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Nonverbal Communication in Two- and Three-Year-Old Children with Autism[1]

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The forms, functions, and complexity of nonverbal communication used by very young children with autism were investigated. Fourteen children with autism were matched to 14 children with developmental delays and/or language impairments on the basis of CA, MA, and expressive vocabulary. Subjects participated in a structured communication assessment consisting of 16 situations designed to elicit requesting or commenting behavior. Children with autism requested more often and commented less often than controls. Autistic children were less likely to point, show objects, or use eye gaze to communicate, but were more likely to directly manipulate the examiner's hand. The autistic group also used less complex combinations of behaviors to communicate. Implications for early identification and intervention are discussed.

Within the first year of life, typically developing infants learn to communicate nonverbally through behaviors such as eye gaze, vocalizations, and prelinguistic gestures (Trevarthen & Hubley, 1978). These behaviors serve a number of important developmental functions: They enable infants to convey their affective experiences; they serve to establish and maintain social

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interactions; and they provide a means of expressing their needs and desires (Adamson & Bakeman, 1985; Bates, Camaioni, & Volterra, 1975; Bretherton & Bates, 1979). With development, nonverbal communication becomes more varied and complex. For example, infants show increases in the rate of their communication, their ability to communicate for more reasons, and their ability to coordinate gestures with sounds during communicative acts (Wetherby, Cain, Yonclas, & Walker, 1988).

Children with autism typically demonstrate a disordered pattern of communication development that includes deficits in the use and understanding of nonverbal forms of communication (American Psychiatric Association [APA], 1994). Previous research comparing groups of autistic children to developmentally matched controls has revealed that autistic children communicate for different reasons and use different nonverbal behaviors to communicate. For example, although they exhibit similar rates of communication for the purpose of requesting objects or actions, children with autism communicate less often for the purpose of establishing joint attention, or commenting (i.e., directing another person's attention toward an object or event to indicate interest) (McEvoy, Rogers, & Pennington, 1993; Mundy, Sigman, & Kasari, 1990; Mundy, Sigman, Ungerer, & Sherman, 1986; Wetherby & Prutting, 1984; Wetherby, Yonclas, & Bryan, 1989). The significance of this finding is highlighted by recent theories suggesting that the ability to direct attention in order to indicate interest is a precursor to the development of a "theory of mind" (Baron-Cohen, 1993).

Children with autism also have been found to demonstrate a limited range of nonverbal behaviors. In particular, less frequent use of eye contact, pointing, and showing objects has been reported (Baron-Cohen, 1989; Curcio, 1978; Landry & Loveland, 1989; Mundy, Sigman, & Kasari, 1994; Sigman, Mundy, Sherman, & Ungerer, 1986). Moreover, the use of certain nonverbal behaviors appears to be associated with specific communicative functions (Stone & Caro-Martinez, 1990). For example, autistic children have been reported to be more likely to use pointing for the purpose of requesting than for indicating interest (Baron-Cohen, 1989; Curcio, 1978). Likewise, Mundy et al. (1986) found that autistic children and matched controls used similar rates of eye contact while requesting, but the autistic group was less likely than the control group to use eye contact to coordinate attention between an adult and a toy.

Finally, there is some evidence that autistic children use less complex combinations of nonverbal behaviors to communicate. Wetherby et al. (1989) found that the communicative acts of children with autism involved a higher proportion of isolated gestural acts and a lower proportion of gestures combined with vocalizations relative to typically developing prelinguistic children. The ability to coordinate gestures with vocalizations increases with age in typically developing

children (Wetherby et al., 1988). This aspect of communication can have important social implications. Specifically, the ability to coordinate multiple nonverbal cues within communicative acts has been shown to increase the salience and interpretability of the communication, as well as increase the probability of maternal responsiveness to the communication (Yoder, Warren, & Kim, 1996; Yoder, Warren, Kim, & Gazdag, 1994). For this reason, the level of complexity of communicative acts in children with autism warrants further study.

The research cited above has been very helpful in identifying specific deficits in the use of nonverbal behaviors by children with autism. However, the mean ages of the children participating in these studies ranged from approximately 4 years to 8 years. Little is known about the communication of autistic children within the 2- to 3-year age range. The importance of studying such a young population lies in its potential impact on early identification as well as intervention. The study of very young children can serve not only to enhance our understanding of the social and communicative deficits of autism but also to guide our efforts to provide more accurate early diagnosis and to design more specific and effective social-communication interventions.

