

# Training Responding Behaviors in Students with Autism:

## *Using Videotaped Self-Modeling*



Abstract  
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**Abstract:** Videotaped self-modeling (VSM) has been developed as a means to allow participants to view themselves in situations where they are performing at a more advanced level than they typically function. VSM has been effectively used to train positive behaviors and to reduce unwanted behaviors across a range of ages and behaviors; however, studies of VSM have not been conducted with students with autism. Our study was designed to analyze the effects of VSM on the acquisition and maintenance of appropriate verbal responses to questions by children with autism. A multiple baseline design across students was used to evaluate performance. The results indicated that the three participants almost doubled their rates of appropriate responding to questions during play situations. The findings suggest that VSM may constitute a positive behavior change intervention worthy of consideration in a treatment regimen.

For many years, parents, teachers, and therapists have actively and aggressively pursued a wide range of approaches to treating individuals with autism. The mysterious nature of behaviors associated with autism—especially those related to social skills and attending to tasks—has been a source of frustration for teachers and therapists. Parents often experience a normal infancy with their child with autism, only to have the child withdraw during a developmental period when emotional and physical bonding are critical. This often leaves parents confused and desperately searching for answers. At present, the state of the art in autism treatment remains confusing. Controversy surrounds many forms of interventions, resulting either from the obtrusiveness of the intervention or from the lack of research evidence in its support.

### **Traditional Interventions**

#### **PHYSIOLOGY- AND SENSORY-BASED APPROACHES**

Interventions for people with autism are often aimed at controlling symptoms and originate from a variety of theoretical models. Physiology-based treatments—including vitamin therapy, dietary interventions, anti-yeast therapies, medications, and shock therapy—have been reported

to control some symptoms (Gerlach, 1995). In individual cases or testimonials, more drastic improvements have been attributed to these methods; however, controlled studies have failed to indicate sustained, positive results (Bailey, Phillips & Rutter, 1996; Lovaas, 1987; Murray, 1996).

Other treatments involve manipulation of sensory stimulation. These approaches include music therapy, auditory integration training, sensory integration therapy, squeeze machine therapy, and holding therapy (Gerlach, 1995). These approaches purportedly increase tolerance for sensory stimuli and produce a calming effect in children with autism. However, support for these treatments has also relied mainly on testimonials and case studies. More formal research has produced mixed results. Other methods such as facilitated communication (Montee, Miltenberger, & Wittrock, 1995) and the Doman-Delacato method (American Academy of Pediatrics, 1982) are steeped in controversy, yet maintain loyal followings.

#### **BEHAVIORAL APPROACHES**

Probably the most effective treatments used today are those based on principles of applied behavior analysis, such as positive behavior support (PBS) and the discrete

trial methods. *Positive behavior support* represents a relatively new trend in working with behaviors associated with autism. It involves behavior change procedures that are designed around the values of empowerment and interpersonal independence (Koegel, Koegel, & Dunlap, 1996). Behavior reduction becomes a by-product of self-direction and control. The PBS process focuses on creating interdisciplinary teams composed of family members, teachers, medical professionals, and other important individuals in the life of the child. Once interdisciplinary teams have been created, the following steps are required in order to develop a functional support plan for the child: functional assessments, determining functions of students' behaviors, creating behavior support plans, and reviewing and modifying plans on an ongoing basis. Positive results have been reported for PBS; however, the time needed for development and implementation of a PBS plan can be up to 6 months. Other methods based on behavioral strategies have similar limitations.

One well-known therapy using applied behavior techniques is the Lovaas or *discrete trial method* (McEachin, Smith, & Lovaas, 1993). The therapy's basic sequence is

- . a cue from a therapist,
- . response from the child, and
- . a consequence for the response given by the child.

