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Naturalistic Observations of Spontaneous Communication in Autistic Children[1]

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Thirty children with autism were observed during their everyday school activities in order to examine patterns of spontaneous communication. The forms, functions, and targets of their communication were recorded by trained observers. The prototypical communicative event consisted of a child directing a motoric form of communication toward the teacher to request something or to attract attention to himself or herself. However, communication patterns were found to vary as a function of the child's cognitive level and severity of autism. Deficits in joint attention functions were observed, and were most striking in the subgroup of children who did not use speech. Results are discussed with reference to Wetherby's (1986) model for the development of communicative functions in autistic children.

Communication problems represent a core feature of autism. Deficits in this area are characterized by a broad spectrum of difficulties, ranging from mutism, to unusual speech characteristics such as echolalia, to deficient nonverbal communication (e.g., use of eye contact or gestures) (Paul, 1987; Ricks

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& Wing, 1975; Rutter, 1978). In recent years the study of communication problems in autism has shifted toward an emphasis on pragmatics, or the functional use of communication within the social context (Olley, 1985; Tager-Flusberg, 1981). One approach toward investigating functional communication has been to analyze the spontaneous initiation of communication by autistic children. Research in this area has revealed differences between autistic children and their peers in two important aspects of functional communication: the *forms* of communication they use and the *functions* or purposes underlying their communicative efforts (Prizant & Schuler, 1987; Watson, 1985).

Forms of communication can range from nonverbal methods, such as gestures or signs, to verbal methods (i.e., speech). The forms of communication used by autistic children appear to be qualitatively different from those used by their handicapped and nonhandicapped peers. For example, Wetherby, Yonclas, and Bryan (1989) found that autistic preschoolers were more likely than other prelinguistic children to use gestural forms of communication in isolation, without accompanying vocalizations. Autistic children also appear to be limited in the types of gestures they use. Fewer attention-sharing gestures, such as pointing and showing objects, are seen in this group relative to children with language disorders, mental retardation, or no handicaps (Landry & Loveland, 1988, 1989; Loveland & Landry, 1986; Mundy, Sigman, Ungerer, & Sherman, 1986; Sigman, Mundy, Sherman, & Ungerer, 1986). The use of speech by autistic children differs from that of language-disordered children in that it is less socialized and characterized by fewer spontaneous remarks and more unusual features (Cantwell, Baker, & Rutter, 1978). Moreover, autistic children have been found to use unconventional forms of communication, such as echolalia and self-injury (Prizant & Schuler, 1987). Although immediate and delayed echolalia were once viewed as noncommunicative, recent work suggests that they may serve a diverse set of communicative functions, such as requesting, giving information, and protesting (Prizant & Duchan, 1981; Prizant & Rydell, 1984).

Autistic children also have been found to possess a more limited repertoire of communicative functions than their peers, with particular deficiencies in utilizing communication for social or interactive purposes. For example, Cunningham (1966) studied one autistic boy over a 5-year period and found him to communicate less often for the purposes of giving information and asking questions than children at comparable language levels. Wetherby and Prutting (1984; Wetherby et al., 1989) found that autistic children communicated less often for the purpose of attracting or directing attention to themselves or objects, relative to other handicapped and nonhandicapped groups.

On the basis of her empirical data, Wetherby (1986; Wetherby et al., 1989) proposed a model for the development of communicative functions in autistic children. Unlike the synchronous development seen in normal children, autistic children are said to display an uneven pattern of development, with specific functions emerging in a predictable sequence. The earliest communicative functions to emerge are those used to regulate the behavior of another person to obtain an environmental end; communicative functions at this level include protesting and requesting actions and objects. At the next level is communication for the purpose of attracting or maintaining attention to oneself; examples are requesting social routines, greeting, and showing off. The latest functions to develop are those used to direct another person's attention to an object or an event for social ends (i.e., establishing joint attention). Communicative functions at this level include interactive commenting and requesting information. Although speculative at this point, this model holds great potential for the understanding of the development of communication in autistic children.

