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Conversations with Autistic Children: Contingent Relationships Between Features of Adult Input and Children's Response Adequacy[1]

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The relationship between certain features of adult speech and autistic children's response adequacy was examined within the context of unstructured, dyadic conversations. On separate sessions, four verbal, nonecholalic children were observed talking with their mothers and teachers. Analysis of conversational turns showed that as the number of facilitating features contained in adults' eliciting utterances increased, the proportion of adequate replies from the children increased. In this analysis, facilitating features included the use of Yes/No questions, questions that were conceptually simple, and questions that were semantically contingent on the child's topic. In a further analysis, it was found that adults tended to modify their use of these features in response to child feedback, although this tendency was relatively small and observed only in a minority of the sequences evaluated. The findings are discussed in terms of pragmatic deficits associated with autism and implications for intervention with this population.

There is general consensus among clinicians and researchers that severe communication deficits constitute one of the major features of the autistic syndrome. Since Kanner's (1943) initial description some 40 years ago, such

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children have been variously described as socially withdrawn, aloof, and unresponsive, and further, even when drawn into social interchange, they tend to exhibit bizarre and inappropriate verbal behavior. While many research studies have identified selective language deficits in this population, it is only recently that pragmatic aspects of autistic language have received any systematic empirical study. Some recent work in this area has been aimed at evaluating whether deficits in autistic children's use of language exist over and above their knowledge of its structural properties (i.e., phonology, semantics, and syntax). For example, through a discourse analysis, Baltaxe (1977) demonstrated that high-functioning autistic adolescents who were capable of producing grammatically well-formed utterances nevertheless showed deficiencies in their ability to conduct meaningful coherent conversations with adults. Other investigators have reported that autistic children's adherence to more basic, turn-taking rules in discourse is impaired relative to nonautistic children who were matched on measures of structural linguistic ability. For example, Ball (1978) found that autistic children's conversations with an adult contained over three times more non sequiturs than conversations of normal or aphasic children. Similar results have been reported by Tager-Flusberg (1981), Paccia-Cooper, Curcio, and Sacharko (1981), and Piserchia and Curcio (1980), all based on comparisons of normal and autistic language. Additionally, in the latter two studies autistics were more likely than normals not to respond at all to adult queries within these conversational settings.

While these studies document the presence of severe pragmatic deficits relative to other aspects of language in this population, they leave unanswered the question of *why* such children function poorly in conversational exchanges. In this regard, it is useful to note that the autistic child's language is not always conversationally inadequate. For example, the autistic children in Tager-Flusberg's (1981) study were found to respond adequately to an adult's question about half of the time. In fact, in all of the studies previously noted, the autistic children shifted between adequate and inadequate responding during the course of the conversation, at times responding adequately to an adult's question and at other times responding inadequately.

The primary aim of this study was to evaluate whether such moment-to-moment variation in a given child's response adequacy during natural conversational exchanges could be accounted for by corresponding variation in features of the child's linguistic environment, i.e., the adult speech that is directed to him or her. It is now rather well established that adults simplify their speech in terms of several features when talking to young normal children (e.g., Snow, 1972; Cross, 1977) or those who are linguistically impaired (Cantwell, Baker, & Rutter, 1977; Cramblitt & Siegel, 1977; Lord, Merrin, Vest, & Kelly, 1983; Pratt, Bumstead, & Raynes, 1976). Further, evidence from

normal and mentally retarded children suggests that at least some of these adjustments have a facilitative effect on aspects of the child's language functioning. For example, an accelerated rate of language development appears to be associated with a maternal style that incorporates a high proportion of Yes/No questions (Furrow, Nelson, & Benedict, 1979) and utterances that are semantically contingent on the child's speech (Cross, 1978). Of particular relevance to the present study, the recent work by Blank and Franklin (1980) has demonstrated that, *within,* a conversation, the adequacy of young children's replies is systematically related to certain features in the immediately preceding adult utterance, in this case, the complexity of the concepts it encodes.