The method has evolved and gained popularity partly due to a study published by Lovaas (1987). The study involved three groups of preschoolers with autism with varying intensities of behavioral intervention over 2 years. According to the study's results, those receiving the most intense treatment (40 hours per week) showed substantially more behavioral progress over those receiving moderate (10 hours) or no treatment. Forty-seven percent of the intensive group passed the first grade with other normally developing peers. Many parents who have had their children involved in in-home Lovaas therapy reported excellent results (McEachin, Smith, & Lovaas, 1993). The major drawbacks to this applied analysis strategy are the long waiting lists to get training and the long-term, intense nature of the treatment.

## Videotape Interventions

### MODELING

As researchers continue to investigate treatment techniques for people with autism, additional emphasis on validating existing methods is needed, as well as new strategies that can overcome the drawbacks of existing techniques. A relatively new genre of treatments that holds promise for circumventing present methodological weaknesses has focused on the use of videotaping. In an intervention conducted by one family, the use of video to teach their 5-year-old child with autistic tendencies to learn

tasks and develop vocabulary had very positive results (Zihni & Zihni, 1998). When the Zihnis began showing their child nouns and pictures on video, their child began to use the vocabulary and, within 6 months, had learned 250 words. From there, they were able to teach concepts such as color identification, writing, and *who* and *what* responses through video. They called the method they used with their child the "A to Z method."

The Zihnis' successful experience with using video as a therapy was attributed to several factors:

- many children with autism are uncomfortable with human interaction; the use of video obviates this stress;
- many children with autism are highly visual; therefore, the TV screen offers a comfortable medium;
- the predictability and controllability of video can be helpful with children with autism;
- video allows for extraneous variables to be filtered out, making learning easier for a child with autism (Zihni & Zihni, 1998).

Although this intervention was not empirically based and did not describe a specific procedure, it offers insight into the possible benefits of the use of video for children with autism. The possibility exists that people with autism may be better able to model behaviors from a medium that does not require much in the way of pragmatic language skills.

The study of self-as-model techniques emerged as video technology became readily accessible in the early 1970s. There is some confusion in the self-modeling literature concerning the labeling of specific techniques. *Self-observation* is generally used to describe unedited feedback that presents both negative and positive aspects of behavior. Other terms for this form of intervention have included *video training* (Fireman & Kose, 1991), *self-confrontation* (Kimball & Cundick, 1977), and video feedback (Alger, 1969).

Much of the research on self-observation has come from the fields of counseling and social skill training. As a therapeutic technique, self-observation has resulted in improvements in self-acceptance (Boyd & Sisney, 1967; Fuller & Manning, 1973), marital social skills (Eisler, Hersen, & Agras, 1973), realistic self-appraisal (Bailey & Sowder, 1970; Stoller, 1968), decreasing denial as a coping strategy (Silk, 1972), problem solving skills (Fireman & Kose, 1991), and conversational speech in children with autism (Charlop & Milstein, 1989).

In spite of the apparent power of self-observation to promote behavior change, this technique has been criticized. Several authors have reported that the effects of self-observation are minimal unless supplemented with other therapies that draw attention to and facilitate desired outcomes (Alger, 1969; Eisler & Frederickson, 1980;

Hosford & Mills, 1983). Other researchers have found that participants with a history of negative responses to their behaviors may be adversely effected by exposure to self-observation techniques (Fuller & Manning, 1973; Griffiths, 1974; Kimball & Cundick, 1977). These negative aspects make the use of self-observation techniques with children with handicaps or learning delays problematic. The maintenance of positive behavior with children who may have had previous negative experiences is a primary concern of early educators.

