ROLE TAKING ABILITY AND SOCIAL INTERACTION COMPETENCE IN MENTAL RETARDATION AND AUTISM

by

Donald P. Oswald

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APPROVED:

Thomas H. Ollendick,
Chairman

David W. Harrison

Constance R. Schmidt

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Thomas H. Ollendick, Chairman

Psychology

(ABSTRACT)

Role taking ability has been examined in many ways including developmental studies with normal subjects and studies which demonstrated role taking deficits in a variety of special populations. Recent data suggest that individuals with autism also show such deficits when compared to non-autistic mentally retarded subjects and normal subjects matched for mental age. These deficits in role taking ability have been proposed as one of the cognitive bases for the social interaction difficulties which are present in all autistic persons.

The purposes of the present study were to demonstrate, for each of three primary dimensions of role taking, the presence of role taking deficits in the autistic, and to determine the extent to which those deficits correlate with measures of social interaction competence. Subjects for the study included a group of autistic children and a matched group of non-autistic mentally retarded children.

Results revealed significant deficits in the autistic group for one of the three role taking dimensions. In addition, that dimension showed significant positive correlations with several of the social interaction measures. Secondary findings suggest the need for a more fine-grained analysis of the nature of social deficits in autism. Implications of these results for the understanding and treatment of the autistic were discussed and future directions for research in the area of autism and social cognition were suggested.

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Introduction

In the course of any interaction with an autistic individual, the characteristic which stands out most clearly is a peculiar interpersonal style which is frequently difficult to operationalize. This has been described by some as a lack of empathy, by others a failure to respond to subtle social cues, and, still by others, as a deficit in the most fundamental of social interaction skills (Kanner, 1943; Ornitz & Ritvo, 1968). This peculiarity exists even when the autistic person is relatively high in cognitive functioning and has been taught to follow normal social interaction formulae.

These observations suggest that there is a more basic ability which underlies normal social interaction and which is somehow deficient in individuals with autism. The social cognitive construct which appears to most clearly fit this deficit is that of role taking, i.e., the ability to infer another's thoughts or feelings when those thoughts or feelings are different from one's own. The purpose of the present study is to examine role taking abilities in autistic persons and to determine the extent to which these abilities or deficits are related to behavioral measures of social interaction competence.

Overview of Autism

Definitions

Descriptions of the syndrome of infantile (or early childhood) autism have evolved considerably since Kanner presented his first summarization of "children whose condition differs so markedly and uniquely from anything reported so far" (1943, p. 217).

In that pioneering work, Kanner noted the following features as characteristic of the syndrome: inability to relate to people and situations, extreme autistic aloneness, failure to assume at any time an anticipatory posture preparatory to being picked up, excellent rote memory, inability to use language for the purpose of communication, delayed echolalia, literal interpretation of language, reversal of personal pronouns, excessive responses to loud noises and moving objects, monotonous repetitions of noises and motions, anxiously obsessive desire for the maintenence of sameness, limitation in the variety of spontaneous activity, inability to experience whole without full attention to constituent parts, good relation to objects, lack of attention and response to people, good cognitive potentialities, and strikingly intelligent physiognomies.

Kanner condensed these observations into a list of eleven essential characteristics:

- an inability to develop relationships with people
- delay in speech acquisition
- non-communicative use of speech after it develops
- delayed echolalia
- pronoun reversal
- repetitive and stereotyped play activities
- an obsessive insistence on the maintenance of sameness
- lack of imagination
- a good rote memory
- a normal physical appearance

Rutter (1978) reconceptualized the syndrome in terms of three primary groups of characteristics:

1. A profound and general failure to develop social relationships with regard to intellectual level;
2. Language retardation, and deviant language development with impaired comprehension, echolalia and pronomial reversal; and

3. Ritualistic or compulsive phenomena; "insistence on sameness."

These, in addition to the criteria of onset before 30 months of age, Rutter suggested as essential characteristics for inclusion in diagnostic samples.

Currently, the definitions employed most frequently in this country are the definitions adopted by the National Society for Children and Adults with Autism (Ritvo and Freeman, 1978) and that proffered in the Diagnostic and Statistical Manual of Mental Disorders -- Third Edition (American Psychiatric Association, 1980). Ritvo and Freeman proposed the following as the essential features of the syndrome:

1. Manifested before 30 months of age;
2. Disturbed developmental rates and sequences;
3. Disturbed responses to sensory stimuli;
4. Disturbed speech, language and cognitive capabilities; and
5. Disturbed capacities to relate to people, events and objects.

DSM-III offered similar diagnostic criteria for Infantile Autism:

1. Onset before 30 months of age;
2. Pervasive lack of responsiveness to other people (autism);
3. Gross deficits in language development;
4. If speech is present, peculiar speech patterns such as immediate and delayed echolalia, metaphorical language, pronomial reversal;
5. Bizarre responses to various aspects of the environment, e.g., resistance to change, peculiar interest in or

attachments to animate or inanimate objects; and

6. Absence of delusions, hallucinations, loosening of associations, and incoherence as in schizophrenia.

One of the commonalities across the various definitions is the characteristic of "disturbed" or "deficient" social interaction ability. This inability to relate to others gave the syndrome its name and remains the most pervasive and crippling handicap of the autistic individual. This observation leads to the question, "What are the cognitive and social features of autism which result in such a characteristic deficit?" It is to these features that we shall now turn.

Cognitive characteristics of autism

A majority of all autistic people are mentally retarded. While there is some variation in the literature in terms of the proportion of individuals with autism in a given IQ range, generally accepted figures indicate that approximately 40 percent have IQs below 50; approximately 30 percent have IQs between 50 and 70; and the remaining 30 percent have IQs above 70 (American Psychiatric Association, 1980). However, the cognitive characteristics of interest which seem to be related to the peculiar social deficits of autism are those that are not found generally in mental retardation without autism. Rutter (1983) proposed that "a cognitive deficit constitutes the core of autism; that it is an integral part of the disorder (and not just something that may or may not be present); and that it is likely to underlie many of the autistic features" (p. 516).

One feature of the cognitive functioning of autistic individuals which has been widely studied is that of "stimulus overselectivity." Lovaas, Schreibman, Koegel, and Rehm (1971) introduced the term to describe the tendency to respond to only part of a relevant cue or to a minor or irrelevant feature of the environment without learning about other relevant features. Lovaas, Koegel, and Schreibman (1979) in a review of the "stimulus overselectivity" literature, concluded that the evi-

dence supports the notion that autistic individuals demonstrate such overselectivity. Thus, discriminations based on multiple attributes tend to be difficult and, in fact, autistic individuals are likely to attend to only one concrete attribute even if discrimination is impossible on the basis of this attribute alone.

Stimuli employed in overselectivity studies range from a red light, white noise, and a pressure cuff (Lovaas et al., 1971) to life-like male and female dolls (Schreibman and Lovaas, 1973). Results, however, have been relatively consistent. In the former study, for example, autistic children responded to only one of the components of the stimulus even if that component was not sufficient for errorless discrimination, while Schreibman and Lovaas (1973) found that the autistic children's discriminations between male and female were frequently based on some irrelevant feature such as the figure's shoes.

In a subsequent review of the literature, Goldstein and Lancy (1984) concluded that the most consistent finding regarding autistic individuals' responses to stimulus configurations is that "autistic children attend to only a limited portion of the configuration and/or to surface (shallow) rather than structural, meaningful (deep) features" (p. 89). This hypothesized lack of attention to relevant stimulus characteristics could account for delayed development of role taking due to failure to notice social cues which provide information about the partner in an interaction.

Other cognitive characteristics have also been implicated. Rimland (1964) has proposed that the primary deficit in autism is the lack of ability to generalize, while Hermelin and O'Connor (1970) concluded that the basic cognitive deficit is the inability to encode stimuli meaningfully. Although differences exist, each of these accounts suggest that the problems of identifying relevant stimuli and attaching appropriate meaning to those stimuli are central to autism. To the extent that these are true for social stimuli, it is easy to see how such a deficit could result in significant social interaction difficulties. As we shall see, the dimensions of role taking to be investigated in the present study appear to be closely related to the ability to attend to, and correctly interpret, social stimuli.

Social characteristics of autism

The definitions of autism cited above provide an indication of the importance of the social deficit in understanding the syndrome. Case studies and narrative accounts abound, giving graphic illustrations of the many ways in which that deficit is manifested. Unfortunately, careful, systematic study of the social characteristics of autism has been less frequently undertaken.

How is it that the social presentation of autistic individuals differs from that of normals or that of persons with other handicapping conditions? Kanner (1943), in an early account, describes one of his cases as follows:

> "There was, on his side, no affective tie to people. He behaved as if people as such did not matter or even exist. It made no difference whether one spoke to him in a friendly or a harsh way. He never looked up at people's faces. When he had any dealings with persons at all, he treated them, or rather parts of them, as if they were objects. He would use a hand to lead him. He would, in playing, butt his head against his mother as at other times he did against a pillow. He allowed his boarding mother's hands to dress him, paying not the slightest attention to her. When with other children, he ignored them and went after their toys" (p. 228).

The theme of confusion of, or peculiar response to, objects and people recurs throughout Kanner's descriptions. In one case, he notes: "While [at her residential placement], she soon learned the names of all the children, knew the color of their eyes, the bed in which each slept, and many other details about them, but never entered into any relationship with them" (p. 240). One fascinating reversal of the typical inability to attribute feelings or thoughts to people is shown in the following attribution of feelings to an object: "He frets when the bread is put in the oven to be made into toast, and is afraid it will be burned and be hurt" (p. 233).