With rare exceptions (i.e., Cantwell et al., 1978; Wetherby & Prutting, 1984), the studies cited above were all conducted in clinical or laboratory settings. There has been a relative dearth of studies of the spontaneous communication of autistic children in naturalistic settings such as their homes or schools. Moreover, all but two of the studies (Cantwell et al., 1978; Sigman et al., 1986) assessed children's communicative interactions with an unfamiliar adult (i.e., an experimenter). There is evidence to suggest that autistic children's spontaneous communication is more limited in unfamiliar situations. For example, in studying the communicative behavior of one 8-year-old boy, Bernard-Opitz (1982) found that more spontaneous communication occurred with the mother and with a familiar adult than with an unfamiliar adult. McHale, Simeonsson, Marcus, and Olley (1980) obtained similar results in a school situation; autistic children demonstrated more social communication in the presence of their teachers than in the presence of unfamiliar adults. Consonant with the results of these studies, several authors have recommended that functional communication be observed as it occurs naturally in familiar contexts (Watson, Lord, Schaffer, & Schopler, 1989; Wetherby, 1986).

Relationships between the quality of children's spontaneous communication and specific developmental characteristics (e.g., chronological age, cognitive level) have rarely been investigated. The one study that looked at the relationship between chronological age and spontaneous communication in autistic children (Loveland & Landry, 1986) found no relationship between these variables. Results regarding cognitive functioning have been equivocal. McHale et al. (1980) found a relationship between IQ and certain aspects

of communication: Children functioning at higher cognitive levels demonstrated more frequent use of symbolic forms of communication (i.e., speech and signs) and more frequent interactive communication. However, this relationship existed only for those communicative acts observed in the teacher's presence. Loveland and Landry (1986) found no relationship between autistic children's mental age and their total number of spontaneous initiations or the level of gestures they used. Severity of autism was also found to be unrelated to social communication in one study (McHale et al., 1980). Further research on the developmental aspects of spontaneous communication is clearly warranted (Mundy & Sigman, 1989; Prizant & Wetherby, 1987; Tager-Flusberg, 1985).

The objective of the present study was to provide a descriptive account of the spontaneous communication of autistic children in a naturalistic setting (i.e., school). This study employs a larger sample of autistic children and more extensive observations than previous work in order to address the following questions:

1. What forms of communication and communicative functions are demonstrated spontaneously by autistic children in familiar settings? To whom do they direct their communication?

2. What is the relationship between the amount and type of spontaneous communication and specific developmental characteristics (i.e., age, cognitive level, and severity of autism)? Are younger children or more cognitively delayed children more likely to demonstrate less advanced functions (e.g., requesting objects)?

3. What relationships exist between the specific forms of communication used by autistic children and the purposes underlying their communicative efforts? Are less advanced communicative forms used with the developmentally earlier functions? Do children with speech demonstrate a wider range of communicative functions?

METHOD

Subjects

Thirty children (26 boys and 4 girls) attending special education classrooms for autistic students in a large, urban school district participated in the study. This project was undertaken for the purpose of educational planning and involved a total of 10 classrooms in four different schools. All children in the sample met the state eligibility criteria for autism[3] as well as the

[3]The Dade County eligibility criteria for autism define an autistic student as: "One who has a disability reflected in severe disorders of communication, behavior, socialization, and academic skills, and whose disability was evident in the early developmental stages of childhood.

DSM-III-R criteria (American Psychiatric Association, 1987). Children ranged in age from 4 to 13 years, with a mean age of 8.4 years (SD = 2.7). The sample was heterogeneous with respect to ethnic background: 12 (40%) were American black, 10 (33%) were Hispanic white, 6 (20%) were non-Hispanic white, and 2 (7%) were of other ethnic backgrounds.

Cognitive levels were obtained from school records. For most children (i.e., 70%), scores on intelligence scales such as the Leiter International Performance Scale (Leiter, 1980) or the Merrill-Palmer Scale of Mental Tests (Stutsman, 1948) were available. For the others, scores on developmental scales such as the Developmental Profile (Alpern, Boll, & Shearer, 1982) were used. All scores were converted to standard scores, which ranged from 21 to 102 (M = 50.7, SD = 21.1).

Procedure

Each child was observed on several different occasions during his/her everyday school routines. All observations were conducted during unstructured activities (e.g., leisure time in the classroom, lunch in the cafeteria), in order to insure that subjects had the opportunity to interact freely. An effort was made to observe each child at different times of the day and during different activities. During each observation session, a communication sample was obtained and behavior ratings were made using the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988). Four undergraduate and graduate students in psychology served as observers. Before beginning their observations, they received intensive training in the use of the communication coding system using practice videotapes of autistic children in a free play setting.

