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The Development of Contingent Discourse Ability in Autistic Children

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Abstract—This study investigated communicative competence in autistic children. Six autistic boys were matched to six children with Down syndrome on age and language level. For each child four samples of spontaneous speech over the course of 1 year were analysed. Child utterances were coded for adjacency, contingency and various categories of contingent discourse that either did or did not add new information. Autistic children were found to be more non-contingent, and to show no developmental change in their contingent discourse, especially in categories of contingent discourse that added new information.

Keywords: Autism, Down syndrome, language development, discourse

Introduction

Over the past decade it has become widely recognized that autistic children's primary area of language dysfunction lies in the domain of pragmatics—or the functional uses of language in a social context (e.g. Baltaxe, 1977; Fay & Mermelstein, 1982; Paul, 1987; Schopler & Mesibov, 1985; Tager-Flusberg, 1981, 1989). This perspective on the language deficit in autism takes on special significance when it is viewed in relation to the other cognitive and social impairments that are the hallmark of this pervasive developmental disorder (Caparulo & Cohen, 1977; Baron-Cohen, 1988). For this reason it is important to identify more precisely the particular aspects of pragmatic functioning that are specifically impaired in autism in order to advance our theoretical understanding of the nature of the psychological deficit in autism.

Kanner's original papers on autism included descriptions of the children's language, especially some of the aberrant features such as echolalia, pronominal reversals and repetitive questioning, as non-communicative (Kanner, 1943, 1946); and subsequent work supported this view (e.g. Creak, 1972; Ricks & Wing, 1975). More recently, as research on pragmatic aspects of language and communication has grown (cf. Bates, 1976; Bruner, 1975; Keenan, 1974), a different perspective has been placed on autistic children's language. Within this newer framework, even the peculiar features of autistic

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children's language have been interpreted in a more positive way, as an effort toward communicating with others. Prizant's research on both immediate and delayed echolalia has enriched our understanding of the variety of messages that are communicated through this form of language (Prizant & Duchan, 1981; Prizant & Rydell, 1984; see also, McEvoy, Loveland & Landry, 1988). Other forms of repetitive speech, including excessive questioning or other idiosyncratic phrases, have also been shown to serve a primarily communicative role (Coggins & Frederickson, 1988; Hurtig, Ensrud & Tomblin, 1982). Thus we no longer view autistic children's communicative abilities in an all-or-none fashion (Wetherby, 1986); rather these abilities lie on a continuum both within and across children at different levels of functioning.

A number of studies have investigated factors that influence autistic children's communicative competence. Wetherby and Prutting (1984), who studied four autistic children at the early stages of language development, found that they used a limited range of communicative functions: those that served *environmental* ends, to gain a desired object or action. Their subjects rarely used language to serve a *social* function, such as gaining attention or showing off, in contrast to matched normal controls. Both the situational context (Mermelstein, 1983) and conversational partner (Bernard-Opitz, 1982; McHale, Simeonsson, Marcus & Olley, 1980) have been shown to influence the communicative level of autistic children. The more structured the situation, the more communicative the autistic child will be. Similarly, autistic children will be more communicative with people that they know well, such as their mother (Bernard-Opitz, 1982) or a familiar teacher (McHale *et al.*, 1980).

One important aspect of communicative competence is the ability to maintain and develop a topic of discourse. Autistic children have been found to be quite deficient in this area because they either do not respond to adult initiations or they do so in a non-topically related way (Ball, 1978; Paccia-Cooper, Curcio & Sacharko, 1981; Tager-Flusberg, 1982). Nevertheless, at least some of the time the autistic subjects in these studies were able to respond appropriately to their conversational partner. Curcio and Paccia (1987) found that one factor influencing this discourse ability was the linguistic environment: if adults asked conceptually simple yes/no questions that were related to the child's previous utterance, autistic children were more likely to be able to maintain the ongoing topic of conversation.

The primary goal of this study was to extend this line of research on communicative competence in autism by investigating the ways in which autistic children are able to respond in a contingent, or topically related, way while engaged in conversation with their mothers. Research by Bloom and her colleagues has shown that as young normally developing children become more proficient linguistically, they are more likely to respond contingently to their mothers' utterances, and to do so in more advanced ways by adding new information to the topic of discourse (Bloom, Rocissano & Hood, 1976). We were particularly interested in studying the development of this aspect of discourse ability in a group of autistic children to see whether they would show the same changes in their communicative competence as do normal children.