In addition, previous research with older children focused almost exclusively on their use of conventional forms of communication. As a result, we learned a great deal about the communication *deficits* of children with autism but we gained less understanding of how these children actually *do* communicate their needs and desires. By studying less conventional forms of communication, we may acquire more insight into the ways that autistic children have learned to communicate effectively.

The purpose of the present study was to extend previous research by examining the forms, functions, and complexity of nonverbal communication used by very young children with autism. A structured communication assessment was used to determine whether young children with autism, relative to matched controls, (a) demonstrate different patterns of requesting and commenting,[3] (b) use different forms of nonverbal behaviors to communicate, and (c) use less complex combinations of nonverbal behaviors during their communicative acts.

[3]Although the terms "joint attention" and "commenting" have both been used to refer to communicative behaviors that involve the direction of another person's attention to an object or event, we have chosen to use the term "commenting" because the manner in which it has been conceptualized and operationalized is more consistent with the nature of this research. Joint attention has been used most often in the autism literature to refer to a specific set of behaviors defined by their form (e.g., pointing, showing objects) as well as their function (i.e., directing attention) (e.g., Mundy et al., 1990). In contrast, commenting has been used primarily to refer to a specific communicative function (Wetherby et al., 1988). Although certain communicative forms may be used more frequently than others to express this function, the presence of commenting is defined independently from the forms used. Because the intent of the present study is to examine communicative forms and functions separately, the term "commenting" appears to reflect our objectives more precisely.

METHOD

Subjects

Fourteen children with autism and 14 children with developmental delay and/or language impairment (DD/LI) were included. Children were recruited from a regional multidisciplinary evaluation center and from local developmental preschools during the period of 1991–1994. Informed consent was obtained from parents prior to participation. All children were younger than $3\frac{1}{2}$ years old. The diagnosis of autism was made by a licensed psychologist on the basis of DSM-III-R or DSM-IV criteria (APA, 1987, 1994) requiring the presence of social deficits, communication impairments, and restricted activities or interests. All children in the autistic group also obtained scores within the autistic range (M = 35.9, SD = 3.7, range = 30.5–42.5) on the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988). The DD/LI group consisted of 5 children with developmental delays and 9 children with language impairment and developmental delays. The diagnosis of language impairment was made by a licensed speech-language pathologist. One child in the DD/LI group had Down syndrome, and the etiology for the other children in this group was unknown.

Children in the DD/LI group were individually matched to the autistic sample on the basis of chronological age (within 5 months), mental age (within 4 months), and expressive vocabulary (within 15 words). Mental age was assessed using the Mental Scale from the original Bayley Scales of Infant Development (Bayley, 1969) or the Second Edition of the Bayley Scales of Infant Development (Psychological Corporation, 1993). For the purpose of group comparisons, a developmental quotient was obtained using the following formula: (MA/CA) × 100. Expressive vocabulary was measured using the MacArthur Communicative Development Inventories (Fenson et al., 1993). On this instrument parents are presented with a vocabulary list and asked to indicate which words the child uses. One-way ANOVAs revealed no significant group differences for chronological age, mental age, developmental quotient, or expressive vocabulary (Table I). Chi-square analyses revealed that the groups were also comparable on the characteristics of race, gender, and maternal level of education.

Procedure

Nonverbal communication was assessed using the Prelinguistic Communication Assessment (PCA). The PCA was developed specifically for use with very young children with autism, and consists of 16 situations designed to elicit either requesting behavior or commenting behavior. Some of the situations were

Table I. Subject Characteristics

	Autistic	DD/LI
Chronological age (months)		
M (*SD*)	32.8 (3.5)	31.8 (4.4)
Range	27–38	25–39
Mental age (months)		
M (*SD*)	17.0 (1.8)	17.9 (2.9)
Range	14.5–21	13–22
Number of words		
M (*SD*)	8.4 (8.1)	11.4 (9.2)
Range	0–24	2–33
Developmental quotient		
M (*SD*)	52.6 (8.9)	57.2 (11.0)
Range	37.7–77.8	35.5–80.8

derived from those described by Wetherby et al. (1988) and McLean, McLean, Brady, and Etter (1991) and others were developed on the basis of clinical experience. Compared to existing measures of nonverbal communication (e.g., the Early Social-Communication Scales [Seibert, Hogan, & Mundy, 1982], the Communication and Symbolic Behavior Scales [Wetherby & Prizant, 1990]), the PCA was developed to offer a wider variety of situations for eliciting commenting, and a standard set of instructions for providing specific prompts.