Communication Sample

Communication samples were obtained according to procedures outlined in the Division TEACCH communication curriculum (Watson, 1985; Watson et al., 1989). All instances of spontaneous, unelicited communica-

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The autistic child appears to suffer primarily from a pervasive impairment of cognitive and perceptual functioning, the consequences of which are manifested by limited ability to understand, communicate, learn, and participate in social relationships." Eligibility criteria for receiving services in programs for autistic students are impaired social relationships, severe disorder of communication, abnormal response to stimuli involving any or all sensory abnormalities, and severe functional retardation which may be accompanied by normal or superior abilities in some areas (Dade County Public Schools Exceptional Student Education Procedures Manual, 1988).

tion were recorded verbatim onto communication record sheets. For the purpose of this study, spontaneous communication was defined as communication that was initiated by the child; children's responses to questions were not included. For each communicative event, the form(s) of communication used, the function or purpose of the communication, and the target of the communication (i.e., teacher, classmate, observer, or other person) were also recorded on the sheets.

The TEACCH curriculum recommends that communication samples consist of at least 50 communicative events, or involve at least 2 hr of observation. All children in the present sample were observed for a minimum of 2 hr. However, due to low rates of communication, the observation times for some children were extended (to a maximum of 3 hr) in order to obtain more representative samples. Consequently, observation times ranged from 2 to 3 hr per child.

The categories used to code the forms and functions of communication were derived from those described by Watson et al. (1989). The following four categories were used to code the form of communication:

Motoric Acts. Nonsymbolic actions involving direct manipulation of a person or object (e.g., touching a person to get his/her attention; pushing an object away in protest).

Gestures. Specific, symbolic actions involving the head or body (e.g., pointing to a desired object; nodding the head in affirmation; signing).

Vocalizations. Sounds or combinations of sounds that are not identifiable words (e.g., whining or screaming; babbling).

Speech. Meaningful, identifiable words or phrases (e.g., "Look!"; "Do you want some tea?")

The form categories were not mutually exclusive; that is, more than one form could be coded for a given communicative event.

Nine categories were used to code communicative functions. Unlike the form categories, only one function category was assigned to each communicative event. Definitions and examples of each function category are presented in Table I.

Interobserver agreement for the communication coding system was calculated for one third of the subjects. Cohen's kappa was used when appropriate (e.g., for the variables coded as mutually exclusive categories), and percentage agreement [agreements/(agreements + disagreements)] was used for the other variables. Cohen's kappa for the function categories was .82 and for the targets of communication was .98. There were no observations for two of the function categories in the reliability sample (i.e., social interaction and expressing feelings). Given their infrequent occurrence in the sample as a whole, these two categories were omitted from all further analyses. Percentage agreements for the form categories were .80 for motoric acts, .60 for vocalizations, .67 for gestures, and .99 for speech. The relatively low

Table I. Definitions and Examples of Communicative Functions[a]

Function	Definition	Examples
Requesting	Child conveys the message that he wants someone else to give him an object, perform an action for him, or give him permission to do something.	"Want Coke."; Child hands the teacher an empty cup to request a drink.
Getting attention	Child indicates that he wants another person to look at him when he does not already have that person's attention.	"Mrs. Smith!"; Child taps the teacher's arm.
Rejecting/ refusing	Child rejects objects, protests actions of another person, or refuses to comply with a request.	"Stop crying!"; Child pushes food away.
Commenting	Child points out characteristics of himself, other people, or objects that are readily apparent to the listener and pertain to the immediate environment.	"I'm working."; Child holds up a toy to show the teacher.
Giving information	Child tells another person something that is not obvious to that other person and that may relate to past or future events.	"I went to the beach."; Child holds up completed work to indicate that he has finished.
Seeking information	Child conveys the message that he wants another person to tell him something.	"Where book?"; Child searches for an object and looks to the teacher for information.
Expressing feelings	Child indicates how he feels, physically or emotionally; or indicates likes, dislikes, or personal preferences.	"I like pink nail polish."; Child screams in frustration when given a difficult task.
Social routine	Child carries out simple routines or rituals of a social nature.	"Hello!"; "Thank you!"; Child waves at teacher when she enters the room.
Social interaction	Child communicates for the primary purpose of interacting; a response is expected.	"You can't catch me!"; Child grabs teacher's pencil and runs away, looking back.