#### SELF-MODELING

Another form of video intervention has been used to successfully train new behaviors and eliminate undesired ones with people with a range of disabilities. Having individuals act as their own models through videotaping has been proposed as a method that maximizes the characteristics that serve to promote attention to the model (Creer & Miklich, 1970; Hosford, 1981). Researchers have found that the most effective models tend to be individuals close to the observing child's age, with similar characteristics (gender, personality, race, and mood), who are functioning only slightly above the level of the observer (Bandura, 1969; Thoresen & Hosford, 1973). In regard to the latter quality, it has been shown that video models who exhibit absolute mastery of a task are not as effective as models who display some task anxiety but are effectively learning to cope with a situation (Hosford & Mills, 1983). Other benefits experienced by peers when acting as models in the classroom, such as increased prestige, improved retention by practicing recently acquired skills and knowledge, and learning of responsibility, lead to the question whether a child, given the opportunity to view himself or herself performing well at an advanced level, would serve as an even better model than a peer. No peer or adult could exhibit characteristics as close and relevant to the individual as the child him- or herself as both model and imitator.

The technology is available to permit observers to act as their own models. Videotaped self-modeling (VSM), in which observers are shown only their positive performances of a targeted behavior, has been shown to be an effective treatment across an extensive range of behaviors, ages, and abilities. Positive results have been obtained for treating depression (Kahn, Kehle, Jenson, & Clark, 1990), stuttering (Bray & Kehle, 1996), elective mutism (Pigott & Gonzales, 1987), attention disorders (Dowrick & Raeburn, 1977; Woltersdorf, 1992), behavior disorders (Lasater & Brady, 1995), and aggressive behaviors (Creer & Miklich, 1970; Esveldt, Dawson, & Forness, 1974; McCurdy & Shapiro, 1988). Likewise, VSM has proved efficacious as a tool for teaching skills such as math (Schunk & Hanson, 1989), life skills (Miklich, Chida, & Danker-Brown, 1977), social behaviors (Lonnecker, Brady, McPherson, & Hawkins, 1994; Rasing, Coninx, Duker, & Van Den Hurk,

1994), and language (Buggey, 1995a; Haarmann & Greelis, 1982). In a review of 27 studies that used VSM, Meharg and Woltersdorf (1990) reported moderate to dramatic gains across all target behaviors. There also was a consensus that the gains occurred almost immediately after the intervention began and that the behaviors were maintained after the intervention was withdrawn. In the same review, analysis of 12 comparative studies showed that in 10 instances VSM was shown to be the superior treatment, and in 2 cases it was equivalent to alternative treatments. In spite of the apparent efficacy of VSM, there are no references in the literature to its ever being used with people with autism.

Unlike other methods of change, VSM offers a way for individuals to confront their own behaviors. It also allows individuals to see themselves as they could be. This process was described by Dowrick (1983, p. 105) as a "feed forward" process. The basic procedure used to conduct VSM experiments involved videotaping behaviors, editing a portion of video to create or show a desired version of the behavior, and allowing individuals to view videos of themselves performing these desired behaviors (Meharg & Wolersdorf, 1990).

There are two major methods for having students perform desired behaviors for videotaping. The less time-consuming of these methods is to have the student role-play or imitate the target behavior. This method is especially effective when working with language and social behaviors. Children can often imitate correct language forms or role-play correct responses to social situations before they adopt them into their everyday usage. For example, Buggey (1995a) used VSM to train preschoolers to use the contractible copula form of the verb "to be." These children were videotaped imitating the use of short sentences with the words "am," "is," and "are." The tapes were edited to include their best imitations and then shown to the children for 3 to 5 minutes each morning. Audio recordings during recess and lunch indicated that the students were using the new forms in natural situations soon after the intervention began. This finding of positive generalization is found throughout the literature on VSM.

The second method for obtaining tapes of desired behaviors is more time-consuming. This requires taping a person's behavior over time and then editing the tape so that only exemplars of the behavior are present in the final product. People who may not readily role-play, such as those with autism, are candidates for this form of the technique. This method also requires that some baseline form of the behavior be demonstrated by the person being taped.

