play. For example, David was described as initiating and sustaining discourse with the investigator and doll figures. His engagement with the examiner seemed to be reflected in his high sociocentric scores. Andy was described as active and controlling but somewhat engaged in discourse with the investigator. Andy's performance was idiosyncratic but seemed related to his mid-level sociocentric scores.

Matt was described as passive and unable to maintain conversations with the researcher. The investigator had to work hard to engage Matt in

discourse. Matt's lack of engagement with the researcher was also seen on his low sociocentric scores. These data suggest an integral relationship between communicative style and perspective-taking abilities.

Jason (S4) and Michelle's (S1) perspective-taking performance seemed less clearly related to their pragmatic performance. Similar to David, Jason was described as active and engaged with the investigator both initiating and sustaining dialogues. Similar to Andy, the content of his language was, at times, unclear and non-informative. Jason's conversational pattern did not seem related to his low sociocentric scores. His perspective-taking scores were poorer than would be expected based on his communicative interactive style. It seemed that Jason's inability to take the listener's perspective on perceptual tasks skewed his overall scores. When language was introduced on perspective tasks, his ability to take another's perspective increased. Thus, higher rankings during during low structured observations (free play) related to presence, and influence, of language which enabled him to appear more engaged with others.

Michelle was described as a passive partner with most of her talk directed to doll figures. When the investigator was more intrusive, Michelle was slightly more communicative. This communicative style did not

clearly relate to her high sociocentric responses on perspective tasks. Similar to Jason, the influence of language seemed to enhance her perspective-taking performance. It is of interest to note that Michelle's inability to perform one of the perceptual tasks related to her passive conversational style (i.e., lack of initiation of language during free play). In sum, for these two children, performance on perspective-taking tasks and pragmatic performance seemed less clearly related.

Social-Affective Relatedness

In terms of the children's social-affective relatedness, certain positive relations were evident. On the social-relatedness scale, David and Jason were ranked highest (2.5). In looking at these children's overall sociocentric scores (see Table 32), David (S2) was again ranked high while Jason (S4) was ranked lower. David's perspective-taking performance related to his social-affective profile while Jason's social-affective ranking did not seem to be related to his specific problems with perspective-taking tasks. Perhaps, Jason's high social-affective ranking was positively influenced by his language use during low structured observations (free play). Further support for this may be seen in Jason's higher perspective-taking scores when language was introduced into the activities. Thus, language may have enhanced

his overall perspective-taking performance. Jason's poor perceptual responding markedly decreased his overall sociocentric score and thus, affected the relation between social-affective relatedness and sociocentric responding.

Michelle's (S1) social-affective ranking was rather low (3.5) but her sociocentric responding on tasks was higher than most children. However, she did poorly on one perspective task, and similar to Jason, the use of language may have enhanced her sociocentric score.

Matt (S5) was the least interactive and most poorly related child and was ranked lowest on the social-affective scale. Similarly, his sociocentric performance on tasks was at the lowest level and a clear relationship was evident here.

Andy (S3) was more idiosyncractic in his interactions with varying (and limited) degrees of sensitivity to others. Andy's social-affective relatedness was ranked at a mid-level (3) similar to his sociocentric score. Unlike Jason, Andy's perceptual perspective-taking skills were excellent and his performance decreased markedly with the presence of language. In sum, there appeared to be a positive relation between the children's social-affective relatedness and overall perspective-taking or sociocentric responsiveness.

Chronological Age

In terms of chronological ages, no attempt was made to select, and match, subjects according to specific ages (with the exception that subjects had to be school-age). In the selection of subjects, diagnosis, non-verbal intelligence, mental age, and MLU were considered the primary variables to be matched (or controlled). In looking at the subgroups described above, the two oldest children (Michelle and David) often exhibited the best performance in most domains while the two youngest children (Jason and Matt) often exhibited the poorest performance across domains.

Although age might appear to be a variable that positively influenced Michelle and David's performance, the other children's performance seemed to contradict the importance of age (see Table 28). For example, Jason's performance on certain measures (such as clarity of deixis, production of deictic pairs, quantitative shifts on presuppositional measures) indicated that age did not seem significant since he performed similar, or better, than the older subjects on these tasks (Jason was 52 months younger than Michelle and 45 months younger than David).

Further, if one looks at Andy, Jason, and Matt relative to age, these children's age ranges were rather close (in comparison to Michelle and David). Specifically, Andy was 11 months older than Jason and

Jason was 7 months older than Matt. These three youngest subjects exhibited variable patterns of performance in which age did not appear to significantly contribute to their overall (poorer) performance. For example, Andy (the oldest child in this younger sub-group), often performed more poorly, or similar to, Jason or Matt. Thus, his age did not enhance his performance.

Performance IQ/Non-verbal Mental Age

In terms of performance IQ scores, it will be recalled that four children were administered the WISC-R (see non-verbal mental age on Table 32). Based on performance only, Michelle (S1) and David (S2) exhibited higher performance IQs and they performed better than Andy (S3), who had a lower performance IQ (and quite variable performance). However, Jason's (S4) performance IQ (84) was virtually the same as Michelle's (85) and Jason did poorer than Michelle across most domains. Further, in comparison to Andy, Jason did poorer than Andy on some domains and his performance IQ was much higher than Andy's (57). Although the children were not matched on verbal IQs, it is interesting to note how close all the children's verbal IQ scores on the WISC-R fell (within a range of 60 (S4) to 50 (S3)) and how differently they performed (see Table 2).

In comparing children who were administered the Leiter scale (see Table 2), although Andy had the highest MA score on this test, on some perceptual/linguistic and linguistic domains, Andy ranked at the lowest level. Again, research studies report that young normal preschoolers complete perspective tasks at very early ages (Masangkay et al., 1974). Two children (Jason and Matt) did not complete these rudimentary tasks in spite of mental ages well above those of normal children who easily completed these activities.

Similarly, in comparing MA scores, David had the highest MA (11.9 years) followed by Michelle (10.5 years). Jason (6 years), Andy (5.4 years on WISC-R or 6.9 years on Leiter) and Matt (4.6 years) had similar and lower scores. It did appear that for David and Michelle increased MA scores related to some skills. However, certain dips (such as Michelle's performance on the Turtle task) did not seem affected by mental age alone. Looking within the younger subgroup, variations in performance were constant and did not reflect a pattern relative to higher or lower mental ages (i.e., Matt was not always at the lowest rank and/or if he was, he was not alone). In sum, there did not appear to be an important relationship between performance IQ (or non-verbal mental ages) and the children's perspective-taking abilities.

Mean Length of Utterance

In terms of MLU, all children had MLUs beyond 3.0 morphemes. In analyzing MLU relative to the children's performance, MLU seemed to be poorly related to skills in linguistic and/or perceptual perspective-taking (see Table 32). For example, in using the MLU values obtained during low structured observations (free play), regardless of calculation, Michelle (S1) and Matt (S5) had similar scores. In spite of their similar MLUs, these children exhibited markedly different performance across all domains studied.

Similarly, David (S2) and Andy (S3) had the highest MLU scores relative to the other children. However, David's performance was markedly better than Andy's in all domains. Further, Andy's performance on the presuppositional measures was the lowest of all subjects. Thus, MLU did not predict presuppositional skill. Jason's (S4) MLU was mid-range relative to the other children and he did well on quantitative presuppositional measures and poorly on other language measures. Of further interest, the two oldest subjects (Michelle and David) had a wide range in MLU scores and both performed similarly and better than the other subjects. In sum, MLU did not appear to have an important relationship to perspective-taking abilities.

Summary of Results

Linguistic Perspective-taking

Analysis of Deixis

1. The children's non-contrastive use of person, object and place deixis during low (free play) and moderately (re-tellings) structured observations revealed adequate to good clarity of deictic use for all subjects.

2. During low structured observations (free play), person deixis was the most clearly encoded category. Place deixis, although used less frequently, was the next most clearly encoded category. Object deixis presented the most difficulty for four out of five subjects and they exhibited problems with clarity and indications of distal objects.

3. During low structured observations (free play), the children evidenced use of contrastive person deictic forms but not contrastive object or place deictic forms. Similarly, during highly structured observations (perspective task), the children demonstrated difficulty producing all contrastive deictic pairs.

4. All subjects demonstrated skills in deictic use in both the presence and absence of physical-perceptual supports. However, the children's use of anaphoric

reference was less frequent in comparison to exophoric and exophoric plus anaphoric reference.

5. The children's use of gestures accompanying deictic elements was minimal during low structured observations (free play). However, on highly structured observations (presuppositional task), gestures were used extensively with sighted and non-sighted listeners.

6. Clarity of non-contrastive deictic use was good in highly contextualized situations (free play) and poor in highly decontextualized contexts (tasks). The children's display of non-contrastive deictic knowledge seemed highly dependent on the context in which deixis was assessed. For contrastive use of object and place deixis, no context effects were seen.

7. The children tied their deictic forms to prior adult and/or child referents and all children demonstrated some ability to recode, or shift, person and object (with less frequent use of place) deictic forms relative to the prior linguistic context.

Analysis of Presuppositions

1. During moderately structured observations (re-telling episodes), quantitative changes were observed in frequency of talk relative to listener condition for all but one subject while group (mean) MLUs were relatively the same across listener contexts. However, individual profiles revealed some shifts in

MLU (and therefore, assumed increased syntactic complexity) relative to naive listener context.

2. The children's overall use of new nouns was slightly higher in the presence of the naive as compared to the knowledgeable listener.

3. Regardless of listener context, the children did not use conventional linguistic markers (such as articles, modifiers, etc.) preceding nouns to signal listener knowledge.

4. Three children used a greater proportion of activity-related nouns with the naive listener and most children were able to use semantically-relevant nouns to talk about their prior experiences.

5. The children's overall ability to use specific and deictic reference was slightly better with the naive as compared to the knowledgeable listener. However, more frequent inappropriate reference was seen in the presence of the naive listener.

6. The children's overall ability to be informative was poor regardless of listener context. The ability of the children to share information about, and elaborate on, prior experiences was restricted.

7. The children's use of non-informative propositions ranged from highly redundant (i.e., coding of old information) to highly irrelevant or unrelated.

8. During highly structured observations (task), two children evidenced clear modifications in verbal

encodings relative to the non-sighted listener condition while three children made minor, or no, modifications. Unlike other contexts, all children used gestures (mainly pointing) in both listener conditions.

Perceptual Perspective-taking

Analysis of Perspective-taking tasks

Perceptual tasks.

1. On the Level I task, three children were able to take the other person's visual perspective while two subjects could only take their own perspective.

2. On the Level II task, only two subjects could take the other's visual perspective while three subjects could only take their own perspective.

Perceptual/Linguistic task.

1. With increased linguistic demands, only two children could take the other's visual perspective while three children performed poorly.

2. The introduction of language on the visual/linguistic task enhanced some children's perspective-taking responses (increased sociocentric scores) and hindered one child's perspective-taking performance (decreased sociocentric scores).

Interrelationships Across Domains

1. Perceptual perspective-taking performance seemed to relate to qualitative aspects of the children's presuppositional performance but did not seem to relate to deictic and quantitative aspects of presuppositional performance.

2. The children's overall sociocentric (or perspective-taking) scores seemed related to dimensions of their communicative functioning and social-affective relatedness.

3. Variables such as chronological age, non-verbal mental age and MLU seemed poorly related to the children's overall perspective-taking performance.

CHAPTER V

DISCUSSION

> Curiously, until very recently the social abnormalities of autistic children have been the least studied features of the syndrome, in spite of the fact that it is they that give rise to the name of the syndrome, autism.
> (Rutter, 1983, p. 524)

The primary objective of this research was to explore dimensions of social-cognitive knowledge in verbal autistic children. Based on evidence from the autistic children's linguistic and non-linguistic (perceptual) perspective-taking performance, the following conclusions were drawn.

1. The children demonstrated varying degrees of social-cognitive understanding of another person's perspective.

2. The children's display of social-cognitive knowledge was directly influenced by varying dimensions of context--most importantly, the listener, physical-perceptual and linguistic context.

3. The presence of language enhanced some children's performance and hindered other children's perspective-taking performance.

4. The children's perspective-taking performance seemed more related to dimensions of their communicative and social-affective performance and less

directly related to their chronological age, non-verbal mental age (or non-verbal intelligence) and MLU.

5. Individual differences (both intra-subject and inter-subject) in perspective-taking performance further differentiated this group of autistic children.

In exploring these conclusions, when possible, comparisons to the perspective-taking skills of normal and other autistic children will be made. Normal developmental data will only be used if the children demonstrate similar non-verbal mental ages, or MLUs, to the subjects of this study. Comparisons with normals will be discussed to gain a broad sense of the continuum of similarities, differences and/or delays in autism.