[a]From *Teaching spontaneous communication to autistic and developmentally handicapped children* (p. 35) by L. R. Watson, B. Schaffer, C. Lord, & E. Schopler, 1989, New York: Irvington. Copyright 1989 by Irvington Publishers. Adapted by permission.

rates of agreement for the vocalization and gesture categories are felt to be spurious in light of the low base rates of these forms in the reliability sample. Nevertheless, caution in interpreting these variables is warranted. Percentage agreement for the identification of communicative events (i.e., agreement that a given communicative event occurred) was .86.

Childhood Autism Rating Scale

Assessment of the presence and severity of autism was based upon the Childhood Autism Rating Scale (CARS) (Schopler et al., 1988). The CARS is an observational scale comprising 15 items assessing behaviors such as relating to people, resistance to change, communication, and body use. Each item is rated on a 7-point scale ranging from 1 to 4 (midpoint scores are also used), with higher numbers reflecting greater levels of abnormality. Total CARS scores can range from 15 to 60; the cutoff score for children is 30 and for adolescents and adults is 28 (Mesibov, 1988; Schopler et al., 1988). Psychometric properties of the CARS are quite acceptable (Morgan, 1988; Schopler et al., 1988). Interobserver agreement for the total CARS score, calculated for one third of the subjects, was .93, using Pearson product-moment correlations.

Since a separate CARS form was completed following each observation, several CARS scores were available for each child. For the purpose of statistical analyses, a composite CARS rating was derived by averaging all of the individual CARS scores. Total CARS (composite) scores ranged from 28 to 39.5, with a mean of 33.1 (SD = 3.5).

RESULTS

A total of 266 communicative acts were observed. The number of initiations per child ranged from 0 to 34 (M = 8.9, SD = 8.9). One child failed to initiate communication during 3 hr of observation. All statistical analyses were therefore based on data from the 29 children who initiated communication at least once. Overall, the majority of communicative acts (70%) were observed in the classroom; others occurred on the physical education field (24%), in the cafeteria (3%), and in other locations such as hallways (3%).

The frequency of occurrence of each of the communicative forms, functions, and targets is summarized in Table II.[4] On the average, each child used two different forms of communication (range = 1 to 4). Motoric forms

[4]The decision to present data as raw number of occurrences was based upon the finding that differences in observation times did not influence the nature of the communication samples obtained. This was determined by subdividing children according to length of observation time, using a median split, and comparing the two subgroups on each communication variable. Wilcoxon two-sample tests revealed that no group comparisons attained significance at the .05 level. Moreover, the pattern obtained for most communication variables was in the direction of lower frequencies for children who were observed for longer periods. This pattern was not unexpected, in that the children who communicated less often tended to be observed for longer periods in order to obtain more representative samples.

Table II. Frequency of Occurrence of Each Communicative Form, Function, and Target in 266 Communicative Acts

Communication variable	Occurrences		Children	
	No.	%	No.	%
Forms[a]				
Motoric acts	137	51.5	25	83.3
Speech	69	25.9	11	36.7
Vocalizations	43	16.2	12	40.0
Gestures	34	12.8	9	30.0
Functions				
Getting attention	61	22.9	20	66.7
Social routine	59	22.2	14	46.7
Requesting	58	21.8	18	60.0
Commenting	41	15.4	11	36.7
Rejecting/refusing	20	7.5	13	43.3
Giving information	13	4.9	4	13.3
Seeking information	7	2.7	2	6.7
Expressing feelings	4	1.5	4	13.3
Social interaction	3	1.1	3	10.0
Targets				
Teacher	129	48.5	24	80.0
Observer	64	24.1	14	46.7
Peer	58	21.8	15	50.0
Other	15	5.6	6	20.0

[a]Total frequency exceeds 266 because two or more forms could be used concurrently.

were the most common, occurring in over half of the initiations. The average number of different functions used per child was 3 (range = 1 to 8). The most common communicative functions were getting attention, engaging in social routines, and requesting; together these functions accounted for two thirds of the communicative acts. Children directed their communication to an average of two different targets (range = 1 to 4), with the teacher being the most common target of communication.