On the basis of these various studies of input language, three features of adult queries to autistic children during conversation were selected for study: its syntactic form (i.e., Yes/No vs. Wh questions), the complexity of the concepts it contained, and whether it was semantically related to the child's previous conversational turn. It was hypothesized that children would find it easier to respond to adult utterances which called for clearly specified, automatic forms of responding (i.e., "yes" and "no"), which were conceptually simple, and which were contingent on a topic of conversation already established by the child. It was further reasoned that the influence of these features would be additive in nature, such that appropriate responding would occur most often when most or all of these facilitating or "positive" features were present in adult's eliciting utterances, and increasingly less often to adult utterances that contained fewer of these features.

In order to evaluate the generality of the hypothesized relationships, conversations of autistic children with two familiar adults, their mothers and primary teachers, were recorded on separate occasions and analyzed. Several studies have shown significant variations in the language behavior of normal (Scott & Taylor, 1978) and atypical children (Bernard-Opitz, 1982; Kramer, James, & Saxman, 1979) when talking to mothers versus trained professionals; however, none of this research has looked at the kinds of contingent relationships hypothesized to occur in the present study. Therefore, this aspect of the research was considered exploratory in nature; no specific predictions were made concerning differences in child responding to different conversational partners.

Besides investigating the relationship between adult initiations and child responsiveness, a complementary aim of this study was to evaluate the converse of this relationship, i.e., adult responses to aspects of children's speech. There is ample evidence that children's responsiveness exerts an influence on adult behavior in social contexts (Bugental, Caporael, & Skennum, 1980; Cantor & Gelfand, 1977) and that these influences extend to adult verbal behavior (e.g., Bohannon & Marquis, 1977), such that adults tend to simplify the speech they address to a child following evidence of noncomprehension.

This kind of continuous monitoring of child feedback, aside from encouraging adults to use more simplified language when talking to young children, would also appear to facilitate a sustained, coherent dialogue between conversational partners. In terms of the present study, it was hypothesized that when faced with a non sequitur or a failure to respond, adults would attempt to elicit more appropriate child responding by simplifying their subsequent utterance relative to their inital utterance. Given the adult features examined here, this was interpreted to mean shifts to subsequent utterances which were more often phrased in the form of a Yes/No question and which were conceptually simple. This analysis was based on the same conversations used in examining the adult–child sequences outlined under the first hypothesis, and so the sensitivity of mothers versus teachers to child feedback was also compared. As in the first analysis, no specific predictions were made regarding mother–teacher differences.

METHOD

Subjects

The subjects were four boys recruited from a school for severely disturbed children their four mothers, and four female primary school teachers. The chronological ages of the children were 7 years 4 months, 7 years 7 months, 11 years, and 12 years 8 months ($\overline{X}$ = 9 years 8 months). On the basis of diagnostic records and current teacher evaluation, all children manifested characteristics consonant with a diagnosis of autism according to the criteria described by Rutter (1978): (1) age of onset prior to 30 months, (2) impaired social development in relating to people and events, (3) disturbance of language and cognitive skills, and (4) insistence on sameness (e.g., ritualistic behavior, adherence to routines).

Estimates of the children's verbal IQ, based upon the WISC-R or Peabody Picture Vocabulary Test, ranged from 47 to 70. All children were regularly producing multiword utterances of a generative, nonecholalic nature. Their expressive speech, indexed by Lee's Developmental Sentence Scoring (DSS) system, ranged from 3.9 to 5.2 ($\overline{X}$ = 4.8). These scores placed the group somewhat below the overall median performance of 6.2, achieved by normal 3½- to 4-year-old children (Lee & Canter, 1971).