Another requirement for VSM to be effective is that the viewer attend to the video. The attention problems that children with autism often exhibit may be among the reasons why this method has never been attempted with

people with autism. However, children with autism display selective attention which is often directed toward viewing television. Interestingly, two studies found self-modeling to be ineffective, and both of these had preschoolers as participants. Clark et al. (1993) found that self-modeling did not modify aggressive behaviors in a group of six preschoolers who were labeled as **oppositional-defiant**. Buggley (1995b) had mixed results in a study aimed at training language skills with two preschoolers. One child made significant gains in mean length of utterance and intelligibility, but the second child made no measurable gains in his target behaviors. The child who made gains was interested in the tape and paid rapt attention to it. Although she was asked to repeat utterances that she heard herself make on the video, she refused to do so. The child who did not make gains was very imitative of his utterances but did not focus on the video. He moved around the room either physically or with his eyes while repeating what he heard on the video. The results of these studies raise the question whether children with autism who have developmental delays in cognition, language, and attending skills could benefit from VSM intervention.

## Design

### PARTICIPANTS

Three children with autism between the ages of 7 and 12 participated in this study. Participants were identified by contacting the president of the local Autism Society, who contacted local families and provided the names of nine families who showed interest in participating. Parents were sent an overview of the research on VSM, as well as a questionnaire and a consent/disclaimer form. The questionnaire included items that allowed the researchers to determine whether the child had the prerequisite skills for VSM training. Items included "Does your child have self-recognition concerning pictures or videos?" and "Is your child verbal?" Parents were also asked to provide a list of inappropriate behaviors that their child exhibited on a regular basis. Estimates of duration and frequency of the behaviors were also requested. To aid in establishing social validity, parents were asked to identify behaviors they would like to see changed and skills they would like their children to learn. Responses were received from seven families. From these families, three children were selected who exhibited a similar need to improve appropriate social responses to questions in conversational settings.

#### Child 1

Matt was 11 years and 3 months old at the beginning of the study. He was diagnosed with autism when he was 3 years old in a university child developmental center. Matt attended a fully inclusive private school that had seven additional students. Matt lived at home with both his par-

ents and had an older brother in high school. A respite care professional came to the home four times a week to spend time with Matt. Several intervention strategies had been attempted over the years, such as sensory integration, auditory training, and cranial sacral therapy. At the time of the study, Matt was not receiving any of these therapies.

#### Child 2

Esther was 11 years and 3 months old at the beginning of the study. Esther was diagnosed with autism at 3 years and 4 months of age by a developmental delay specialist. She was enrolled in a seventh-grade self-contained classroom in a suburban public school. She lived with both parents and three siblings ranging from preschool to high school age. Esther had been involved in several studies in the 7 years prior to this study, including **Lovaas/ABA** therapy, auditory training, TEACCH classroom, the picture exchange communication system, vitamin B6, magnesium and magnesium therapies, and various sensory integration techniques. During this study, none of these interventions was being used. She took melatonin at night to help sleep, and she started taking Depo-Provera shots 1 year prior to the study.

#### Child 3

Fred was 8 years and 9 months old at the outset of the study. Fred was diagnosed with autism by developmental delay specialists at 6 years of age. The reasons for the delay in diagnosis was attributed to Fred's bilingual home, where both English and Spanish were spoken. Doctors at first believed this was the cause of Fred's speech delay. Fred was enrolled as a third grader at a local suburban public school where he was mainstreamed a portion of the day. Fred lived with both parents, who were natives of Columbia, and an older sister who was in sixth grade. Family members actively participated in a regimented home intervention program that included computer application, communication and verbal prompting, and artistic expression.

All participants were developmentally delayed in terms of language development and adaptive behavior. Matt and Fred could recognize some basic sight words. Esther was the most severely affected of the three and often exhibited tantrum and motor perseveration behaviors. Matt also exhibited a range of perseverative behaviors. All three diverted eye gaze, and the parents reported that, although the children did respond to direct questions, they did so only rarely.

### PROCEDURE

Initially, the researchers visited each home to introduce themselves and explain the study. Explanations were given concerning the general procedures of the study and the approximate duration. The study was to begin in **mid-**

October and tentatively end by late December of 1997. Parents were not informed of the behavior that would be studied and were asked to provide an area where the intervention could be applied in privacy, yet that provided a natural and relaxing environment for the child.