Kanner concludes by stating: "We must, then, assume that these children have come into the world with innate inability to form the usual, biologically provided affective contact with people, just as other children come into the world with innate physical or intellectual handicaps" (p. 250).

Controlled studies of the social behavior of autistic individuals have tended to examine individual components of social interaction. For example, Sherman, Sigman, Ungerer, and Mundy (1984)

found that, compared to normal controls, autistic children were unable to discriminate facial expressions although they could distinguish male and female faces. Such a failure to interpret emotionality may be an important feature in the social deficits of the autistic.

Physical withdrawal from social contact has frequently been described in clinical reports on autistic persons. Howlin (1986), however, concludes that it has been overemphasized. Her review of the literature suggests that the amount of physical avoidance shown by autistic children does not differ from normal controls. Strain and Fox (1981) proposed that the impression of withdrawal may be due to excessive stereotypic behavior rather than actual avoidance of social contact. These data emphasize the importance of objective measures of interaction when examining cognitive and behavioral correlates.

Seibert and Hogan (1981) found that autistic and matched mentally retarded subjects, while similar in frequency of social responses and initiations, differed significantly in their use of "attention getting" strategies. The autistic subjects rarely attempted to share toys or to direct an adult's attention. The authors concluded that the autistic subjects understood how to use people as agents but failed to demonstrate any understanding that the other person had a perspective which could be shared or directed. Such a conclusion provides support for a role taking deficit hypothesis.

If we are to posit a cognitive basis for the syndrome of autism as has been suggested by some authors, a consideration of the social characteristics of individuals with autism must point back to some cognitive feature which underlies effective social interaction. The construct of role taking ability presents itself as a likely candidate for such an underlying feature. Lack of role taking ability is proposed as a partial basis for the autistic person's social and affective deficiencies described so aptly by Kanner.

Overview of Mental Retardation

Definitions

Mental retardation has generally been defined by the presence of deficits in cognitive functioning and adaptive behvavior. The definition found in the Diagnostic and Statistical Manual of Mental Disorders -- Third Edition (American Psychiatric Association, 1980) consists of the following three criteria:

1. Significantly subaverage general intellectual functioning: an IQ of 70 or below on an individually administered IQ test (for infants, since available intelligence tests do not yield numerical values, a clinical judgement of significant subaverage intellectual functioning).

2. Concurrent deficits or impairments in adaptive behavior, taking the person's age into consideration.

3. Onset before the age of 18.

Mental retardation is frequently found in conjunction with other mental disorders such as Stereotyped Movement Disorder, Infantile Autism, or Attention Deficit Disorder with Hyperactivity, with other behavioral concomitants, such as irritability, aggressivity, temper tantrums, or stereotyped movements, and with neurological abnormalities, involving neuromuscular function, vision or hearing, or seizures (American Psychiatric Association, 1980).

Cognitive Characteristics of Mental Retardation

Zigler (1966) suggested that the cognitive style of mentally retarded individuals is characterized by outer-directedness, that is, a focus on "external cues provided either by the stimuli of the problem or other persons in the belief that such attention will provide . . . a guide to action" (p. 104). Zigler indicated that this style is the expected result for individuals, like the mentally retarded, who experience a disproportionate amount of failure and that it may be this style which produces some of the behaviors such as distractibility which are frequently found in the retarded and are thought to inhere in retardation. One might speculate that this outer-directedness, particularly as it is oriented toward people, would be associated with a heightened sensitivity to social stimuli as compared to autistic individuals who tend to be impervious to such stimuli.

Turning to another cognitive skill, the literature on imitation and mental retardation is inconsistent. Glidden and Warner (1982) in a review of the imitation literature found that, of 15 studies which examined the relationship between cognitive-developmental (C-D) level and imitation, five found that as C-D level increased, so too did imitativeness; three studies found that subjects with higher C-D imitated less than those with a lower C-D level; and seven either found no relationship between C-D level and imitativeness or were designed so that no conclusions about the relationship could be established. Similarly, in a review of the literature on long- term memory in mental retardation, Belmont (1966) concluded that the only study not critically flawed by methodological problems found that normal and mentally retarded individuals were equal in long-term memory.

These studies suggest that the cognitive characteristics of mentally retarded individuals are not qualitatively different from normals. The term "developmental delay" appears to accurately describe the cognitive characteristics of mentally retarded persons, and the differences which do exist can be better explained in terms of learning history than pathology *per se*. This conclusion supports the use of non-autistic mentally retarded individuals matched for chronological age and non-verbal IQ as control subjects in the present study.

Social Characteristics of Mental Retardation

Bliss (1985) examined the development of persuasive skills in mentally retarded children. Persuasive skills have been found to be related to role taking ability in normal (Flavell, Botken, Fry, Wright, & Jarvis, 1968) and retarded (Affleck, 1976) children but to be underdeveloped in mentally retarded children as compared to chronological-age matched peers (Herman, 1978, cited in Bliss, 1985). In the context of the task of convincing someone to do something, Bliss examined the subject's ability to anticipate counterarguments and generate appropriate rebuttals. Bliss found that persuasive strategies of mentally retarded children were generally less developed than those of non-retarded children matched for mental age and that changes across increasing mental age groups for the mentally retarded subjects showed an uneven pattern of growth whereas consistent increases were shown for non-retarded subjects.

These data indicate that a developmental lag in role taking ability may be expected in mentally retarded individuals but that relating it to mental age produces inconsistent results. This suggests that chronological age may be an important factor to consider in examining the social cognitive development of the mentally retarded.

Further, an examination of Morrison's (1985) data suggests that in a regular classroom environment, Learning Handicapped (Educable Mentally Handicapped, Learning Disabled, and Behavior Disordered) children are slightly less able to accurately estimate how their peers feel about them. However, in a special class environment surrounded by handicapped peers, the Learning Handicapped children generally appear to be more accurate estimators than non-handicapped children in a regular classroom setting.

These results suggest that social cognitive skills may lag behind other cognitive skills in the mentally retarded and that social cognitive development may not follow the same rates and sequences found in normal subjects. This finding emphasizes the importance of matching mentally retarded subjects

for chronological age. The studies cited above also demonstrate the difficulties encountered when including a normal control group in a study such as the one proposed. The solution adopted by some researchers of using normal subjects matched for mental age is problematic because of the confound of experience due to chronological age, while using normals matched for chronological age is clearly not useful because of the vast discrepancy in cognitive levels. As a result, no attempt was made to include a normal control group in the present study.

Overview of Role taking

Definitions

Role taking has been defined variously throughout the literature, with definitions ranging from a rather general concept to a specific, relatively isolated skill. For instance, Borke (1971) concludes that role taking is the awareness that others have feelings which vary according to the situation whereas Urberg and Docherty (1976) maintain that the critical issue in defining role taking is to determine "to what extent and under what circumstances has this child developed the ability to recognize that others have thoughts, feelings and attitudes different from his or her own" (p. 199). Similarly, Chandler and Greenspan (1972) describe role taking as the ability to anticipate what another feels or thinks when those thoughts or feelings are different from one's own whereas Enright and Lapsley (1980) indicate that it is the cognitive ability to understand another's thoughts or feelings from the other's point of view.

Higgins (1981) proposed a more specific definition and indicated that judgements involve role taking "when there is an inference about a target's viewpoint (or response) under circumstances when the judge's own viewpoint is salient and different from the target's" (p. 133). It is Higgins' expanded

definition which serves as the basis for the present exploration of role taking. The critical features of this definition are:

1. that role taking involves an inference; that is, it is more than recognizing that another has a different perspective; more even than considering what one's own perspective would be if one were in another's situation. It is, rather, inferring what another is thinking or feeling about a situation, recognizing that one may be a part of that situation;

2. that the other's perspective must be salient; that is, failure to recognize another's perspective when that perspective is irrelevant to an accurate interpretation of the situation does not constitute a failure in role taking; and

3. that the other's perspective must be different from one's own; that is, understanding another's perspective when it is identical to one's own does not constitute role taking.

Developmental changes in role taking ability

Role taking has generally been viewed as a developmental phenomenon exhibiting an orderly progression of stages. The stages have been described in a variety of ways depending upon which aspect of the phenomenon has been emphasized. For example, Gore and Keating (1979), in discussing the development of inference, distinguished between role taking which requires only a reading of the situation from role taking which requires psychological inference (i.e. a discrimination and explanation of affective states). Using subjects ranging in age from 3 years, 2 months to 6 years, 0 months, they demonstrated that "inference" role taking is a more advanced skill developmentally. Emphasizing the dimension of recursion or the consideration of multiple elements, Miller, Kessel, and Flavell (1970) suggested a four stage sequence: a) thinking about contiguous people, b) thinking about other's action (talking), c) thinking about other's thinking, and d) thinking about other's

thinking about one's own thinking. It can be seen that this latter stage requires a rather sophisticated cognitive ability.