Procedure

Dyadic conversations between each child and his mother and teacher were audiotaped during separate sessions scheduled on different days. The conversations took place in a quiet, familiar setting during lunch or snack

time and were recorded using a small, unobtrusive cassette recorder and remote, directional microphone. Teacher–child conversations were recorded at the child's school; those with the mother were recorded at the child's home. In all sessions, only the child, the adult, and an experimenter were present. Adults were informed that the study was designed to look at spontaneous conversation between adults and children with severe language disorders and that therefore, they should try to keep their speech to the children as natural as possible. To minimize the presence of a silent, passive observer on spontaneous exchanges, the researcher acted more like a "visitor" who occasionally participated in ongoing activity and conversation. The fact that the lunch or snack time situation was task-oriented, familiar, and routine seemed to foster natural exchanges, mostly dealing with requests and comments about food. The length of the conversations ranged from 13 to 35 minutes.

The taped conversations between each child and his mother and teacher were transcribed and divided into conversational turn units, defined as an adult utterance followed by either a child utterance or a failure to respond. Conversational exchanges containing the researcher's utterances were deleted from the transcripts. Response failures on the part of the child were scored when more than 2 seconds elapsed between successive adult utterances. The 2-second criterion was derived from Jaffe and Feldstein (1970), who found that replies in a conversation, if they occur at all, usually occur within 2 seconds of an eliciting response. On occasions where the adult produced two or more utterances in succession that were syntactically distinct, but not separated by pauses of at least 2 seconds, only the last utterance in the series was coded and subsequently analyzed.

The present analyses were limited to adult utterances containing an explicit request for a verbal response. Adult comments, directives, and incomplete utterances were not included. Within the class of requests, only Wh and Yes/No questions were examined. Adult requests for clarification or confirmation, simple either/or questions, and partial sentences provided by the adult that the chid was expected to complete were not evaluated.

The conceptual complexity of each Wh or Yes/No question was evaluated according to the nature of the concepts it contained, borrowing from a system proposed by Blank and Franklin (1980). Turns encoding actual perceptual experiences were categorized as conceptually concrete (corresponding to Blank & Franklin's levels 1 and 2), while those referring to internal states or abstract ideas were coded as conceptually abstract (corresponding to Blank & Franklin's levels 3 and 4). Included in the "concrete" category were turns that served to label objects and actions, note attributes or locations of objects, or describe events and activities, either in reference to some aspect of the ongoing interactive situation or else outside of the immediate discourse setting. "Abstract" turns, which went beyond mere description of experience and instead involved some degree of inferencing or

reasoning, included references to subjective states and feelings, such as expressions of emotion, introspection, and self-awareness, and taking another's perspective. Also scored as conceptually abstract were utterances that involved inferences concerning the external, objective world. These included references to social norms and conventions, explanations of events or how or why things work, predictions, comparisons, generalizations, and definitions. Again, for turns containing multiple utterances that differed in terms of conceptual level, coding was applied to the turn-final utterance.

The adult questions were also evaluated in a binary system in terms of their semantic contingency with the child's antecedent turn. Those questions that incorporated at least one of the constituents contained in the child's previous utterance were judged as contingent. For example, following the child utterance "I want to play with the tape recorder," adult utterances such as "Where is *it*?" or "Would you rather *play* with this toy instead?" were considered contingent. On the other hand, adult utterances which may have been motivated by the child's utterance but which did not semantically code, either explicitly or implicitly, any aspect of it were scored as noncontingent. These criteria were applied only to adult speech up to three turns removed from an antecedent child utterance. Thus, adult turns occurring after an interval of silence on the part of the child lasting longer than three adult turns were scored as noncontingent, regardless of their connection to the child's earlier speech.

Children's responses to adult Wh and Yes/No questions were coded as adequate or inadequate. Inadequate responses included response failures, as defined above, and inappropriate verbal responses. The latter included jargon, echoes, perseverations, and any other type of non sequitur. Adequate responses were scored when the child's utterance served to meet the conversational requirements of the adult's question or when the child requested clarification.

