TEACHING AUTISTIC CHILDREN CONVERSATIONAL SPEECH USING VIDEO MODELING

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We assessed the effects of video modeling on acquisition and generalization of conversational skills among autistic children. Three autistic boys observed videotaped conversations consisting of two people discussing specific toys. When criterion for learning was met, generalization of conversational skills was assessed with untrained topics of conversation; new stimuli (toys); unfamiliar persons, siblings, and autistic peers; and other settings. The results indicated that the children learned through video modeling, generalized their conversational skills, and maintained conversational speech over a 15-month period. Video modeling shows much promise as a rapid and effective procedure for teaching complex verbal skills such as conversational speech.
DESCRIPTORS: autism, conversational speech, video modeling, modeling

Speaking with an autistic child has been likened to "holding a conversation with a well-programmed computer" (Ricks & Wing, 1975, p. 208). Verbal autistic children may benefit from learning the basic components of conversational speech, including asking questions, providing contextually appropriate statements, and taking turns to speak.

Recently, researchers have begun to address the teaching of conversational speech to handicapped populations (Haring, Roger, Lee, Breen, & Gaylord-Ross, 1986). Much of this literature has focused on teaching question asking to retarded (Twardosz & Baer, 1973; Warren, Baxter, An-

derson, Marshall, & Baer, 1981) and autistic (Hung, 1977) individuals. Question asking, however, has been studied as an isolated skill and not in the context of a conversation in which reciprocal interactions must be taught. Additionally, generalization and maintenance have often been weak.

Modeling is one procedure that has shown promise for addressing the concerns of acquisition as well as generalization for autistic children. Coleman and Stedman (1974) taught an autistic girl appropriate voice volume and expressive labels through peer modeling. Charlop, Schreibman, and Tryon (1983) demonstrated that modeling procedures, which involved a loosely structured teaching situation, produced greater generalization of receptive labeling skills across settings and persons than did traditional discrete-trial procedures. Charlop et al. (1983) also suggested that modeling can serve as a cost-efficient and convenient teaching tool.

The cost efficiency of modeling may be enhanced through the use of video procedures. Haring, Kennedy, Adams, and Pitts-Conway (1987) provided initial evidence of the efficacy of video modeling in teaching generalization of purchasing skills with autistic adolescents. Video modeling may also be an appropriate medium to teach speech skills to autistic children.

In the present study, we assessed (a) the effects

of video modeling on acquisition of conversation skills, (b) generalization of these skills across persons, settings, stimuli, and topics of conversation, (c) maintenance of treatment gains, and (d) concomitant changes in the children's appropriate question asking and in spontaneous variation of their speech.

METHOD

Participants

Three boys attending an after-school program for autistic children participated in this study. The children were diagnosed according to the National Society for Autistic Children's criteria (Ritvo & Freeman, 1978) and the DSM III (American Psychiatric Association, 1982). All children were verbal and could answer simple questions, generally in three- or four-word phrases. They were considered to be high functioning as demonstrated by their mental ages, presence of speech, and evidence of some social skills. However, they seldom asked questions, engaged in spontaneous speech, or maintained a conversation. Additionally, the children had a history of failing to generalize newly acquired speech skills. Despite numerous efforts to teach conversational speech through traditional prompting and reinforcement procedures by the children's teachers, speech therapists, parents, and the after-school program's staff, the children had failed to acquire such skills.

Child 1 was 7 years, 6 months old with a mental age of 3 years, 10 months as derived from the Slosson Intelligence Test. He displayed appropriate expressive and receptive speech but also exhibited immediate and delayed echolalia and inappropriate intonation. Most of his limited spontaneous speech centered around specific objects such as toilets, lawn mowers, and a certain type of automobile. His receptive vocabulary age equivalent was estimated to be 4 years, 5 months as derived from the Peabody Picture Vocabulary Test. He displayed self-stimulatory behavior of eye blinking, twisting hair, and waving objects in front of his eyes.

Child 2 was 6 years, 10 months old with a mental age of 4 years, 7 months as derived from the Peabody Picture Vocabulary Test. He generally spoke in full sentences but displayed poor intonation and articulation. Most of his speech was perseverative, involving leaves, trees, and pine cones. He was frequently noncompliant. His age-equivalent scores were estimated to be 6 years, 4 months on the Expressive One-Word Vocabulary Test and 3 years, 3 months on the Test of Auditory Comprehension of Language.