Eight situations afforded the opportunity for the child to direct the adult's attention to an unusual or interesting event (i.e., comment). The commenting situations were having a slinky drop from the ceiling; having a noisemaker sound unexpectedly; having a balloon fly across the room as it deflates; having a remote control car suddenly roll across the floor; "accidentally" spilling a cup of juice; having the examiner wear an unusual object (i.e., a fish glove) on her hand; giving the child a bag containing several toys; and showing the child a picture book. The other eight situations were designed to elicit requesting: giving the child a clear jar containing crackers with the lid screwed tightly; giving the child a closed jar of soap bubbles after blowing some bubbles; withholding a koosh ball after a brief game of catch; playing a tickle game with a puppet and then holding the puppet out of reach; giving the child a small amount of juice and then placing the juice container out of reach; hitting a balloon back and forth with the child and then holding it out of the child's reach; playing a swinging game and then pausing; and operating a wind-up toy and then handing it to the child when it stopped.

To standardize the administration of the PCA across examiners, a protocol consisting of explicit directions for each task was developed. The protocol provided the specific verbal instructions that accompanied the presentation of each situation and also specified two levels of prompts to be used if the child did not respond spontaneously. The first level employed verbal prompts (e.g., asking "What do you see?") and the second level employed verbal prompts in conjunction with nonverbal cues (e.g., asking "What do you see?" while looking back and forth between the child and the object).

The PCA sessions were videotaped and 100% of the data were coded independently by three graduate students who received extensive training. A three-step coding procedure was used. The first step involved determining whether a communicative act occurred, using Wetherby et al.'s (1989) definition of intentional communication. This definition requires evidence of a child directing a motoric and/or vocal act toward the adult and awaiting a response. Only those communicative acts that were identified by at least two of the three raters were included in subsequent analyses.

The second step involved identifying which function the communication served. Three primary categories of communicative functions were coded: Requesting, Commenting, and Rejecting. (Although the situations were designed to elicit requesting or commenting, pilot work revealed that rejecting occurred with sufficient frequency to warrant inclusion in the coding system.) An Other category was also included for functions that were unclear or that did not fit into one of these three categories. The function categories were mutually exclusive. Definitions for these categories were derived from those described by Wetherby et al. (1989) (see Table II for definitions and examples).

The third step was to identify the forms of communication used during the communicative act. Seven mutually exclusive categories of communicative gestures were of primary interest: Give Objects, Show Objects, Touch Objects, Manipulate the Examiner's Hand, Reach, Contact Point, and Distal Point. Gestures not fitting into these categories constituted an Other category for the purpose of the present study. In addition to communicative gestures, two additional form categories were coded: Vocalization and Eye Gaze toward the examiner. The last two categories were not mutually exclusive and could be coded independently or in combination with any of the gesture categories (see Table II). The purpose of this three-step process was to ensure that communicative functions and communicative forms were coded as independent dimensions.

Table II. Abbreviated Definitions and Examples for Coding Categories

Category	Definition	Example
	Communicative functions	
Request	Acts used to obtain a desired object, command an action, or continue a social routine	Reaching toward the juice container to indicate "more juice"
Comment	Acts used to direct the examiner's attention to an object or event	Pointing to a slinky that has dropped from the ceiling
Reject	Acts used to refuse an object, protest an action, or discontinue a social routine	Giving the koosh ball back to the examiner instead of playing catch
	Communicative forms	
Manipulate hand	Child physically guides examiner's hand to perform a desired action	Placing the examiner's hand on the lid of a food container to indicate "more food"
Give object	Child places object in examiner's hand or pushes object toward examiner (at least halfway between him/herself and examiner)	Handing the examiner a wind-up toy which has deactivated
Contact point	Child touches object with extended index finger	Touching pictures in a book
Show object	Child extends arm in the direction of the examiner's face while holding object	Holding a colorful wand in front of examiner's eyes
Touch object	Child holds or touches object in a manner not consistent with giving, showing, or contact pointing	Holding an empty cup while looking at the juice container and vocalizing
Reach	Child extends arm and hand toward a desired object	Extending an arm toward the balloon during a game of catch
Distal point	Child extends arm, with index finger extended, in the direction of an out-of-reach object or event	Pointing toward a remote control car which has suddenly activated
Eye gaze	Child directs his/her visual attention in the direction of the examiner's face	Looking at the examiner while reaching toward bubbles
Vocalization	Child produces a verbal utterance involving sounds, babbling, jargon, single words, or phrases	Saying "Da" while taking a toy dog out of a bag

A total of 626 communicative acts were identified independently by at least two raters, and were included in subsequent analyses. This number represents 59% of the total acts that were coded as communicative by each of the three raters. Interobserver agreement for each coding category was calculated for the 626 acts using Cohen's kappa. Because several of the coding categories were observed at low frequencies, kappas were collapsed across subjects. Average kappas for the function categories ranged from .74–.84 (M = .80), and average kappas for the form categories ranged from .62–.77 (M = .71), indicating good to excellent reliability (Cicchetti & Sparrow, 1981).