In a somewhat similar analysis, Selman and Byrne (1974), incorporating the ideas of developing inferential ability and increasing ability to consider multiple elements, suggested four levels of role taking:

1. egocentric role taking -- child is unable to make a distinction between a personal interpretation of his own or others' social actions and what he considers the correct perspective;

2. subjective role taking -- child realizes that people feel or think differently because they are in different situations or have different information, but he cannot judge his own actions from another point of view and he does not understand that persons consider each other as subjects rather than as social objects;

3. self-reflective role taking -- child is aware that people think and feel differently because each person has his own uniquely ordered set of values or purposes, but he cannot consider two or more perspectives at the same time;

4. mutual role taking -- child understands that both the self and the other can consider each party's point of view simultaneously and mutually; each can view a situation from the perspective of a third party who can assume each individual's point of view and consider the relationships involved.

Urberg and Docherty (1976), emphasizing the development of simultaneity in the consideration of multiple elements, identified three stages in the development of role taking: a) no role taking skill, b) sequential decentration (i.e. considering others' and one's own perspectives, one at a time), and c) simultaneous decentration (i.e. considering others' and one's own perspectives simultaneously).

Rather than designating developmental stages *per se*, Higgins (1981) attempted to integrate the literature by identifying three dimensions along which role taking seemed to progress: (1) inference -- an increase in the level of inference and reasoning about psychological characteristics which is involved in the judgement; for example, less inference is reflected in the judgement that a mother is angry at her child for running into the street (because she looks angry) than in the judgement that her anger also includes relief that he was not injured and guilt for not watching him more carefully; (2) interrelating multiple elements -- an increase in the number and relation of mental elements involved in the judgement (i.e., increasing recursiveness in one's inference -- I think about what another is thinking about what I am thinking); an example of the levels of this dimension is the distinction between, on the one hand, realizing that another child wishes he had the toy I am using and, on the other, anticipating that he knows that I realize he wants the toy and so will act uninterested until I leave it unguarded for a moment; and (3) controlling the self -- an increase in ability to prevent one's own viewpoint from interfering with the judgement of another's viewpoint; this ability is illustrated by the child who learns to refrain from confessing some wrongdoing about which his parent clearly knew nothing.

For the purposes of the present study, Higgins' view of the development of role taking will be employed. Within this framework the three dimensions or strands of role taking are seen as continua along which a child moves as he or she develops. The benefit of this view is that it allows the separate examination of the development of the three strands of role taking and the exploration of the correlates of each strand.

Types of role taking

Role taking was once seen as a unitary construct, based on the Piagetian concepts of egocentrism and decentration (Piaget, 1963). Leichtman (1980) still cites evidence for a common cognitive ability underlying communicative, spatial, relational, and cognitive role taking.

The various manifestations of role taking (perceptual, cognitive, and affective) are, however, now generally viewed as separate types if not entirely distinct constructs. Evidence in the literature argues against a single cognitive schema underlying these dimensions (Kurdek, 1979). Sullivan and Hunt (1967) reported that visual perspective taking in seven, nine, and eleven year old boys was found to be unrelated to social perspective taking. Kurdek and Rodgon (1975) found that the intercorrelations among cognitive, affective, and perceptual perspective taking in Kindergarten through sixth grade students were low, nonsignificant, and inconsistent. Rubin (1978), employing preschool through fifth grade subjects, reported low convergent and discriminant validity among six of the most common measures of cognitive and affective role taking.

Further evidence for the existence of different types of role taking is supplied by studies which demonstrate that what has been called perceptual, cognitive, and affective role taking appear at different times in the child's social-cognitive development (Kurdek & Rodgon, 1975), contrary to Piaget's belief that the child abandons egocentrism across dimensions about the age of six (Piaget, 1965). For instance, Borke (1971) reported that children as young as three know that others have feelings and that those feelings vary according to the situation. Similarly, Hoffman (1975) suggested that "the rudiments of role- taking competence may be present in some children by age 2 years or earlier" (p. 622).

At the other end of the spectrum, the level of role taking which considers the social system is thought to be achieved at about age twelve (Selman & Byrne, 1974) and Flavell (1968) presents evidence that for a specific task requiring relatively complex interpersonal inference, only a small proportion of normal eleventh grade participants demonstrate the highest level of role taking ability.

These data suggest that the various assessment procedures for role taking that have evolved over the past number of years, while possessing adequate psychometric qualities (Kurdek, 1977), are measuring different things. Higgins (1981) suggested that correlations across instruments may be low due to the fact that the instruments tap different dimensions of role taking. While all involve inference of some sort, some require primarily interrelating of multiple elements (associated with

the Piagetian concept of decentration) while others require primarily controlling the self (associated with non-egocentrism).

Shantz (1975) described five types of role taking ability that have appeared in the literature employing the questions "What is the other: 1) seeing (visual perspective taking), 2) feeling (affective role taking), 3) thinking (cognitive role taking), 4) intending (moral judgement), and 5) like (person perception). In light of the social and cognitive characteristics of autism and mental retardation, and because we are interested in pursuing the relationship between role taking and social interaction ability, the present study will consider only the second and third questions (i.e. affective and cognitive role taking).

Theories of development

Perhaps the most significant gap in the role taking literature is a systematic exploration of the process by which children develop role taking abilities. Descriptions of developmental stages abound, but the mechanisms by which development occurs remains largely uninvestigated (Shantz, 1975).

In one theoretical formulation, Piaget applied the processes of assimilation and accommodation in espousing the importance of cooperative peer exchange to the development of role taking (Piaget, 1965). Brigdeman (1981) supported Piaget's propositions by demonstrating that role taking could be enhanced by encouraging cooperative interdependence. Burns and Brainerd (1979) reported that participation in constructive or dramatic play sessions produced positive changes in perspective taking ability. These data suggest that role taking develops as a result of the experience of interacting with others.

Several other studies have also demonstrated the importance of environmental factors in the development of role taking. Hollos and Cowan (1973) showed that socially isolated farm children in

Norway differed significantly from village and town children in role taking ability while showing no difference in logical operations, a non-social, cognitive ability. In an extension of this work, Hollos (1975) found that in a broader sample, farm children demonstrated less role taking ability but showed a higher level of logical operations, suggesting that environments conducive to the development of one form of cognitive operation may not be optimal for the development of another operation. These results are relevant to the present study in that they suggest that social cognitive abilities such as role taking may develop independently of other cognitive abilities.

Skills associated with role taking ability

The ability to infer the cognitive or affective perspective of others takes on social value to the extent to which it can be shown to be a component of more complex social skills or abilities. The most widely studied of these is the development of moral judgement (e.g. Kurdek, 1978, 1980; Selman, 1971).

Social behavioral characteristics have also been related to role taking. Rubin and Schneider (1973) demonstrated a relationship between communicative role taking and two measures of altruism, generosity, and helpfulness and Chandler (1973) documented cognitive role taking deficits in chronically delinquent boys. Kurdek (1980) showed that cognitive perspective taking predicted accurately later parent ratings of behavior involving social interaction.

Based on a review of the literature on role taking and popularity, Shantz (1975) suggested that role taking may relate more to positive social interactions with others than to popularity. However, Morrison (1985) reported that those children who were more accurate in their estimate of how their peers felt about them were also more popular. In any event, these data tend to support the hypothesis of role taking as a predictor of social interaction competence.

G. H. Mead (1934) suggested that the ability to take the perspective of another is a fundamental prerequisite for the development of language. In the light of a more contemporary understanding of language, this proposition might be restated to suggest that pragmatics, or the use of language in a situational context, is a function of role taking ability. While Mead's implication that there is a causal relationship between role taking and language does not appear to be established at this time, the relationship between role taking and pragmatic language has received significant empirical support (Affleck, 1976; Bliss, 1985; Chandler, Greenspan & Barenboim, 1974; Loveland, 1984; Shantz, 1975). Further, role taking has been implicated as a prerequisite for effective interpersonal problem solving (Marsh, Serafica, & Barenboim, 1981; Spivack, Platt & Shure, 1976;). Marsh et al. (1981) also reported a positive relationship between affective perspective taking and interpersonal functioning.

In sum, the literature supports the notion that role taking ability is an important element in a broad range of social interaction skills. The present study seeks to determine the extent to which role taking ability, or lack thereof, can be related to the unique social deficits of individuals with autism.

Role taking assessment procedures

Many different procedures for assessing role taking ability appear in the literature (see Rubin, 1978; Shantz, 1975). These procedures can be divided according to the primary dimension of role taking ability which each appears to tap. A further division of procedures relevant to the present study can be made between those which require a verbal response and those which can be conducted without verbal responses from the subject.

One non-verbal measure for each of Higgins' (1981) dimensions was selected from the literature to assess role taking ability in the present study. The selected procedures are related to the three role taking dimensions as shown below:

ROLE TAKING DIMENSION	TASK
INFERENCE	Baron-Cohen, Leslie & Frith (1986) picture sequences
CONTROLLING THE SELF	Baron-Cohen, Leslie & Frith (1985) puppet scene
INTERRELATING MULTIPLE ELEMENTS	Gratch's (1964) penny hiding game

Role taking literature in autism

Recently a uniquely pervasive deficit in role-taking has been reported in individuals with childhood autism (Baron-Cohen, Leslie, & Frith, 1985). In this study, in order to demonstrate role taking ability, the youngsters were required to correctly indicate where the puppet "thinks" an object is hidden even though they know that the object is no longer there. This type of role taking is best described as cognitive in nature, tapping the dimension of "controlling the self". Baron-Cohen et al. reported that autistic children (n = 20) were dramatically less able than MA-matched Down's syndrome (n = 14) and normal controls (n = 27) to respond correctly to this simple "privileged information" scenario requiring the attribution of a belief to the puppet which differs from what the subject knew to be true.