Child 3 was 7 years, 10 months old with a mental age estimated to be 6 years, 6 months as derived from the Leiter International Performance Scale. He displayed appropriate receptive and expressive speech but also exhibited immediate and delayed echolalia. His expressive speech consisted primarily of previously acquired responses such as answers to common questions (e.g., "What's your name?") and requests for desired items (e.g., "I want cookie."). Child 3 frequently engaged in self-stimulatory and off-task behaviors, such as finger rubbing, hand flapping, and inappropriate laughter.

Materials

Conversations. Five scripted conversations (Conversations A through E) on the topic of specific toys were developed to assess whether each child could hold a brief conversation. (Conversations and a list of stimuli used for each child can be obtained from the authors.) Each of the five conversations had a corresponding version (A' through E') identical to the original except for the object of discussion (specific toys) (see Table 1). These corresponding versions were used to test for stimulus generalization. In addition, two abstract conversations (Abstract 1 and 2) that did not include physical referents as topics of conversation were also presented (see Table 1). Each conversation consisted of three lines for the child and four lines for the conversant so that the child's last question would be answered. All lines consisted of both answering and then asking a question (except for the first line of each conversation, which consisted of only a question). Specific topics of conversation varied across children because of individual preferences for toys. Toy preference was determined by parental

report and the child's verbal requests during his after-school program. For example, Conversation A for Child 1 was about dinosaurs, whereas Conversation A for Child 2 was about Disney characters. For conversations used with more than 1 child, the order of presentation was varied across children to control for order effects. That is, Conversation B for Child 1 was presented as Conversation D for Child 2.

Videotapes. A videotape for each of the conversations was created and consisted of two familiar adults engaging in the particular conversation. Different adults were featured in each videotape. The adults were facing the camera and held the pertinent toys as they modeled the conversation by taking turns in saying their lines. The average length of each videotaped conversation was 45 s.

Settings

Baseline and generalization probes were presented in the training setting and in two generalization settings. The training setting consisted of a work room (2.9 m by 2.9 m) at the children's after-school program. The room contained two child-sized chairs, a small table, and a toy chest. When video modeling was presented in this setting, a VHS recorder and 19-in. color television monitor were brought into the room. The two generalization settings consisted of an outdoor grassy yard area and the child's living room at home.

Design

A multiple baseline design across children for Conversations A and B (with the therapist) and within subjects across Conversations A and B was used. In addition, a multiple probe design across conversations (Conversation B through Abstract 2) for each child was used. Baseline data on the children's performance on all conversations were collected in the training setting. Baseline data were also collected for Conversations A and B in all generalization probe settings except for the probe with an autistic peer (described later). Then, video modeling was presented in the training setting. Finally, after acquisition criterion was met, generalization probes were presented.

Table 1
Examples of Conversations

Conversation A	
Therapist:	What do you have?
Child:	A box. Are you holding something?
Therapist:	Yes, a box. What's in your box?
Child:	A ball. Is there something in your box?
Therapist:	Yes, a puppet. Do you want to play with the toys?
Child:	Yes. Can I play with the puppet?
Therapist:	Yes.
Conversation A'	
Therapist:	What do you have?
Child:	A barrel. Are you holding something?
Therapist:	Yes, a barrel. What's in your barrel?
Child:	A duck. Is there something in your barrel?
Therapist:	Yes, bubbles. Do you want to play with the toys?
Child:	Yes. Can I play with the bubbles?
Therapist:	Yes.
Abstract 1	
Therapist:	How are you?
Child:	Fine. How are you?
Therapist:	Fine. Did you have fun at school today?
Child:	Yes. What did you do at school today?
Therapist:	Read. What did you do at school today?
Child:	A puzzle/colored. What's the name of your school?
Therapist:	Claremont.
Abstract 2	
Therapist:	Do you like to swim?
Child:	Yes. Do you swim?
Therapist:	Yes. What do you wear when you swim?
Child:	A bathing suit. Where do you swim?
Therapist:	Claremont. Do you play with beach balls?
Child:	Yes. Do you like rafts?
Therapist:	Yes.

