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Enhancing Conversation Skills in Children with Autism Via Video Technology: Which Is Better, "Self" or "Other" as a Model?

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The present study was designed to compare the efficacy of "self" versus "other" video-modeling interventions. Five children with autism ranging in age from 4 to 11 were taught to answer a series of conversation questions in both self and other video-modeled conditions. Results were evaluated using a combination of a multiple baseline and alternating treatments design. Three out of the five participants performed at levels of 100% accuracy at posttreatment. Results indicated no overall difference in rate of task acquisition between the two conditions, implying that children who were successful at learning from video in general, learned equally as well via both treatment approaches. Anecdotal evidence suggested that participants who were successful with video treatment had higher visual learning skills than children who were unsuccessful with this approach. Results are discussed in terms of a visual learning model for children with autism.

Enhancing Conversation Skills in Children With Autism via Video Technology

Which Is Better, "Self" or "Other" as a Model?

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Albert Bandura first introduced the concept of modeling during the 1960s with the dramatic demonstration that young children reacted

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more aggressively toward a toy after an age-matched model demonstrated aggressive behavior toward that same toy (Bandura & Huston, 1961). Later, Bandura went on to show that simply watching another individual receive reinforcement for a particular behavior would later increase the rates of that behavior in the onlooker as well as the model (Bandura, Ross, & Ross, 1961). Given the potentially powerful effects of modeling, the past 35 years have been replete with research documenting and extending Bandura's work (Backhoff & Lovitt, 1979; Bandura & Menlove, 1968; Barry & Overmann, 1977; Charlop, Schreibman, & Tyron, 1983; Charlop & Walsh, 1986; Coleman & Stedman, 1974; Egel, Richman, & Koegel, 1981).

Technological advances during the past two decades have allowed researchers to extend the concept of modeling to include the use of video to teach a wide variety of skills including motor behaviors such as swimming (e.g., Dowrick & Dove, 1980), social behaviors such as conversation (e.g., Charlop & Milstein, 1989), and even to decrease anxiety (e.g., Anholt, 1987). An interesting approach to this work has been the incorporation of "self" as the videotaped model. Self-modeling can be defined as "a procedure in which people see themselves on videotapes showing only adaptive behavior" (Dowrick, 1983, p. 105). Dowrick and colleagues have developed and refined the concept of self-modeling for over 20 years, demonstrating usefulness of this construct for enhancing and teaching many behaviors ranging from independent play to walking (cf. Dowrick, 1991). Although much research has been done with "other" and self models, an important research question is to determine the efficacy of one procedure in comparison to the other. Using other as a videotaped model has its potential advantages over self: It is easier and typically faster to videotape a typical child (or adult) as the other model rather than orchestrate successful performance with a disabled individual as the self model. Alternatively, arguments could also be made that self-modeling is a superior treatment option. For example, children might enjoy watching themselves more than watching an age-matched model and, thus, may be more motivated to attend to the videotape. An additional argument might be that the familiarity of the self model might make visual processing, and thus learning, easier. Despite appealing arguments for

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each side, no study exists that attempts to directly compare the effectiveness of these two strategies.

Participant populations in the aforementioned studies, whether self or other as a model, have varied from typical (Miklich, Chida, & Danker-Brown, 1977) to severely mentally impaired individuals (Dowrick & Hood, 1981). Recently an interest in the use of video treatments with autistic individuals has emerged. These children typically exhibit severe attentional (Courchesne et al., 1994; Pierce, Glad, & Schreibman, 1997), social (Pierce & Schreibman, 1995), affective (Hobson, Ouston, & Lee, 1988), language (Rutter, 1978), and motivational (Schreibman, 1988) deficits. Often these formidable obstacles make children with autism a challenging population to instruct. Video modeling may be an effective treatment approach because it minimizes attentional and language requirements, requiring the child only to look at a small spatial area (i.e., a television monitor) and to hear only the minimum necessary language. This procedure also avoids reliance on social interaction or the presence of a therapist to promote learning. Finally, motivation may be enhanced because most children (including children with autism) typically enjoy watching videos. In addition, although not well documented in the literature, people have often suggested that children with autism are visual learners and typically excel in treatment modalities that rely on visual stimuli such as pictures (e.g., Pierce & Schreibman, 1994), computer technology (Campbell, Lison, Borsook, Hoover, & Arnold, 1995), and videos (Charlop & Milstein, 1989; Schreibman, Whalen, & Stahmer, 2000).