The reliability of the coded data for adult and child was determined as follows. For each of the eight conversations, a random two-page stretch of transcribed dialogue, corresponding to approximately 10 to 20% of the conversational data for each dyad, was independently coded by a second examiner for each of the four categories described above. These data were then compared with the corresponding data coded by the first examiner and the percentages of interrater agreement for each category were calculated separately by dyad. Averaged across all four categories and eight dyads, an overall reliability index of 94% was obtained, with the individual coefficients ranging from a low of 82% to a high of 100%. Table I contains a transcript of one portion of a conversation, in this case between a child and his mother, along with scoring for each of the three features of adult questions and for child responding.

Table I. Sample Transcript and Scoring of Adult–Child Conversation in Terms of Three Features of Adult Utterances and Adequacy of the Child's Response

Adult features				
Contingency to child's topic	Conceptual complexity	Question type	Mother	Child
			Now let me see you eat some peanut butter and jelly. So what else can you tell Michelle about?	(Child is eating lunch)
Not contingent	Complex	Wh	What else have you been doing?	(No response; inadequate)
Not contingent	Complex	Yes/No	Did you do anything else that was fun besides going to the movie?	
				The Great Muppet Caper (inadequate response)
			Yeah, but something else. You told us about that already.	
Not contingent	Simple	Wh	Where did you play with Dad the other night?	(No response; inadequate)
Not contingent	Simple	Yes/No	Did you play golf?	Yeh. I played golf. (adequate response)
Contingent	Simple	Wh	And what did you do at golf?	I swunged. (adequate response)
Contingent	Simple	Wh	Who was the winner?	Me. (adequate response)

RESULTS

To address the primary hypothesis of this study regarding the relationship between adult eliciting speech and adequacy of the child's subsequent response, the number of positive features in Wh and Yes/No adult questions were tallied for each of the eight dyadic conversations. As an example, the first scored adult utterance shown in Table I contains no positive features since it was not a Yes/No question, it was not conceptually simple, nor was it contingent on the topic established by the child's antecedent turn. The next scored utterance contained one positive feature, i.e., it is a Yes/No question; however, it is neither conceptually simple nor contingent to the child's topic. Across all conversations, a total of 1,115 adult requests for a verbal response were observed, of which 68% were either Wh or Yes/No questions. Of these, 22% contained no positive features while 47%, 28%, and 3% contained one, two, and three positive features, respectively. Since there were so few utterances with three features, they were combined with two-feature utterances for purposes of analysis.

The percent of adequate child responding to 0, 1, or ⅔ features in adult questions is given in Figure 1 for each of the eight conversations separately. Thus, for example, for Child A with his mother these percentages are 18, 62, and 80, respectively. Inspection of Figure 1 suggests that increases in adequate responding accompany increases in the number of faciliating features contained in adults' eliciting questions. A 3(0-1-⅔ features) × 2(mother-teacher) repeated-measures analysis of variance was applied to these data. The number-of-features variable was significant ($F(2, 6) = 14.01, p < .01$), but the mother-teacher variable and interaction were not significant ($F < 1.0$). The mean percent of adequate child responding was 27% for zero features, 44% for one feature, and 60% for ⅔ features.

To evaluate feedback effects from child to adult, three-turn sequences were selected that consisted of two successive adult Wh or Yes/No questions preceding and following an intervening child turn. These three-part, adult-child-adult sequences were used to evaluate whether adults modified the number of positive features in the *second* utterance as a function of the child's response to the *initial* adult utterance in the sequence. Throughout all conversations, a total of 385 of these question sequences occurred; 225 contained an intervening inadequate child response and the remaining 160 contained an adequate response. Adult modifications from the first to the third utterance in the series were divided into three categories: those reflecting an increase in the number of positive features, those reflecting a decrease, and those reflecting no change. An example of a sequence falling into the first of these categories would be as follows:

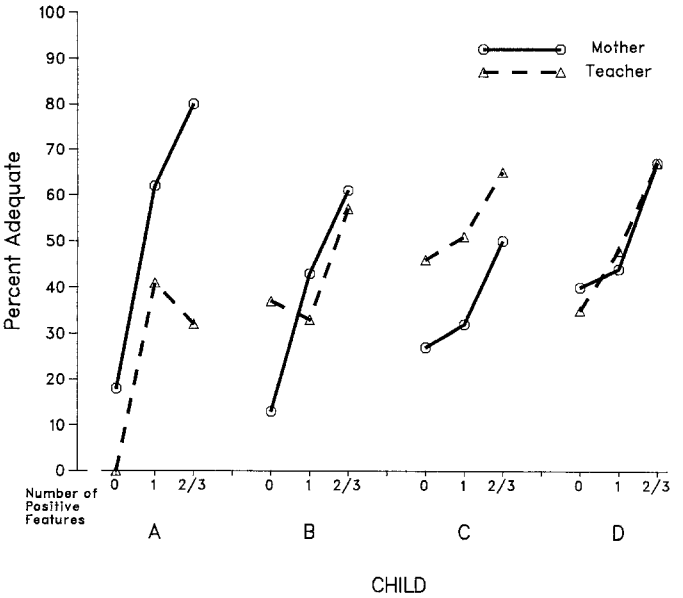

Fig. 1. Percent adequate responding for four children as a function of number of positive features contained in mother's and teacher's eliciting questions.

Adult: "How did you hurt your fingers?"
Child: (No response)
Adult: "Did you catch your hand in the door?"

In this sequence, the adult initially posed a conceptually complex Wh question and followed it with a conceptually simple Yes/No question, thereby "simplifying" her question following the child's response failure by increasing the number of positive features it contained. In this analysis, the topic relatedness of adult utterances to the child's speech was not evaluated, since this feature of the adults' antecedent and consequent questions would be expected to remain the same when the child failed to respond on the intervening turn.

In 57% of the observed sequences, there were no changes in the number of positive features contained in adults' first and second questions; increases in positive features occurred 20% of the time and decreases occurred 23%. The overall pattern was virtually identical for mothers and teachers and therefore the mother-teacher variable was dropped from further analysis. Feedback effects from child to adult were evaluated by examining whether

the pattern of no changes, increases, and decreases was related to the child's intervening response. Figure 2 displays two patterns: for sequences where the intervening response was inadequate and for sequences where it was adequate. A 2(inadequate-adequate) × 3(increase, decrease, no change) analysis of these data yielded a significant main effect; i.e., adults were more likely not to modify their utterances than to increase or decrease the number of positive features ($F(2,6) = 25.4$, $p < .002$), and a significant interactive effect ($F(2, 6) = 27.2$, $p < .001$). Post hoc comparisons of the means depicted in Figure 2 using the Newman-Keuls procedure showed that when the child responded inadequately and the adults did modify their subsequent question, they were more likely to *increase* than decrease the number of positive features it contained ($p < .05$). In contrast, in instances where the child responded adequately to an initial adult question, adults were more likely to decrease the number of positive features contained in the ensuing question ($p < .01$), thereby escalating rather than reducing the processing demands it entailed.

DISCUSSION

The findings showed rather consistent variation in children's response adequacy as a function of the number of positive features contained in adults' eliciting utterances. At one extreme, when adult utterances contained two