Procedure

Baseline. Conversational speech was assessed by attempting to engage the child in the specific conversations. The child and therapist/conversant held the specific toys related to the particular topic of conversation and the therapist presented the first line (a question). The therapist waited 10 s for the child to answer the question and then ask a contextually appropriate question. It was anticipated

that this 10-s time delay would help occasion the response (Charlop, Schreibman, & Thibodeau, 1985; Touchette, 1971). The conversant continued by saying the next line (an answer and then a question) of the conversation even if the child did not ask a question. A response was considered correct if the child said the line of the predetermined conversation or any other contextually appropriate statement consisting of an answer *and* a question. If a novel response was provided by the child, the conversant answered appropriately and encouraged any appropriate conversational speech by continuing along the topic proposed by the child. All such responses, although they seldom occurred during baseline, were recorded as correct.

Appropriate responses were acknowledged in a manner that may naturally occur in conversations, such as "Yeah," "Uh-huh," and "That's right," in order to encourage the child to continue talking. Appropriate questions were reinforced with answers and with access to toys that were requested. In the training setting only, the child was given a small food reinforcer for good sitting, eye contact, and "working hard" on a variable-interval 1-min schedule. This was done to maintain the child's general responsiveness. Although few correct responses were made, a food reinforcer would have been presented if the child had completed a conversation (three of three lines). No food was provided in any of the generalization settings, either during baseline or after video modeling.

Video modeling. Prior to video presentations, the child was requested to sit quietly and watch the television. During the first video modeling session for a particular conversation, the child was presented with the videotaped conversation three times and subsequently tested to determine whether he would then hold the modeled conversation with the therapist. To begin testing, the therapist said, "Let's do the same" and then paused briefly before providing the first line of the conversation. During this test, the child and therapist were holding the same toys as the videotaped models. As in baseline, correct answers and statements were acknowledged (e.g., "Yeah," "Uh-huh"), questions were answered, and access to requested toys was provided.

If the child provided a complete conversation (three of three lines), praise (e.g., "Wow," "That's neat," "Cool") and a small food treat was presented for sitting still, attending, and talking. After one complete conversation, testing continued to assess whether the child could meet the criterion of two of three consecutive repetitions of that conversation. If criterion was not met, the video was shown only once and the child was then tested again. This procedure of showing one presentation of the videotaped conversation and subsequently testing for acquisition continued until the child met criterion.

Generalization Probes

Generalization probes were presented 2 to 5 days after acquisition criterion had been met. These probes were presented in the same manner as during baseline, with the pertinent toys and without any food treats. Sometimes the three conversations were presented on the same day, but more often, there was a 2- to 5-day period between them depending upon the child's next scheduled session at the after-school program. Criterion performance was assessed in each of the generalization settings, as described below.

Topics of conversation. Generalization to untrained topics of conversations was assessed through the use of the multiple probe design across conversations. For example, after video modeling and subsequent criterion performance on Conversation A, a probe on Conversation B was conducted to determine whether conversational speech generalized across topics or whether video modeling was needed for Conversation B. As mentioned earlier, video modeling was presented for each conversation until generalization across topics was demonstrated.

Conversants. Probes were conducted in the training setting with an adult unfamiliar to the child (Conversations A and B) and with an autistic peer (Conversations B and E) to test for generalization across persons. Dyad 1 (Children 1 and 3) and Dyad 2 (Children 1 and 2) were tested on Conversations B and E, respectively. The therapist instructed the peer, whose conversation contained the first line, to start talking to the other child. A prompt (e.g., "Johnny, say 'Do you have a truck?'")

was provided whenever either child did not ask a question, so that each child had an opportunity to respond.

Settings. Probes for Conversations A and B were conducted outdoors in a grassy yard with the therapist.

Conversants and settings. Generalization across conversants and settings for Conversations A and B was assessed with an unfamiliar person outdoors and with the child's sibling at home. Child 1's 15-year-old brother and Child 3's 13-year-old sister participated (Child 2 did not have a sibling). Siblings were instructed by their parent to start the conversations.

Stimuli. To determine whether the child's speech generalized to different stimuli (toys), probes were presented on the corresponding version of each conversation (A' through E') in the training setting with the therapist.