RESULTS

Preliminary Analyses

One-way ANOVAs revealed that the duration of the PCA did not differ between the two groups of subjects, $F(1, 27) = 1.34$, ns. The mean duration was 28.4 minutes (SD = 4.7) for the autistic group and 26.3 minutes (SD = 5.0) for the DD/LI group. Initial analyses revealed that the average number of unprompted communicative acts was significantly lower for the autistic group (M = 7.9, SD = 4.3. range = 1–15) than for the DD/LI group (M = 20.3, SD = 11.4, range = 1–40), $F(1, 27) = 14.5$, $p < .001$. Because of the low frequency of unprompted communicative acts in the autistic group, the decision was made to include both prompted and unprompted acts for subsequent analyses. This decision was supported by the finding that the proportion of prompted communicative acts did not differ between the two groups; the mean proportion of prompted acts was .46 (SD = .28) for the autistic group and .32 (SD = .18) for the DD/LI group, $F(1, 27) = 2.4$, ns.

The average number of communicative acts (including prompted and unprompted acts) was significantly lower for the autistic group (M = 16.7, SD = 8.9, range = 3–31) than for the DD/LI group (M = 28.0, SD = 12.2, range = 4–45), $F(1, 27) = 7.8$, $p < .01$. Likewise, the average rate of communication (i.e., number of acts per minute) was significantly lower for the autistic group (M = 0.60, SD = 0.34, range = 0.12–1.20) than the DD/LI group (M = 1.09, SD = 0.51, range = 0.17–1.79), $F(1, 27) = 9.1$, $p < .01$. The rate of about one communicative act per minute in the DD/LI group is comparable to that reported by Wetherby et al. (1988) and Wetherby and Rodriguez (1992) for their samples of typically developing children communicating at a prelinguistic level.

Table III. Mean Rates of Occurrence per Minute for Communicative Functions and Forms

	Autistic		DD/LI	
	M	*SD*	*M*	*SD*
		Functions		
Request	.49	.27	.61	.31
Comment[c]	.04	.05	.38	.32
Reject	.07	.13	.07	.12
		Forms		
Manipulate hand[a]	.07	.08	.01	.02
Give object	.13	.11	.15	.10
Contact point[b]	.01	.02	.05	.06
Show object[b]	.00	.00	.03	.25
Touch object	.05	.04	.12	.11
Reach[a]	.20	.13	.39	.25
Distal point[b]	.01	.04	.16	.15
Eye gaze[c]	.11	.07	.44	.27
Vocalization[b]	.39	.32	.85	.52

[a] $p < .05$ using Kruskal-Wallis tests.
[b] $p < .01$ using Kruskal-Wallis tests.
[c] $p < .001$ using Kruskal-Wallis tests.

The rates of occurrence for each form and function are presented in Table III. However, because the total amount of communication differed between the two groups, group differences for rate data might reflect this disparity. Therefore, the unit of comparison for most of the subsequent analyses was proportion of total communicative acts. In addition, comparisons were made between the number of subjects in each group evidencing at least one instance of specific target behaviors. Nonparametric statistics were used to examine group differences because the nature of many of the data violated the homogeneity of variance assumption.