Social-Cognitive Understanding of Another's Perspective in Autism

Evidence from the Children's Linguistic Perspective-taking Performance

Linguistic Deixis

The appropriate and effective use of deictic elements implies that the speaker has directed the listener's attention to an object or event as well as having clearly marked the (presupposed) referent so the listener can identify it (Wales, 1986). Inherent in communicative deictic use is an awareness of the listener's needs (i.e., marking the unique status of a

referent for the listener in a given communicative context), flexibility in coding changing aspects of the communicative context and the ability to make modifications in language relative to speaker/listener roles.

Several points regarding normal children's developing use of deixis can be discussed relative to the autistic children studied. Normal children produce non-contrastive deictic forms from early on and clarity of deixis does not appear to be an issue (Clark, 1978). Normal children's early deictic use involves successful establishment of joint attention and reference with others (Bruner, 1975). Further, gestures are used early on to reference objects and people, and later, gestures accompany children's use of linguistic deictic forms (Clark, 1978; Clark & Sengul, 1978). In terms of contrastive deictic use, person deixis is mastered earlier than other categories of deixis (object and place) perhaps because of the more absolute boundaries of person forms (Clark and Sengul, 1978).

Similar to normals at early stages of language learning, all the autistic children produced a range of deictic categories and the listener clearly interpreted their deictic use (in low and moderately structured contexts). This implies that the children established joint attention and reference with the listener; thus, apparently demonstrating sensitivity to the listener's

needs. Similarly, the autistic children did best with person deixis which seems to reflect the more definite and concrete boundaries of this category.

Further, and similar to normals at similar MLUs, the autistic children had difficulty making object and place contrastive distinctions. If compared to normals at similar non-verbal mental ages, some subjects (S1 and S2) would be expected to have worked out these distinctions. Lack of contrastive deictic use appears less directly related to a general egocentrism, or failure to take perspective, and more related to learning more subtle semantic-syntactic and social distinctions (deHart and Maratsos, 1984). Normal children's learning of the appropriate use of specific linguistic indicators seems to involve complex analyses about terms that are not salient, require analytical elements and combinatorial devices as well as the need to construct notions about universal features of discourse (deHart & Maratsos, 1984). Thus, there are increased cognitive demands placed on the child to integrate subtle linguistic and social cues that may affect use of specific linguistic forms such as deixis.

Based on observational data of normal infants and children at early stages of language development (Bruner, 1975; Clark, 1978), gestural use precedes and later accompanies children's production of deictic forms. The autistic children studied used gestures

minimally to accompany their linguistic production of deictic forms and some children used gestures in an idiosyncratic (and unclear) manner. In contrast, on the non-deictic presuppositional task, all children frequently used gestures in the presence of the sighted and non-sighted listeners. In this situation, extensive pointing was used to indicate referents.

In terms of specific deictic categories, autistic children's problems with personal pronouns have been a predominant, and frequently discussed, symptom of autism. The results of this study clearly demonstrate that some autistic children resolve person pronominal problems by at least Brown's (1973) Stage IV of language development. These results substantiate Kanner's (1943) observation that autistic children do eventually learn to use personal pronoun forms correctly. Surprisingly, this resolution of person deictic use has not been highlighted in the autism literature.

Several inferences can be drawn based on the children's clarity of deictic use in low structured communicative contexts (namely, free play). First, all children demonstrated underlying knowledge of speaker-listener perspectives by shifting person deictic elements relative to speaker/listener roles. If we follow Sharpless' (1985) hypothesis that children's use of personal pronouns is an index of

their developing sense of self and awareness of their conversational roles, then the autistic children's use of person deixis suggests knowledge of self versus other(s), interrelatedness of self with other(s) and some desire to be assertive in communication. The findings in this study contradict some social hypotheses (Charney, 1980a; Loveland, 1984) that young autistic children lack social responsiveness and do not differentiate self from other. If children's use of person deictic forms reflects self-other(s) awareness, differentiation and involvement, then the children in this study clearly demonstrated some understanding of self and other(s).

Examination of the children's use of first, second and third person deictic forms can reveal more information about degrees of self as well as other involvement in autism. These children rarely used second person forms (nor the investigator's name) to reference the listener. Three children used the majority of their person forms to refer to other inanimate (doll) figures (using second and third person forms) while two children primarily used pronoun forms for self-reference. This seemed to indicate each child's greater, or lesser, involvement with the social milieu; that is, pronoun preferences seemed to relate to each child's degree of social awareness and evolvement. This was further substantiated on the

social-affective relatedness scale. Future studies should explore what social differences exist between those autistic children who use self-reference frequently and in exclusion of other types of person reference. This may be a prognostic indicator of degree of self versus other social development.

Other indications of the children's social involvement can be seen in their use of the first person plural form we. All children used this form to some extent during low and moderately structured observations. Although it was hard to judge the specific dimensions of we (general-other versus specific adult partner), these data suggest that the children's use of we, at times, involved the examiner. This was interpreted as the children having some understanding of self with other(s). This contradicts Weiland and Legg's (1962) observation that autistic children avoid we because they avoid shared social experiences.

Furthermore, all children produced third person forms which also indicated some awareness of other(s). Many of these third person forms often involved interactions with, and references to, inanimate others (namely, doll figures). Interestingly, during low structured observations (free play), four of the five subjects engaged in discourse to (and for) the dolls. This clearly involved shifts in speaker/listener roles

and perspective-taking since all conversational roles were produced by the child alone. The data in this study also refute Silberg's (1978) claim that autistic children use first person forms more frequently than second or third person forms. This type of generalization cannot be made and does not apply to several of the children studied.

Second, clarity of object and place deictic reference was adequate to good while object and place contrastive deictic distinctions were not well developed. Again, the autism literature suggests that these children have problems with specific demonstrative and locative deictic elements (Caparulo & Cohen, 1983; Cunningham, 1968; Fay, 1979). Based on the literature, one might expect greater problems with listener interpretation of object and place deixis but this was not found. However, relative to the other deictic categories studied, object deixis (during free play) seemed to present greater difficulty for most (four out of five) subjects.

The children's greater problems in clarity of object deictic reference may relate to Yudkovitz et al. (1975) observations of referential unclarity in the language of school-aged psychotic children. Based on observations of one hundred psychotic children, they found that the children failed to define referential antecedents (by using indefinite nouns or undefined

pronouns). These researchers attributed these errors to either the child not assessing the needs of the listener or some failure to extract features of the language environment which permit rule formation. Again, this seems to support the notion that children have to learn more subtle linguistic and pragmatic features for the appropriate use of specific linguistic forms such as deixis (deHart & Maratsos, 1984).

The children's surprisingly good performance with overall clarity of deictic reference seems to contradict recent hypotheses about autistic children's deficits in joint attention and reference (Loveland & Landry, 1986; Paul, 1987) or the data in this study may indicate changes in joint attention and reference over time. At more advanced language levels (MLUs > 3.0 morphemes) than the children studied by Loveland and Landry (mean MLUs of 1.96 morphemes), the autistic children in this study did not evidence major deficits with joint attention or reference in the presence of a rich physical-perceptual context (i.e., during free play).

These data suggest that perhaps not all autistic children experience major problems with joint attention and reference (Paul, 1987). Remnants of earlier joint reference problems may be reflected in the children's greater proportion of unclear object deictic use (relative to other deictic categories); greater

problems in use of appropriate reference with the naive listener and occasions of referential unclarity during re-telling episodes. Unfortunately, early information about these subject's gestural signalling devices is unavailable. The children's lack of gestural devices accompanying linguistic deictic forms and their extensive use of gestures on the presuppositional task need further exploration. This pattern was unexpected, gestural use was expected with deictic productions and unexpected in the presence of a non-sighted listener.

Third, deictic problems have been used to support or refute varied theoretical perspectives on autism. Rees (1984) suggested that variations in children's degree of self-other involvement may be reflected in degrees of language impairment. For deixis, the greater the child's problem in self-other differentiation, the greater their deictic deficits (Rees, 1984). This would imply that autistic children's social deficits would be evidenced by their not gaining complete mastery of the linguistic deictic system (Rees, 1984). Although this data cannot substantiate Rees' claim without more developmental information, some of the children who did better with deixis (i.e., greater proportion of clarity of use across categories) appeared more socially related based on their social-affective rankings than those children who did poorer with deixis (i.e., less clear use) and

appeared less socially related. This trend seems to support Rees' claim that greater problems in self-other differentiation will be reflected in greater difficulties with the deictic system (or vice versa).

Evidence of these autistic children's good use of non-contrastive deictic forms refutes other theoretical perspectives on autism or particular subgroups of autistic children. These data contradict Loveland's (1984) hypothesis that the unresponsiveness of autistic children makes it hard for them to grasp reciprocal relations involved in the core use of person pronominal forms. In fact, the opposite notion emerges in this study. That is, these autistic children's deictic abilities evolved from some skill at appreciating another's point of view.

The evidence of these children's deictic ability may substantiate the hypothesis that there are at least two subgroups of autistic children (Watson, Martin & Schaffer, 1986). Based on observations of the spontaneous speech of seventeen autistic children at varying communicative and linguistic levels, Watson et al. (1986) concluded that one group of autistic children lacks motivation for shared reference and makes limited progress in acquiring language skills. Another group of autistic children possibly has motivation for shared reference, and therefore, makes better progress in learning language but nevertheless

"suffers" other social-cognitive deficits (Watson, Martin & Schaffer, 1986, p. 101). The particular autistic children studied here would best be described by the second subgroup.

To summarize, for person, object and place deixis, all the autistic children were able to establish joint reference with the listener by signalling the unique status of the presupposed referents in varied communicative contexts. These results support Tanz' (1980) claim that evidence about children's emergence from states of nonegocentrism may be seen by studying aspects of language such as deixis. Thus, both in its microstructure (alternation of deictic terms) and macrostructure (alternation of turns in conversation evidenced by use of recodes), the children's deictic use reflected some ability to decenter or role-switch (Tanz, 1980, p. 163). Of course, the presence of physical-perceptual supports seemed to be a major influence on the children's display of deictic knowledge (see below).

Presuppositions

Similar to deixis, presuppositions are integrally linked to the communicative context; involve speaker's inferences about listener knowledge; and the degree to which speaker's presuppose their listener's needs reflects degrees of sociocentric/egocentric behavior (Bates, 1976). The children's presuppositional

strengths/weaknesses appeared more varied, and uneven, than their deictic performance.

In terms of normal developmental data, several researchers have demonstrated pre-schooler's (three-to-five years) skills at presupposing their listener's informational needs (Maratsos, 1973; Perner & Leekam, 1986; Peterson, 1974). In terms of quantitative shifts in language relative to different listener contexts, Peterson (1974) found that pre-schoolers talked more, had greater use of new nouns, and required less prompting, in the presence of a naive rather than knowledgeable listener. It will be recalled that the re-telling contexts in this study were similar to Peterson's contexts; thus, comparisons can be made.

Similar to normals (of similar non-verbal mental ages) studied by Peterson (1974), four of the autistic children made some quantitative shifts in language with the naive listener; however, the extent of shifts (i.e., the number of different types of shifts) varied across subjects (with some subjects making one change while others made several changes). No research on normal children's differing MLUs relative to listener knowledge has been completed to date (with the exception of Shatz and Gelman (1973) where listener age was a variable). Some of the autistic children increased MLU relative to the naive listener context and increased syntactic complexity (based on MLU) was

interpreted as increased specificity of information with the naive listener.

On qualitative measures, similar to normals, the autistic children (at the same or greater non-verbal mental ages as Peterson's (1974) pre-schoolers), introduced more new nouns with the naive listener. However, normal children made greater distinctions in frequency of use of first mention of new nouns than the autistic children (Peterson, 1974). Similar to Peterson's subjects, the autistic children's use of modifiers, articles, etc., preceding nouns was not developed and seemed to relate to the children's MLU levels rather than social-cognitive knowledge.

In looking at informativeness, young normal children easily make modifications in the amount and quality of information shared relative to listener context (Maratsos, 1973; Perner & Leekam, 1986; Peterson, 1974). These data on these five autistic children seemed quite different. During re-tellings, all children had difficulty producing informative utterances regardless of listener context. In fact, a greater proportion of the children's utterances were coded as non-informative. In comparison to normals, more informative use would be expected but was not found. Perhaps, some of the autistic subjects' output could be characterized as more under-informative similar to younger-aged normals (Perner & Leekam,

1986). However, two other subjects' (Andy and Matt) utterances were not only under-informative but appeared to be irrelevant relative to the prior activities. This pattern seems distinctly different than normal developmental patterns.

In contrast to moderately structured observations (re-tellings), during the presuppositional task, differences in some of the children's ability to be informative relative to listener context were seen. On this task, normal pre-schoolers (Maratsos, 1973) easily coded more adequate (or informative) utterances with naive listeners. In this study, two of the five autistic children (Michelle and David) were responsive to the non-sighted versus sighted listener context. Other differences were seen between normal and autistic children on the presuppositional task. Although normal pre-schooler's used gestures with the sighted (knowledgeable) listener, they rarely used gestures in the presence of the non-sighted listener (Maratsos, 1973). In this study, all the children used extensive gestures in both sighted and non-sighted listener contexts. In fact, some children increased their use of gestures with the non-sighted listener. Perhaps, this is evidence of the children's understanding of the need for increased information but not knowing how to convey this information.