Abstract conversations. Probes were conducted on two abstract topics of conversation with the therapist to assess generalization of training effects to conversations without physical referents (toys). Only one conversation was conducted with Child 3 because of time constraints; also note that Child 3 did not participate in conversants and settings probes.

Maintenance. Probes were conducted with the therapist in the training setting 1, 2, 3, 6, and 15 months after criterion was met to assess maintenance of the conversations acquired from video modeling.

Ancillary Behaviors

Response variation. For all conversations with the therapist in the training setting, the number of appropriate novel (never said before in the study) responses that differed from the modeled conversations was recorded. This was done to assess diversity in the children's speech and whether spontaneous additions or changes to the modeled conversations were provided. To be scored as varied, a response had to differ from any previous response by one or more words.

Question asking. Recording of the children's speech during their biweekly sessions at the after-

school program was conducted throughout all conditions (baseline, video modeling, and generalization probes) to assess any concomitant changes in frequency of appropriate questions. A continuous record of each child's speech during an entire 1.5-hr session was obtained once a week during baseline and twice a week after video modeling was introduced, using a microcassette recorder. A question was operationally defined as a contextually appropriate verbalization that was asked with the proper intonation and that began with "is," "may," "what," "when," "where," "how," or "can." Prompted questions and questions asked when the child was engaged in the conversations related to this experiment were not included. If the child asked and answered his own question, it was not recorded as an appropriate question. If the child asked a question repetitively, only the first occurrence was recorded.

Social Validation

Ten parents of nonhandicapped elementary school-age children rated one tape of preintervention and one tape of postintervention conversations held with the therapist for Conversations A and B to assess the social importance of treatment effects. Following each conversation, ratings were obtained on seven items with a 5-point Likert-type scale (1 = strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, and 5 = strongly agree) (see Table 2). Conversations were randomly chosen for each child and presented in a counterbalanced order. The rater was not informed as to whether the conversation occurred before or after the intervention.

Interobserver Agreement

A reliability observer, behind a one-way mirror in the training setting or at an unobtrusive location in generalization settings, recorded correct and incorrect target responses. Verbal responses that deviated from the scripted response were recorded verbatim by the therapist and reliability observer. An agreement was scored if the therapist and reliability observer recorded the exact same response(s) for the trial and identically scored the

Table 2

Mean Responses and Standard Deviations for the Social Validation Questionnaire Pre- and Postintervention.

Item	Pre		Post	
	M	SD	M	SD
1. The child shows an interest in the conversation.	3.44	1.11	4.46*	0.58
2. The child shows an interest in the toys.	3.76	0.96	4.98*	0.58
3. The child seems to be paying attention.	3.18	1.15	4.42*	0.57
4. The child likes to talk.	2.72	1.18	3.54*	0.68
5. My child would like to talk with this child.	2.80	0.93	3.74*	0.74
6. My child would like to play with this child.	2.98	0.91	3.60*	0.70
7. This child's speech sounds natural.	2.28	0.91	3.12*	0.90

Scale: 1 = strongly disagree, 5 = strongly agree.
* $p < .001$.

response as correct or incorrect. Interobserver agreement was calculated by dividing the total number of agreements between the therapist and reliability observer by the total number of agreements plus disagreements and multiplying by 100. Interrater agreement was obtained for 50% of all conversations across all conditions for all children. For Children 1, 2, and 3, interobserver agreement was 97%, 99%, and 99%, respectively.

To obtain reliability for home probes, the therapist taught the child's mother to collect data by explaining how to record correct and incorrect responses and those responses that differed from the predetermined conversations. When experimenter–parent agreement was between 80% and 100% for three consecutive conversations, the mother then trained the sibling at home. Interobserver agreement was assessed between the child's mother and therapist for 10 conversations (30 responses) at the after-school program and between the child's mother and sibling for all home probes. Finally, reliability checks with the siblings and therapist were also conducted at the after-school program for three conversations. Reliability for both Child 1's mother and Child 3's mother with the therapist was 100%. Interobserver agreement for Child 1's mother and sibling and Child 3's mother and sibling was 100% and 94%, respectively. For both siblings, reliability with the therapist was 100%.

For response variation, interobserver agreement was assessed for 33% of all conversations across all conditions for all children by comparing the ther-

apist's and reliability observer's records of verbatim responses and judgments of variation. An agreement was scored, on a trial-by-trial basis, if the therapist and observer recorded the exact same response(s) after the child's answer and judged them as novel. Using the formula previously described, interobserver agreement was 99.5% for Child 1, 93% for Child 2, and 99.5% for Child 3.