In an associated study, Baron-Cohen, Leslie, and Frith (1986) demonstrated that autistic children, compared to Down's syndrome and normal controls, again displayed a unique deficit in the ability

to impute mental states to others using the Picture Sequence Task. While the autistic subjects performed admirably on the task of arranging pictures to tell a story when it involved the understanding of mechanical or behavioral causation, they were typically unable to do so when called upon to consider the mental state of the protagonist in the stories.

One weakness of these studies appears to be the failure to relate the assessment procedures to previous role taking measures; thus while it is clear that Baron-Cohen et al. have isolated a deficit in individuals with autism which distinguishes them from non-autistic mentally retarded subjects and from normal subjects, the question remains whether this deficit is empirically related to other measures of role taking ability. An additional and perhaps more important question is whether this deficit is empirically related to measures of social competence.

Role Taking Literature in Mental Retardation

Houssiadas and Brown (1967), in a study employing subjects with a mean IQ of 55, concluded that the development of visual perspective taking follows the same broad path of development in the mentally retarded as in normals but occurs much slower. Similarly, Devries (1970) concluded that the developmental order of acquisition of cognitive role taking for mentally retarded children (mean IQ for different age groups ranging from 68 to 75) did not differ from that of normal or bright children.

DeVries used as her measure of role taking ability the Penny Hiding Game originally reported by Gratch (1964). Rubin (1978), using preschool through fifth grade subjects, reported the following correlations between DeVries' procedure and other common measures of role taking, with the effects of chronological age partialed out:

-- Borke's (1971) affective role taking task ($r = .07$)

-- Rothenberg's (1970) affect identification task ($r = .06$)

-- Chandler's (1973) cartoon series (r = -.03)

-- Miller, Kessel and Flavell's (1970) cartoon series (r = .22)

-- Glucksberg and Krauss' (1967) referential communication task (r = .05)

It is significant to note that the only procedure which correlates significantly with DeVries' measure is Miller et al.'s cartoon series, a task which, like DeVries', is most associated with Higgins (1981) dimension of interrelating multiple elements. This lends additional credence to Higgins' position that the various "role taking" measures have assessed quite different skills and to the validity of the dimensions he proposes.

In a one-year follow-up to an earlier study, Blacher-Dixon and Simeonsson (1981) reported that the changes in visual perspective taking in mentally retarded subjects were generally consistent with developmental expectations. Leahy, Balla, and Zigler (1982) report that retarded and non-retarded persons, matched for mental age, showed equivalent role-taking skills. They conclude that this finding supports the cognitive- developmental view that cognitive level is a primary determinant of role taking ability.

In a series of studies, Affleck (1975a,b; 1976) found that role taking in mentally retarded is related to a variety of social competencies. Affleck (1975a) found that role taking ability in mentally retarded individuals (mean IQ of 66) was particularly related to the tendency to recognize the other's feelings and intents during social encounters. Affleck used role plays of conflict situations to simulate social encounters. He suggested that role taking proficiency plays a central role in the interpersonal adequacy of retarded adults.

In a related study, Affleck (1975b) found that role taking ability in mentally retarded children (mean CA of 12.96 years; mean IQ of 66) was related to success in accomplishing a dyadic interpersonal

task and to the establishment and maintenance of a reciprocal exchange strategy which ensured maximum outcome for both participants.

Employing the same population, Affleck (1976) found that role taking ability was associated with interpersonal control tactics. Subjects with higher role taking ability preferred tactics which considered the others' needs, motives, desires, or situational norm expectations while those with low role taking ability did not choose a tactic or relied on a simple request. Blacher-Dixon and Simeonsson (1978) found that with mentally retarded individuals (mean CA of 10-3; mean IQ of 61), as with normal subjects, shared experience positively affected visual perspective taking.

In general, the literature appears to suggest (1) that the development of role taking ability in the mentally retarded follow a similar pattern to that found in normals, and (2) that there are some social behaviors of mentally retarded subjects which are related to role taking ability. These conclusions support the value of studying role taking in handicapped populations and using mentally retarded subjects as controls in the fashion proposed in the present study.

Purpose of the Study

The purposes of the present study were: (1) to seek to replicate and extend the findings of Baron-Cohen et al. (1985) using three role-taking assessment procedures which reflect Higgins' (1981) model of role taking; (Baron-Cohen demonstrated a significantly greater deficit in cognitive role-taking ability in autistic individuals than in non-autistic mentally retarded individuals), and (2) to explore the social validity of the reported role-taking deficits in autistic individuals; that is, the extent to which such deficits as measured by currently available instruments and procedures correlate with the autistic person's lack of competence in social interactions.

Hypotheses

1. Autistic individuals as a group are significantly more deficient in cognitive role-taking abilities than non-autistic, mentally retarded individuals matched for non-verbal I.Q.

2. Autistic individuals demonstrate significantly less social interaction competence than non-autistic, mentally retarded individuals matched for non-verbal I.Q.

3. Measures of role-taking ability will correlate positively with measures of social interaction competence.

4. A measure of the "inference" dimension of role-taking will be more positively related across populations to measures of competence in social interaction than will measures of the other two dimensions.

5. A measure of pragmatic language across all subjects will correlate positively with measures of role taking ability while the relationship between semantic complexity and role taking ability will be non-significant.

Method

Subjects

Subjects for the present study ranged in age from 12 years, 9 months to 17 years, 10 months (X = 15 years, 2 months; SD = 1 year, 6 months). Non-verbal IQs as measured by the Performance

Scale of the Wechsler Intelligence Test for Children - Revised (WISC-R) (Wechsler, 1974) or the (in the case of one subject) Hiskey-Nebraska Test of Learning Aptitude (Hiskey, 1966) ranged from a low of 40 to a high of 88 ($X = 61.1$; $SD = 12.5$). Subjects in the two groups were matched according to chronological age and non-verbal IQ. All subjects were male. (Group means, standard deviations, and t-values for the matching variables are shown in Table 1.)

Primary diagnoses of autism and mental retardation were required for inclusion in the respective groups. Primary diagnoses were obtained from case records. In two cases, where the subjects' primary diagnosis was not documented, the extent to which the potential subject met the diagnostic criteria was evaluated independently by the primary investigator and a second professional in the field of autism. Validation of the diagnostic groupings was provided by obtaining a completed Childhood Autism Rating Scale (CARS) (Schopler, Reichler, Devellis, & Daly, 1980) for each subject. The mean CARS score for the autistic group was 44 with a standard deviation of 3.2 while the mean CARS score for the mentally retarded group was 19 with a standard deviation of 2.7. (Cuttoff scores on the CARS are as follows: less than 30 - Not Autistic; greater than 30 but less than 37 - Mild-Moderately Autistic; greater than 37 - Severely Autistic.) These data indicate that the autistic group showed significantly more of the behavioral characteristics of autism than did the mentally retarded group ($t = 19.82$; $p = .0001$) and that they were in the severely autistic range.

An additional requirement for participation was that the subjects have sufficient receptive language to respond to the test items and situations, as indicated by their ability to follow necessary directions and to produce scorable responses. Each group consisted initially of 12 subjects; however, 2 subjects were dropped from each group due to perseverative responding on the role taking measures, resulting in a final cell size of 10 subjects per diagnostic group.

Table 1. Matching variables

Chronological age in months

	Mean	Standard Deviation	t-value	p
Autistic	183	19.4	.23	.82
Non-autistic	181	17.0		

Non-verbal IQ

	Mean	Standard Deviation	t-value	p
Autistic	61	15.2	.00	1.00
Non-autistic	61	9.7		

Assessment instruments and procedures

Role Taking Measures

Role-taking ability was assessed using the picture sequences and puppet scene employed by Baron-Cohen, Leslie, & Frith (1985, 1986); and the Penny-Hiding Game (Gratch, 1964). These procedures were selected in order to tap Higgin's (1981) three dimensions of role taking, employing a non-verbal response mode for each dimension. A brief description of each of the instruments follows. (See Appendix for specific administration instructions.)

Baron-Cohen et al.'s picture sequences: This task involves fifteen sets of pictures each of which tells a story. There are three picture sets for each of the following five types of stories:

1. Mechanical 1: Objects interacting causally with each other.

2. Mechanical 2: People and objects acting causally on each other.

3. Behavioral 1: A single person acting in everyday routines not requiring attribution of mental states.

4. Behavioral 2: People acting in social routines, involving more than one person, but not requiring attribution of mental states.

5. Intentional: People acting in everyday routines requiring attribution of mental states.

Each set consists of four pictures which are to be arranged in a predetermined sequence to tell a story. The subject is given the first picture and told to make a story by adding the remaining three pictures. For each sequence, the subject is asked to "arrange the pictures so they tell a story that makes sense." The final arrangement is then recorded and subsequently scored according to the following criteria: If the sequence is perfect, the subject is given a score of 2; if the last picture is in the correct position, but the inner two are reversed, the subject receives a score of 1; and, if neither of the above are true, the score for that sequence is 0.

For the purposes of the present study, the only picture sequences of interest were those in the "Intentional" story type, as these were the only sequences which required the subject to make an inference about the characters' mental states. Thus, the subjects' scores on the Picture Sequence task consist of the total score for the three picture sequences depicting "Intentional" stories and can range from 0 to 6.