To date, published studies of video treatments for children with autism are rare. However, several studies have demonstrated the effectiveness of these treatments for children with autism (Charlop & Milstein, 1989; Haring, Kennedy, Adams, & Pitts-Conway, 1987; Schreibman et al., 2000; Taylor, Levin & Jasper, 1999). One recent study indicated that children with autism learned a variety of positive behaviors including conversational speech, expressive labeling, greetings, independent and social play, oral comprehension, and self-help skills more quickly and with better generalization from a video model than from a live model.

The majority of studies using video modeling with this population have employed an other-as-model paradigm (Charlop & Milstein,

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1989; Charlop-Christy, Le, & Freeman, in press; Haring et al., 1987; Taylor et al., 1999). Only one study to date has utilized a self-modeling procedure with autistic participants (Bline, 1997). Due to myriad possibilities suggesting high success for this treatment approach with this population, further investigation is warrented.

The purposes of the present investigation were as follows: (a) to replicate the overall finding that using video produces rapid skill acquisition for children with autism, (b) to compare effectiveness of self versus other as a model within individual children, and (c) to investigate characteristics that might be associated with positive treatment outcome.

METHOD

PARTICIPANTS

Five male children with autism participated. All received a diagnosis of autism from an agency not affiliated with this research (e.g., from a school psychologist). In addition, 4 out of the 5 participants were diagnosed as autistic by the second or sixth author using *DSM-IV* criteria (American Psychiatric Association, 1994); the remaining child (i.e., Joey) was diagnosed as Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). The mean chronological age was 7 years, 5 months (range = 3 years, 11 months to 11 years, 2 months). Verbal ability, mental age, severity of autism symptomatology, and adaptive functioning were assessed for all children using the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981), Leiter International Performance Scale (Leiter, 1979) or Stanford-Binet Intelligence Scale (Thorndike, Hagen, & Sattler, 1986), Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988), and the Vineland Adaptive Rating Scales (Sparrow, Balla, & Cicchetti, 1984), respectively. Results for individual subjects are presented in Table 1. Mean verbal abilities defined as language age (LA) equivalent was 3 years, 3 months (range = 2 years, 9 months to 4 years, 2 months), mean mental age was 4 years, 2 months (range = 3 years to 5 years, 2 months), mean severity of autism was 37.3 (range = 33.5 to 41.5), and mean level of adaptive

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TABLE 1
Subject Characteristics

	CA	*MA*[a]	*LA*[b]	*CARS*	*Adaptive Functioning*[c]
Luke	5-10	3-0[2]	2-9	40.5	3-6
Sam	7-1	4-2[1]	3-9	41.5	5-0
Joey	4-0	4-0[2]	3-3	33.5	1-8
Jack	11-2	4-8[1]	4-2	35.0	1-8
Chuck	9-0	5-2[1]	2-9	36.0	4-3

NOTE: CA = chronological age; MA = mental age; LA = language age; CARS = Childhood Autism Rating Scale.
a. Derived from the Stanford-Binet Intelligence Scale (Thorndike, Hagen, & Sattler, 1986) (1) or Leiter International Performance Scale (Leiter, 1999) (2).
b. Derived from the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981).
c. Derived from the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984).

functioning was 3 years, 3 months (range = 1 year 8 months to 5 years). All participants had expressive language skills and could speak spontaneously in short sentences, although these verbalizations typically centered around requests (e.g., "I want Nintendo"). Joey, however, often used language for items other than requests (e.g., "The boy has a red shirt"). Participants were selected on the basis of the following: (a) a lack of ability to maintain a social conversation, and (b) parental desire to teach their children to answer simple conversation questions (e.g., Where do you live?).

Six typically developing children also participated and served as peer models in conversation videos and generalization peers during baseline and posttreatment measures. Mean age of typical children was 7 years (range = 6 to 8 years). Typical children were selected to participate based on gender and approximate chronological age matches to participants with autism.