Communicative Functions

Kruskal-Wallis tests revealed that the autistic group used a significantly higher proportion of acts involving requesting, $\chi^2(1, N = 28) = 6.8, p < .01$, and a significantly lower proportion of acts involving commenting, $\chi^2(1, N = 28) = 12.3$, $p < .001$, relative to the DD/LI group (see Figure 1). The proportion of rejecting

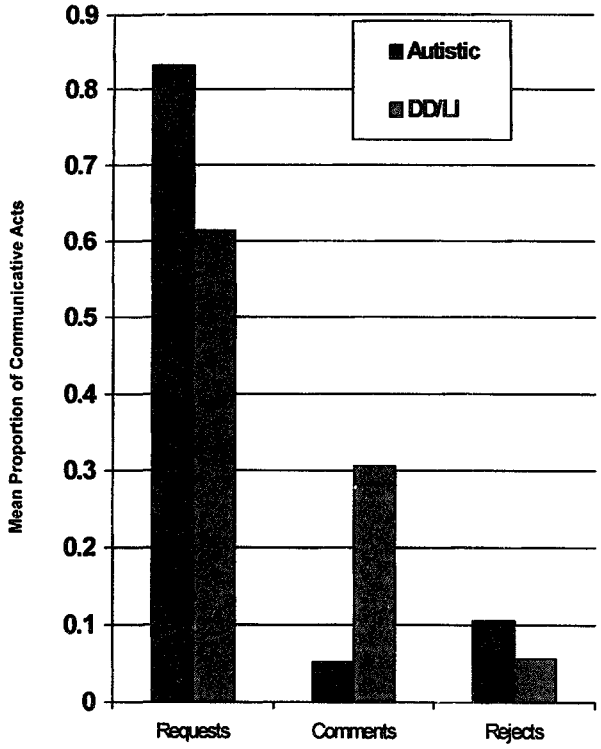

Fig. 1. Mean proportion of communicative functions exhibited by each group.

did not differ between the two groups. As Table III indicates, rejecting was used rarely by both groups. At the individual level, similar proportions of children in each group requested at least once (14 autistic, 14 DD/LI) and rejected at least once (7 autistic, 8 DD/LI). However, significantly fewer children with autism commented at least once relative to children with DD/LI (7 autistic, 13 DD/LI), $\chi^2(1, N = 28) = 6.3, p < .05$. A comparison of the 7 autistic children who commented and the 7 children who did not comment revealed no differences in chronological age, mental age, or expressive vocabulary. However, distal and contact pointing were observed only in the commenting subgroup; none of the autistic children who failed to comment were observed to use a pointing gesture. (In addition, the one child in the DD group who did not comment also did not use pointing to communicate.)

Communicative Forms

Individual Kruskal-Wallis tests were also used to assess differences in the proportion of communications involving each of the nine forms. The autistic group used a significantly lower proportion of acts involving contact points, $\chi^2(1, N = 28) = 6.5, p < .05$; distal points, $\chi^2(1, N = 28) = 7.9, p < .01$, showing objects, $\chi^2(1, N = 28) = 7.2, p < .01$; and eye gaze, $\chi^2(1, N = 28) = 9.6, p < .01$, and a significantly higher proportion of acts involving manipulation of the examiner's hand, $\chi^2(1, N = 28) = 6.9, p < .01$. No differences for reaching, giving objects, touching objects, or vocalizing were obtained (Figure 2).

Significant differences were found for the number of children in each group who used a contact point (1 autistic, 8 DD/LI), $\chi^2(1, N = 28) = 8.0$, $p < .01$, distal point (2 autistic, 9 DD/LI); $\chi^2(1, N = 28) = 7.3, p < .01$, showing objects (0 autistic, 6 DD/LI), $\chi^2(1, N = 28) = 7.6, p < .01$, and manipulating the examiner's hand (9 autistic, 3 DD/LI), $\chi^2(1, N = 28) = 5.3$, $p < .05$. No differences for the other forms were found.

It was also of interest to determine the degree to which specific communicative forms were associated with each communicative function. Table IV presents the proportion of requests and comments utilizing each of the specific communicative forms. For requests, the most common gestures used by both groups were reaching and giving objects. The autistic group was more likely to manipulate the examiner's hand and less likely to use distal gestures (i.e., reaching and distal pointing) and eye gaze relative to the DD/LI group. For comments, the proportions of gestures used by the two diagnostic groups were similar; however, the autistic group was less likely than the DD/LI group to use eye gaze and vocalizations to express this communicative function.

A related question was whether the communicative forms used for requesting differed from those used for commenting *within* each diagnostic group. To make these within-group comparisons, only those children who demonstrated both requesting and commenting were included (7 autistic, 13 DD/LI). The number of children demonstrating each form, as well as the number of communicative acts utilizing each form, are presented in Table V. As the table reveals, similar patterns for the autistic and DD/LI group were found for giving objects, reaching, and vocalizing; each of these communicative forms was used more often during requesting acts than during commenting acts. In contrast, different patterns were observed between the groups for the use of eye gaze. For the autistic group, eye gaze was used more often for requesting than for commenting, whereas for the DD/LI group, eye gaze was used with similar frequency to express both functions.