Gratch's penny hiding game: This task involves asking the subject first to guess in which hand a penny is hidden and then to hide the penny for the experimenter to guess. Gratch (1964) reported that scores on the penny-hiding game followed a clear developmental trend for children between the ages of two and seven. Using Gratch's task, DeVries (1970) reported a similar trend and identified

five levels of role-taking skill ranging from Level One at which the child has no awareness of individual perspective to Level Five which involves irregular shifting of both guessing and hiding.

In DeVries' implementation of this task, the subject's level of role taking ability is scored by considering hiding and guessing behavior, competitive attitude, and affective reactions during the game. Each of ten items on a checklist is scored "passed" or "failed" by the experimenter at the end of the game and the subject's total score consists of the number of items passed. Thus, subjects' scores for this task can range from 0 to 10. Sample items from the checklist include: "Attempts to play when asked to hide", "Has competitive attitude in hiding", and "Uses shifting strategy in guessing."

The administration of this task in the present study was videotaped to allow for a check on rater reliability. Trained undergraduate observers were asked to complete the scoring checklist for one-fourth of the subjects and interrater reliability was computed at .91 (Pearson's correlation coefficient).

Baron-Cohen et al's. puppet scene: In this procedure, the subject is introduced to two puppets, each of which possesses a container. One of the puppets has a marble in her container. Subsequently, the puppet who has the marble leaves the scene, and the remaining puppet takes possession of the marble by transferring it to her own container. The absent puppet returns and the subject is asked where she will look for her marble.

Responses are scored correct or incorrect according to the subject's ability to take on the perspective of the returning puppet who does not know that her marble has been taken as indicated by the subject choosing the container which hid the marble originally. Each subject is thus given a score of 1 or 0 as a result of demonstrating, or failing to demonstrate, this dimension of role taking ability.

All role taking assessment procedures were videotaped and examined subsequently for evidence of response perseveration or attentional neglect. Indications of perseveration include always choosing the same hand in the penny-hiding game or arranging the picture sequence cards in a stereotyped

fashion regardless of the content. Indications of attentional neglect include failing to attend to the sequence pictures in one hemispace (ignoring the pictures to the right or left of center or responding as if they did not exist), and consistently failing to guess or to hide the right or the left hand in the penny-hiding game.

Social interaction measures

Social interaction competence was assessed using the Socialization Domain from the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984), and a subset of items from the Social Performance Survey Schedule (Cautela & Lowe, unpublished manuscript, cited in Lowe & Cautela, 1978). Further, direct observation of peer and adult interaction in an unstructured setting provided additional measures of social competence (Ollendick, 1981).

Vineland Adaptive Behavior Scales (VABS): The VABS constitutes a major revision of the Vineland Social Maturity Scale (Doll, 1965). The subdomains of the socialization domain of the VABS are described as assessing how the individual interacts with others, how the individual plays and uses leisure time, and how the individual demonstrates responsibility and sensitivity to others.

Raw scores for the socialization domain and for each subdomain were used in the present study. Sparrow et al. reported the following psychometric data for the socialization domain: median split-half reliability -- .86; 1-month test- retest reliability using raw scores -- .98; interrater reliability using raw scores -- .96.

Social Performance Survey Schedule (SPSS): The SPSS was developed to provide a comprehensive analysis of social behavior. It includes 100 items, half of which consist of behavioral definitions of "positive" social traits (e.g. "has eye contact when speaking", "asks questions when talking with others", "stands up for his/her rights") and the other half definitions of "negative" social traits (e.g. "makes embarrassing comments", "reacts with more anger than a situation calls for", "takes or uses

things that aren't his/hers without permission"). Initial norms and psychometric data were generated using a population of college students (Lowe & Cautela, 1978).

A subset of 57 SPSS items (28 positive, 29 negative) has been used successfully as a staff rating instrument with a population of mentally retarded adults (Matson, Helsel, Bellack, & Senatore, 1983). The items employed by Matson et al. were chosen by establishing an interrater reliability cutoff figure for items of the full scale ($r = .30$) and including only those items for which reliability was equal to or greater than the cutoff. The present study examined only the 57 items used by Matson et al.

Factor analysis of the Matson scale identified four factors, "Appropriate Social Skills", "Poor Communication Skills", "Inappropriate Assertion", and "Sociopathic Behavior" which consisted of 26, 12, 9, and 10 items respectively. As is suggested by the names, the first factor is made up exclusively of "positive" items while the latter three factors consist primarily of "negative" items (Matson et al. 1983).

Behavioral Observation: Unstructured peer and adult interactions were assessed by videotaping subjects in three, 20-minute free-play sessions. Subjects were observed in small groups consisting of two subjects from the autistic group, two from the mentally retarded group, and two adults. This combination was used in order to standardize, as nearly as possible, the interaction opportunities for each of the subjects. Groups were assembled by dividing subjects into two age brackets, 12-14 years and 15-17 years. Within these age brackets, two subjects were drawn at random from the autistic group and two from the mentally retarded group.

Each of the three sessions consisted of the same group of subjects. Instructions given at the beginning of the session directed the subjects to play in the room however they chose. Adults were instructed to refrain from initiations but to respond as appropriate to subjects' initiations.

The videotaped sessions were scored subsequently by two trained, undergraduate observers who were initially blind to the diagnosis of the subjects. Although scorers were initially unable to identify the diagnoses of the subjects at the conclusion of their task, when told that half of the subjects in each free-play group were autistic and given a brief training session in the characteristics of autism, both scorers were able to identify the autistic subjects with 100 percent accuracy.

The system for scoring the subjects' social interactions was adapted from that described by Ollendick (1981). This procedure involved five-second interval observations which were coded as "interacting with a peer", "interacting with an adult", or "alone". If the subject was interacting with a peer or with a peer and an adult during any portion of the five-second interval, the interval was coded "peer"; if the subject was interacting with an adult only, the interval was coded "adult"; and if the subject interacted with no one throughout the interval the interval was coded "alone."

Each interval was also coded as involving predominantly positive or predominantly negative interaction. Criteria for positive interaction included activities such as participation in a conversation or group game, attending to others who were interacting, and positive verbalizations directed at another. Criteria for negative interactions included aggression, disrupting an interaction or activity, negative verbalizations directed at another, inappropriate use of play materials, self- stimulatory behaviors, and absence of any play activity (e.g. staring into space).

Scorers were trained on the scoring criteria using a sample scoring tape and were required to achieve at least 85 percent interrater reliability before proceeding to score the actual subject tapes. Tapes were coded independently. Interrater reliability (percentage agreement) was computed for approximately 25 percent of all subject sessions. On two occasions, reliability fell below 85 percent at which point the scorers were retrained on the coding criteria and the session was re-coded by both scorers. Final interrater reliability figures averaged 93 percent.

Linguistic measures

Additional measures for all subjects included measures of semantic complexity and pragmatic language level in order to assess the relationship between language level and role taking ability. Level of semantic complexity was assessed using the Type-Token Ratio (TTR) and Mean Length of Utterence (MLU) procedures on a 50-utterance language sample. The TTR provides a language age equivalent based on the total number of words and the number of different words in the sample. The MLU language age equivalent is based on the average number of morphemes per utterance. Pragmatic language level was assessed by the subjects' primary language therapist (n = 10) or the primary investigator (n = 10) using the Test of Pragmatic Skills (Shulman, 1985).

All subjects were assessed using all measures, with the role taking procedures presented in randomized order across subjects. The VABS subscales were completed by the subject's parents whenever possible (n = 9) or by the primary caregiver(s) if the parent's were unavailable or were unable to respond to the questionnaire (n = 11). The SPSS was completed by members of the child's school treatment team.

Results

Unexpectedly, measures of two of the role taking dimensions revealed no significant differences between the autistic and mentally retarded groups. Mean scores on the "inference" dimension (the Picture Sequence task) were virtually identical (autistic: X = 2.5, SD = 2.80; mentally retarded: X = 2.4, SD = 1.84; Related Measures t = .09, p = .93). As a point of reference, Baron-Cohen et al. (1986) reported a mean of 5.19 for a group of normal children ranging in age from three years, six months to five years, eleven months, suggesting deficits in the present subject populations al-

though the deficits are the same for the two clinical groups. The means for the autistic and mentally retarded groups in the Baron-Cohen study were 1.76 and 2.86, respectively.

A chi-square analysis of the results of the Puppet Scene, assessing the "controlling the self" dimension, revealed a non- significant trend in the hypothesized direction (70 percent "failure" in the autistic group, 40 percent "failure" in the mentally retarded group; chi-square = 1.8, df = 1, p = .18). A more conservative estimate of the chi- square which included a continuity adjustment for small ns yielded a probability of .37. Baron-Cohen et al.'s (1986) group of normal controls described above, demonstrated a failure rate of 15 percent; a 14 percent failure rate was found in their mentally retarded group, and an 80 percent failure rate in their autistic group.

The third dimension of role-taking, "interrelating multiple elements" (the Penny Hiding Game), revealed highly significant differences between groups (Related Measures t = 5.91, p = .0002). Group means for this measure (autistic: X = 6.6, SD = 1.71; mentally retarded: X = 9.9, SD = .32) may be compared with DeVries' (1970) sample of average five- to seven-year-olds whose mean score was 8.66.

Results from the social interaction measures supported the hypothesis that the autistic group would demonstrate less social interaction competence than the mentally retarded group, particularly on those measures which tapped positive social skills. Results for the measures of social interaction competence are summarized in Table 2.