In sum, similar to normal developmental data, the children showed degrees of sensitivity to disparate listener contexts. This awareness of listener perspective was more evident for some subjects on quantitative, rather than qualitative, language indices. On some qualitative analyses, modifications in language were seen with the naive listener; however, differences in overall frequency of shifts with each listener did not appear as distinct as modifications easily made by normal children (Maratsos, 1973; Peterson, 1974).

Similar to deixis, research on presuppositional deficits of autistic children has been anecdotal and impressionistic (Snyder, 1984). However, there have been several direct studies that can be discussed relative to this investigation.

In their study of autistic children at lower MLUs (1.96 to 2.82 morphemes), McCaleb and Prizant (1985) reported that their subjects coded new information as often as they coded old information. Similarly, in this study, three children (Michelle, David and Andy) coded redundant (i.e., old) information in at least .50 of their non-informative propositions. Unlike McCaleb and Prizant's data, where the autistic children infrequently coded a new action or state change (i.e., they frequently talked about nontransient information), the children in this study were able to talk about

dynamic events. However, they did so less frequently than might be expected relative to normal children at similar non-verbal mental ages (Perner & Leekam, 1986; Peterson, 1974). Langdell (1980, as cited in Baron-Cohen, 1988) also found that autistic children had difficulty in sharing information with listeners who had shared and unshared experiences with the child.

Presuppositional deficits in autistic individuals have been reported in other research studies (Baltaxe, 1977; Paul & Cohen, 1984; 1984, Paul & Feldman as cited in Paul, 1987). These deficits include lack of informative language, lack of relevancy in language use and insufficient amount of information to meet a listener's needs Likewise, similar presuppositional problems were seen, in varying degrees, in all the children studied here. That is, intra-subject and inter-subject variations were seen relative to the amount (quantity) and type (quality) of information shared with naive and knowledgeable listeners.

Evidence from the Children's Non-linguistic Perspective-taking Performance

Perceptual and Perceptual/Linguistic Tasks

It will be recalled that all perceptual and perceptual/linguistic tasks were selected based on (a) evidence that normal children easily completed these tasks by (three to) four years of age (Fishbein et al.,

1972; Masangkay et al., 1974) and (b) completion of tasks involved minimal linguistic ability.

On perceptual tasks, individual variations were seen in the children's performance which ranged from excellent perceptual perspective-taking performance (David and Andy) to uneven performance (Michelle) to an inability to take the listener's visual perspective (Jason and Matt).

On the perceptual/linguistic task, different subgroups emerged. Here, only two children (Michelle and David) demonstrated sensitivity to the other's visual perspective while three children (Andy, Jason and Matt) demonstrated limited to minimal degrees of sociocentric responsiveness.

To date, two studies have explored autistic children's perceptual perspective-taking abilities. Hobson (1984) studied older (9.9 to 16.1 years), high functioning autistic individuals ability to complete varied perceptual perspective-taking tasks. He found that all the autistic subjects evidenced the ability to take another's visual perspective (on what appeared to be Level II type tasks). Hobson suggested that deficits in visual perspective-taking may be a problem in earlier stages of development in autism. The trends in this study may support this claim since the two youngest children (Jason and Matt) could not take another's visual perspective on the perceptual tasks

presented. However, the oldest subject (Michelle) could not complete one of these visual perspective tasks. Only two subjects (David and Andy) performed well on both perceptual perspective-taking tasks. Interestingly, their age differences were thirty-four months apart; thus, age did not seem to affect perceptual perspective-taking performance while other variables (such as degree of social-affective relatedness based on social-affective scale) seemed more related to success on visual perspective-taking activities than other variables such as age, non-verbal mental age or MLU.

In a study by Dawson and Fernald (1987), perceptual role-taking tasks were administered to autistic individuals with a mean age of 11.1 years and a mean non-verbal mental age of 5.8 years. These mean non-verbal mental ages are closer to some of the subjects in this investigation. Although Dawson and Fernald were interested in correlational analyses, the children's mean performance on perceptual tasks was reported as 7.8 out of 18 possible correct responses with a S.D. of 3.9. Thus, their autistic subjects had difficulty with perceptual activities. Again, these data appear to differ from Hobson's findings and support the variations in autistic children's perceptual perspective-taking performance found in this study.

Although it has been suggested that visual perspective-taking is the least social type of perspective-taking activity (Flavell et al., 1968; Shantz, 1983), in this study, it appeared that the children's performance on visual perspective-taking tasks reflected each child's degree of sensitivity to another person's visual experiences. The visual perspective-taking tasks revealed information about the children's early levels of perspective-taking skill that was corroborated on other analyses. Coupled with other perspective-taking data, the perceptual tasks served as one means of gaining a sense of the children's rudimentary understanding of self versus other.

Contextual Influences on Children's Display of Social- Cognitive Knowledge

A universal feature of language is that it is context-sensitive (Prutting, 1982). Among other things, the child-speaker's behaviors vary as a function of not only the major characteristics of the listener context (Craig, 1983) but also the physical-perceptual and linguistic context. With pragmatic perspectives on autism, changes have been seen in not only what aspects of language (from syntactic to pragmatic) are studied but also the contexts (from experimental to more naturalistic) in

which language is observed (Prizant & Duchan, 1981; Wetherby & Prutting, 1984).

An important finding of this study was that the children's perspective-taking performance varied relative to changing dimensions of the context. For some domains, differences in context resulted in markedly different behaviors within and across subjects. This supports McHale, Simeonsson, Marcus & Olley (1980) observations that the quantity and social quality in autistic children's communication appears to be influenced by the nature and setting of the transaction.

Influence of the Listener Context

As previously discussed, the autistic children studied demonstrated varying degrees of difficulty making inferences about their listener's informational needs during moderately (re-tellings) and highly structured observations (presuppositional task). This data supports observations of Baltaxe (1977) and Paul and Cohen (1984). However, inferencing problems were not evidenced on the children's deictic productions, use of specific noun reference in re-tellings and on quantitative (for most subjects) and qualitative aspects (for two subjects on the presuppositional task) of presuppositional performance. The conclusion in this study is that most of the autistic children attempted to meet their listener's needs (to varying

degrees of success). However, for some subjects, varying degrees of language impairment influenced displays of social-cognitive knowledge about the listener.

Perhaps, strengths and weaknesses in autistic children's social understanding of the listener can be looked at relative to the type of inferences autistic children have been asked to make in particular contexts. In this study, when the children shared the physical-perceptual context with the listener, having mutual knowledge of events as well as observing the listener's explicit behaviors, the children evidenced better perspective-taking skills. This can be seen for deictic performance in low structured observations (free play) and on perceptual and perceptual/linguistic tasks (for some subjects). Similarly, explicit listener cues as evidenced on the presuppositional task (i.e., listener closed eyes), enabled some of the children to take the listener's perspective when they did so less clearly during re-tellings.

When the listener's knowledge was more implicit (such as making psychological inferences about the listener for non-shared events), the children performed worse on perspective-taking activities. This was seen during moderately structured observations (re-tellings) with naive and knowledgeable listeners. These differences in inferencing in relation to explicit

versus more implicit listener behaviors may relate to findings that autistic children have difficulty with conceptual (Baron-Cohen et al., 1985) and affective (Hobson, 1986) dimensions of perspective-taking. Both conceptual and affective domains of perspective involve more implicit psychological inferences (in comparison to perceptual tasks) about the listener's mental state(s). Similar to normal children, the degree of complexity (explicit to more implicit) of listener behavior(s) that a child is asked to judge will directly affect the child's display of social-cognitive understanding and communicative success in presupposing the listener's needs (Shatz, 1983).

Recently, Baron-Cohen (1988) postulated that awareness of listener's mental states involves inferencing based on complex cognitive mechanisms. Beliefs about the physical world involve primary representational capacity while beliefs about other people involve second-order representations (or meta-representational capacity). Baron-Cohen suggests that meta-representational deficits exist in autistic individuals which results in pragmatic deficits (since all communication involves meta-representational skills) and some (but not all) social deficits. Again, the type and level of inference seems to be directly related to level of social-cognitive understanding in autism. The results of the present study suggest that

autistic children have some knowledge of another's mental states (or some meta-representational capacity) since linguistic perspective-taking tasks seem intimately related to conceptual perspective-taking abilities. However, to support this tentative conclusion, these autistic children's performance on a broad range of conceptual and affective perspective-taking tasks would have to be further assessed.

Similarly, Paul (1987) has hypothesized that autistic children cannot go beyond the literal meanings of messages to make inferences about other people's cognitive states or implicit intentions. She states that a wide range of deficits emerge from inferencing problems including failure to establish joint topics, poor presuppositional skills, inability to gauge how much information listener's need, etc. Some of these communicative deficits were observed to varying degrees in some of the children studied; however, the children also demonstrated more strength in these areas than might be expected based on reports in the autism literature. That is, a pervasive lack of social-cognitive understanding of other(s) was not observed in this study.

The findings in this study support a more uneven social-cognitive profile for the autistic children studied rather than a total lack of social

responsiveness to others. Furthermore, characteristics of listeners will always influence what inferences children make and subsequently, what inferences researchers can draw from their data. Thus, as Hopkins and Lord (1981) note, the social impairment(s) in autism take different forms according to whom the children are interacting with. Further, the study of social cognition in autism is complicated by the fact that social behaviors change developmentally; thus, autistic childen at different developmental stages will evidence different social-cognitive profiles.

Influence of the Physical-Perceptual Context

Presence of physical-perceptual context.

Low structured observations (free play) involved a rich non-linguistic context, language use embedded within the "here and now" and minimal adult-imposed direction. As previously discussed, the children's deictic performance was best in this context.

The children's use of the physical context was evidenced by high proportion of exophoric (and exophoric and anaphoric) deictic reference that may reflect their level of language development--namely, being grounded in the immediate "here and now." Based on group mean MLUs, the children were at linguistic levels where physical supports are important and language is contextually contingent. Furthermore,

developmental information reveals that exophora develops before anaphora (Karmiloff-Smith, 1979).

From another perspective, Shatz (1983) comments that with exophoric reference, the child not only has information about the object of reference but also can follow the listener's line of regard, etc. This seems to imply sensitivity to the listener's explicit behaviors. Similarly, this interpretation can be viewed from the listener's perspective; that is, an interested listener can use physical supports to follow the child's line of regard, gestures, actions, etc. This may make interpretation of children's deictic use easier than it would be without physical supports.

With anaphoric reference, such information is lacking. The child must rely on memory of prior discourse and also make judgments about the listener's ability to make inferences about the prior discourse (Shatz, 1983). Thus, less explicit characteristics of the listener have to be accounted for by the child. Similarly, the listener would have to work harder to interpret deictic elements in anaphoric contexts. Thus, for both participants, a rich physical context clearly aids deictic interpretations.

For presuppositions, the highly structured (presuppositional task) context was somewhat similar to free play in that there was more physical-perceptual supports than in some of the other contexts, language

grounded in the "here and now," more explicit listener behaviors, and a highly adult-directed situation. This rather concrete context enhanced two of the five children's ability to clearly presuppose the listener's informational needs that was not as clearly evident during moderately structured observations (re-tellings).

Absence of physical-perceptual context.

The moderately structured (re-telling) episodes involved an absence of non-linguistic supports, language related to events removed in time (i.e., not grounded in the "here and now"), more adult-direction, structure, and adult-initiated topics and decreased adult input. The children's presuppositional performance varied greatly and was more uneven in comparison to overall deictic performance. It seems that the lack of physical context, the use of language in the "not here and now," and/or the increased linguistic demands placed on the children to create a coherent text and be informative, all contributed to their poor performance on qualitative measures. Of further importance, the children had to talk about adult-initiated rather than child-initiated topics. This was the opposite of free play where child-initiated topics were most often used.

It is hypothesized that the children's performance on the presuppositional (re-telling) activity may be

related to the increased cognitive complexity of this particular context. The need to integrate linguistic (talking about past events), social (making inferences about more subtle listener cues) and conceptual (memory of past experiences) information may have resulted in more limited displays of social-cognitive knowledge. As Shatz (1983) states, children demonstrate more of a given ability when task and situation demands are confined to their level of knowledge and are consonant with their presuppositions about the world. Thus, the children's poor performance may relate to some sort of cognitive overload and not necessarily to an absence of social-understanding of the listener.

It is important to reiterate that during moderately structured observations (re-tellings), some children (four out of five) made quantitative changes (increased frequency of talk, shifts in MLU) in language relative to the listener context. Perhaps, these language indices required less advanced linguistic skill for these subjects than other language measures (such as being informative). Also, although anaphoric deictic reference was excellent during re-tellings, the number of people and objects to be referenced was limited, and coded repeatedly.