A multiple baseline single-subject design across the three participants was used to evaluate results. Three raters rotated weekly to conduct and videotape play sessions in the children's home. Seventeen items were chosen that represented questions that might be asked during typical play interactions with the children (see Figure 1). The questions were selected based on their appropriateness to the tasks of the play sessions during baseline. Because of a lack of information about the receptive language abilities of the participants, the same questions were asked to each of them. Most of the questions required identifying objects or attributes; however, some of the questions (e.g., "What comes next?" and "Whom does that belong to?") required more advanced cognitive skills. Raters were not required to ask every question to the child during each session; however, the raters had a list of the questions with them at all times and could manipulate the play sequence so that the questions better fit the situation. Questions not asked during a particular session were marked and targeted for inclusion in the next session.

#### BASELINE

Baseline data were collected simultaneously across all participants over a 4- to 6-week period. Students were visited by the rater at times convenient to the parents; however, three visits per week of at least half an hour were required for participation in the study. On occasion, due to a child's refusal to interact with the rater, data could not be collected in entirety. When the participant was unable or unwilling to interact in a natural, unprovoked manner, the session was halted. The length of sessions varied from 30 minutes to 1½ hours, depending on family schedules and the child's disposition. Typical sessions ran the full 1½ hours. Only one shortened session each was necessary with Matt and Fred. Three sessions were shortened with Esther. Sessions were initiated by the rater by creating activities that interested the child. Initially, coloring books, crayons, markers, and paper were supplied to initiate an environment conducive to interaction. As the study progressed, individual activities were modified in order to keep the participant's interest. All aspects of the sessions were videotaped for later analysis.

#### INTERRATER RELIABILITY

Raters met biweekly and viewed the tapes to analyze responses and measure interrater reliability. Each rater viewed the tapes and recorded responses according to whether the child did or did not provide an appropriate

1. What is that?
2. What is this?
3. What are you making?
4. What color is that?
5. What is your favorite color?
6. What shape is that?
7. What number is this?
8. What is this picture?
9. Which one do you want?
10. Who is that?
11. Who does that belong to?
12. What comes next?
13. What sound does that make?
14. Have you ever seen (object)?
15. What do you want me to do?
16. What is your favorite (object other than color)?
17. What can you draw?

Figure 1. Questions used with study participants.

verbal response to the question. Verbal responses were scored as appropriate when they were given within 5 seconds of the question and were directly related to the question (e.g., the response "green" would be scored correct if the child was asked the color of a red crayon, but would be scored incorrect if the child was asked how old he or she was). Raters wrote both the question and the response (when appropriate) in chronological order as they appeared on the tape. These data were analyzed across raters, and the percentage of agreement per session was used to evaluate interrater reliability. In order for a child's response to be scored correct, raters had to have exact agreement as to the verbal content and the appropriateness of the response to the question. Responses with mixed ratings were replayed. If the rater's transcription of the response exactly matched, it was scored correct; if there were still disagreement, it was scored as incorrect.

#### INTERVENTION

Once the baseline was determined, the experimenters created the self-modeling tape by splicing together examples of appropriate responses obtained from the 4 weeks of baseline. Added into the video were marquees (poster-board signs) with voice over that stated the following:

- "A movie starring . . ."
- "Let's listen to . . . answer questions quickly and correctly. Ready? Let's listen!"
- "Good job!"

Thus, the independent variable in this study was the introduction of a videotaped self-modeling intervention that illustrated correct responses to questions by the participant following question prompts by the experimenters. For example, a child saw and heard the adult on the tape asking, "What is your favorite food, Matt?" The child then saw and heard himself responding, "Papa John's pizza." The tape also included three to five intermittent verbal reinforcements by the adult (e.g., "Good, you responded to the question very nicely.") to remind the children of the target behavior throughout the tape. Children then viewed the 3- to 5-minute tapes of themselves at the beginning of each of the three weekly sessions.