Total scores on the Vineland Adaptive Behavior Scale (VABS) tended to be somewhat lower for the autistic group, though not significantly so. Subdomain scores indicated that the autistic group was significantly lower on "Interpersonal Relationships" (VABS-IR) and tended to be lower on "Play and Leisure Time" (VABS-PL). However, the two groups showed virtually no difference on "Coping Skills" (VABS-CS).

Table 2. Social Interaction Competence – Group Differences

Measure	Autistic $\bar{X}$	Autistic SD	Mentally Retarded $\bar{X}$	Mentally Retarded SD	t-value	p
Vineland Adaptive Behavior Scale (VABS)	150.0	29.3	182.5	27.5	2.04	.07
VABS-IR	50.1	11.1	64.3	12.3	2.46	.03
VABS-PL	52.8	14.4	69.6	12.2	2.20	.06
VABS-CS	47.4	9.2	48.6	10.5	.23	.82
Social Performance Survey Schedule (SPSS) Total	117.9	23.5	130.8	19.2	1.75	.11
SPSS-AS Mean Item Score	1.2	.6	2.1	.8	4.07	.003
SPSS-PC Mean Item Score	2.6	.6	2.4	.9	.83	.43
SPSS-IA Mean Item Score	3.1	.7	2.5	.9	2.40	.04
SPSS-SB Mean Item	2.7	.4	2.5	.9	.71	.49
All Interaction						
Peer plus Adult	30.2	28.2	95.0	28.7	5.06	.0007
Adults	13.3	22.3	32.2	36.0	1.31	.22
Peers	16.9	24.5	62.8	54.1	2.01	.07
Activity --						
Positive	66.2	36.8	99.3	28.4	3.15	.01
Peer plus Adult	29.7	27.8	94.8	28.6	5.10	.0006
Adults	13.3	22.1	32.1	36.0	1.32	.22
Peers	16.4	24.1	62.6	54.2	2.08	.06
Alone	36.6	40.4	4.6	6.1	2.45	.03
Activity --						
Negative	53.7	36.8	20.7	28.4	3.14	.01
Peer plus Adult	0.5	1.7	0.2	0.5	.89	.40
Adults	0.0	.1	0.0	0.0	1.00	.34
Peers	0.5	1.7	0.2	0.5	.80	.45
Alone	53.2	37.1	20.4	28.5	3.10	.01

The mentally retarded group scored slightly higher on the Social Performance Survey Schedule -- 57 item scale (SPSS) although the difference was not significant. Factor One, however, on the SPSS, "Appropriate Social Skills" (SPSS-AS), revealed highly significant differences in mean item scores between groups with the mentally retarded group scoring higher as predicted. The only other significant difference was observed on the "Inappropriate Assertion" Factor. Here, unexpectedly, on a subscale for which a higher score indicates fewer negative social behaviors, the autistic group showed a higher mean item score than the mentally retarded group.

Analysis of the behavioral observations during free play indicated, as expected, that the mentally retarded group spent significantly more time than the autistic group in interactions with peers or adults. When the Peer plus Adult interaction intervals were divided into adult interaction and peer interaction, between group differences were not significant although the latter approached significance.

These data also indicate that the mentally retarded group was engaged in positive activity for a significantly greater portion of the period than was the autistic group. Since neither group spent very much of their interaction time in negative activity, the Peer plus Adult, Peer, and Adult positive interaction group differences were parallel to those categories for All Interaction. The autistic group did, however, spend significantly more time in Alone-Positive activity than the Mentally Retarded group.

The autistic group also spent significantly more time in negative activity; since most of this negative activity time was spent alone rather than in interaction, a significant difference also appears when considering only Alone-Negative. Adult- Negative, Peer-Negative, and Peer plus Adult-Negative values were negligible.

The degree of relationship between role taking measures and measures of social interaction competence was investigated for all subjects combined and for the autistic and mentally retarded groups separately. Tables 3 - 5 summarize these results.

Table 3. Intercorrelations – Role Taking and VABS

All Subjects -- r/(p)[1]

	VABS	VABS-IR	VABS-PL	VABS-CS
Picture Sequence Task	.03 (.86)	.07 (.74)	.15 (.52)	.20 (.37)
Puppet Scene	.06 (.79)	.11 (.62)	.12 (.61)	.16 (.49)
Penny Hiding Game	.47 (.04)	.44 (.05)	.60 (.005)	-.06 (.79)

Autistic Subjects -- r/(p)[1]

	VABS	VABS-IR	VABS-PL	VABS-CS
Picture Sequence Task	.08 (.82)	.05 (.88)	.24 (.49)	-.16 (.65)
Puppet Scene	-.21 (.54)	-.32 (.37)	-.23 (.52)	.02 (.96)
Penny Hiding Game	.17 (.63)	.06 (.86)	.45 (.19)	-.26 (.46)

Mentally Retarded Subjects -- r/(p)[1]

	VABS	VABS-IR	VABS-PL	VABS-CS
Picture Sequence Task	.02 (.94)	.19 (.61)	.12 (.74)	-.28 (.42)
Puppet Scene	-.008 (.98)	.16 (.66)	.13 (.71)	-.36 (.31)
Penny Hiding Game	-.24 (.49)	-.25 (.48)	-.16 (.67)	-.18 (.62)

[1]r/(p) = Pearson's correlation coefficient / (probability)

As shown below, scores on the Picture Sequence Task were not significantly related to any of the social interaction competence measures. However, it should be noted that, for the Mentally Re-

Table 4. Intercorrelations – Role Taking and SPSS

All Subjects -- r/(p)[1]

	SPSS	SPSS-AS	SPSS-PC	SPSS-IA	SPSS-SB
Picture Sequence Task	.17 (.48)	.31 (.17)	-.07 (.75)	-.10 (.67)	-.25 (.29)
Puppet Scene	.10 (.68)	.45 (.04)	-.39 (.08)	-.31 (.19)	-.26 (.26)
Penny Hiding Game	.29 (.22)	.52 (.01)	-.25 (.28)	-.28 (.23)	-.08 (.73)

Autistic Subjects -- r/(p)[1]

	SPSS	SPSS-AS	SPSS-PC	SPSS-IA	SPSS-SB
Picture Sequence Task	.31 (.39)	.29 (.40)	.33 (.35)	.07 (.84)	-.06 (.86)
Puppet Scene	.04 (.91)	.24 (.50)	-.27 (.44)	-.22 (.53)	.17 (.63)
Penny Hiding Game	.19 (.62)	.23 (.52)	-.27 (.46)	.14 (.70)	.41 (.23)

Mentally Retarded Subjects -- r/(p)[1]

	SPSS	SPSS-AS	SPSS-PC	SPSS-IA	SPSS-SB
Picture Sequence Task	-.04 (.91)	.55 (.07)	-.48 (.16)	-.38 (.27)	-.47 (.17)
Puppet Scene	-.03 (.93)	.46 (.19)	-.44 (.20)	-.21 (.55)	-.41 (.24)
Penny Hiding Game	-.53 (.11)	.04 (.92)	-.41 (.23)	-.30 (.39)	-.47 (.17)

[1]r/(p) = Pearson's correlation coefficient / (probability)

---

tarded group, three factors of the SPSS, "Appropriate Social Skills", "Poor Communication Skills", and "Sociopathic Behavior", showed relatively strong correlations with this task, correlations which

Table 5. Intercorrelations – Role Taking and Interaction

All Subjects -- r/(p)[1]

	Peers and Adults	Peers	Adults Only	Positive
Picture Sequence Task	-.08 (.95)	.002 (.99)	-.02 (.92)	.08 (.74)
Puppet Scene	.01 (.96)	.07 (.77)	-.08 (.71)	-.10 (.67)
Penny Hiding Game	.69 (.0008)	.31 (.18)	.49 (.03)	.47 (.04)

Autistic Subjects -- r/(p)[1]

	Peers and Adults	Peers	Adults Only	Positive
Picture Sequence Task	.10 (.78)	-.24 (.51)	.39 (.27)	.22 (.54)
Puppet Scene	-.33 (.34)	-.31 (.39)	-.09 (.81)	-.27 (.44)
Penny Hiding Game	.29 (.42)	-.32 (.36)	.72 (.02)	.26 (.47)

Mentally Retarded Subjects -- r/(p)[1]

	Peers and Adults	Peers	Adults Only	Positive
Picture Sequence Task	-.14 (.70)	.19 (.59)	-.40 (.25)	-.14 (.70)
Puppet Scene	-.38 (.27)	-.02 (.96)	-.27 (.44)	-.32 (.37)
Penny Hiding Game	-.26 (.47)	-.34 (.33)	.31 (.38)	-.26 (.48)

[1]r/(p) = Pearson's correlation coefficient / (probability)

failed to achieve significance due to the relatively small n. Furthermore, the relationship was positive for the first factor and negative for the latter two.

Similarly, the Puppet Scene scores yielded only one significant relationship, with the "Appropriate Social Skills" factor of the SPSS for all subjects. As with the Picture Sequence Task, however, the Puppet Scene showed a fairly strong positive relationship with "Appropriate Social Skills" factor of the SPSS and a fairly strong negative relationship with the "Poor Communication Skills" and "Sociopathic Behavior" factors for the Mentally Retarded group.