In comparing MLUs relative to the presence and absence of a physical-perceptual context, four out of five subjects demonstrated increased MLU scores from

low structured (free play) to moderately structured (re-tellings) observations. However, it is unclear which of the following variable(s) influenced shifts in MLU: (a) lack of physical-perceptual context that may have resulted in decreased use of ellipsis, (b) degree of adult imposed structure, (c) increased communicative responsibility with decreased adult support, and/or (d) the content of the re-telling episodes. What is important is that the children demonstrated flexibility in language relative to changing contextual influences.

Finally, the highly structured observations (deictic and presuppositional tasks) fall somewhere between a rich physical-perceptual context (free play) and the complete absence of a physical-perceptual context (re-tellings). Both linguistc perspective-taking tasks involved decontextualized situations with less physical support than free play, highly imposed adult direction, and limited language input devoid of rich content (i.e., specific questions presented to children in isolation from an ongoing discourse).

The children's task performance varied in relation to both the linguistic index being evaluated (e.g., quantitative versus qualitative presuppositional measures, non-contrastive versus contrastive deictic use, etc.) as well as the dimension(s) of context. For example, all children performed poorly on the deictic

tasks. This could be interpreted in two ways. On one hand, the children did not have enough advanced linguistic ability to comprehend/produce contrastive deictic pairs which would be supported by normal developmental data (Tanz, 1980) as well as their free play performance. On the other hand, the restricted physical and linguistic context did not give the children any extra clues in which to interpret deictic elements. In some sense, the deictic task seemed like a meta-linguistic activity. In contrast, the presuppositional task involved a simpler and more concrete physical context and easier (and more explicit) language input. This seemed to result in two of the five children making verbal modifications in language relative to the listener's perspective (unlike the deictic task where all children performed poorly relative to listener perspective).

Influence of the Linguistic Context

The children's ability to be linguistically contingent (as measured by deictic forms tied to prior adult or child referents) was analyzed during low (free play) and moderately (re-tellings) structured observations. Again, context-dependent changes in language were seen. During low structured observations (free play), all children more often linked forms to prior adult referents than to their own prior referents; thus, demonstrating responsiveness to

another speaker's input. Most of the children also used recodes; thus, demonstrating the ability to shift deictic forms relative to prior linguistic context. During re-tellings, there was a decrease in the overall proportion of forms that were linked to prior adult referents and an increase in forms linked to child's own prior referents. Perhaps, this difference suggests the children's awareness of the nature of the communicative context; that is, that they were to engage in a monologue rather than a dialogue.

However, the children's decreased use of recodes during re-tellings was not necessarily expected. Perhaps, their increased use of repeats suggests that the absence of a rich linguistic environment (i.e., adult's input) resulted in greater dependency on their own language skills which was reflected in less sophisticated language behaviors (i.e., more imitations).

Similar to normal youngsters at similar MLUs (Bloom, Rocissano & Hood, 1976), the autistic children demonstrated linguistic contingency in the use of deictic forms that anchored their talk to prior adult (or child) talk (i.e., recodes); thus, demonstrating sensitivity to their conversational partner's linguistic input as well as different perspectives of speaker-listener reflected by contrastive use of person deictic forms and non-contrastive use of object terms.

In a recent study, the relationship between adult linguistic input and autistic children's response adequacy was explored within unstructured conversations (Curcio & Paccia, 1987). The authors found that as adult language input included more yes/no questions, more conceptually simple questions and more semantically contingent questions related to the child's topic, the proportion of adequate responses from the autistic children increased. This suggests that autistic children's linguistic contingency is related to level of complexity of linguistic input. As in normal children, most linguistic contingency occurred after wh-questions (Bloom, Rocissano & Hood, 1976). This research demonstrates that increased communicative performance by autistic children occurs when less cognitive and linguistic processing demands are placed on the children.

Finally, researchers have often observed that autistic individuals fail to tie their comments to the physical-perceptual or linguistic context (Baltaxe, 1977; Kanner, 1943; Yudkovitz et al., 1975). In the present study, based on analyses of deictic forms, the children demonstrated some ability to be contingent relative to both the situational and linguistic environment. Similarly, one could look at the children's language in re-tellings contexts in relation to linguistic contingency. All children produced some

linguistically contingent utterances about their prior experiences. Other analyses of the children's ability to formulate contextually and/or linguistically contingent messages were not completed. The findings on the children's deictic and presuppositional use suggest more skill in autistic children's ability to produce situationally and linguistically contingent language than has previously been reported in the autism literature.

The Influence of Language on Autistic Children's Perspective-taking Performance

Observations of the children's social-cognitive behaviors across domains resulted in another important finding--namely, that the presence of language enhanced some children's performance while it hindered other children's perspective-taking performance.

Certain hypotheses have been postulated about possible relationships between domains of perspective-taking in normally developing children. Some theorists suggest that perceptual (or visual) perspective-taking emerges earlier than other forms of perspective (Flavell et al., 1968; Loveland, 1984). Bates (1975, 1976) suggests that role-taking (no particular domain) skills may be pre-requisite to the development of presuppositions. For these researchers, domains of perspective-taking (other than

language) appear to be prerequisite, or important, for subsequent language developments.

Conversely, Tanz (1980) suggests that children may evidence certain nonegocentric operations in language before they can perform comparable skills outside the sphere of language. She further postulates that decentering in language (as evidenced in deixis) not only precedes but helps prepare children for subsequent non-linguistic decentering (or perspective-taking). Thus, one can infer that aspects of linguistic perspective-taking may emerge earlier than other types of perspective-taking.

Tanz also suggests that the content of linguistic communication may provide another means of contributing to children's emergence from egocentrism. She points out that "language offers partial access to other people's inner states that indicate an individual's figurative (or conceptual) perspectives on situations" (Tanz, 1980, p. 163). Thus, information available to children through language may compensate for difficulty of directly experiencing another person's perspective.

An original assumption in this study was that perceptual perspective-taking was the easiest, and earliest, developing form of perspective (Shantz, 1983). It was assumed that perceptual perspective-taking tasks would be an important index of autistic children's social understanding of others

prior to emergence in other domains (such as language). It was hypothesized that the children's language problems might interfere with assessment of their knowledge of self versus other; thus, non-language means of demonstrating self-other differentiation had to be studied.

The presentation of perceptual perspective-taking tasks, non-social locative tasks and the perceptual/linguistic perspective-taking task revealed individual variations in the children's performance. Two children (Jason and Matt) could not take another person's perspective on both perceptual perspective-taking tasks. However, when language was introduced into the perceptual/linguistic task (e.g., the use of locative forms), some ability to appreciate another's perceptual viewpoint was seen. Although these children evidenced perspective-taking deficits, some distinctions between self and other became more evident on the perceptual/linguistic task and also on other language perspective-taking measures (such as presuppositional analyses). Similarly, the oldest subject (Michelle) experienced difficulty with one perceptual task; however, when language was introduced on the perceptual/linguistic task, her perspective-taking scores increased.

An opposite pattern was seen for another subject. Andy performed at 1.00 accuracy on both perceptual

perspective-taking tasks and on the locative task, he demonstrated adequate knowledge of certain locative forms in non-social contexts. However, when the listener was introduced, his perspective-taking performance decreased dramatically. Here, the combined linguistic plus social demands of the context hindered his sociocentric responsiveness. In sum, for Andy, introduction of increased language demands (coupled with social demands), resulted in decreased perspective-taking performance. Conversely, for Jason and Michelle, introduction and use of language, seemed to enhance their performance.

Of further interest, only the children who performed adequately on both the perceptual and perceptual/linguistic perspective-taking tasks, performed adequately on the presuppositional tasks. This may support Bates' (1975) hypothesis that role-taking skill(s) are necessary for the development of presuppositional knowledge and perhaps, not necessary for other language developments.

This study cannot make any claims regarding the emergence and interrelationships among domains of perspective-taking. However, two results may shed some light on the relationship(s) across domains of perspective-taking. First, Loveland (1984) postulated that visual perspective-taking seemed to be necessary for the development of person forms I/you. These data

do not substantiate this claim since the autistic children who did poorly on the visual perspective-taking tasks had worked out I/you distinctions in natural communicative contexts (free play). Thus, visual perspective-taking (as measured by Level I and Level II type tasks) was not necessary for aspects of linguistic perspective-taking.

Second, the results (for some subjects) support Bretherton and Beeghly (1982) and Tanz' (1980) hypotheses that language may be a crucial aid in children's social understanding of other's and their emergence out of a state of egocentrism. If this is true, for some autistic children, greater linguistic skills in comparison to poorer social-cognitive abilities may enhance their display of social-cognitive knowledge (e.g., Michelle). For others (such as Andy), social-cognitive understanding of other people may be less obvious due to greater (or equal) linguistic deficits that mask displays of social-cognitive knowledge. Of course, for some autistic children, severe social-cognitive and linguistic deficits co-exist. Within social-cognitive and linguistic domains, uneven profiles are probably the norm for autistic children that must be more fully appreciated when assessing, and treating, these children.

Interrelationship(s) between Perspective-taking, Pragmatic Skills, Social-affective Relatedness and Other Variables

Some researchers postulate that the development of communication leads to social-cognitive understanding of other people. For example, McHale et al. (1980) state that the acquisition of symbolic, communicative skills may be important determinants of social competence. Thus, with this viewpoint, communication serves an important role in the process of learning about self and other (Bretherton & Beeghly, 1982). Similarly, Tanz (1980) has suggested that dimensions of language and communication may aid children in their development of other types of perspective (Tanz, 1980).

The opposite perspective is that awareness of self and other(s) leads to effective communication. That is, the use of language meaningfully and communicatively implies that the speaker is aware of another's perspective or mental state (Baron-Cohen, 1988). Regardless of which viewpoint one follows, the inference in both viewpoints is that the greater children's perspective-taking skills (or self-other awareness), the better their communicative skill(s). As Baron-Cohen (1988) states, "autistic children who do have a theory of mind at lowest level should be less pragmatically impaired than the majority of autistic children who show no theory of mind at all"

(Baron-Cohen, 1988, p. 396). His position implies an order of direction--namely, that perspective-taking skills are prerequisite (or necessary) for effective communicative skills (Flavell et al., 1968; Piaget, 1926).

One of the primary interests in this study was to explore how dimensions of autistic children's perspective-taking performance related to variables such as communicative functioning, social-affective relatedness, chronological age, non-verbal mental age and certain language measures such as MLU.

In terms of communicative performance, general observations were made of the children's expression of speech acts, listener's ability to interpret intentionality conveyed in speech act production and overall conversational skills (during low structured observations). A positive relationship was seen for some children (David, Andy and Matt) between overall perspective-taking scores (or sociocentric responses) and their communicative performance during free play. A relationship between perspective-taking scores and communicative functioning was not directly observed for the other two subjects (Michelle and Jason). However, for Michelle, some positive relationship was seen between her poor perspective-taking scores on one perceptual perspective-taking task and her poor conversational style. For Jason, perspective-taking

scores in non-language domains were poorer than perspective-taking scores in language domains. Jason's linguistic perspective-taking scores seemed more in harmony with his overall communicative pattern during free play.

In terms of social-affective relatedness, some positive relationship(s) were seen between the psychotherapist's ranking of the children's social behaviors and their overall perspective-taking scores. The influence of the children's language on their overall social-affective rankings remains a variable that was not controlled. In spite of this confounding factor, clear patterns were seen between high-mid-low perspective-taking scores and high-mid-low social-affective rankings for three subjects (David, Andy and Matt). Less clear patterns were seen for the other two children. Jason's low perspective-taking scores did not seem related to his high social-affective ranking. Perhaps, this child's higher social-affective ranking was influenced by his better linguistic and communicative performance during free play that masked poor social-cognitive knowledge evidenced on non-language perspective-taking tasks. Similarly, Michelle's high perspective-taking scores did not seem related to her poor social-affective ranking. Interestingly, Michelle's lack of spontaneous language during free play may have negatively

influenced her social ranking. In contrast, the presence of language on perspective-taking tasks seemed to positively influence her overall perspective-taking performance.

It is of interest to compare the children's perspective-taking performance relative to severity of autism. Although each child was diagnosed by different psychologists, three children (Michelle, Jason and Matt) were categorized as having residual state autism while the other two children (David and Andy) were not labelled as exhibiting full or residual state impairments. For the three children labelled as less severely autistic (i.e., residual state), degree of social impairment seemed related to Jason's performance and aspects of Michelle's performance; however, the diagnosis of residual state autism did not seem well related to Matt's overall performance.

In looking at the autism literature, there has been one recent study of the relationship(s) between perspective-taking ability and the social behaviors of autistic children. Dawson and Fernald (1987) studied autistic children's (six-to-fourteen years of age with a mean non-verbal mental age of 5.8 years) performance on varied perceptual, conceptual and affective perspective-taking tasks. Their performance was correlated with performance on the PPVT, Leiter,

Vineland Social Maturity Scale and a social behavioral scale designed by the authors.