In order to distinguish deficits in this area of language functioning that are specific to autism from those that may be related to delays in language acquisition, we included a control group of children with Down syndrome, who were the same ages and at the same levels of linguistic competence as the autistic children at the start of the

study. Children with Down syndrome provide a particularly interesting contrast to autistic children in that it is a genetic condition that is almost never associated with autism (cf. Wakabayashi, 1979). Unlike autistic children, they are generally described as being highly sociable and responsive in communicative situations (Leifer & Lewis, 1984; Loveland, Tunali, McEvoy & Kelley, 1989), and do not share similar impairments in social-cognitive development (Baron-Cohen, Leslie & Frith, 1985, 1986).

Method

Subjects

The subjects for this study included six children with autism and six children with Down syndrome who were part of a larger study on language acquisition (Tager-Flusberg *et al.*, 1990). The autistic subjects, all boys, were diagnosed using DSM-III criteria and current proposals for defining the syndrome (Cohen, Paul & Volkmar, 1987; Denckla, 1986), including onset prior to 30 months; gross and sustained impairments in socialization and social relationships; delays and deficits in language development; and repetitive or obsessive behaviors.

The autistic children lived with their families and attended special programs in school or at home. Their socio-economic status ranged from lower to upper middle class. The children all had some spontaneous language at the start of the study. Their non-verbal IQs were assessed using the Leiter International Performance Scale (Leiter, 1974) and five of the six boys fell in the normal or low-normal range of intellectual functioning.

The Down syndrome children, four boys and two girls, were selected to match the autistic children on chronological age and language level, using mean length of utterance (MLU) at the time of the first sample for this study. They too lived at home, attended special programs and came from families with similar educational and socio-economic backgrounds as the autistic subjects. The Down syndrome children's scores on the Leiter indicated that they were not matched on non-verbal IQ or mental age levels.

Details about the two groups of subjects are shown in Table 1. *t*-Tests confirmed that the two groups were well matched on age [t (10) = 0.34] and MLU [t (10) = 0.07] at the time of the first sample. The autistic subjects, however, had significantly higher non-verbal IQ scores than the Down syndrome subjects [t (10) = 4.32, $p < .001$].

Table 1. Subject characteristics

Autistic					Down Syndrome				
Child	Age (years; months)	IQ*	MLU Sample 1	MLU Sample 4	Child	Age (years; months)	IQ	MLU Sample 1	MLU Sample 4
Stuart	3;4	61	1.17	1.90	Charlie	3;3	46	1.21	1.43
Roger	4;1	105	2.86	3.28	Kate	4;1	65	2.98	4.03
Brett	5;8	108	3.74	3.91	Penny	5;3	63	3.36	4.14
Mark	7;7	75	1.46	2.12	Martin	5;4	47	1.63	2.21
Rick	4;7	94	1.73	2.79	Billy	5;9	49	1.93	2.51
Jack	6;9	91	3.03	2.84	Jerry	6;9	54	2.86	3.32
M	5;4	89	2.37	2.81		5;1	54	2.33	2.94
S.D.	1;8	18	0.99	0.73		1;3	8	0.86	1.07

*Non-verbal IQ score.

Collection and preparation of language samples

Spontaneous speech samples were collected in the children's homes while they interacted with their mothers, in play or other loosely structured activities selected by the mothers. The sessions, lasting about 1 hour, were recorded using video- and audio-cassette equipment by two researchers. Written transcripts were later prepared from the audiotapes. The transcripts were then checked using the videotapes, and detailed context notes about the ongoing non-verbal activity were added. The transcripts of the language samples were typed into computer files, using the SALT format (Miller & Chapman, 1985) to facilitate coding and analysis. More details about the procedures used to collect and prepare the language samples can be found in Tager-Flusberg *et al.* (1990).

Coding

For each child four language samples were taken at 4-monthly intervals providing data across the span of 1 year. MLU was computed for each sample based on 100 consecutive intelligible spontaneous utterances, using the SALT program. Each sample was then assigned to one of Brown's language stages on the basis of MLU: Stage 1, 1.0–1.9; Stage 2, 2.0–2.4; Stage 3, 2.5–2.9; Stage 4, 3.0–3.4; Stage 5, over 3.5.