The relationship between developmental characteristics (i.e., age, cognitive level, and severity of autism) and spontaneous communication was evaluated using Pearson product-moment correlations. The communication variables investigated were number of initiations, number of different forms, functions, and targets, and number of times each of the communicative forms, functions, and targets was observed.

Results revealed that cognitive level and severity of autism were related to several communication variables (see Table III). Children functioning at lower cognitive levels were less likely to use speech and to communicate for the purposes of commenting and giving information. In fact, of the 14

Table III. Significant Correlations Between Developmental Characteristics and Communication Variables

Communicative form	Developmental variables		
	Chronological age	Cognitive score	Total CARS score[a]
Forms			
Motoric			.41[c]
Vocalization			.39[c]
Speech		.61[e]	−.40[c]
Functions[b]			
Requesting [1]	−.37[c]		
Social routine [2]			.47[d]
Commenting [3]		.55[d]	−.37[c]
Giving information [3]		.59[e]	
Targets			
Peer		.42[c]	
Observer		.37[c]	
No. different targets		.40[c]	

[a]Higher CARS scores indicate more severe autism.
[b]Numbers in brackets indicate the developmental level of the communicative function derived from Wetherby et al. (1989).
[c]$p < .05$.
[d]$p < .01$.
[e]$p < .001$.

children with cognitive scores below 50, only 3 (21%) used speech, 3 (21%) used the function of commenting, and none used the function of giving information; in contrast, 8 of the 15 children with scores at or above 50 (53%) used speech, 8 (53%) commented, and 4 (27%) gave information. Children at lower cognitive levels also directed communication to fewer different targets and were less likely to address peers and observers. Children demonstrating more severe autism were more likely to use nonsymbolic forms of communication (i.e., motoric acts and vocalizations) and less likely to use speech; they were also more likely to communicate for the purpose of engaging in social routines and less likely to communicate for the purpose of commenting. Chronological age was related to only one communicative function: younger children were more likely to communicate for the purpose of requesting.

The relationship between children's use of communicative forms and functions was evaluated by computing Pearson product-moment correlations across the sample. Significant correlations are presented in Table IV. For the purpose of presentation, the seven communicative functions are classified into three developmental levels corresponding to those designated by Wetherby et al. (1989): Level 1 consists of functions involved in regulating

Table IV. Significant Correlations Between Communicative Forms and Functions

	Communicative forms			
Communicative functions[a]	Motoric	Vocalization	Gestures	Speech
Requesting [1]	.40[b]			
Rejecting/refusing [1]		.38[b]		
Getting attention [2]	.76[c]			
Social routine [2]	.77[c]	.74[c]		
Commenting [3]			.67[c]	.66[c]
Giving information [3]				.94[c]
Seeking information [3]				.65[c]

[a]Numbers in brackets indicate the developmental level of the communicative function derived from Wetherby et al. (1989).
[b].01 < p < .05.
[c]p < .001.

the behavior of others to achieve environmental ends (i.e., requesting and rejecting); Level 2 consists of functions involved in focusing attention to oneself (i.e., getting attention and engaging in social routines); and Level 3 consists of functions involved in directing attention to an object or event (joint attention) (i.e., commenting, giving information, and seeking information).[5] As the table reveals, a clear pattern emerged, with less symbolic forms of communication related to the less advanced functions (i.e., Levels 1 and 2), and more symbolic forms of communication related only to the most advanced functions (i.e., Level 3).

It was also of interest to determine whether children who displayed speech (n = 11) demonstrated different communication patterns from children without speech (n = 18). Group differences were evaluated for the following variables using Wilcoxon two-sample tests: number of initiations, number of different functions, and number of times each communicative form (except speech) and function was observed. The two groups did not differ in length of time observed, z = .21, ns. Results revealed that children with speech utilized more gestures, z = 2.36, p < .05, more different communicative functions, z = 1.99, p < .05, more commenting, z = 3.38, p < .001, and more giving information, z = 2.66, p < .01, than children without speech. No difference in number of initiations was found between the groups, z = 1.45, ns. The means for all variables are presented in Table V.