Performance on the Penny Hiding Game, on the other hand, demonstrated a significant positive relationship with several of the social competence measures for all subjects. Significant relationships were obtained with the total score on the VABS and with scores on the first two factors, "Interpersonal Relationships" and "Play and Leisure Time", although not on the last ("Coping Skills"). The Penny Hiding Game also showed a relatively strong positive relationship (although not significant due to the small n) with "Play and Leisure Time" for the autistic group alone but not for the Mentally Retarded group.

Further, performance on the Penny Hiding Game was positively related to the "Appropriate Social Skills" factor on the SPSS and to three of the four Social Interaction measures: total amount of time spent in interaction, amount of time spent in interaction with adults only, and amount of time spent in positive or productive activity.

When the Penny Hiding Game measure and the social interaction measures were examined within each group, only one significant relationship was discovered. Scores on the Penny Hiding Game in the autistic group were highly related to the amount of time spent in interaction with adults only.

Intercorrelations among role taking measures are shown in Table 6. No significant relationships were found among the role taking measures when all subjects were examined together. However, these relationships presented a different picture when looking at each group separately. For the mentally retarded group, the Picture Sequence Task and the Puppet Scene were significantly correlated and the relationship of each with the Penny Hiding Game was relatively strongly positive, although not significant due to the small n. The autistic group, on the other hand, demonstrated

an unexpected negative relationship between the Picture Sequence Task and the Puppet Scene which approached significance.

Intercorrelations among the social interaction competence measures are presented in Table 7. While VABS total score and its first two subdomains correlated highly with SPSS total and its first factor, the remaining SPSS factors were not significantly related to VABS scores. Further, the behavioral observation measures of interaction appear to be relatively independent of parent- and teacher-report scales. The exception to this was the amount of time spent in positive or productive activity. This particular measure showed a fairly consistent positive relationship with those measures which tapped positive social skills, especially on the Vineland scale.

Contrary to our third hypothesis, the "inference" dimension of role taking was least related (of the role taking measures) to social interaction competence measures (see Tables 3-5). A comparison of the degree of relatedness between the role taking measures and the various measures of social interaction competence showed that the "interrelating multiple elements" dimensions was highly related to social interaction competence, "controlling the self" was somewhat related, although not significantly, and "inference" was generally unrelated.

Relationships between role taking measures and measures of semantic complexity (TTR and MLU) and between role taking measures and a measure of pragmatic language (TOPS) are shown in Table 8.

While the Picture Sequence Task and the Puppet Scene showed no significant relationship with language measures, the Penny Hiding Game conformed to predictions by demonstrating no significant relationship with measures of semantic complexity but a highly significant relationship with a measure of pragmatic language.

Table 6. Intercorrelation Matrix – Role Taking Measures

All Subjects -- r/(p)[1]

	Puppet	Penny
Picture Sequence Task	-.002 (.99)	.16 (.49)
Puppet Scene		.24 (.32)

Autistic Subjects -- r/(p)[1]

	Puppet	Penny
Picture Sequence Task	-.62 (.06)	.32 (.36)
Puppet Scene		-.11 (.77)

Mentally Retarded Subjects -- r/(p)[1]

	Puppet	Penny
Picture Sequence Task	.89 (.0006)	.46 (.18)
Puppet Scene		.41 (.24)

[1]r/(p) = Pearson's correlation coefficient / probability

Discussion

The results of the present study are somewhat equivocal with regard to its primary theses, i.e., that autistic individuals would be uniquely deficient in role taking ability and that that deficit would be related to deficient social interation skills. Although support was garnered for at least one dimension of role taking, that of "interrelating multiple elements", it was not found for Higgins' (1981)

Table 7. Intercorrelation Matrix –Social Interaction Competence Measures

All Subjects -- r/(p)[1]

	SPSS	SPSS-AS	SPSS-PC	SPSS-IA	SPSS-SB
VABS	.57 (.0009)	.54 (.02)	.04 (.84)	-.05 (.83)	.10 (.67)
VABS-IR	.48 (.03)	.73 (.0003)	-.25 (.29)	-.26 (.27)	-.15 (.52)
VABS-PL	.49 (.03)	.53 (.02)	-.01 (.94)	-.07 (.75)	-.002 (.99)
VABS-CS	.43 (.06)	-.07 (.77)	.54 (.02)	.32 (.16)	.55 (.01)

	Peers and Adults	Peers	Adults	Positive
VABS	.34 (.14)	.24 (.30)	.11 (.66)	.43 (.06)
VABS-IR	.39 (.08)	.24 (.31)	.18 (.42)	.54 (.01)
VABS-PL	.42 (.06)	.29 (.20)	.14 (.56)	.49 (.03)
VABS-CS	-.12 (.62)	-.01 (.96)	-.15 (.53)	-.13 (.59)
SPSS	.01 (.95)	.14 (.56)	-.19 (.42)	.31 (.19)
SPSS-AS	.35 (.13)	.18 (.44)	.21 (.38)	.42 (.06)
SPSS-PC	-.26 (.26)	.04 (.86)	-.43 (.06)	-.09 (.70)
SPSS-IA	-.43 (.06)	-.09 (.68)	-.46 (.04)	-.08 (.74)
SPSS-SB	-.24 (.30)	-.10 (.69)	-.19 (.41)	-.16 (.51)

[1]r/(p) = Pearson's correlation coefficient / probability

Table 8. Role taking and Language

All subjects -- r/(p)[1]

	TTR	MLU	TOPS
Picture Sequence	-.29 (.22)	-.05 (.85)	.06 (.77)
Puppet Scene	.25 (.28)	.31 (.19)	.28 (.24)
Penny-hiding Game	.05 (.84)	.16 (.50)	.80 (.0001)

[1]r/(p) = Pearson's correlation coefficient / probability

other two dimensions, "inference" and "controlling the self." Several reasons for these equivocal results need to be examined.

Perhaps one of the most surprising results in the present study was the failure to replicate the Baron-Cohen et al. (1985, 1986) findings, employing the same measures used in those studies to assess the role taking dimensions of "inference" and "controlling the self." The Picture Sequence Task, tapping the "inference" dimension of role taking, failed to suggest even the slightest difference between groups. One explanation for this result is that the mentally retarded subjects in the present sample were simply as deficient in this dimension of role taking as the autistic subjects. The mentally retarded subjects were all students in a residential school for learning and behavior problems and Chandler et al. (1974) demonstrated that such students are more likely than normal peers to be deficient in role taking ability. Such an explanation, however, argues against the "Inference" dimension of role taking as the "unique" cognitive variable which explains the social deficits in autistic individuals.

Other findings tend to cast doubt on the validity of this assessment tool, if not on the underlying construct. The fact that scores on this measure of "inference" demonstrated no significant relationship with any of the measures of social interaction competence suggests either that the social

cognitive construct of "inference" is of little value in predicting such competence or that the present assessment tool, the Picture Sequence Task, fails to measure "inference" ability separately from other cognitive skills. The latter conclusion is suggested by the fact that scores on the Picture Sequence Task correlated highly with non-verbal IQ scores ($r = .62$, $p = .003$). The fact that the task is loaded so heavily with non-social cognitive ability, upon which the groups were matched, renders the present result more understandable.

The second Baron-Cohen task, the Puppet Scene, tended to support the role taking deficit hypothesis for the autistic subjects but the results did not achieve statistical significance. This finding lends some tentative support to the notion that individuals with autism are uniquely deficient in "controlling the self" dimension of role taking.

The impact of this result, however, is diminished by the finding that this dimension appears to show little relationship to most other measures of social interaction competence. Further, the theoretical basis for this dimension would appear to suggest that it should co-vary, more specifically, with the interpersonal communication skills component of social interaction, a conclusion not supported by the present data. In fact, "controlling the self" showed a negative relationship approaching significance with the communication skills factor of the SPSS and a positive but unimpressive relationship with pragmatic language skills.

These results appear to call into question the construct validity of the "controlling the self" dimension of role taking ability. While one can demonstrate that this dimension has some potential for distinguishing between autistic and mentally retarded groups, its failure to relate as predicted to social interaction competence variables suggests that it has limited value in the assessment and treatment of the populations from which the present subjects were drawn.

The third dimension of role taking, "interrelating multiple elements", on the other hand, shows some promise with regard to the primary hypotheses of the present study. These two carefully matched subject groups differed significantly on this dimension, indicating that the deficit may be

specifically related to the presence of the autistic syndrome. Further, significant relationships with social interaction competence variables were found, suggesting that it may be closely tied to the unique social deficits of the autistic. This dimension appears to be particularly related to direct and indirect measures of positive social skills.

This finding is of special interest because, at first glance, it appears to be the least "social" of the dimensions. "Interrelating multiple elements" would appear to be more directly associated with overall cognitive complexity than with specific social cognitive factors.

More careful examination of the dimension, however, suggests that it incorporates, to some degree, the other two and adds a specifically "conscious" element to the process of role taking. In effect, "interrelating multiple elements" demands the activities of "inference" and "controlling the self" plus requiring that they be exercised consciously and recursively. Thinking about what the other is thinking about what I am thinking about requires a level of social cognitive sophistication which is quantitatively, if not qualitatively, different from the other two dimensions. In the present study, it appears that it is this sophistication which is lacking in autistic individuals but present in a matched group on mentally retarded subjects. Likewise, it is this dimension which possesses the concurrent validity of social interaction competence measures.