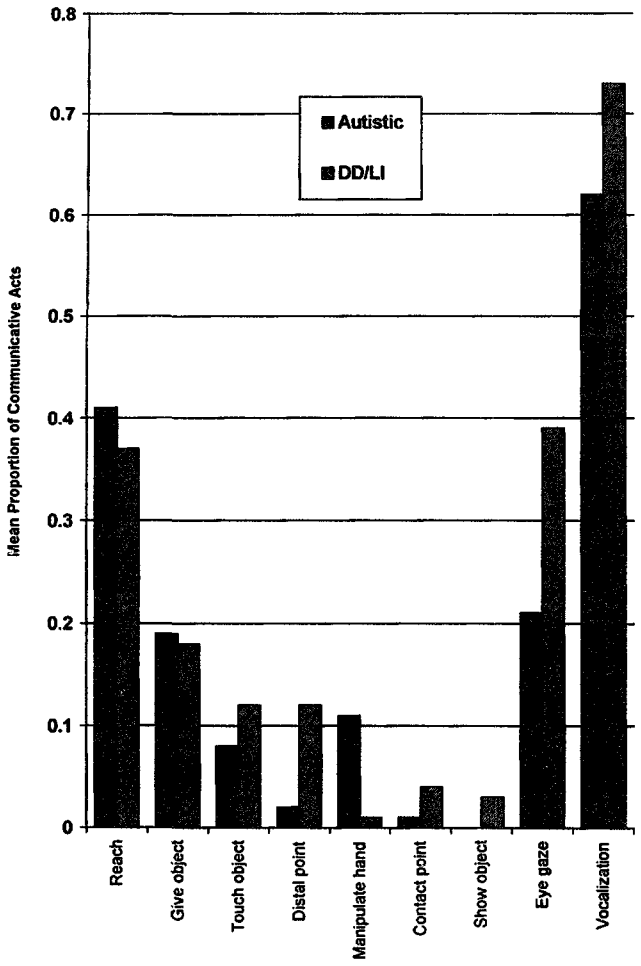

Fig. 2. Mean proportion of communicative forms used by each group.

Communicative Complexity

Communicative complexity was evaluated by examining the degree to which communicative gestures were accompanied by eye gaze toward the examiner and/or vocalizing. Three levels of complexity were examined: Level 1 represented the least complex acts, in that communicative gestures were not accompanied by either eye gaze or a vocalization; Level 2 acts

Table IV. Proportion of Requests and Comments Utilizing Specific Communicative Forms for Each Group

	Requests		Comments	
Form	Autism	DD/LI	Autism	DD/LI
Manipulate hand	13.9[c]	1.4	0.0	0.0
Give object	23.2	22.3	0.0	3.7
Contact point	0.0	0.9	20.0	11.2
Show object	0.0	0.9	0.0	8.2
Touch object	7.2	5.5	20.0	20.9
Reach	39.2[b]	53.2	20.0	9.7
Distal point	1.5[c]	10.0	20.0	24.6
Eye gaze	19.2[b]	31.1	40.0[a]	66.7
Vocalization	61.9	69.1	46.7[c]	87.3

[a] $p < .05$ using chi-square tests.
[b] $p < .01$ using chi-square tests.
[c] $p < .001$ using chi-square tests.

were intermediate in complexity, in that they involved the combination of a gesture with either eye gaze or a vocalization, but not both; and Level 3 acts were the most complex, in that the child combined a gesture with both eye gaze and a vocalization. Results revealed group differences for Level 3 acts only. The autistic group used a significantly lower proportion of acts involving gestures, eye gaze, and vocalizations relative to the DD/LI group, $\chi^2(1, N = 28) = 9.2, p < .01$ (Figure 3). In addition, significant differences in the number of children in each group exhibiting at least one Level 3 act were found (8 autistic, 14 DD/LI), $\chi^2(1, N = 28) = 7.6, p < .01$.