The samples were coded for the use of contingent speech using a hierarchical coding scheme that was adapted from one developed by Bloom *et al.* (1976). At the first level, each child's utterance was coded for adjacency, that is, its relation to a prior adult utterance. All child utterances were coded into one of the following three categories.

Adjacent: Child utterance follows immediately after an adult utterance addressed to child.

Non-adjacent: Child utterance does not follow immediately after adult utterance; may follow child utterance, after an adult utterance with intervening pause, vocalizations, or an adult utterance not addressed to child.

Unintelligible: Child utterance is either fully or partially unintelligible.

Only adjacent utterances were then coded at the next level for their relation to the topic of the previous adult utterance. The following categories were used to code adjacent utterances.

Imitation: Child utterance is exact or partial repetition of prior adult utterance. It maintains the topic but is not different from the adult utterance.

Contingent: Child utterance maintains topic of prior adult utterance without being a simple imitation.

Non-contingent: Child utterance does not relate to topic of prior adult utterance.

The following is an example from an autistic subject who was playing with toy animals:
Mother: See the horse running?
Child: Look at the Susan.
(Child shifts away from the animals and mentions the visitor present.)

At the third level, all contingent utterances were coded further to distinguish the different ways in which the child maintained the ongoing topic of discourse, in addition to simple imitation. The following categories were used.

Yes/No: One word yes/no (or equivalent) responses.

Routines: Includes standard social routines (e.g. thank you, good night), verbal games, songs, TV talk, etc.

Recode: Repetition of prior adult utterance with some alteration in form; however, no additions or changes in meaning.

The following is an example from a Down syndrome child who was also playing with toy animals:
Mother: I think that's his tail.
Child: Yeah, a tail.

Self-recode: Repetition of child's own prior utterance after intervening adult acknowledgement, with alterations in form but not in meaning.

An example from an autistic child is:
Child: Have a paintbrush please.
Mother: No.
Child: I want the paintbrush.

Wh-response: Simple noun phrase response to adult test wh-questions.

For example, from an autistic child:
Mother: What color is the milkball?
Child: It's white.

Expansion: Adds information to topic and content of prior adult utterance.
An example from a Down syndrome subject is:
Mother: You're invited to a concert, yeah.
Child: And need a ticket for get in concert.

Self-expansion: Adds information to topic of child's own prior utterance after intervening adult acknowledgement.

Alternation: Adds information by opposing some aspect of content of adult prior utterance.
For example, from a Down syndrome subject who is trying on a paper mask she made:
Mother: This is a man?
Child: No, it's a lady.

Expatiation: Adds information to topic of prior adult utterance and introduces new related topic.
Another example from a Down syndrome child who is discussing a TV program:
Mother: Oh I'm glad a black dog came along and saved the bunny.
Child: No, hunter shoot him.

Results

The data from each level of the coding scheme were analysed for developmental trends as well as for comparisons between the groups. The first level of the coding scheme distinguished between adjacent and non-adjacent utterances. In their study of normal children Bloom *et al.* (1976) found that at all MLU stages there was more adjacent speech than non-adjacent speech. Figure 1 presents the data on adjacency as a percentage of the total number of intelligible utterances from our autistic and Down syndrome subjects. Bloom *et al.*'s (1976) findings for their four normal subjects at stages 1, 2 and 5 are also included on the graph. Overall, the groups look very similar to one another, although, at all stages, normal children are less adjacent and more non-adjacent than the autistic and Down syndrome children.