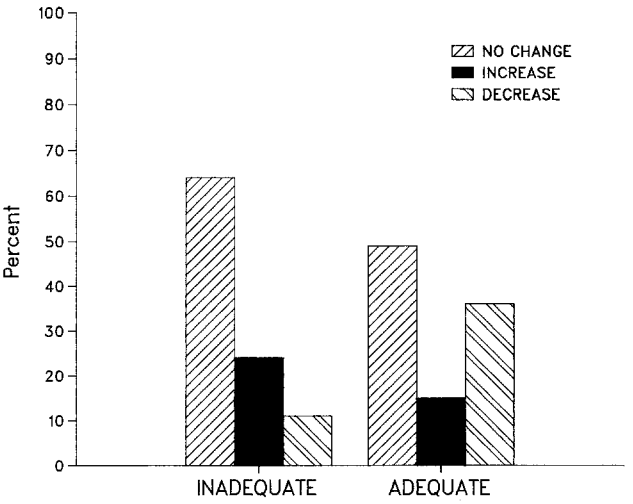

Fig. 2. Percent of no change, increase, and decrease in positive features contained in adult quesitons following inadequate and adequate child responses.

or all three positive features—i.e., a Yes/No question, low conceptual complexity, and/or topical contingency—adequate responding averaged 60%; at the other extreme, when Wh questions were posed that were high in conceptual complexity and not topically contingent, adequate responding averaged only 27%. It would appear, therefore, that a substantial portion of these children's difficulties as responder in a conversation stems from a failure to process certain information contained in adult questions. This notion is in line with previous speculation and research, where a range of processing deficits have been implicated in autistic children's communication disorders, including such factors as overselectivity (Schreibman & Lovaas, 1973), an inability to take the listener's viewpoint (Baltaxe, 1977; Schuler, 1980), and an impaired ability to structure and organize information (Clark & Rutter, 1981). Although the study was not designed to evaluate the relative merits of these various interpretations, each could plausibly account for some portion of the current findings. For example, it could be argued that an overselective mode of attending in a conversation would make it difficult for a child to shift informational "sets" when a new topic is introduced. Likewise, one would expect an increased need for externally imposed structure to result in greater difficulty with question forms where the child must generate the requested information himself rather than simply affirm or negate the truth value of information provided by the adult.

However such processing limitations are defined, the contingent relationships observed between adult and child speech were remarkably uniform across children and across different adults (cf. Figure 1). In part, the findings may reflect the relatively small, homogeneous sample used here. In a related study one of the authors (Paccia, 1985) extended the current analysis to a larger group of autistic children, more variable than the present sample in terms of such characteristics as severity of autistic disturbance, degree of intellectual impairment, and level of linguistic ability. While the same general pattern of results was obtained, significant and stable individual differences were found among the 10 children studied, both in their degree of susceptibility to variations in the adult's linguistic input and in terms of the particular features of adult speech that were most problematic.

This observation of individual differences notwithstanding, the demonstrated interaction between specific behavioral inadequacies and particular features of the child's linguistic environment raise interesting implications for language intervention with many autistic children who, in spite of a basic capacity for generative speech, often fail to use language appropriately. Since an individual child's variation within a conversation is related to certain features of adult speech, perhaps intervention that increases adults' use of these features will lead to overall improvements in conversational adequacy, particularly for those children who are observed to be strongly susceptible to this type of influence. There was some evidence in this study that

adults do make an attempt to adjust the processing demands entailed in their speech by modifying the number of positive features following feedback of noncomprehension from the child (cf. Figure 2). However, this tendency held for only a small portion of the data. In 64% of the observed instances, the adults did not simplify their subsequent utterance following an inadequate reply from the child. In other words, from a purely quantitative appraisal of the interaction, there seem to be many missed opportunities for adults to simplify their questions when children evidence a lapse in their turn.

Such an approach to intervention is consistent with the emerging clinical trend in the field of linguistic pragmatics, wherein the aim is to stimulate the appropriate use of language in a natural way by altering the child's linguistic environment (e.g., Hart & Rogers-Warren, 1978; Beisler & Tsai, 1983), rather than attempting to equip the child with a set of language skills via more traditional operant training techniques (e.g., Lovaas, 1977). Whether adults can be taught to modify their speech in the rather specific ways indicated by the present study, whether they can do so in a natural style, and whether such intervention can assist autistic children to be more responsive and appropriate in talking with others are questions that are being addressed in the authors' current program of research.

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