DISCUSSION

Our results reveal that young children with autism show different patterns of nonverbal communication relative to nonautistic children individually matched on chronological age, mental age, and expressive vocabulary, and group matched on developmental quotient, race, gender, and maternal education. First, young children with autism communicated less often during a structured activity designed to elicit communication. Second, when they did communicate, children with autism were more likely to request objects or actions and less likely to direct the examiner's attention to an object or activity of interest (i.e., comment) relative to controls. Whereas commenting constituted almost one third of the communicative acts in the DD/LI group,

Table V. Use of Communicative Forms for Requesting and Commenting by Subjects Demonstrating Both Functions

	Autistic (n = 7)				DD/LI (n = 13)			
	Request		Comment		Request		Comment	
Form	Acts n	Subjects n	Acts n	Subjects n	Acts n	Subjects n	Acts n	Subjects n
Manipulate hand	9[b]	5	0	0	3	3	0	0
Give object	30[c]	7	0	0	46[c]	11	5	4
Contact point	0	0	3	1	2[b]	1	15	8
Show object	0	0	0	0	2[a]	2	11	6
Touch object	6	5	3	3	12[a]	6	28	8
Reach	47[c]	7	3	3	116[c]	13	13	7
Distal point	3	1	3	2	22	9	33	9
Eye gaze	19[a]	7	6	4	63	13	86	12
Vocalization	72[c]	7	7	5	151[a]	13	117	13

[a] $p < .05$ using binomial tests.
[b] $p < .01$ using binomial tests.
[c] $p < .001$ using binomial tests.

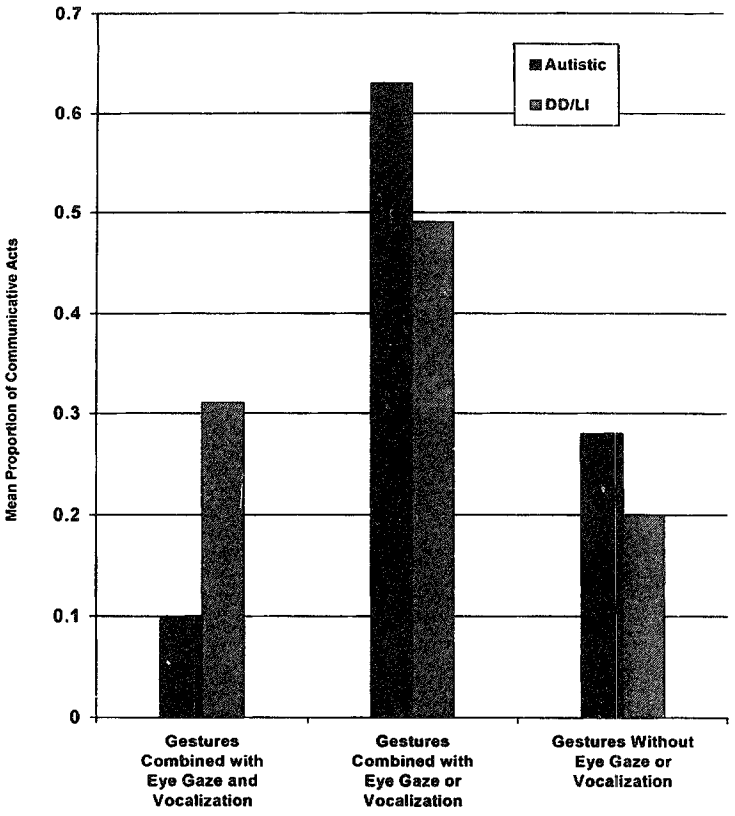

Fig. 3. Mean proportion of communicative acts at three levels of complexity exhibited by each group.

less than 1% of the communicative acts in the autistic group served the purpose of commenting. Third, the two groups of children used different forms of nonverbal behavior to communicate. Children with autism demonstrated a lower rate of and proportionally fewer gestures associated with commenting (i.e., pointing and showing objects), a lower rate of and proportionally fewer acts involving eye gaze, and proportionally fewer acts showing the highest level of complexity (i.e., combining gestures, eye gaze, and vocalizations). In contrast, the children with autism demonstrated a higher rate of and greater proportion of acts involving the direct manipulation of the examiner's hand, which was used primarily to request.

The results of the current study are consistent with those of previous research suggesting that children with autism demonstrate less frequent use of comments (Mundy et al., 1990; Wetherby et al., 1989) and less frequent use of forms associated with commenting (e.g., distal points and shows) (Baron-Cohen, 1989; Mundy et al., 1994). Moreover, the present study extends previous work by demonstrating that these deficits are observable and measurable in children as young as 2 and 3 years old. In addition, we found that the lower rates of comments and associated forms are not simply due to lower overall rates of communication in the autistic group. Group differences were obtained even when the proportion of total communication was the unit of analysis.