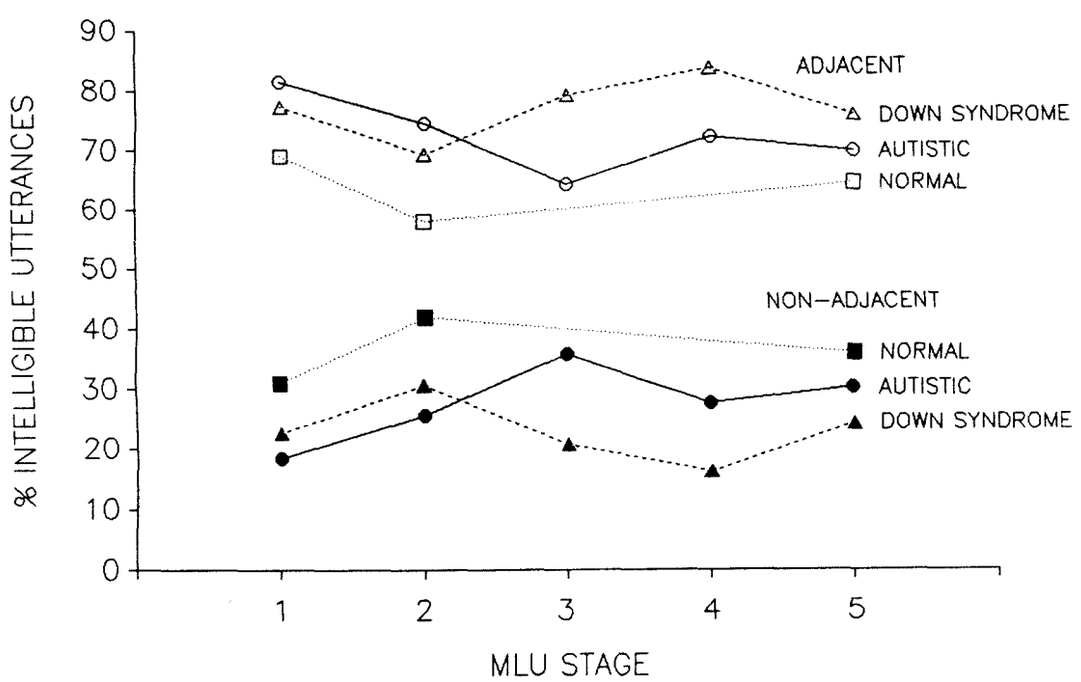

Fig. 1. Distribution of adjacent and non-adjacent utterances.

The autistic and Down syndrome children were compared in their adjacency using a multivariate analysis of variance (MANOVA) on data transformed with an arcsin transformation for proportional data (Snedecor & Cochran, 1967). Neither the main effect of group [F (1, 46) = 1.40] nor the interaction between group and adjacency variables [F (2, 45) = 1.13] were significant.

We then analysed the children's adjacent utterances for contingent responding, as a percentage of total intelligible utterances. The data for contingent and non-contingent utterances are presented in Fig. 2, again including Bloom *et al.*'s (1976)

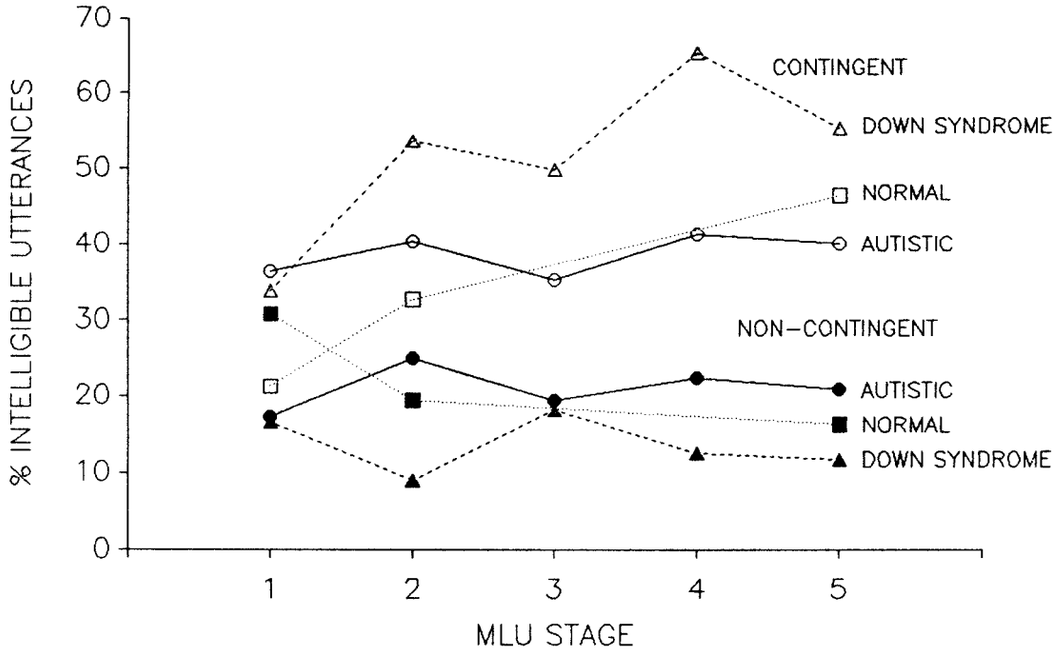

Fig. 2. Distribution of contingent and non-contingent utterances.