A deficit in the ability to interrelate multiple cognitive elements may be related to the Lovaas et al. (1979) findings that autistic individuals have difficulty with discriminations based on multiple elements. While that finding was based on visual discrimination tasks, the present results suggest that such a deficit may extend to social cognition as well.

These results indicate a need to explore further the "interrelating multiple elements" dimension of role taking ability. This ability to infer thoughts and feelings in a recursive fashion appears to have excellent potential in the search for social cognitive variables which are associated with social interaction competence.

More importantly for the populations represented in the present study, the results described above have significant implications for clinical intervention. These data suggest a need for further study to determine whether the ability to interrelate multiple elements can be increased through intervention and whether such increases are reflected in social interaction competence.

The present study also produced some secondary findings which could contribute to a better understanding of the syndrome of autism. An examination of the results of several of the measures suggest some interesting possibilities with regard to characteristics which distinguish, or fail to distinguish, between autistic and mentally retarded individuals.

The Vineland subdomains which differed between groups as hypothesized appear to assess ability to participate actively in relationships and ability to engage in social leisure activities. The autistic individuals were, as expected, less adept in these two areas.

The third Vineland subdomain, somewhat misnamed "Coping Skills", appears to tap social abilities having to do with politeness and following simple social conventions. These abilities tend to be relatively concrete; they can be specifically taught and are likely to generalize relatively well across situations. The fact that the autistic and mentally retarded groups did not differ on this dimension supports the notion that it is not a failure in concrete, standard social conventions which cause the autistic individual to stand out as different. Further, these data support the conclusion (Baron-Cohen et al., 1986) that it is not merely the fact of having to deal with people that causes the autistic person difficulty. Rather, the present results suggest that the autistic individual's deficit appears in those skills and activities that involve the more abstract, less rule-governed, interpersonal behaviors required in informal social interaction and in longer-term relationships.

Results on the Social Performance Survey Schedule suggest several other conclusions. Again, the first factor, "Appropriate Social Skills", as predicted, indicated that the autistic group was inferior to the mentally retarded group in the performance of positive social skills. Results on the other

three factors, however, indicated that the autistic individuals also demonstrated fewer or less intensive negative social behaviors.

It must be remembered that the comparison, mentally retarded group consisted of individuals who were more likely identified as having behavior problems than their peers by virtue of their placement at a residential school. Further, it is likely that the negative social (and non-social) behaviors typically exhibited by the autistic were not adequately represented on the scale.

A cautious interpretation of this finding suggests merely that, when dealing with the autistic population, one should not necessarily expect to be confronted with the same kinds of social behavior problems found in non-autistic populations. One might speculate that individuals with autism exhibit fewer negative social behaviors because they engage in fewer total social behaviors. If this is true, it is conceivable that effective intervention which increases the social interaction competence of an autistic person may also result in increased negative social behaviors, eliminating the difference between groups found in this study.

Such an outcome is also suggested by the fact that all dimensions of role taking showed fairly strong negative relationships with the absence of poor communication skills and sociopathic behaviors in the mentally retarded group. In other words, those mentally retarded subjects who scored higher on role taking tasks also showed poorer communication skills and more sociopathic behavior. Although this finding was unexpected, as suggested above, it is possible that improved role taking ability leads to increases in both positive and negative social interaction behaviors.

These speculations suggest a direction for future research, namely, examining the development of social behaviors in the autistic over time. How do the social characteristics of autism evolve across the life span of the individual? How do compensatory behaviors develop in response to social deficits and what impact do such behaviors have on social interaction? The answers to such questions will have implications not only for the treatment of the autistic but also for the understanding of social development in normal individuals.

The fact that the "inference" and "controlling the self" dimensions were positively related in the mentally retarded group and negatively related in the autistic group presents a difficult question. The difference might be viewed as uninterpretable in light of the questions of validity raised regarding the two procedures involved.

On the other hand, we might suggest that one of the peculiarities of role taking in individuals with autism is that these two dimensions do not tend to coexist in the same person -- that autistic persons who demonstrate some level of inference ability find it exceedingly difficult to refrain from assuming that everyone possesses the same information which they possess while those who are able to "control the self" are severely deficient in inference ability.

This formulation, if correct, could provide a better understanding of why the third dimension was clearly deficient in the autistic persons in the present study. If, as suggested above, the interrelating of multiple cognitive elements presumes, and builds upon, the first two dimensions, a severe deficiency in either "inference" or "controlling the self" would tend to undermine "interrelating multiple elements" resulting in lower scores on the latter dimension across all autistic individuals. Such speculation goes beyond the data provided in the present study; it suggests, however, a need to explore further the relationships among the dimensions of role taking as they appear in autistic persons.

The significant relationship, for the autistic group, between scores on the Penny Hiding Game and time spent in interaction with adults only suggests that differences in ability to interrelate multiple cognitive elements are more important in determining an autistic individual's ability to relate to adults than to peers. Such a finding is significant in view of the observation from personal experience that high-functioning autistic persons frequently appear less impaired when interacting with an adult or authority figure than when interacting with a peer; it appears that possessing this dimension of role taking aids significantly in the autistic person's interaction with an adult but contributes little to peer social contacts.

The finding that the Penny Hiding Game is unrelated to measures of semantic complexity but highly positively related to measures of pragmatic language must be examined in light of the results of the complete assessment. On the one hand, this result can be viewed as a support for the theoretical formulation of G. H. Mead (1934), suggesting that role taking ability is, indeed, related to functional communication ability. The present data, however, do not imply causality as Mead proposed, that is that role taking ability is necessary for, and leads to, the beginning of functional communication; nonetheless, the two phenomena appear to co-vary to a significant degree.

Limitations of the study

One limitation apparent in the present study is the number of subjects. The primary effect of a relatively small sample size is to call into question the generalizability of the findings. Such a problem is somewhat predictable when studying a relatively low-incidence disorder such as autism but the issue of generalizabilty of the present results persists.

A second limitation reflects the current state of our knowledge. It is the opinion of the primary investigator that we do not yet have tools that are sensitive enough to fully describe the social competence deficits which autistic persons display. Until such tools are devised, we shall not be able to adequately explore the social cognitive correlates of those behavior deficits.

Finally, the multiple t-tests and correlation coefficients reported raise a concern about the experiment-wise error rate. Considering the 22 t-tests reported in Table 2, for example, yields an experiment-wise error rate of $p = .69$.

Conclusion

A broad view of the all of the findings reported above suggests a cautious conclusion. These data indicate that teacher- and parent-report inventories of social interaction skills and behavior samples of pragmatic language and social interaction confirm what the diagnostic criteria for autism have specified, namely, that autistic individuals tend to have greater deficits in these areas as compared to non-autistic peers.

The contribution of the present study, then, is that a cognitive role taking variable, the interrelating of multiple cognitive elements, is shown to be deficient in the autistic. Further, the data show that this cognitive variable tends to co- vary with social interaction competence and other behavioral characteristics of the autistic syndrome. Further investigation of this and other cognitive variables is indicated to examine the role of social cognition in the development of those skills which autistic persons lack.

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Appendix: Role taking measures: instructions

Puppet Scene -- Instructions

1. Place two puppets, two cups, and one marble on the table.

2. Put puppets on hands: "I want you to meet two friends of mine. This is Sally and this is Bill."

3. Have puppets shake hands with child saying, "Hi, my name is _____."

4. Ask child: "Now what is this one's name? Good. And what is this one's name? Very good." (Naming Question: correct on first try = C; incorrect on first try = I.)

   If child gets names wrong, correct him and then ask him again until he has the names correct.

5. Have Sally take the marble and put it under her cup. Then have Sally disappear under the table.

6. Have Bill remove the marble from Sally's cup and put it under his own cup.

7. Bring Sally back and ask the child: "Where will Sally look for her marble?" (Belief Question: Sally's cup = C; Bill's cup = I.) A gesture or point is sufficient.

8. Conclude with final questions: "Where is the marble really?" (Reality Question: Bill's cup = C; Sally's cup = I.) "Where was the marble in the beginning?" (Memory Question: Sally's cup = C; Bill's cup = I.)

Picture Sequence -- Instructions

1. Place frame in front of subject, numbers facing the subject.

2. Arrange the picture set above the frame, with the numbers on the backs of the cards in order (1 to 4) from the subject's left to right. The letters will be scrambled.

3. Take the first picture from the set (corresponding to the first letter of the word for that set) and place it in position '1' in the frame.

4. Say to the subject: "This is the first picture. Look at the other pictures, and see if you can make a story with them." If the subject does not respond immediately, name all the objects in the first picture and then say "Which is the next picture?" Allow the subject to order the pictures in the frame and make any corrections he chooses.

5. When the child is obviously finished, say to the subject, "Tell me the story." If the subject does not proceed, begin with the card on the left and say "What's happening here?" Point to each card in turn with the same prompt if needed. Finally, record the sequence of letters on the back of the cards from the subject's left to right.

6. Continue with the other sets in order until finished.

Penny Hiding Game -- Instructions

1. For the first six trials, hide a penny in each hand, and tell the subject: "Guess which hand the penny is in."

2. For the next four trials, hide a penny in neither hand, and for the last trial, hide a penny in each hand. Use the same direction each time.

3. Tell the subject, "Now it's your turn; you hide the penny." Each time, for six trials, try to guess the wrong hand.

4. Score the subject pass/fail on each of the ten items on the score sheet.

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