The percentage of total initiations accounted for by different communicative functions in children with and without speech is illustrated in

[5]Although the specific function categories employed in this study differ slightly from those utilized by Wetherby, their assignment to particular levels is consistent with Wetherby's descriptions (1986; Wetherby et al., 1989).

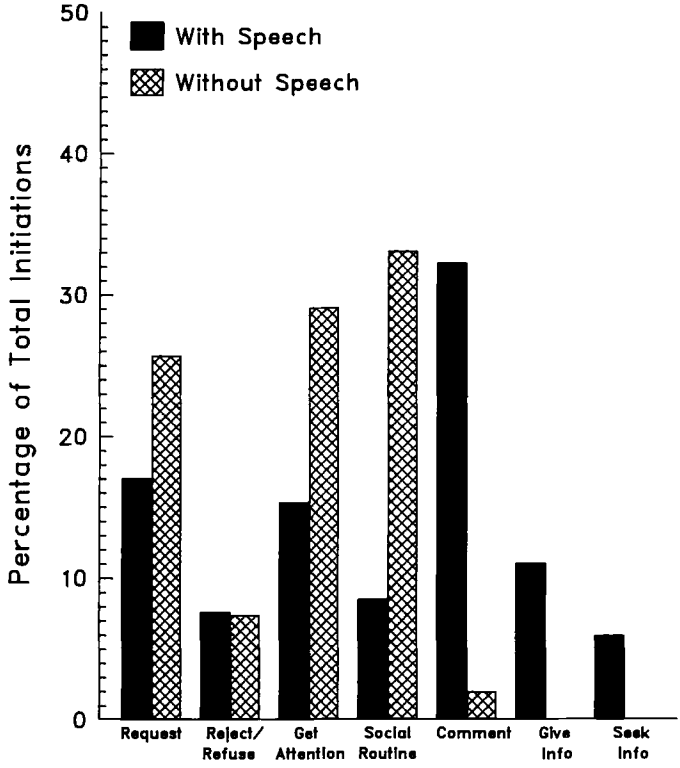

Fig. 1. Percentage of total initiations accounted for by different communicative functions in children with and without speech.

Figure 1. It is interesting to note that Level 3 functions accounted for nearly 50% of the initiations of children with speech (58 of 118 initiations), but only 2% of the initiations of children without speech (3 of 148 initiations). The numbers of children with speech who demonstrated commenting, giving information, and seeking information were 8 (73%), 4 (36%), and 2 (18%), respectively. Only 3 children in the nonverbal group (17%) used a Level 3 function, and in all cases it was commenting.

DISCUSSION

The present study involved observations of 30 autistic children during unstructured portions of their everyday school routines. A lengthy observation time (i.e., 2 to 3 hr per child) in a naturalistic setting was employed in order to obtain as representative a sample as possible of spontaneous com-

Table V. Means, Standard Deviations, and Ranges for Communication Variables for Children With and Without Speech

Communication variable	With speech			Without speech		
	M	*SD*	Range	*M*	*SD*	Range
			Forms			
Motoric acts	2.3	1.7	0–5	6.2	8.2	0–27
Vocalizations	1.1	1.8	0–5	1.7	3.0	0–11
Gestures[b]	2.5	2.9	0–8	0.3	1.0	0–4
Speech	6.3	7.5	1–21	0.0		
			Functions[a]			
Requesting [1]	1.8	1.8	0–5	2.1	3.5	0–14
Rejecting/refusing [1]	0.8	0.9	0–3	0.6	0.9	0–2
Getting attention [2]	1.6	1.2	0–4	2.4	4.0	0–14
Social routine [2]	0.9	1.1	0–3	2.7	5.7	0–23
Commenting [3][d]	3.5	3.1	0–8	0.2	0.4	0–1
Giving information [3][c]	1.2	2.3	0–7	0.0		
Seeking information [3]	0.6	1.8	0–6	0.0		
No. different functions[b]	4.0	2.1	1–8	2.5	1.4	1–5
No. initiations	10.7	7.2	2–24	8.2	9.7	1–34

[a]Numbers in brackets indicate the developmental level of the communicative function derived from Wetherby et al. (1989).
[b]$p < .05$.
[c]$p < .01$.
[d]$p < .001$.

munication. Our results reveal that spontaneous communication was a relatively rare event; on the average, these children initiated communication only 3 to 4 times per hr. One child demonstrated no spontaneous communication at all in 3 hr of observation. Low rates of initiation of communication have also been reported by other investigators (Cantwell et al., 1978; Loveland, Landry, Hughes, Hall, & McEvoy, 1988), and highlight the need for specific educational programming in the area of functional communication skills.