data on normal children. At all stages the Down syndrome and autistic children are more contingent than non-contingent. In contrast, the normal children at stage 1 used more non-contingent speech. From stage 2 on, the Down syndrome children were highest in their use of contingent speech, and lowest in their use of non-contingent speech. The autistic children appear more similar to Bloom *et al.*'s normal children in their overall use of contingent speech; however, unlike either the normal or the Down syndrome children, they do not show an increase in the use of contingent speech with growth in MLU.

Table 2 shows the overall means and standard deviations for the different types of adjacent utterances for the Down syndrome and autistic children. A MANOVA

Table 2. Means (and standard deviations) for categories of adjacent speech for autistic and Down syndrome subjects

	Autistic		Down Syndrome	
	M	(S.D.)	*M*	(S.D.)
Non-contingent	20.1*	(5.6)	14.6	(7.1)
Contingent	38.1	(13.3)	48.5	(15.5)
Imitation	16.1	(12.8)	14.9	(10.6)

*Percentage of total intelligible utterances.

on arcsin-transformed data yielded a significant interaction effect between group and contingency variables [$F(2, 45) = 6.48, p < .005$], and there were significant univariate effects on contingent responses [$F(1, 46) = 5.71, p < .03$] and non-contingent responses [$F(1, 46) = 7.4, p < .01$], confirming that the Down syndrome children were more contingent in their speech than the autistic children. There were no significant univariate effects on imitation [$F(1, 46) = 0.01$].

The final level of analysis focused on the ways in which the children maintained the ongoing topic of discourse. Children could reply in a topic-related way to their mother's prior utterance in a variety of ways, including imitation and nine different categories of contingent responses. Of these, five categories were identified as not adding significant new information: yes/no, routine, recode, self-recode, and wh-response. According to Bloom *et al.* (1976) imitation should also be included as a category of topic-related responding that adds no new information. The other four categories did provide new information to the ongoing topic of discourse, including expansion, self-expansion, alternative and expatiation. Bloom *et al.* (1976) found that the latter group, particularly expansions, were the most important developmentally. In general, as children's MLU grew, they were more likely to respond contingently by adding new information.

Table 3 presents the data from the autistic and Down syndrome children for the categories of topic-related responses that do, and do not, add new information. Figure 3 presents a developmental summary of these two sets of responses. Across these sets of response categories, autistic children did not appear to change with growth in MLU. This contrasts sharply with the Down syndrome children who, like normal children, showed a general increase in topic-related responses that add new information, as they became more advanced linguistically. Among specific categories of responses that do not add information, autistic children only showed declines over time in imitation, while the Down syndrome children declined in imitation and wh-responses. None of the categories of responses that add new information increased over time

Table 3. Means (and standard deviations) for categories of topic-related responses for autistic and Down syndrome children

	Autistic		Down Syndrome	
	M	(S.D.)	*M*	(S.D.)
No new information				
Yes/No	12.2*	(10.4)	27.9	(15.5)
Routine	7.9	(6.6)	2.9	(2.7)
Recode	5.3	(2.6)	4.5	(2.4)
Self-recode	4.1	(3.2)	2.9	(2.0)
Wh-response	29.3	(9.9)	14.3	(8.3)
Imitation	28.9	(17.8)	24.8	(19.1)
New information				
Expansion	7.8	(4.5)	16.6	(10.2)
Self-expansion	2.2	(2.1)	2.3	(1.8)
Alternative	1.9	(2.7)	3.2	(2.1)
Expatiation	0.3	(0.8)	0.7	(0.9)

*Percentage of topic-related adjacent utterances.