They found that conceptual perspective-taking was consistently related to the children's social behavioral scores as well as severity of autism. It will be recalled that language perspective-taking involves dimensions of conceptual perspective-taking. Perhaps, this indirectly supports the findings in this study that suggest a positive relationship between social-affective relatedness and linguistic perspective-taking skills. Dawson and Fernald (1987) also found that perceptual role-taking was significantly correlated with autistic children's scores on their social behavior scale and there also was a trend toward correlations on the Vineland Scale. Affective role-taking was not found to be significantly related to either measure of social behavior.

In sum, these researchers found that perspective-taking abilities related to qualitative aspects of social behavior and severity of autistic symptoms. Perspective-taking was found to be a better predictor of level of social skills than language measures (PPVT) or non-verbal intelligence (where no correlations were seen). Similar to the present study, the children's perspective-taking performance seemed to relate to their degree of social-affective relatedness.

Similar to Dawson and Fernald's (1987) findings, chronological age, non-verbal mental age and dimensions of language (such as MLU) did not have a positive relationship to the children's perspective-taking performance. Further, the children's scores on sub-tests of the TOLD-P seemed unrelated to their overall perspective-taking performance.

Two other language measures may relate to the children's perspective-taking performance or degree of sociocentric involvement. As previously discussed, each child's use of person deictic forms relative to self versus other revealed that Michelle, David and Andy used a majority of person forms directed to other(s) (namely,--inanimate doll figures). This pattern seemed to relate to some aspects of these children's better perspective-taking performance, or awareness of other(s). Jason and Matt used a majority of person deictic forms for self-reference and this may reflect their degree of egocentricity or lack of social involvement with other(s) that was seen on some dimensions of their perspective-taking performance.

Similarly, although the children's use of gestures accompanying deictic forms was infrequent, Michelle and David used the greatest proportion of accompanying gestures in a clear manner while Andy and Jason used gestures infrequently. For Matt, although he used gestures more frequently (similar to Michelle and

David), he also used the greatest proportion of unclear and idiosyncratic gestures. Although these observations can only be considered tentative, these language measures (such as use of person deictic forms and accompanying gestures) may be important indicators of autistic children's sense of other(s) and involvement with other(s).

Several tentative conclusions can be drawn from this study. First, there appears to be some important relationship(s) between the autistic children's perspective-taking performance and dimensions of their communicative (e.g., conversational style) and social-affective abilities (e.g., social-affective rankings). Second, less clear relationship(s) existed between perspective-taking performance and the children's chronological age, non-verbal mental age and MLU. All of these findings are further supported by Dawson and Fernald's (1987) research where social behaviors were correlated with perspective-taking while non-verbal mental age and language level (based on PPVT) were not correlated with perspective-taking.

Future research studies should include more detailed analyses of specific aspects of autistic children's communicative abilities in relation to specific dimensions of their perspective-taking skills. In this study, limited analyses were completed on each

child's communicative abilities. More quantitative and qualitative analyses of broad and specific aspects of communicative performance would be necessary to further understand the relationship(s) between communicative functioning and perspective-taking in autism.

Further, the use of more standardized social behavioral measures is recommended to further understand the relationships between social interactive abilities and perspective-taking. If possible, analyses of autistic children's social-affective relatedness with, and without, the influence of language may be interesting to measure. Perhaps, videotaped interactions could be viewed without sound. It was hypothesized that the psychotherapist's evaluation of the children's social-affective rankings was influenced by the children's linguistic and conversational styles.

Finally, more normal developmental information is needed regarding the emergence, and interaction, of domains of perspective-taking and how specific domains of perspective-taking relate to children's developing social and communicative abilities. Similarly, continued exploration of autistic children's perspective-taking abilities (across domains) and in relation to their social and communicative abilities is warranted. Autistic children's social-cognitive knowledge relative to their communicative performance

may shed light on normal as well as atypical social-cognitive developmental processes.

Individual Differences in Autistic Children's Perspective-taking Performance

Individual differences were seen in the autistic children's perspective-taking performance within each child (intra-subject variation) as well as across children (inter-subject variation). Further inter-subject variations in perspective-taking skill were evident when comparing these subject's performance to other studies of autistic individuals.

The particular verbal autistic children studied were those whose language was beyond 3.0 morphemes coupled with high non-verbal cognitive functioning (relative to other subgroups of autistic children where lower non-verbal cognitive skills are more common). Although these subjects would be considered a distinct group of autism, further individual differences were seen within this particular subgroup. An appreciation of intra-subject and inter-subject variations emerged as a result of exploring the children's perspective-taking abilities across non-linguistic and linguistic domains and in varied communicative contexts.

The findings in this investigation clearly support attempts at classifying autistic children into more

well-defined and discrete subgroups such as the system of interactive styles described by Wing and her colleagues (Wing & Attwood, 1987; Wing & Gould, 1979). As previously discussed, the five children studied could be characterized as aloof (Matt), passive (Michelle) and active-but-odd (David, Andy and Jason). In spite of a wide range of social and interactive styles within each of these subgroups, all the children evidenced some social-cognitive understanding of another person's perspective.

Intra-subject Variations

The importance of highlighting intra-subject variation in autism is to minimize some of the rather broad descriptions of autistic children's overall lack of social-cognitive understanding of other people. Furthermore, researchers must gain a better sense of the nature of specific social-cognitive skills in subgroups of autistic children; how autistic children's display of social-cognitive knowledge is affected by the cognitive complexity of tasks and varying dimensions of context; and how each child's linguistic-pragmatic skills interact with, and influence, their social-cognitive knowledge, and vice versa.

One of the important conclusions in this study was that all subjects evidenced some degree of

social-cognitive understanding of another person's perspective. If one looks at Matt's profile, he was clearly the most impaired autistic child studied. However, in the presence of serious social-cognitive deficits, he demonstrated some ability to maintain joint attention and reference with another person and infer the listener's needs as reflected in his adequate deictic performance (during low and moderately structured observations). Similarly, he made quantitative shifts in language relative to the naive listener's needs during re-tellings; on more qualitative presuppositional measures, he was unable to infer the listener's needs. To some limited extent, this child, who could be described as aloof, demonstrated some social understanding of another person.

In contrast to Matt, Michelle was described as having a passive interactive style. She was the oldest subject and had one of the lowest MLUs (similar to Matt). Michelle's social-cognitive understanding of others seemed greater than one might expect based on her linguistic-communicative style and social-affective profiles. She clearly made distinctions in listener contexts and took the listener's perspective on many of the perspective-taking activities.

Similarly, the three children described as active-but odd (David, Andy and Jason), all

demonstrated varying degrees of social-cognitive understanding of another's perspective. A wide range of strengths and weaknesses were observed for each of these children. David was the only one of these three subjects who had a more even social-cognitive profile although he performed poorly on certain presuppositional indices. For example, David's sociocentric sensitivity to another person was evident in different ways than expected. He made more modifications in language with the knowledgeable rather than the naive listener. That is, his MLU and frequency of talk increased with the knowledgeable listener. David's increased linguistic and communicative interactions with the knowledgeable listener may have related to a greater familiarity, and thus, decreased anxiety, with the investigator. Although this performance was not expected, it certainly made sense relative to his long standing relationship with the investigator.

Individual differences were also important in how language influenced Jason's and Andy's perspective-taking performance. For one child (Jason), language enhanced perspective-taking performance and perhap, resulted in higher social-affective relatedness rankings. For the other child (Andy), language diminished and decreased displays of social-cognitive knowledge of others.

Inter-subject Variations

Inter-subject variations were found within the domain of linguistic perspective-taking. Variations were most evident on presuppositional rather than deictic performance. Distinct differences in the children's performance were seen during moderately (re-tellings) and highly (tasks) structured observations. For example, in the presence of the naive listener, three subjects produced some informative utterances while two subjects infrequently made informative comments. Further differences were seen in non-informative language with some children being redundant while others were irrelevant. On the presuppositional task, two children clearly modified language relative to the non-sighted listener while two children made no modifications in language with the non-sighted listener.

Inter-subject variations were also evident on the perceptual perspective-taking tasks. Clear differences were seen in that some of the children demonstrated excellent perceptual perspective-taking performance (David and Andy) in comparison to other children's poor (Jason and Matt) perceptual perspective-taking performance. Similarly, on the perceptual/linguistic perspective-taking task, variations were seen across subjects with two children performing at the highest

level and three children performing at lower, and varying, levels.

In comparing inter-subject variations in perspective-taking performance to other studies on autistic individuals, evidence about autistic children's perceptual perspective-taking performance varies. For example, Dawson and Fernald (1987) found perceptual perspective-taking deficits in autistic children (six-to-fourteen years of age) while Hobson (1984) found excellent visual perspective-taking abilities in older (9.9 - 16.1 years) autistic individuals. In the present study, both excellent and poor perceptual perspective-taking performance was observed.

For other domains of perspective-taking not explored in this study, Baron- Cohen et al. (1985) found that autistic children could not complete a conceptual perspective-taking activity. In comparison to normal and mentally retarded children, the autistic children (with higher mental ages than the retarded control group) could not complete conceptual perspective-taking tasks accurately. The authors hypothesized that the autistic children failed to employ a theory of mind as evidenced by their inability to infer another's (a doll) mental state. Similarly, Dawson and Fernald (1987) observed conceptual role-taking deficits in somewhat younger autistic

children with lower non-verbal mental ages (mean mental age of 5.8 years). Since conceptual domains of perspective-taking were not studied, no comparisons can be made. However, linguistic perspective-taking abilities are integrally related to conceptual perspective-taking abilities. The autistic children's linguistic perspective-taking performance in this study suggests that greater strengths in some dimensions of conceptual perspective-taking may be found in some autistic children.

In terms of affective perspective-taking, Hobson (1986) found that older autistic children (with a mean age of 14.9 years) lacked the ability to experience empathy as reflected by their inability to appreciate emotional expressions of other people. He suggests that autistic children remain "dimly" aware that other people have feelings (p. 339). Thus, aspects of affective perspective-taking were deficient in this population of autistic individuals.

Future research studies should explore variations in perspective-taking performance within and across each domain of role-taking. More careful study of the range and level of skill within each domain needs to be assessed. In the assessment of perspective-taking, particular subgroups of autistic children should be studied who are at varying stages of social, cognitive and linguistic development. Further, researchers must

also take into account the type of inference(s) autistic children are asked to make about another person's perspective or mental state. Level of inference is an important variable that affects children's display of perspective-taking knowledge.

In sum, the intra-subject and inter-subject variations observed in this study occurred in children who were matched on non-verbal mental age and MLU. The individual differences seen within and across subjects were not easily accounted for by variables such as age, non-verbal cognitive ability or MLU. Other variables such as social-affective relatedness and communicative functioning seemed better predictors of perspective-taking performance and more detailed study of these two variables seems warranted.

CHAPTER VI

SUMMARY, CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Summary

The primary objective of this study was to explore autistic children's social-cognitive understanding of other people as reflected in their linguistic and non-linguistic (perceptual) perspective-taking performance. The children's perspective-taking abilities were assessed relative to varying dimensions of the listener, physical-perceptual and linguistic context. Further, the children's perspective-taking skills were explored relative to their overall pragmatic and social-affective performance and other variables such as chronological age, non-verbal mental age and MLU.

In terms of linguistic perspective-taking, the results of this study indicated that the autistic children produced a range of person, object and place deictic categories. Furthermore, all children demonstrated the ability to clearly code non-contrastive and contrastive person deictic forms and non-contrastive object and place deictic forms. The children's deictic performance primarily involved exophora which was what might be expected given the

children's overall linguistic level. However, the children demonstrated anaphoric deictic use (during moderately structured observations) and were able to link their deictic forms to prior adult and child forms. Thus, linguistic contingency was seen in the area of deixis.

The children's communicative deictic performance reflected (a) the children's ability to establish joint attention and reference with a listener (in low and moderately structured observations) and (b) the children's underlying knowledge of speaker/listener perspectives and ability to switch speaker/listener roles relative to changing aspects of the communicative context.

The children's presuppositional skills varied relative to the particular language index being assessed. All children made some modifications in language relative to naive versus knowledgeable listener contexts. Differentiation of listener contexts was seen for some subjects on quantitative (e.g., increased frequency of talk, higher MLUs, etc) and qualitative (e.g., more nouns with the naive than knowledgeable listener, increased specificity of information) aspects of the the children's language.

The children's weakest area of performance involved being under-informative or non-informative when sharing experiences with naive and knowledgeable listeners. It

appeared that the type of inference that the children were asked to make about their listeners affected their perspective-taking performance. Furthermore, the cognitive complexity of the activity (i.e., interaction, and integration, of social, cognitive and linguistic information) seemed to affect each child's display of presuppositional knowledge.

In terms of non-linguistic perspective-taking, the children demonstrated a continuum of skills at taking another person's perceptual viewpoint. This ranged from excellent to minimal visual perspective-taking ability. The children's visual perspective-taking performance did not predict their deictic performance. It did not appear that visual perspective-taking skills predict performance in linguistic perspective-taking areas. Of further interest, when language was introduced into one perceptual perspective-taking task, some of the children's perspective-taking skills were enhanced while other children's perspective-taking skills were diminished.