For question asking, interobserver agreement was assessed on a trial-by-trial basis with each trial consisting of the question transcribed by one or the other observer. An agreement was scored if the primary and reliability observers recorded the exact same question or one that differed by one word (e.g., "May I have a cookie?" and "Can I have a cookie?"). A disagreement was scored if one observer failed to record a question that the other observer recorded. Observers were trained by reviewing the operational definition of an appropriate question, scoring a tape with the second author during which feedback was provided, and finally, scoring a tape independently to assess agreement with the second author. If an observer had to rewind the cassette more than twice to understand an utterance, the child's speech was deemed unintelligible and was omitted. Once interobserver agreement was between 80% and 100% for one 60-min tape, the observer met criterion for scoring tapes. Reliability for question asking was calculated for 33% of Child 1's speech recordings, 33% of Child 2's recordings, and 25% of Child 3's recordings, using the previously described formula.
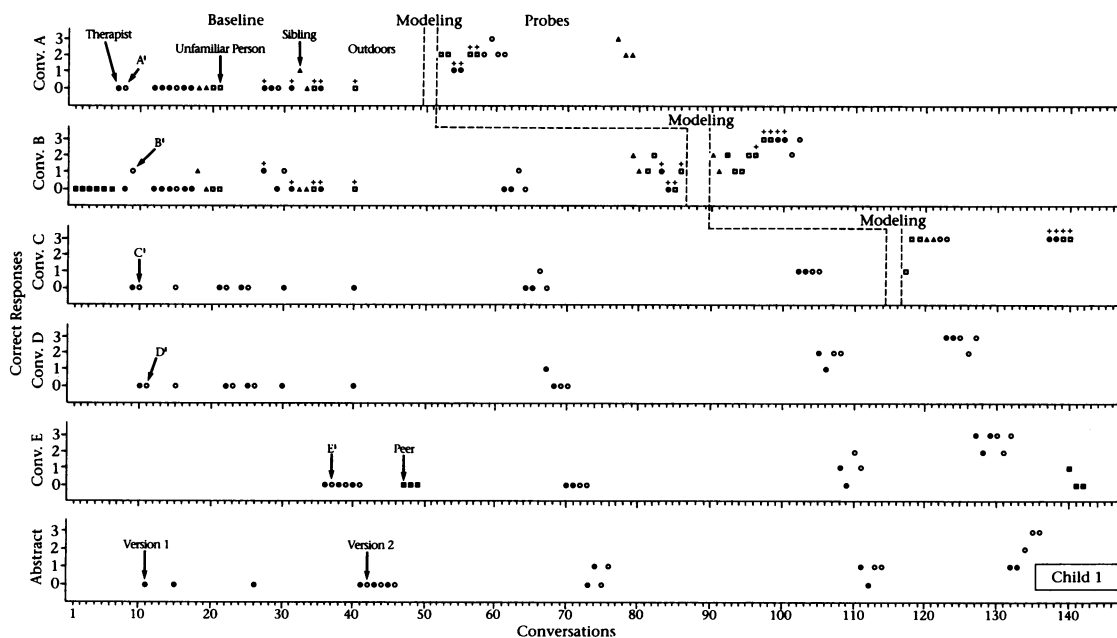
Figure 1.   Child 1's performance on conversations during baseline and probe conditions.

Interobserver agreement was 95% for Child 1, 86% for Child 2, and 87% for Child 3.

RESULTS

The results of video modeling procedures for Children 1, 2, and 3 can be seen in Figures 1, 2, and 3, respectively. (Note that modeling trials do not appear on the figures.) During baseline, Child 1 did not meet criterion on any of the conversations (see Figure 1). Child 1 met criterion performance on Conversation A after 20 presentations of the videotaped conversation. Probes for generalization across persons, settings, and topics of conversation indicated some generalized responding, although criterion responding (three of three correct responses within two of three consecutive conversations) was not met. Video modeling for Conversation B was then implemented; criterion responding occurred after only nine presentations of the videotaped conversation. Generalization probes across persons and settings for Conversation B indicated criterion performance with the therapist and an unfamiliar person outdoors, but not with the child's sibling at home or an autistic peer. Probes for generalization

to Conversation B' (generalization across stimuli) and to the remaining conversations again demonstrated some generalized responding, although criterion performance was not met. Thus, video modeling of Conversation C was introduced, and, after only four presentations of the videotaped conversation, criterion performance was met. Importantly, generalization to all other persons, settings, and conversations was demonstrated except for Abstract Conversation 1 and probes with an autistic peer.