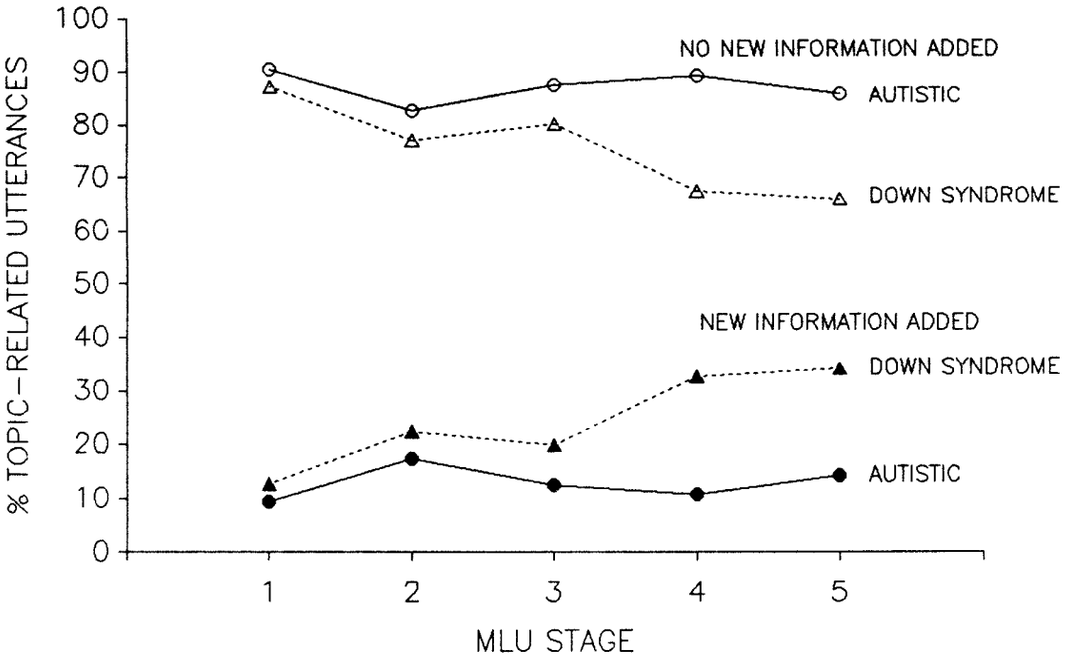

Fig. 3. Distribution of topic-related utterances that do and do not add new information.

for autistic children, whereas the Down syndrome children showed significant increases in the use of expansions.

A MANOVA on arcsin-transformed data, comparing the two groups of children on the categories of topic-related responses that did not add new information showed a significant main effect of group: $F(1, 46) = 5.34$, $p < .03$; and an interaction effect: $F(4, 43) = 7.3$, $p < .0001$. Significant univariate effects were found for yes/no responses [$F(1, 46) = 11.96$, $p < .002$], which were more prevalent among the Down syndrome children, and for Wh-responses [$F(1, 46) = 9.68$, $p < .004$] and routines [$F(1, 46) = 10.97$, $p < .002$], which were more prevalent among the autistic children.

The MANOVA comparing the groups on responses that did add new information found a significant main effect for group [$F(1, 46) = 8.06$, $p < .007$], but the interaction was not significant [$F(3, 44) = 2.0$]. Significant univariate effects on expansions [$F(1,46) = 6.33$, $p < .02$] and expatiations [$F(1, 46) = 5.31$, $p < .03$] were found, indicating that these categories were more prevalent among the Down syndrome children. No significant differences were found in the children's uses of alternatives and self-expansions, which were very infrequent among all the subjects.

Discussion

The findings from this study are quite revealing about the ways in which autistic children compare to other populations of children in the acquisition of discourse skills. We found evidence that when autistic children interact with their mothers, they look quite similar to both Down syndrome and normally developing children who are at the same levels of language development, for certain aspects of conversational skill, especially at the early stages. On the other hand, those autistic children whose language advanced more begin to look different from the control groups in quite significant

ways. While the numbers of subjects within each of the groups represented in this study are small, we found fairly consistent developmental patterns. Nevertheless, we need to be cautious about the conclusions to be drawn, given the limitations in sample sizes.

In certain respects, for example, turn-taking ability, autistic children are no different from Down syndrome children: there are no differences in their use of adjacent utterances (cf. Paccia-Cooper *et al.*, 1981; Tager-Flusberg, 1982). Moreover, at the early stages of language development, when MLU is less than 2.0, autistic children are also similar in contingent topic-related discourse, and even in their use of particular categories of contingent discourse. Here, then, we have evidence that high-functioning autistic children who are beginning to learn how to speak may not be particularly impaired in these aspects of their discourse abilities, at least when they are interacting with their mothers in a highly familiar environment.