Modifications in the children's language and non-language behaviors were seen relative to all dimensions of context that were studied--listener, physical-perceptual and linguistic. No subject had the exact same linguistic and non-linguistic perspective-taking profile or rankings across tasks. Thus, each autistic child demonstrated some

modifications in language relative to varying dimensions of of the communicative context. Flexibility and adaptability in the autistic children's linguistic behaviors were observed. In terms of non-language behaviors, the children infrequently used gestures accompanying linguistic deictic forms. However, all the children frequently used gestures (pointing) in the presence of the sighted (knowledgeable) and non-sighted (naive) listeners.

Intra-subject and inter-subject variations were seen in all the children's non-linguistic and linguistic perspective-taking performance. Within this particular subgroup of autistic children, distinct and different patterns of social-cognitive understanding of another person's perspective were seen.

Finally, the children's overall perspective-taking performance seemed to be related to broad dimensions of their communicative functioning and social-affective relatedness. The children's chronological age, non-verbal mental age and language level (based on MLU and sub-tests of the Told-P) did not account for variations in perspective-taking performance.

Conclusions

Several conclusions can be drawn from these autistic children's linguistic and non-linguistic perspective-taking performance. Most importantly, all

the children demonstrated varying degrees of social-cognitive understanding of another person's perspective.

First, the children's linguistic behaviors suggested an awareness and differentiation of self versus other(s) and self with other(s) as well as the ability to take varied conversational roles. Based on the autistic children's deictic performance, it was concluded that they had the ability to establish and maintain joint attention and reference with another person. This finding suggests that not all autistic children exhibit deficits in joint attention and reference as has been hypothesized by several researchers (Loveland & Landry, 1986; Paul, 1987) or changes in the ability to establish and maintain joint attention occur in autistic language development.

In terms of presuppositional performance, varying skills were seen in each autistic child's ability to make inferences about the naive versus knowledgeable listener. All subjects demonstrated some changes in quantitative or qualitative aspects of language relative to the naive versus knowledgeable listener contexts. Thus, demonstrating varying degrees of ability to adapt to another person. Similar to other observations on autistic individuals (Baltaxe, 1977; Paul, 1987), the children's greatest difficulties related to the amount and quality of information shared

with another person. It is hypothesized that autistic children's inferencing abilities are directly related to the explicitness (or implicitness) of listener behaviors that they are asked to judge.

Recently, autistic children have been characterized as not having a "theory of mind" (Baron-Cohen et al., 1985). This rather broad statement needs more careful consideration, and study, in terms of the type and level of inferencing about listener behavior(s) that autistic children are asked to make. Inferences about another's physical or perceptual experiences will be different than inferences about another's mental state. Further, within the area of inferences about another's mental state(s), many different types of inferences need to be assessed in autistic individuals such as inferences about another's intentions, ideas, motivations, feelings, etc.

Second, an appreciation of these autistic children's social-cognitive understanding of other people only emerged because the children's perspective-taking skills were assessed in different domains of perspective-taking and in varying communicative contexts. By comparing non-language and language perspective-taking performance, one gained a sense of the importance of language as an aid or hindrance to displays of perspective-taking knowledge in autism.

Similar to normal developmental literature, the complex relationship(s) between how perspective-taking influences linguistic and communicative development, or how language influences and aids perspective-taking, remain unresolved. However, these data suggest that perspective-taking and linguistic-pragmatic functioning are integrally related. The results of this study also suggest that visual perspective-taking does not appear to be a prerequisite for other types of perspective-taking and the order emergence of domains of perspective-taking is not necessarily perceptual prior to linguistic perspective-taking for autistic children. This finding suppports Tanz' (1980) observation that language may precede, and aid, in children's development of other types of perspective-taking.

Third, the intra-subject and inter-subject variations in perspective-taking performance seen in this study clearly support notions of individual differences in autism. These findings suggest that individual autistic children have varying degrees of social-cognitive knowledge of others. Thus, broad descriptions of autistic children's paucity of social-cognitive knowledge do not capture the complex range of social-cognitive abilites that need to be assessed in autism (such as attachment behaviors, self-recognition, etc.). More distinct classification

systems such as those proposed by Wing and her colleagues (Wing & Attwood, 1987; Wing & Gould, 1979) should be used in describing and comparing particular subgroups of autistic children. Further, these data support observations proposed by Watson et al. (1986) that there are at least two subgroups of autistic children differentiated by some ability and motivation to establish joint or shared reference. The particular autistic children studied here seem to reflect one subgroup of autistic children--namely, those with some motivation to establish joint attention and reference with others.

Fourth, the trends in this study suggest positive relationships between perspective-taking, communicative functioning and social-affective relatedness in autism. These findings are further supported by the research of Dawson and Fernald (1987) where social behavior and severity of autism were correlated to autistic children's perspective-taking skills. Future research should attempt to analyze and quantify what particular communicative and social-cognitive behaviors relate to specific domains, and levels, of perspective-taking in autism.

Implications for Future Research

Perspective-taking and Childhood Egocentrism in Autism

During the last decade, researchers have reported more evidence about normal children's sociocentric capacity based on their communicative and social behaviors (Maratsos, 1973; Rees, 1978; Shatz, 1977, 1983; Shatz & Gelman, 1973). As Shatz (1977) states, "we now have newly found respect for young children's communicative skill, particularly with regard to their ability to orient to, adjust to and respond to others" (p. 1).

A greater appreciation of young normal children's sociocentric skills evolved from analyses of their performance in naturalistic communicative contexts and on perspective-taking tasks appropriately geared to the children's linguistic and cognitive levels (Gelman, 1978; Shatz, 1977). This evidence only emerged when researchers started to carefully explore how cognitive complexity, and integration of social, cognitive and linguistic information, affected children's display of social-cognitive understanding of others (Shatz, 1977).

Similar to the study of social-cognition in normal children, the study of autism has moved to exploration of the social-cognitive domain. Researchers have started to explore autistic children's social-cognitive knowledge of others as reflected in dimensions of their

perspective-taking performance (Baron-Cohen et al., 1985; Hobson, 1984). To date, there is too little evidence to make definitive conclusions about the nature of perspective-taking strengths and weaknesses in autistic individuals.

Perhaps, greater appreciation of individual variations in autistic children's social-cognitive understanding of others will lead to more detailed study of specific aspects of social-cognition as they develop in specific groups of autistic individuals. The study of social-cognition in autism is further complicated by the fact that as autistic children develop, changes in their social-cognitive, linguistic and communicative behaviors are obvious. Autism prior to five years of age is markedly different than autism after five years of age. Thus, stages of social-cognitive and linguistic development must be carefully considered when exploring and comparing the social-cognitive abilities of autistic individuals.

The study of social-cognition is in its infancy in both normal and developmental psychopathologies (Rutter, 1983; Volkmar, 1987). As in normal child language research, the same careful consideration of variables that affect normal children's display of social-cognitive knowledge should be applied to the study of social-cognition in autism. Similar to normal developmental studies, autistic children's emergence

out of egocentric states may be a gradually unfolding process and too much emphasis has been placed on autistic children's apparent egocentrism rather than patterns of emerging sociocentrism.

Appendix A

Social-Affective Relatedness Scale (Burnett, 1988)

Normal ability (1)

Child demonstrates ability to initiate and sustain social and affective relatedness in goal directed behaviors with an adult.

Mildly impaired ability (2)

Child demonstrates some ability to initiate and maintain social and affective relatedness in goal directed behaviors with an adult but mild anxiety is evident.

Moderately impaired ability (3)

Anxiety interferes and interrupts child's ability to initiate and maintain social and affective relatedness in goal directed behaviors with an adult.

Severely impaired ability (4)

Ongoing inability to initiate and maintain social and affective relatedness with an adult. Frequent disturbances in goal directed behaviors.

Very severely impaired ability (5)

Child's social and affective contact with others is marginal and fragmented and is a source of extreme anxiety.

Appendix B

Pool of Toys

Pool of Toys	Manufacturer	Suggested Age by Manufacturer
Play Family Action Garage	Fisher-Price	2-6 years
Popoids Cosmic Creatures	TOMY	3 yrs. up
Universal Building Set	LEGO	3-5 years
Muppet Show/Cabbage Patch Kids Play House	Colorforms	3 yrs. up
Puzzletown	Playskool	3-8 years
Super Powers Playdoh	Kenner	3 yrs. up
A-Team Dolls/Accessories	Fleetwood	5 yrs. up
Movie viewer/cartridges	Fisher-Price	3-10 yrs.
Viewmaster/discs	GAF	3 yrs. up
Happy Valley Airport	ARCO	3-6 yrs.
Busy Streets Town	ARCO	3-6 yrs.
Happy Valley School	ARCO	3-6 yrs.

Appendix C

Specific Descriptions of Perspective-taking Tasks

Perceptual Perspective-taking Tasks

Picture Card Task (Masangkay et al., 1974).

Each child was presented with a series of 8 X 10 inch picture cards. Each card had either different pictures of common objects on each side; identical pictures on each side; and/or one picture on one side and no picture on the other side. This task contained six picture cards which depicted the following stimuli: dog/cat, apple/apple, apple/nothing, duck/duck, bird/nothing and cat/dog.

The child was instructed to hold the picture card between himself/herself and the investigator. The investigator sat opposite the child and the following instructions were given at the beginning of the task: "I'm going to show you some pictures. Sometimes, there are pictures on both sides of the card (shows child one card)." As each card was presented to the child, the investigator asked: "What do you (and/or child's name) see? and What do I (and/or investigator's name) see?"

Each set of cards were presented to the child twice. On the second presentation, the investigator reversed the order of presentation so that child and examiner's pictures were different.

This task tapped the children's ability to make inferences about what another person sees and it has been described as assessing the simplest level of visual perspective-taking skill, Level I (Masangkay et al., 1974). The children had to provide single word responses to the adult's questions.

Turtle Task (Flavell et al., 1968).

Prior to the administration of this task, the children's comprehension of the lexical items right side up and upside down were assessed using a doll. The child was asked to turn the doll right-side up, then upside down.

This task assessed the children's knowledge of the orientation of a single figure. The investigator presented an 8 1/2 X 11 inch cardboard picture with a sideview (in profile) of a turtle. A second card contained a picture of an elephant. The investigator sat opposite the child at a table and the picture was placed on the table between the child and investigator. The child was asked the following questions:

"Does (investigator's name) see the turtle (or elephant) right-side up or upside down?"

"Do you (and/or child's name) see the turtle (or elephant) right-side up or upside down?

Each question was randomly presented twice for each picture. The orientation of the picture was changed after each set of questions. Thus, the child viewed the

turtle (then elephant) in two positions (i.e., upside down and right-side up). A total of eight questions were presented to each child and he/she had to give single word responses.

This task differed from the Picture Card task because the child had to infer how the other person viewed the location of an object in space when the location was opposite from the child's perspective. This task has been described as assessing a more complex level of perspective-taking, Level II (Masangkay et al., 1974).

Perceptual/Linguistic Task

One perspective-taking task involved an overlap between a specific linguistic ability and a specific perceptual perspective-taking ability. In order to differentiate these two domains, an additional task was administered which assessed each child's comprehension of locative forms in non-social (i.e., non-perspective-taking) contexts.

Locative task.

This non-perspective task was a replication of Tanz (1980) design. Tanz assessed normal children's comprehension of the locative forms in front, behind and next to in non-deictic (with fronted objects) and deictic (with non-fronted objects) situations. Fronted objects were defined as objects with clearly intrinsic fronts, backs and sides (car, doll and truck).

Frontless objects were defined as objects without intrinsic fronts, backs and sides (a spool of thread, a bar of soap, and a plastic sphere).

It should be noted that in this task deictic was defined as the child's perception of the location of the non-fronted objects in reference to the child's position in space. In other words, this task could be described as non-social deixis since no other people were involved in the activity.

In terms of presentation, three subjects were given directions with fronted objects first, followed by frontless objects. The remaining two subjects received directions with frontless objects first, followed by fronted objects. The order of the placement of fronted objects, as well as the order of directions, were all randomized. With non-fronted objects, only the investigator's directions were randomized since these objects remained in one position in front of the child.

The investigator was seated next to the child at a small table. Each object was placed in front of the child in the middle of the table. The child was instructed to place a toy block at different positions around each object. The investigator gave the following instructions:

"I'd like you to put the block down in certain places. Listen and I'll tell you where to put it." The child was given one trial before the specific

directions. The directions took the following forms: "Put (investigator hands child block) it (in front, behind, at the side of) the (object)."

Again, all trials were randomly presented. A total of nine directions were given for each object condition. Again, all child responses were socially reinforced.

Turning Task (Fishbein et al., 1972).

This task involved the children manipulating four toy objects which had clearly distinguishable fronts, backs, and sides. The objects used here were a doll, car, truck and horse. Each object was presented one at a time and placed on a revolving tray (i.e., a lazy susan). The child was instructed to turn the tray to different positions.