MATERIALS

A set of 20 questions was compiled for each child. The questions concerned the child's home and school life—ones that the child did not respond to at baseline assessments and that the parent wanted the child to be able to answer. Eight questions were randomly assigned to

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TABLE 2
Sample Questions From "Self" and "Other" Video Conditions

What are your favorite games?
What school do you go to?
How do you get to school?
Who do you sit next to in class?
What do you like to do at recess?
What time does school get out?
Where do you get your hair cut?
What do you like to eat for breakfast?
What is your favorite TV show?
What do you like to do on the weekends?
Where do you live?
What is your phone number?
Where do you like to go on a walk?
What is your bedtime?
What sports do you like to play?
What do you do when you are happy?

the self-as-model video condition, and eight to the other-as-model video condition for each child. The remaining four questions served as generalization probes. Some questions were counterbalanced across children in that a question that was in the self condition for one participant was in the other condition for another participant. A sample question set is presented in Table 2.

Return responses were also included in the conversation. After the therapist asked a target question, she would answer the question as it might apply to her regardless of the child's response. For example, after presenting the question, "What is your favorite TV show?" the therapist would wait 5 seconds and then offer a return response, "My favorite show is Nightline." The therapist's return responses were always inappropriate for a child's response (e.g., "I go to bed at midnight," "My teacher's name is Professor Smith"), to allow detection of mere echoing by the participant.

Two videotapes were constructed for each child: an other videotape and a self videotape. The other tape depicted a typically developing child conversing with an adult answering the questions assigned to the other condition. The self tape depicted the target child engaged in con-

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versation with an adult answering questions assigned to that condition. This tape was created by editing raw footage of the adult and participant, in which the child with autism was prompted either verbally, or by use of cue cards, to respond to the questions the therapist asked.

SETTING

All sessions were conducted in the child's home for Chuck, Luke, Joey, and Jack and at home and in our research laboratory for Sam. The laboratory setting resembled a living room, with a couch, chairs, table with books, and posters on the wall. The therapist and child sat either in chairs facing each other or on a couch facing each other. Distance between the child and adult was approximately 3 feet. All sessions were videotaped using a Panasonic camera positioned on a tripod in the room.

DESIGN AND PROCEDURE

A combination of a single participant multiple baseline design (Barlow & Hayes, 1979) and an alternating treatments design (Barlow & Hayes, 1979) was used in which participants received each treatment condition on alternating days.

Baseline. During baseline, the target child was asked the full question set (i.e., 20 questions). After conclusion of baseline, eight questions were randomly selected to be used in the self video-modeling condition and eight in the other video-modeling condition. The remaining four questions were used as generalization questions (two questions per condition). Time between questions was approximately 5 seconds. Following correct, incorrect, or no response from the child, the therapist would state her return response and proceed with the next question. Baseline sessions extended across several weeks for all participants.

Generalization probes were taken at baseline and included setting, question, and peer probes. Sam and Chuck also had generalization probes taken with their mother. Generalization setting probes were taken in the home setting in rooms or locations other than the training

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site (e.g., garage, patio). Generalization question probes were taken with the four questions that were asked at baseline, but were not part of the subsequent video treatment. Generalization peer probes were taken with an age- and gender-matched peer who was not present on the training tape and who interacted with the target child only during baseline and posttreatment probes. Generalization probes with participants' mothers were taken to assess any changes in conversation with a family member.

Video production: Making the other tape. Prior to making the other tape, a therapist and selected peer model rehearsed the correct responses (i.e., responses appropriate for the target child) and follow-up questions. During tape making, the conversation sequence was as follows: Therapist asked a question, peer model replied, peer model asked therapist the same question, therapist replied. An example is as follows:

Therapist: What do you like to do on the weekends?
Peer Model: I like to play soccer. What do you like to do on the weekends?
Therapist: I like to go jogging.

This sequence was videotaped and repeated for all eight conversation questions.

Video production: Making the self tape. The self-as-model tape was produced using the child with autism, an adult therapist, and a third person for prompting. The entire session was recorded and the film later edited to produce a final tape in which it appeared as if the adult therapist and child with autism were engaging in a conversation. The sequence of responding to questions was the same as above; however, in this condition, the target child (instead of a peer model as in the other condition) was required to provide a response. Two methods were used to facilitate responding in target children: (a) reading from cue cards, and (b) repeating verbal prompts. During the cue-card trials, a therapist asked a question (e.g., What time do you go to bed?) and the target child read the appropriate response and follow-up question (e.g., 8 o'clock. What time do you go to bed?). With the exception

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of Joey, all participants had some sight-reading ability and, thus, cue cards were used to videotape the conversation. Joey was simply asked to repeat the correct answer (e.g., "Joey, say 8 o'clock.").