Significant differences between the groups of children emerge at later stages of linguistic development. The patterns of development for normal and Down syndrome children show that, while there are no changes in the proportion of speech that is adjacent to their conversational partner's, as structural aspects of their language advance these children become more contingent in their speech, indicating that they are more able to maintain an established topic of conversation. The Down syndrome children appear to be even more adjacent and contingent than language-matched normally developing children, which supports the impression these children give for being very sociable and interactive. Furthermore, as their language advances, both normal and Down syndrome children increase in their use of expansions and other categories of topic-related discourse that add new information; thus they contribute more novel and substantive material to the ongoing discussion. Thus, developmentally we see that normal and Down syndrome children change the content of their communications, telling more interesting and novel information to their mothers.

In sharp contrast, we see from Figs 2 and 3 that the autistic children show no such developmental changes. Their developmental patterns are essentially flat: advances in structural aspects of language are not paralleled by advances in discourse abilities. This lack of developmental change means that, as their language advances, autistic children look increasingly more different from both normal and Down syndrome children in both the content and style of their communications.

These significant differences between autistic children and other populations, that emerge at later linguistic stages, are particularly striking when we look at the ways in which the children maintain the conversational topic. Autistic children do not begin adding new information to the topic of discourse by expanding, challenging, or introducing new related topics. Instead, the data on differences in the use of various categories of contingent discourse suggest that autistic children continue relying on developmentally primitive ways of maintaining a topic, such as routines, recodings, and simple responses to test questions, even though they may have acquired the linguistic ability to contribute to the conversation in more interesting and advanced ways. In other words, structurally their language becomes more sophisticated while its content does not change. The relative paucity of expansions and other categories of discourse that add new information to the ongoing topic suggests that autistic children

do not develop the understanding that they can be a source of new knowledge for their mothers.

How might such a problem in learning to converse in more advanced ways by relating novel information connect to other deficits of autistic children? One current hypothesis is that autistic children are significantly impaired in the acquisition of a so-called "theory of mind" (Baron-Cohen *et al.*, 1985; Frith, 1989); that is, they have particular deficits in understanding mental states, both their own and others'. A number of experiments provide considerable support for this view (e.g. Baron-Cohen, 1989a,b; Baron-Cohen *et al.*, 1985, 1986; Leslie & Frith, 1988; Perner, Frith, Leslie & Leekam, 1989), which is of special importance in that this proposal has the potential to directly link the social, cognitive and language deficits that are specific to autism (cf. Baron-Cohen, 1988; Leslie, 1987). These studies have found that autistic children are deficient in a number of different domains which reflect a developing theory of mind, for example, conceiving false beliefs (Baron-Cohen *et al.*, 1985, 1986), distinguishing mental and physical entities, or appearance and reality (Baron-Cohen, 1989b), and understanding sources of knowledge (Leslie & Frith, 1988; Perner *et al.*, 1989).

A child who does not understand that people have mental states would not appreciate that various people can have access to different information or knowledge. On this view, then, autistic children may fail to realize that they know something that their mother does not and that they could inform her of something new. Such an impairment would lead to serious disturbances in communication, as has been hypothesized by Frith (1989). This particular interpretation about the source of autistic children's communicative problems is consistent with the specific pattern of results that we found in this study. Thus, the clearest difference to emerge between our autistic and Down syndrome children was that the autistic children failed to develop those categories of discourse that add new information to the topic of discourse, supporting the view that their conversational impairment stems from a lack of knowledge that people communicate by exchanging information, or indeed, that people have access to different information.

There is, we believe, a direct relationship between the particular deficits in discourse ability that we identified in this study, and the proposed deficit in autism in developing a theory of mind. Even before the age when normal children acquire a rich understanding of false belief, appearance–reality, and sources of knowledge, their language demonstrates the acquisition, at the least, of an 'implicit' theory of mind (Bretherton & Beeghly, 1982; Feldman, 1988; Shatz, Wellman & Silber, 1983). Our data suggest that autistic children show specific impairments even at these early stages in acquiring the conceptual understanding of mental states in themselves and other people which show up in the paucity of the content of their communications. Future research will need to focus on the roots of these problems and other ways in which the language deficits in autistic children might be linked to deficits in acquiring a theory of mind.

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