The investigator sat in different locations around the tray which was placed in the center of a table. The investigator sat next to the child (i.e., taking the same perspective), at a 90 degree angle to the child (i.e., a different perspective), and opposite the child (i.e., an opposite perspective).

The child was instructed to turn the tray to each location (i.e., front, back or side) so that the investigator could see a specified view of the object(s). Thus, the task involved comprehension alone and all child responses were non-linguistic. All locations were randomly presented and the task was

repeated twice. The child received the following instructions:

"Now we are going to play with this moving table (tray). I shall tell you how to turn it. Show me the (location) of the object."

On the second presentation, the investigator elicited productive responses from the child. Thus, the investigator placed the objects in different positions on the tray and asked the child to tell how the investigator viewed the object. The child received the following input: "tell me what I see (front, back or side)." Again, the investigator sat in the same three locations relative to the child (next to, opposite, and at a 90 degree angle). Thus, the only difference in presentation was that the child was asked to give a linguistic response. All items were randomly presented.

It should be noted that on the Turning task the investigator elicited the children's comprehension and production of locatives in both perspective and non-perspective contexts. In other words, when the investigator was seated next to the child both child and investigator's perspectives were the same and these responses could not be counted as assessing the child's ability to infer another's perspective. When the investigator sat opposite (or at an angle from) the child, all child responses involved another's

perspective since adult and child location, and thus perspective, were clearly different. A total of nine trials for each presentation involved perspective-taking skill.

Linguistic Perspective-taking Tasks

Hide and Seek Deictic Task (Tanz, 1980).

One deictic task was administered which involved two separate, but similar, activities. The first part of the task (Part A) assessed the children's comprehension of contrastive deictic pairs and was a replication of Tanz (1980) with some minor modifications (the addition of person deictic forms). The second part of the task (Part B) assessed the production of deictic contrastive pairs and was indirectly based on Tanz (1980) work but involved an adaptation of the comprehension task.

Part A (Comprehension).

The child and investigator were seated opposite each other at a table. The investigator placed two paper cups in front of the child. The investigator explained to the child that they were going to play a game of "Hide the Candy." Next, the investigator told the child to close his/her eyes and she hid a piece of candy under a cup. The child was instructed to open his/her eyes and guess where the candy was hidden. After two trials, the investigator placed two Sesame Street puppets on the table. These puppets (Bert and

Ernie) had moveable mouths. The investigator placed each puppet next to a cup. Each puppet and cup were placed directly in front of the child but there was a discrete distance between them (approximately 6-12 inches apart).

The child was told that the puppets (i.e., Bert and Ernie) would tell the child where to find the candy. Specifically, the investigator stated: "Now, Bert and Ernie will help you find the candy. They will tell you where to look." The investigator demonstrated that when a puppet moved, it talked. Each puppet was manipulated by the investigator separately, and each talked to the child.

Next, the child was instructed to close his/her eyes and the investigator pretended that the puppet hid a piece of candy. The child was instructed to open his/her eyes and one puppet gave a direction to the child. When the investigator manipulated each puppet, the puppets faced each other so they looked as if they were talking to each other. Each puppet alternately gave the child a direction. The following directions were randomly presented (by the puppet):

1. "The candy is under my cup"
2. "The candy is under your cup"
3. "The cup over here has candy under it"
4. "The cup over there has candy under it"
5. "This cup has candy under it"

6. "That cup has candy under it"

The child was required to respond to each direction by picking up one of the cups. Each direction was randomly presented twice so that a total of twelve responses were elicited.

Part B (Production).

After the comprehension task, the child was told that he/she would tell one puppet (whomever the child chose) where to find the candy. In other words, a puppet would hide his eyes while the investigator hid the candy under a cup. In this task only one puppet was used. The puppet was opposite the child and one cup was placed in front of the puppet. A second cup was placed directly opposite the puppet, in front of the child. Thus, the child became more involved in the activity since the task involved the child's cup versus the puppet's cup.

Next, the child's eyes remained open while the investigator hid each piece of candy. The investigator pretended that the puppet had closed his eyes by removing him from the table while she hid the candy. The investigator then made the puppet ask the child the following either/or questions after each piece of candy was hidden:

1. "Is the candy under my cup or your cup?"
2. "Is the candy over here or over there?"
3. "Is the candy under this cup or that cup?"

The child was required to give a verbal response to each either/or question. Non-verbal responses were not accepted and it the child responded non-verbally, the question was repeated and the child was told to give a verbal response. If no verbal response was given on the second trial, the investigator presented the next question. Each question was randomly presented four times and a total of twelve trials were administered to each child. During this task, the child also received all the candy which had been hidden. If a child had a problem attending to this task, he received a piece of candy after each response. If not, he received the candy for all responses at the end of the task.

Presuppositional Truck & Hill Task (Maratsos, 1973).

This task involved a knowledgeable listener, called the sighted-listener condition, and a naive listener, called the non-sighted (or blindfolded) listener condition. Similar to the re-telling activities, a familiar adult was used for the naive listener condition.

This activity was presented twice. First, the investigator completed the activity with the child and subsequently, a naive listener was introduced and the activity was repeated. In both conditions, the listener sat opposite the child. A toy hill and truck were placed in front of the child between the listener

and the child. Several small doll and object figures were placed on the table. The following instructions were given to the child prior to each listener condition. The instructions were identical in both presentations with the addition of one sentence in the non-sighted listener condition. The instructions were as follows:

"We are going to play a game with this truck and hill. I will put some toys in the truck, roll them down the hill and you will catch the truck. (The investigator puts a toy in the truck and rolls it to the child). Now you tell me which toy to put in the truck. In the non-sighted listener condition, the investigator told the child that the listener would close her eyes. The investigator added, now you tell (listener's name) which toy to put in the truck."

Each condition (naive and knowledgeable) was preceded by one practice trial. The child was presented with 12 trials. Each trial consisted of a selected array of toys which contained: different object arrays (e.g., girl/dog); different adjective plus object arrays (e.g., blue airplane/white airplane); and different object and position arrays (e.g., two dogs next to truck/two girls next to truck). The following object arrays were presented:

1. Different object arrays

   dog - boy

chicken - man

lady - cow

girl - horse

2. Different adjective arrays

lady blue dress - lady white dress

yellow car - blue car

yellow horse - white horse

red plane - green plane

3. Different locative arrays

2 cows - 2 horses/ next to & in front truck

2 pigs - 2 horses/ in front & behind truck

2 planes - 2 girls/ behind & next to truck

2 sheep - 2 dogs/ next to & in front truck

Four trials were presented for each array. Each set of object arrays contained different levels of encoding. For example, in the first array, the child only had to name an object. In the second array, the child had to name an attribute of the object. In the third array, the child had to name an object and its location to the truck. Thus, in each array more linguistic specificity was required.

After each array was presented (i.e., 4 trials), the investigator gave the child an opportunity to be the listener and the child received two turns placing toys in the truck following the investigator's directions. This was done to keep the activity as game-like as possible.

In the non-sighted (naive) listener condition, the naive listener covered her eyes (with her hands) only while the child gave each direction. For each trial, the investigator presented an array of objects, the child directed the naive listener, and then the naive listener uncovered her eyes and followed the child's directions.

See Appendix D for scoring procedures for perspective-taking tasks.

Appendix D

Scoring of Perspective-taking Tasks

Perceptual and Perceptual/Linguistic Tasks

Individual tasks.

Each perceptual perspective-taking task was analyzed relative to the child's ability to infer the listener's perspective. This meant that the listener's viewpoint had to be discretely different from the child's viewpoint. If the perspective-taking activity included a portion where the adult and child maintained the same location in space (i.e., the same perspective), these instances were not included in the data analysis. Each child's response on each task was judged as appropriate or inappropriate. These responses could be either non-verbal, verbal, or both. Thus, both comprehension and production tasks were included in each task analysis.

Locative task (Tanz, 1980).

This non-perspective-taking task involved the child's comprehension of locative forms (front, back, and side) in non-social contexts. Appropriate responses to fronted objects were made in relation to the objects intrinsic properties relative to the child's position in space. For non-fronted objects, each child received a correct score if one typical response pattern was followed. Specifically, for in

front a placement on the side of the object nearest to the child; in back would be the position opposite in front; and at the side of would be the remaining two positions. See Tanz (1980) for other possible scoring procedures.

Level of perspective-taking.

Within these tasks, the investigator contrasted the level of perspective-taking skill demonstrated by each child. Based on Flavell's (1977) framework, Level I perceptual tasks (Picture Cards) involve a rudimentary and simpler form of visual perspective-taking than Level II tasks (Turtle and Turning tasks). In Level I tasks, the child described what object another person sees. In Level II tasks the child describes how another person's views an objects position in space.

Linguistic Perspective-Taking Tasks

Deictic (Hide and Seek) task.

The children's responses on the deictic tasks were analyzed according to type of category; comprehension versus production of forms in obligatory contexts; and clear versus unclear usage of forms relative to child-speaker's perspective. Also, deictic forms were analyzed according to proximal versus distal distinctions.

Presuppositional (Truck and Hill) task.

The coding analysis for the presuppositional task involved analyzing the children's ability to explicitly use specific language forms relative to listener knowledge and physical context (i.e., the number of attributes to be encoded within the array of objects). Since it is the modification of behavior relative to listener knowledge which reflects perspective-taking, the children's shifts in non-verbal and/or verbal behavior relative to listener condition were compared.

For each listener condition, the examiner compared differences in each child's non-verbal and/or verbal language relative to the listener's needs. The underlying assumption of this analysis was that a naive listener condition created the need for more explicit (or specific) encoding of language. In contrast, a knowledgeable listener condition presented less communicative demands on the child. Thus, one could expect more variability in language use as well as the use of non-explicit language forms. For each listener condition, the data was analyzed in the same manner. The examiner counted each child's use of (a) non-verbal gestures (e.g., pointing, etc.); (b) object names; (c) adjectives (+ object) and (d) locative form(s) + object.

Again, the appropriate use of these forms varied depending upon the listener condition and the context

(i.e., the specific array of toy items). For Level I array items (see Appendix C), the name of the object was considered an adequate (and/or appropriate) response for both listener conditions. The use of non-verbal gestures were considered adequate for the sighted (or knowledgeable) listener condition but inadequate for the non-sighted (or naive) listener condition. For Level II array items, the child had to encode an explicit attribute. Again, non-verbal gestures were acceptable only for the sighted (knowledgeable) listener condition. For Level III items, the child had to encode the location of the object in relation to the truck as well as name the object. Again, non-verbal gestures were acceptable only for the sighted listener condition. Since none of the children coded the locative arrays, these four trials were eliminated from the analysis. The children performed similarly to normal children (Maratsos, 1974) in that they could not complete the locative array section.

Each adequate encoding was given a score of one (i.e., a non-egocentric response). A total of 8 points in the non-sighted (or naive) listener condition reflected the child's sensitivity to the listener's needs when certain information was not shared. The scores for the sighted listener condition (i.e., knowledgeable) were more variable because the child's

use of non-verbal gestures was acceptable. Differences in scores relative to each listener condition were considered to reflect the child's ability to shift perspective. Each child's use of non-verbal versus verbal responses were coded separately relative to each listener condition.

In addition to adequate versus inadequate codings, an analysis of the children's ability to use specific verbal encodings relative to each context was completed. Similar to the informative analyses described above for re-tellings, the following system was used:

Fully informative utterance	2 points
Partially informative utterance	1 point
Non-informative utterance	0 points

Summary Score for all Perspective Tasks

A scoring procedure was devised to summarize the children's total responses on the perceptual, perceptual/linguistic and linguistic tasks. This procedure was used to evaluate all child responses on all tasks. If the child's response took into account the listener's perspective, the child received a score of 1 (i.e., a sociocentric response). If the child's response was from his/her own perspective, and/or no response was elicited, the child received a score of 0 (i.e., an egocentric response). Similarly, on the presuppositional task, if the child modified verbal

language relative to the listener, a score of 1 was given; if the child did not shift (and/or gave no response), a score of 0 was given.

The total possible score for perceptual tasks was 16 points; 18 points for the perceptual/linguistic task; and 32 points for the language tasks. Each of these total scores indicated optimum sociocentric performance for each domain. Additionally, a total score of the children's sociocentric performance was obtained by combining scores on all tasks. Here, 66 points would indicate optimum sociocentric performance.

Appendix E

Analysis of Formulaic Routines

An analysis of all formulaic child utterances was completed. Subsequently, observations were made of the children's use of deictic forms within formulaic routines versus their use of deictic forms in non-formulaic utterances.

The criteria for identifying formulaic language was based on Peter's (1983) framework. She defined formulaic speech as multi-morphemic phrases or sentences that have became available to the speaker as a single prefabricated item in his or her lexcicon (Peters, 1983). In this analysis, single word routines were also coded as formulaic.

Formulaic utterances could be partially, or totally, fixed in structure. In other words, the child could use a fixed frame in a prefabricated manner; and/or the child could use a fixed frame with the addition of a new (or original) phrase.