Once relative stability was established in the baseline phase for the first participant, the intervention was introduced. Subsequent introduction of the VSM tape was staggered 1 week (three sessions) apart across the other two participants. Each experimenter spent 1 week working with each participant during the 3-week intervention period. This rotation of experimenters was initiated to limit effects that might be caused by a participant's preference for one of the experimenters.

During the intervention, each participant watched her or his movie before starting the session. While viewing the tape, the experimenter sat next to the child to help prompt attention to the specific behavior on the tape (e.g., "I want you to watch this tape so you can hear yourself responding to questions the right way."). Occasionally, the child would watch the movie more than once by choice and seemed to enjoy being in charge of the viewing. After the viewing, the session began and proceeded as it had in the baseline phase of the study. During the playing of the tapes and the play sessions, the adults did not respond to participant responses in ways that differed from normal conversational engagement.

The participants' reactions to viewing the videos varied on an almost daily basis and did not seem to be influenced by the time of day or the experimenter. Responses were positive more than 60% of the time and included staying in their seat, watching the video, **rewatching** the video, directing comments to the video or to themselves, and reproducing exact words and phrases they heard on the video. Some of the negative responses to viewing included walking out of the viewing area, talking constantly while the video played, and concentrating wholly on other things and objects in the room. One response that could be viewed as either a positive or negative was the child's apparent distress when the time to watch the video was over.

The intervention stage of the study lasted 2½ weeks (5 sessions for Fred) to 4 weeks (12 sessions for Matt). Esther's intervention period was 4 weeks; however, she had the highest rate of disruptive behaviors, which occasionally caused play session postponement. Intervention was suspended simultaneously for all participants so that

two maintenance sessions could be conducted prior to winter holidays.

### TAPE CREATION

The methods that the researchers employed to create the intervention videotape were designed to be easily replicated by families and teachers. The camcorder used to tape the sessions was plugged into a VCR. Baseline videos were played, and when a good example of an adult question paired with a child's response was found, it was saved onto the intervention tape. The pause button on the VCR was used to limit breaks in the tape between segments. For Fred and Matt, 3 minutes of the best examples of responding were edited onto their tapes. Esther only had 1 minute of these paired responses during baseline, so these were reproduced or looped to create a 3-minute video.