One explanation for the less frequent use of comments by children with autism may be that autistic children experience the sharing of attention with adults as less intrinsically rewarding than do nonautistic children. In contrast to requesting behavior, which results in the acquisition of desired objects or events, the outcome of commenting behavior is social/emotional in nature. Mundy (1995) has speculated that the behaviors involved in requesting and sharing attention (i.e., commenting) may develop from different neurological systems. He has proposed that the specific neurological and/or neurochemical system underlying the regulation of social approach behavior may be relatively more compromised in autism than the system regulating object approach. As a result, disturbances in self-initiated social behaviors such as commenting may occur.

In contrast to previous studies, the present results do not indicate that children with autism use distal pointing more often to request than to comment. Although the PCA provides a similar number of opportunities for pointing in requesting and commenting situations, pointing was observed very rarely in our autistic sample. The lower chronological and mental ages of the subjects in the present study, compared with those in previous studies, may account for this finding. Only 2 children with autism used pointing to communicate (compared with 9 in the DD/LI group), and it was used with equal frequency to communicate requests and comments (see Table V). Furthermore, in both groups, pointing was observed *only* in children who commented. These results suggest that the ability to direct another person's attention to share interest may be a developmental prerequisite for the emergence and continued use of communicative pointing. Once this basic underlying social requirement is met (and it is met by typically developing infants before their first birthday), communicative pointing may be used to serve both instrumental and social functions.

Although distal pointing and showing objects have been the most well-studied forms associated with commenting, it is important to recognize that children in both groups used several other methods for commenting. In particular, contact gestures other than showing objects (i.e., using a contact point or touching/holding objects) constituted a high proportion of the comments in both groups (50% for autistic, 40% for DD/LI). Further study of different forms of commenting may be instructive in understanding the development of commenting behavior in children with autism, as well as for designing interventions.

Previous reports that children with autism use eye contact less frequently as part of their communication with adults were also replicated with this young sample. Again, the current study ruled out the possibility that lower overall rates of communication in the autistic group were responsible for these results. In fact, it is likely that reduced use of eye gaze in the autistic group accounted for our finding that autistic children demonstrate proportionally fewer instances of the most complex level of communication (i.e., combining a gesture with eye gaze and a vocalization). This speculation is based on the finding that proportion of eye contact differentiated the groups whereas proportion of vocalizations did not. Consistent with previous work, our results suggest that eye gaze was used more commonly in the autistic group for requesting than for commenting. When we looked only at the children who used both comments and requests (n = 7 in the autistic group), we found that children with autism used proportionally fewer acts with eye gaze to convey comments (24%) than to convey requests (76%). Comparable proportions for the DD/LI subsample (n = 13) were 58 and 42%, respectively.

The dual nonverbal deficits of reduced eye gaze and low rates of commenting in the communications of autistic children have an important element in common: Both suggest a deficient ability to monitor the attention of the communicative partner (Gomez, Sarria, & Tamarit, 1993; Mundy et al., 1986). Attention monitoring involves shifting one's own attention between the referent and the partner, in order to determine whether the partner is attending to the gesture and/or referent. Difficulty shifting attention has been postulated as one of the factors underlying commenting deficits (McEvoy et al., 1993; Mundy, 1995; Mundy, Sigman, & Kasari, 1993) as well as other social deficits inherent to autism (Courchesne, 1995; Dawson & Lewy, 1989). The greater use of direct motor acts — such as manipulating the examiner's hand — in children with autism may be an adaptation to compensate for difficulties in shifting attention between a partner and an object or event.

The observation that very young children with autism exhibit specific patterns of nonverbal communicative behavior has important implications for early identification and diagnosis. For example, a 2-year-old child whose communicative profile reveals an absence of pointing and showing objects, but the presence of other ways of communicating requests (e.g., manipulating other people's hands, reaching, giving objects), may require a comprehensive evaluation to rule out autism. In addition, these findings suggest some possible directions for designing early interventions to promote the development of communication in children with autism. For example, because the most frequent function of communicating for autistic children is to request, intervention efforts may benefit from placing an initial emphasis on teaching children to monitor the adult's attention within the context of requesting situations. Likewise, it may prove more effective to teach children with autism to comment by touching objects or reaching while vocalizing, rather than teaching them to comment using a less familiar form (e.g., distal pointing or showing).

One of the most compelling reasons for studying the manifestations of autism in young children is to develop effective early intervention programs. As our understanding of the early features of this disorder increases, so should our ability to design interventions that enhance the outcomes of these children as well as their families.

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