During baseline, Child 2 did not meet criterion performance for any of the conversations (see Figure 2). Once video modeling was introduced for Conversation A, criterion was met after only three presentations of the videotaped conversation (one training session). Criterion was met in all probes for generalization to other persons, settings, and conversations except for Abstract Conversation 1, although some generalized responding occurred.

Child 3 also failed to reach criterion during baseline on any of the conversations (see Figure 3). Criterion on Conversation A was reached after only six presentations of the videotaped conversation. Generalization criterion was met with other persons, in nontraining settings, and for Conversation A',
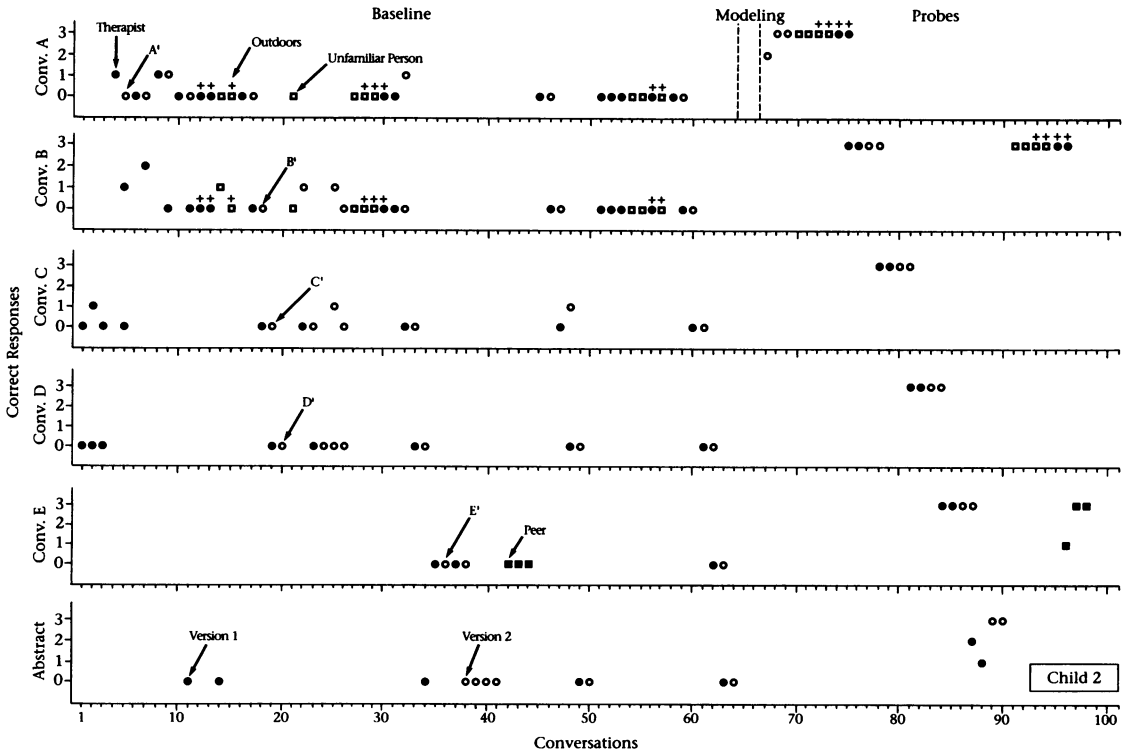
Figure 2.   Child 2's performance on conversations during baseline and probe conditions.

but not on the remaining conversations. Video modeling of Conversation B was then introduced, and, after only nine presentations of the videotaped conversation, Child 3 met criterion. Subsequent probes demonstrated criterion performance across persons, settings, and the remaining conversations except for Abstract Conversation 1, although some generalized responding was observed. Because pretreatment data for some of the conversations were not obtained, however, interpretations regarding these conversations should be made cautiously.