Peters (1983) described formulaic speech as:

1. idiosyncratic chunks of language which a child uses repeatedly and in the same form.
2. unrelated to any productive pattern in the child's speech.
3. "somewhat" inappropriate in some of the contexts in which it occurs.

4. being produced fluently, with an unbroken intonational contour and no hesitations.
5. occurring within a well-defined context (i.e., the expression seems situationally dependent for the child).

For this analysis, at least three (usually 1, 4, 5) of these features had to be observed in order to code an utterance as formulaic.

Once an utterance was identified as formulaic, it was further described as to type of formulaic routine. In general, formulaic utterances involved community-wide routines (social routines used by many people) as well as idiosyncratic routines (particular routines used by an individual speaker). The following categories of routines were coded. These categories were adapted from Peters (1983).

1. Social routines
   greetings, leave-taking and polite forms.
2. Context-related routines associated with home, school, or game-playing.
3. Partially fixed frames. These usually involved starter devices (or phrases). These frames could exist alone and/or in conjunction with another segment of an utterance.
4. Songs, t.v. commercials, riddles and other memorized sequences of talk (e.g., pledge of allegiance).

5. Idiosyncratic routines. These utterances seemed to have a pre-fabricated status particular to an individual child. These met the criteria outlined by Peters and were often over-used in a given sample. Idiosyncratic routines were evaluated using Peters definition (above) as well as the frequency of occurrence of a given routine within a sample.
   EXAMPLE: "Mathew go on the bus?"
   (unrelated to context; used repeatedly; same intonational contour)

Context-related and idiosyncratic routines were coded as formulaic if they appeared within the sample a minimum of two or more times. More conventional social routines, or memorized sequences of talk, were categorized as formulaic based on a single occurrence in a sample.

Child utterances which involved a formulaic routine plus a (novel) non-routine utterance (or phrase) were not coded as formulaic. The only exception to this was when a formulaic routine appeared repeatedly in the sample in isolation as well as in combination with a non-routine phrase.

Formulaic routines which involved a child's imitation of an adult-initiated routine (e.g.,"don't be messy") were not analyzed. These occurred rarely in

the data. Thus, only child-initiated formulaic routines were analyzed.

Appendix F

Worksheet for Deictic Analysis

	Person		Object	Place	Presupposed Referent	Location of Referent	Cohesive Ties	Interpretation		Other
	Ind. in C.A.[a]	Other						Clear	Unclear	
1	I				(child)					
2	you				(to adult)					
3		I (Ina)[b]			(for doll)					
4		you (Ina)			(to doll)					
5	we				(general-person)					
6	we				(general-person)					
7		you			(general-person)					
8			one		(doll)					
9			this (cl)[c]		(movie projector)					

[a]Individuals involved in ongoing communicative act versus other(s) not present, or inanimate.

[b]Inanimate others (doll figures).

[c]Close.

	Person		Object	Place	Presupposed Referent	Location of Referent	Cohesive Ties	Interpretation		Other
	Ind. in C.A.	Other						Clear	Unclear	
10			that (far)		(play doh)					
11				there (cl)	(on slide)					
12				here (cl)	(on mat)					
13				there (far)	(on ramp)					
14				here ( )	(general-garage)					
15				here	(indeterm.)					
16			that (cl)		(plane, luggage)					
17	we		this (cl)		(gen. person) (legos)	Ex2[d] Ex1				
18		everybody(Ina)			(to dolls)	Ex2				
19		he (Ina)			Red Baron	Ana[e]	Adult NP,Recode			
20	I	her(Ina)			(child) Ms. Piggy	Ana & Ex2 Ana & Ex2	Adult-NP,Recode Adult-NP,Recode			

[d]Exophora.

[e]Anaphora.

	Person		Object	Place	Presupposed Referent	Location of Referent	Cohesive Ties	Interpretation		Other
	Ind. in C.A.	Other						Clear	Unclear	
21	I				(child)	Ana & Ex2	Adult-Pron, Recode			
22			that (far)		ball	Ana	Adult-NP, Recode			
23		he (Ina)			(girl doll)	Ex1				Lang.(Error) gender
24			that (cl)		(airplane, rope, hook)	Ex2				Ambig.[f]
25		I (Ina)			(for dolls)	Ex2				Ambig.
26		me (Ina)			(for dolls)	Ex1				
		me (Ina)			(for doll)	Ex1				
		me (Ina)			(for doll)	Ex1				
27				here (cl)	(object on floor)	Ex2				
28		I (Ina)			(for doll)	Ex1				

[f]Ambiguous.

	Person		Object	Place	Presupposed Referent	Location of Referent	Cohesive Ties	Interpretation		Other
	Ind. in C.A.	Other						Clear	Unclear	
29	I (?)				(child or adult)	Ana & Ex	Adult-Pron, Repeat			Ambig.
30			these (S/C)[g] (cl)		girls	Non-deictic				Identity
31	I				(child)	Ex2				

[g]Self-correct.

Appendix G

Non-deictic Language Forms

Definitions

Non-nominal language forms that may or may not refer to a particular person, object or place. These linguistic forms were used in a non-deictic manner and occurred in the following ways:

1. to fulfill the structural requirements of an utterance. These forms usually served as subject-place holders within utterances.

   For example, "There's no metal here"

   (Child looks at Mr. T's metal)

   "This one parks"

   (child puts dolls into car)

   Note that this was coded as non-deictic and one was coded as the object deictic form.

2. to identify a (presupposed) referent in the context whereby the referent is explicitly stated within the child's utterance. Forms used to identify (or name) referents served a labelling (or nomination) function rather than a referential function. These forms could have been coded as cataphoric but since they were within an utterance, they were coded as non-deictic. Also, the listener did not have to

search elsewhere to retrieve the referent. These identity statements were generally found within the following types of utterances:

"this/that + (copula) + (adjective) + noun"

"here/there + (copula) + (adjective) + noun"

For example, "that's Batman"

(child looks at playdoh figure)

3. to specify a particular referent in the immediate context. Identity statements also served a specification function.

For example, "here's a yellow car"

(child places colorform piece on board)

Similar to the example above, the listener did not have to search elsewhere to locate the referent.

4. within formulaic routines where the linguistic form was stereotypic and was used to fulfill the structural requirements of the utterance.

For example, "It's time for bed"

(child moves doll figures around)

Coding of non-deictic usage

All non-deictic forms were listed in either person, object or place category relative to form. If a referent was stated, it was coded without parentheses. Non-deictic forms which completed the

structural requirements of utterances, or occurred within formulaic routines, had no referent.

For all non-deictic forms, the investigator coded non-deictic on worksheet (see Appendix F). Also, the type of non-deictic category (such as identity statement, etc) was noted under other. No further analyses were completed on non-deictic forms. It should be noted that the forms this and that could be used in a non-deictic manner to identify an object. Occasionally, these forms also referenced the place of an object. However, all non-deictic forms that simultaneously identified a referent, and a place, were excluded from further analyses.

Appendix H

Additional Coding Procedures For Deixis

Self-repetitions

1. Self-repetitions that involved different presupposed referents within an utterance were each analyzed separately. These self-repetitions did not involve dysfluencies or false-starts. See Appendix F for codings.

EXAMPLE 26 "me me me"

(child picks up one doll, then a second doll, then a third doll)

2. Other self-repetitions of deictic forms were not analyzed. These self-repetitions often occurred at the beginning of an utterance and involved false starts or dysfluencies, etc. Further, these repetitions coded the same referent (unlike example 31 above). In these instances, the examiner only coded the last repetition of the self-repeated deictic form. This last repetition was usually followed by a complete idea, or proposition.

EXAMPLE 27 "here here" (d = close)

(child places object on floor)

Repetitions of adult.

Deictic forms could be imitative of an adult model but refer to a different referent.

Occasionally, a child repeated an adult's deictic form but the presupposed referent was different than the adult's referent. Since these forms involved different referents, they were coded as exophoric reference.

EXAMPLE 28 A: "I'm full"

(adult picks up doll)

C: "I'm full"

(child picks up a different doll)

Occasionally, a child's imitation of the adult's form was ambiguous in that it may or may not have involved the same presupposed referent. In these rare instances, the form was coded as anaphoric + exophoric and ambiguous.

EXAMPLE 29 A: "I think it's a boy"

C: "I think it's a boy"

In sum, imitations of the adult could be clearly, or unclearly, interpreted. In these instances, the examiner had to rely on the non-linguistic context to disambiguate the confusion.

Self-corrections.

Changes or modifications in the use of a deictic form were noted (s/c). However, the examiner only coded the self-corrected deictic form within the utterance.

EXAMPLE 30 "This s/c these are the girls"

Partial utterances.

If the child's utterance was incomplete and contained a deictic element, the deictic form was analyzed.

EXAMPLE 31 "I want the/"

Contractions.

The examiner did not analyze certain contractions (e.g., let's). However, contracted forms which were used in conjunction with a complete deictic form were analyzed (e.g., I'll). In these instances, the examiner only analyzed the I.

Non-deictic forms.

Once a form was coded as non-deictic in function, no further analyses were completed.

Appendix I

Worksheet for Presuppositions

Informative		Partially Informative			Non-Informative			Other		
Non-Imit.[a] + Add	Repeat/Add	Refer.	Unclarity[b]	Elliptical Rs	Ambiguous	Redund.[c]	Unrelated	Topic[d] Expans.	Y/N	Indeter.[e]
1	6	8		10	11, 12	13	14, 15	16		
2		9								
3										
4										
5										
7										
17										

[a]Non-imitative plus add new information.

[b]Referential unclarity.

[c]Redundant

[d]Topic Expansions.

[e]Indeterminate.

Appendix J

Mean Length of Utterance Calculation

Each one hour sample was calculated as to overall mean length of utterance using Chapman's (1981) adaptation of Brown's (1973) rules. MLU's were completed on the first 100 utterances in each one hour sample as well as the total number of utterances in each one hour sample. MLU's were calculated twice. One calculation included all immediate imitative utterances. The second calculation excluded all immediate imitative utterances and single word yes/no responses to adult questions.

Appendix K

Analysis of Immediate Imitations

An analysis of the children's use of immediate imitation was completed on all utterances. The criteria for defining imitation was adapted from Kirschner (1985). Each child utterance was coded as imitative if:

1. it occurred in a natural context (i.e., without child being asked or prompted to repeat).
2. the repetition was a repetition of all or part of a preceding child (i.e., self) or adult utterance.
3. no more than five utterances (from either participant) intervened after the model utterance.

Once imitative utterances were identified, they were further categorized as: (a) exact imitations, (b) reduced imitations, (c) recoded imitations (replacements of form only), and (d) expanded imitations.

The following definitions were used to categorize imitative utterances. These definitions were based on Kirschner's (1985) framework:

1. Exact imitation. Reproduction of all words and morphemes of the child's own or an adult utterance in their modeled order with no changes or additions. Only phonological deviations were allowed.
2. Reduced imitation. Partial repetition with reduction included those utterances where at least one content word from the model utterance was retained but the utterance was reduced in form from the original model.
3. Recoded imitation. Repetition with replacement consisted of those utterances where the syntactic frame of the model utterance was retained but with substitutions for major and minor lexical items in the same syntactic class. This area was further analyzed since it reflected the children's ability to shift forms relative to a prior adult (or child) utterance. Thus, it was a discourse context in which to explore the children's use of cohesive ties with deictic forms.
4. Expanded imitation. Repetition with expansion consisted of utterances which included at least one content word from the model utterance and at least one word, or morpheme, not present in the model utterance.

When a child utterance involved both an imitation of a previous adult, as well as previous child utterance, the imitation was analyzed in relation to the most adjacent imitated model.

Appendix L

Coding of Adult Input and Adjacent Child Utterances

Analysis of Listener's Input/Style

The investigator coded the adult's entire sequence of talk before the child initiated and/or responded to a general, or specific, request for information. Thus, the adult's input was counted in discourse units rather than utterance units. This was done because the adult-listener's often repeated questions consecutively without giving the child any conversational space in which to respond. This pattern of input seemed to be related to some of the children's difficulty in focusing and attending in this context.

Child Responsiveness to Adult Input

1. Child responses to general requests for information. Child utterances that followed the adult's general requests for information were not analyzed in relation to the adult's input. This procedure was followed because the adult's input primarily functioned as a way of engaging the child in conversation. Thus, the function of general requests for information seemed more comment-like rather than question-like in nature.

2. Child responses to specific requests for information. Child utterances in response to specific requests for information were coded as partially

informative since they were taken as evidence that the listener felt the child did not initiate (nor spontaneously share) a complete idea. These elliptical responses were prompted and probably would not have been expressed by the child without the adult's prompting.

3. Child responses to yes/no questions. Child utterances that contained yes/no responses (or comments) alone were not analyzed. Also, yes/no responses which included an imitation of an adult utterance were not coded; although these could be considered to be informative, they did not add any new information about the prior event(s) and thus, they would not enable the listener to understand the child's prior experience.

4. Child responses to requests for clarification. Child utterances that involved response clarifications were coded.

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