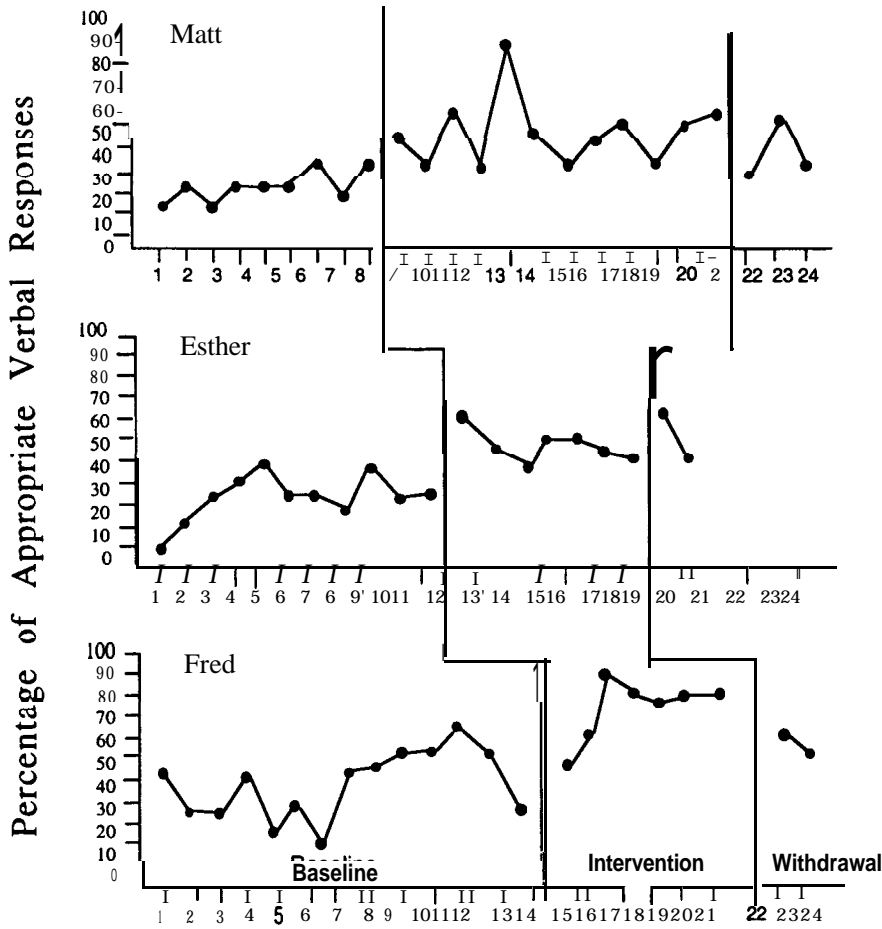
### FOLLOW-UP

On completion of the study, a debriefing session was held with each of the families. Initially, the parents were asked whether they noticed any particular changes in their child's behavior during or after the study. Following this, the experimenters explained what behavior was studied, how it was chosen to be addressed, how the questions were developed, how the participants' responses were categorized, and what the results were. A copy of the movie used in the study was given to the family to use as they saw fit. They were also told how to use their own equipment to create VSM tapes in the future to help them work on other behaviors.

## Results

### INTERVENTION

Analysis of the results confirmed that all three children showed an increase in desired behaviors after the introduction of the VSM intervention. In all cases, the increase was detectable soon after the onset of intervention and remained relatively consistent. Interestingly, the mean percentage of appropriate responses approximately doubled from baseline to intervention for all the participants. Matt's mean percentage of appropriate responses rose from 21% to 45%, Esther's increased from 23% to 47%, and Fred's went from 37% to 72%. Fred's baseline was the most variable, with responses per session ranging from 10% to 65%. His percentage of responses increased during baseline but tended to plateau prior to intervention. The graphs of participant responses are presented in Figure 2. Two of the parents interviewed at the end of the study made mention of changes in response to question rates prior to being informed of the target behavior.



**Figure 2. Percentage of appropriate verbal responses by session for study participants.**

Analysis of responses to individual questions indicated variability across participants and questions. Some questions failed to elicit a high appropriate response rate from any of the children. “Whom does that belong to?” “Have you ever seen \_\_\_\_\_?” and “What is your favorite \_\_\_\_\_?” had the lowest rate of appropriate responses for all participants. For certain questions, the children showed significant gains during the intervention as opposed to baseline. For example, when asked “What do you want me to do?” Fred never responded during baseline. During the intervention he correctly responded 67% of the time. He appropriately responded once in 10 requests to “What can you draw?” during baseline, compared to 6 of 8 times during intervention, and went from 14% to 75% for “What comes next?” Esther made similar improvements with the questions “What is this?” “What number is that?” “Who is that?” and “What is this picture?” Likewise, Matt improved for “What is this?” (22% to 75%), “What color is this?” (22% to 82%), and “What number is this?” (44% to 91%).

The participants exhibited high rates of response during baseline for specific questions. These questions tended to be those closely related to academic tasks that were addressed at school, such as identifying shapes, colors, and numbers. Following withdrawal of the intervention, there were slight decreases in appropriate responses for Matt and Fred; however, the limited number of sessions in the withdrawal phase makes interpretation problematic. Participants were only evaluated for two or three sessions following withdrawal of the VSM intervention.