Follow-up probes conducted 1, 2, 3, 6, and 15 months after acquisition for the conversations that required video modeling (Conversations A, B, and C for Child 1; Conversation A for Child 2; Conversations A and B for Child 3) demonstrated maintenance effects for all children. Each child demonstrated criterion performance (two of three consecutive complete conversations) during each of the follow-up probes.

Response Variation

The number of unmodeled, new responses provided during conversations with the therapist increased for all children after video modeling was implemented. Child 1 increased his percentage of varied response from 0.7% during baseline to 17.6% during video modeling and, finally, to 27% during generalization probes. Child 2's response variation was 5.2% during baseline, 67% during video modeling, and 100% during generalization probes. Child 3's response variation also increased, from 0.9% during baseline to 6.7% during video modeling and to 13% during generalization probes.

Question Asking

Question-asking data for Children 1, 2, and 3 are presented in Figure 4. The average number of appropriate questions increased after the introduction of video modeling from 4 to 10 for Child 1,
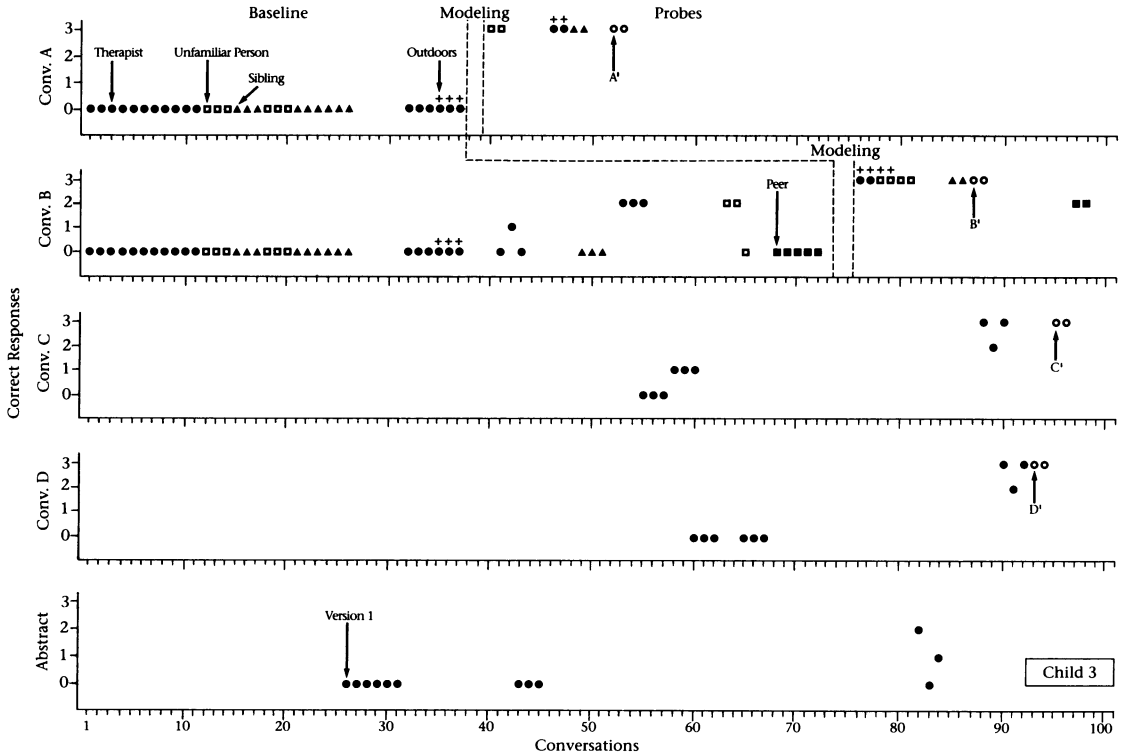
Figure 3. Child 3's performance during baseline and probe conditions.

from 4 to 30 for Child 2, and from 1 to 14 for Child 3.

Social Validation

The mean responses and standard deviations for the social validation ratings by parents of nonhandicapped children appear in Table 3. For each item, postintervention means were higher than preintervention means. These data were also analyzed using a sign test for each item across subjects and raters (Siegel, 1956). The differences between pre- and postintervention means were statistically significant ($p < .001$), suggesting that treatment effects were viewed as socially important by the raters.