Reinforcement in the form of verbal praise was given for correct on-task behavior (e.g., good sitting) but not for answering questions correctly. This was done to maintain responding but prevent acquisition due to contingent reinforcement of correct answers.

Post–video production. Following video production, the therapist again asked the child the entire question set to assess any acquisition effects of making the tape.

Video-modeling treatment. Parents were given a viewing schedule and instructed to show the tape to their child three times prior to going to sleep in the evening. The schedule alternated days between the self and other tape. Participants were not permitted to watch the tapes at any other times. The therapist visited the home following a viewing day and asked the child the questions for either self or other. The question set asked on any day was consistent with the question set viewed on video by the child the previous evening. This phase continued until the participant reached a criterion of 100% correct responding or failed to show an increase in responding over several weeks.

Follow-up. To assess maintenance of gains for participants, follow-up probes were taken 2 months after conclusion of participation and were identical to probes taken during video treatment. Follow-up data were not available for Chuck.

SCORING

All sessions were recorded on videotape. Correct responses were defined a priori through a parental interview. For example, if the sample question was "What time do you go to bed?", the parent provided the answer to this question (e.g., 8 o'clock). Correct conversation was defined as a child's correct response to the question, begun within 5 seconds of the initial question, and a correct return question.

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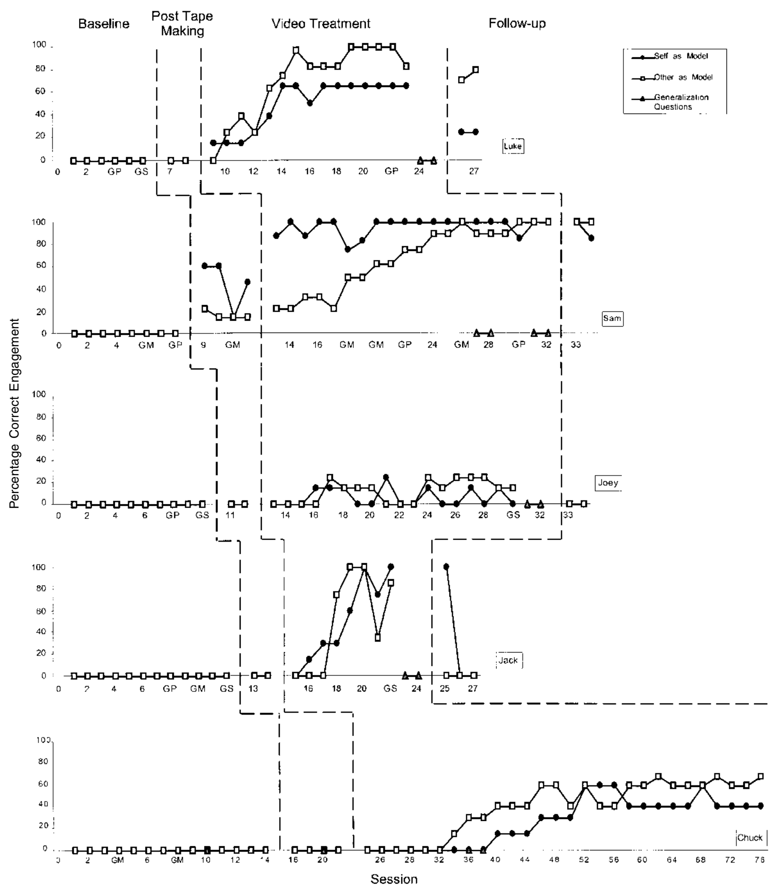

Figure 1. Average percentage correct engagement in conversations for Luke, Sam, Joey, Jack, and Chuck across experimental phases and conditions. A 2-month follow-up probe was also taken.

NOTE: GS = generalization setting probe, GP = generalization peer probe, GM = generalization mother probe.

Reliability data were collected for 33% of sessions across all participants and experimental phases.

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RESULTS

Overall results were variable between subjects: Sam and Jack responded positively to video treatment, reaching acquisition quickly in both conditions; Luke reached acquisition more slowly; and finally, Chuck and Joey failed to reach acquisition on this task in either condition. Results will be discussed in order of participants that were most to least affected by video treatment.