Considering the group as a whole, the prototypical communicative event consisted of a child directing a motoric form of communication toward the teacher for the purpose of achieving an environmental end (i.e., requesting something) or attracting attention to him or herself. However, our results suggest that the specific features of communication displayed by an individual child are likely to vary as a function of the child's developmental characteristics, particularly his/her cognitive level and severity of autism. These results underscore the importance of employing a developmental approach to assessment and intervention with autistic children (Marcus, 1978). In our study, children functioning at higher cognitive levels were more likely to use symbolic forms of communication (i.e., speech), to direct their communica-

tion to individuals other than the teacher, and to communicate for the purpose of establishing joint attention (i.e., comment and give information). The use of speech and joint attention functions was quite rare in autistic children with cognitive scores below 50. Similar results have been obtained by other authors: McHale et al. (1980) found that IQ was related to interactive communication and symbolic communication (i.e., use of speech and signs), and Mundy, Sigman, Ungerer, and Sherman (1987) reported an association between mental age and joint attention skills.

Our observations regarding children's use of communicative functions are compatible with the developmental model proposed by Wetherby (1986; Wetherby et al., 1989). Less advanced functions (i.e., requesting) were associated with younger age, and more advanced functions (i.e., commenting and giving information) were associated with higher cognitive level. For this sample, the demarcation between Level 2 and Level 3 functions appeared to be more pronounced than that between Level 1 and Level 2 functions; that is, functions at Levels 1 and 2 were similar across several dimensions (e.g., their frequency of occurrence, their association with nonsymbolic forms of communication), whereas Level 3 functions stood out as distinct (e.g., their association with cognitive level and symbolic forms of communication).

Consistent with previous research, deficits in joint attention also were found in the present study. These deficits were most striking in the subgroup of children without speech, who *never* exhibited two of the three Level 3 functions (i.e., giving information and seeking information). This finding raises the question of whether the presence of speech—or cognitive skills underlying the development of speech—represents a necessary (but not sufficient) condition for the demonstration of these particular joint attention functions.[6] A relationship between language acquisition and joint attention has also been reported by Mundy et al. (1987). Replication with larger samples and other clinical populations are necessary to clarify further the relationships between joint attention, cognitive skills, and speech.

Use of the third joint attention function, commenting, followed a different pattern. First, it was used by nonverbal children as well as those with speech. Second, it was observed to be quite common in the latter group. Commenting was not only the most frequent function to appear in the communication samples of verbal children but was used by almost three fourths of the children in this subgroup. The differences between commenting and the other joint attention functions may suggest the need for further differentiation between the specific Level 3 functions.

[6]It is interesting to note that speech may not always be used to express these joint attention functions; in one instance a (verbal) child showed a pair of rolled socks to the teacher to indicate (i.e., give information) that he had completed an assignment.

Some implications for communication intervention may be drawn from the results of this study. For example, the function of commenting may provide an important transitional link to other communicative functions. As the most frequently observed Level 3 function for children with and without speech, commenting may be the earliest joint attention function to develop. Intervention programs seeking to increase joint attention may benefit from targeting this function first. For children with speech, in particular, the presence of commenting may signify the potential for expanding to other joint attention functions (e.g., seeking information) and may serve as a springboard for teaching these other advanced functions. In addition, the social routine function, which was the most common function used by nonverbal children, may be helpful in teaching early joint attention functions to this subgroup. A child's understanding of social routines and turn-taking may enable the use of ritualized turn-taking games to teach the function of commenting (Prizant & Wetherby, 1985).

While the existence of certain developmental patterns or progressions may provide a useful framework for understanding and conceptualizing communication in autistic children, it does not supplant the need for individualized assessment and educational planning. It is our hope that continued research along these lines will contribute to an understanding of autism that will enhance our ability to identify and meet the specific needs of autistic individuals.

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