DISCUSSION

Our results demonstrate the efficacy of teaching conversational speech through a video modeling procedure with 3 autistic children. All 3 boys ac-

quired conversational speech after exposure to the modeling procedure. Importantly, the children's conversational skills generalized in all of the probes. Additional advantages of the video modeling procedure include the maintenance of conversational skills at 15 months follow-up, the concomitant increase in question asking, and the increase in the children's spontaneous variation in their responses. Furthermore, parents of nonhandicapped children perceived several notable changes in the autistic children following intervention.

Learning conversational skills was a significant accomplishment for these children, especially in light of the extreme speech and language deficits autistic children display. Additionally, the children in the present study learned rapidly. This may be, in part, the result of the advantageous use of two specific characteristics of autism: (a) an excellent rote memory that may have hastened the children's learning of conversational phrases and (b) echolalic respond-
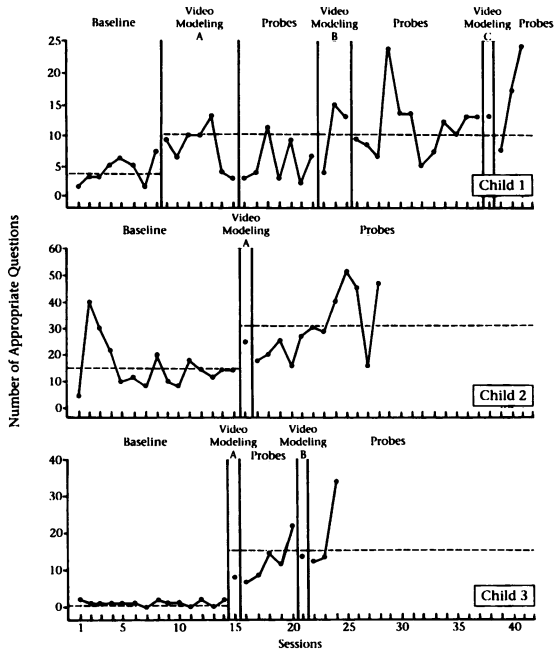
Figure 4. Ancillary data for appropriate questions asked during baseline, video modeling, and probe conditions.

ing and the tendency to repeat verbatim what was spoken (Rimland, 1964). During training, an echolalic response (echoing the model's verbalization) was also a correct response and was considered to be functional speech. Later, the echolalic responses served as communicative speech and were either contextually appropriate, modified by the child, or substituted with novel, untrained responses as seen in the generalization and response variation data. Thus, the tendency to echo may have been advantageous (e.g., Charlop, 1983; Prizant, 1983) with the video modeling procedure.

The robust generalization of conversational speech may have been facilitated by provisions for generalization inherent in the video modeling procedure, including multiple exemplars (of conversations and models), programming common stimuli (toys), and natural contingencies (e.g., answers to questions, access to toys).

The children also displayed some variation in their speech. This was especially striking for Child 2, who frequently elaborated on the topic of conversation. For example, during one conversation Child 2 responded to "What's on the floor?" by

saying, "A dinosaur. Some dinosaurs are a whole bunch of colors. Some are green, some are not. Stegosaurus are bigger than people. Stegosaurus are poky. All dinosaurs are dead. Where are dinosaurs buried?"

Ancillary data also demonstrated increases in the children's appropriate question asking. Although one cannot disregard the effect of potential demand characteristics, the majority of persons to whom the children asked questions (e.g., other children's parents, observers, other children) had little or no knowledge of a specific child's curriculum and participation in video modeling.

Video modeling may offer a time-efficient and personnel-conserving teaching tool. Modifications to the content and quality of the videotape may provide more optimal conditions for learning than those used in the present study. For example, for Child 1, both models in one of the videotapes were wearing bright orange sweaters, possibly making it difficult for the child to distinguish the different roles with their respective verbal responses. The video was then made over with a change in the models' clothes. Child 1 subsequently met criterion responding within three presentations of the new videotape.

Our findings also suggest interesting possibilities for future research, such as enhancement of generalization with those individuals (e.g., peers) who are less likely to interact with an autistic child. Also, future research should address duration of conversational speech, because the conversations in the present study were of a predetermined length. Finally, the discovery of methods for increasing response variation is important.

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