Sam responded at levels of 0% conversation in baseline for self and other, respectively. After the tape was made, correct responding increased to an average of 46% for self and 15% for other. During video treatment, Sam responded quickly, reaching levels of 100% accuracy for correct conversation in 2 sessions in the self condition. The acquisition curve for other was less steep but still resulted in 100% acquisition for correct conversation in 14 sessions. Sam generalized his conversation behavior to a novel setting and with a generalization peer as well as his mother. Sam did not generalize his conversation skills to the four generalization questions. Finally, Sam maintained high levels of conversation at a 2-month follow-up period in both conditions.

Jack's pattern of responding was similar, with 0% rates of conversation at baseline followed by 100% levels of conversation reached after six sessions in the self condition and five sessions in the other condition. Unlike Sam, Jack did not increase his conversation behavior after making the tape. Jack also generalized his conversation behavior across settings and individuals and maintained high levels of conversation at a 2-month follow-up period during the first session, but dropped to levels of 0% during the second session due to behavioral issues that day.

Luke did not answer or return questions during baseline and did not increase his conversation behavior after tape making. During video treatment, Luke reached acquisition for correct responding in the other condition after 7 sessions but failed to reach acquisition in the self condition after 15 sessions. Luke maintained similar levels of responding during the follow-up period.

At baseline, Chuck engaged in 0% correct conversation and maintained this level after tape making. During video treatment, Chuck

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TABLE 3
Trials to Criterion for "Self" and "Other" Video Treatment Conditions

	Self	*Other*	*Preference*
Luke	Never reached after 15 trials	7	Other
Sam	2	14	Self
Joey	Never reached after 18 trials	Never reached after 18 trials	None
Jack	6	5	None
Chuck	Never reached after 54 trials	Never reached after 54 trials	None

increased his conversation behavior to peak levels of 60% in the self condition and 68% in the other condition after 30 and 38 sessions, respectively. Chuck failed to increase above these levels after 54 treatment sessions.

Joey's pattern of responding was similar to Chuck's, with zero rates of responding during baseline and post-tape-making phases. During video viewing, Joey increased to 25% correct conversation engagement in both conditions, but failed to increase above this level after 18 treatment sessions. Joey maintained similar rates of responding during follow-up.

A comparison of levels of acquisition across participants is presented in Table 3.

Reliability percentages were similar across participants and experimental phases and conditions; thus, only overall group averages are presented. Overall reliability averaged 99% with a range of 88% to 100%.

DISCUSSION

Overall, findings replicated those of other researchers: Using video technology is an effective and often rapid treatment approach for some children with autism. Results from this study, however, also raised some interesting issues: (a) the overall lack of preference for self ver-

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sus other video treatment for the group of participants as a whole; (b) the failure of some participants to reach criterion after several months of treatment; (c) the successful generalization of newly learned skills to a generalization peer for the successful participants; and (d) the investigation of characteristics that might be related to positive treatment outcome.

Findings from this study suggest that, overall, using other as a model is equally as effective as using self as a model. Of the five participants, one child (i.e., Sam) reached acquisition faster in the self than in the other condition, one child (i.e., Luke) reached acquisition faster in the other condition than in the self condition, and the remaining three subjects showed no preference (i.e., rates of acquisition were similar in both conditions).

The components of making a self tape for children with autism are many and usually include: (a) requiring the child to cooperate with task demands (e.g., to play appropriately with a particular toy or say a particular sentence while being videotaped); (b) obtaining a clear video of the child and relevant stimuli; and (c) editing the final tape in such a way as to preclude any notion of looking contrived (e.g., editing out the voice or presence of the therapist who helped the child perform the task). Due to the complexities involved in making a self-modeled tape and the finding of relatively equal rates of acquisition for the two treatment approaches, the question then becomes, Is using self-modeled videotapes a cost-effective endeavor? To answer that question, two factors need to be taken into consideration: first, the target behavior, and second, the functioning level and diagnosis of the target child. In the present study, children were taught to answer and reciprocate a constellation of conversation questions with a therapist as well as a generalization peer. The target behavior chosen, conversation, may be a behavior that is easily learned from self or other as a model because it is an acquisition behavior for that child. Another way to put it is that the child is incorporating something new into his or her behavioral repertoire. It might be the case that altering an already existing aberrant behavior might be learned more efficiently in the self-modeling condition. For example, in an initial study in this area, Dowrick and colleagues taught a 4-year-old boy to engage in less hyperactive behaviors after that child watched himself engage in decreased levels of activity via a self-modeled videotape. It is hard to imagine that sim-

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ply watching another child play quietly would have had the same effect on his behavior. In another example, Bray and Kehle (1996) used self-modeling to decrease stuttering in three adolescents. Again, simply watching peer models not engage in stuttering probably would not have had the same effect. Finally, Bline (1997) used a self-modeling paradigm to decrease compulsive restoration of the environment in several individuals with autism. In short, it seems at least plausible that for some behaviors, self as a model may in fact be superior. This may be particularly true for the reduction of inappropriate behaviors. An additional consideration relates to subject characteristics. The participants in this study were autistic and the participants in the majority of the self studies had varying diagnoses, only one of which were autistic. It is conceivable that children with autism are less sensitive to the discrimination of self versus other in comparison with other populations. Of course, the only way to test this hypothesis is to compare a self paradigm across children with different diagnoses.

It is also important to note that the subset of participants who reached acquisition on this task also successfully generalized their newly learned behavior to a novel peer and a novel setting. In addition, these participants maintained behavior gains at a 2-month follow-up period. This finding replicates those of Charlop and Milstein (1989), which suggest that using videos is a strategy that generalizes across individuals and setting and maintains over time.

As indicated in Table 2, 2 participants (i.e., Chuck & Joey) failed to reach criterion in either condition despite several months of treatment. As stated in the method section, each child viewed either the self or other videotape three times before a testing session. Using Chuck as an example, failure to reach acquisition in either condition after 54 sessions yielded an overall total of 162 videotape viewings per condition for a grand total of 324 videotape viewings. Although not as dramatic, the data for Joey look quite similar. This finding thus suggests vast individual differences in response to video treatment. An important question then becomes, Why did some children learn better than others when they were all reasonably well matched for language ability and IQ? Of the 2 children who failed to reach criterion, both had verbal ability (i.e., could speak in sentences) and both had IQ scores within the mildly to moderately retarded range. In addition, Joey was mainstreamed for his entire school day and Chuck was mainstreamed

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for part of the day. Both could follow directions and had appropriate adaptive behaviors for their age (e.g., both could get dressed independently). Given that overall intelligence and language ability of these children probably did not directly account for their difficulties in learning from the video medium, the question becomes somewhat perplexing. Perhaps an easier question to answer would be not why these 2 children failed but rather why 2 out of the 3 successful participants (i.e., Sam & Jack) reached acquisition after relatively few videotaped viewings? A potential answer to this may be obtained from observational data. Informal parental interviews with all participants' parents, as well as behavioral observation, suggested that the 2 participants with the highest levels of performance (i.e., Sam & Jack) had extraordinary visual memories and a preference for compulsions with visual stimuli. For example, the mothers of Sam and Jack each reported that their children were obsessed with pictures in books and would repetitively look at pictures and words for long periods of time. In addition, both children developed sight reading ability by the age of 3 years. Both children displayed high levels of block-building ability and had exceptional memories for directions to and from various places (e.g., from home to a relative's house). These informal findings prompted the hypothesis by the authors that the success or failure of participants on the video task might be related to visual learning ability. In short, it is possible that both Sam and Jack had heightened visual processing ability in comparison to other behaviors in their repertoire. These heightened abilities, in turn, may have been related to their rapid success with video-modeling treatment.

Children with autism are well known to excel in visual treatment approaches (e.g., MacDuff, Krantz, & McClannahan, 1993; Pierce & Schreibman, 1994). In addition, a small subset of children with autism possesses advanced letter recognition skills in which their memory for sight words or visual symbols exceeds age appropriate levels (e.g., Kistner, Robbins, & Haskett, 1988). Other suggestions of visual strengths in children with autism include the typical finding of higher IQ scores based on tests of visuospatial ability such as the Leiter International Performance Scale (Leiter, 1979) as compared to traditional IQ tests such as the Stanford-Binet Intelligence Scale (Thorndike et al., 1986). The literature is also replete with accounts of special

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savant skills in children with autism including memories for directions and special artistic abilities (e.g., O'Conner & Hermelin, 1990). Findings from the current work also suggest that some children with autism may have highly developed visual skills. Specifically, the variable performances of the participants suggest that some children with autism may be stronger visual learners than others. That is, the two children who performed poorly on this treatment approach may have had limited visual learning abilities in comparison to the other participants.

Results from this study have provided support for the notion that some children with autism benefit, often quickly, from video treatments. Acquisition, however, may be related to a visual processing ability, and attempts to operationalize this construct may be a critical factor for both our scientific understanding and clinical treatment of this disorder.

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