**INTERRATER RELIABILITY**

All videotapes were transcribed and rated by at least two of the experimenters, and 50% of the tapes were rated by three of them. Percentage agreement for appropriate responses for Matt and Fred was 94%; however, the agreement on Esther’s responses was 80%. Esther’s verbal clarity was not as well developed as that of the other two. Disagreement among raters for Esther’s responses

depended on discerning the exact wording of her responses. Because responses that were not unanimously identified as appropriate were scored as incorrect, it is possible that Esther's scores could be slightly elevated across the stages of the study.

## Discussion

Data collected during the study and during parent interviews after the study indicated that all three students made significant progress in responding to questions. All three participants seemed to enjoy watching themselves and attended well during the viewing. Occasionally, Esther exhibited behaviors that made viewing impossible; however, on good days she attended well. The parents expressed differing views of the effects of the intervention. Esther's parents were unable to see any difference in behaviors. The parents of Fred and Matt, however, noted significant changes related to language and socialization over the course of the study. Fred's parents related that they saw true advancements in speech, responding, and initiation of conversation. Matt's mother confessed to listening at the door one night to the play session. She stated that she heard questions being asked that she knew Matt would never respond to, heard Matt respond correctly, and could not believe it. She said she was never sure what method the researchers were using, other than that it involved a VCR, and that she wasn't sure exactly what behaviors were being targeted. She did note that she saw marked differences in his responses to her questioning and in socializing with the children in the neighborhood. However, the fact that Matt's mother had some idea of the purpose of the intervention may have affected the way she interacted with him. This would only have affected results from the middle of the intervention stage.

## SOCIAL VALIDITY

The comments of Fred's and Matt's parents, which were elicited prior to explanation of the study, add validity to the results. Additional steps were taken to ensure the social validity of the procedures and the target behavior. Social validity is a measure of whether objectives, procedures, and outcomes are meaningful and appropriate for the child and family (Lloyd & Heubusch, 1996; Wolfe, 1994). Prior to the study, parents had submitted a list of behaviors that they viewed as most in need of change or improvement. Target behaviors for this study were derived by cross-referencing the list to determine a desired behavior shared by all participants.

Procedures for conducting VSM intervention were presented to parents on completion of the study. Two of the families had access to the necessary equipment and stated that they would try the method with other behaviors. A father of one of the children had access to a digital camera and adapted VSM for use on their computer.

## EXTERNAL VALIDITY: LIMITATIONS/THREATS

The frequent one-on-one contact that occurred during the play session accompanied by the frequently asked questions may have offered participants the opportunity to learn and develop new behaviors. It is clear that responding increased slightly for all participants during baseline. This was most noticeable with Esther early in baseline. Attributing some of the gain to familiarity with the experimenters or procedure is unavoidable, even though controls were in place to limit this.

It is also important to interpret the responses to individual questions. The participants were obviously familiar with answering questions requiring them to identify color, shape, and number. For example, the percentage response rate during baseline for "What color is this?" was 73% for Esther, 86% for Fred, and 22% for Matt. Although slight gains in responses to these questions were noted for Fred and Esther, the room for improvement was negligible. (Interestingly, Matt's appropriate response rate rose 60% for this item.) If these questions had been removed from the data analysis, improvement during intervention would have been more dramatic. There were other questions that never elicited responses from participants; these may represent questions beyond the child's cognitive abilities. Matt never appropriately responded to "Whom does that belong to?" "Have you ever seen . . .?" and "What do you want me to do?" Esther never responded to "What are you making?" Because these responses were never made by the children, they were not included in the VSM tape. It would be interesting to investigate further whether limiting the questions to those requiring labeling or naming items known to the children would produce better results.

In order to make a 3-minute intervention tape, it was necessary to use video that only displayed the best examples of appropriate responses for the participant to view. This limited the number of questions that were used in the video. Although the researchers attempted to provide as many examples as possible, the children did not have the opportunity to view themselves modeling all the questions that were asked. The experimenters viewed this as acceptable because VSM research has indicated that learned behaviors generalize easily and that the effects of VSM are caused more by a motivational/self-concept effect than through actual copying of behavior (Dowrick & Biggs, 1983; Dowrick & Raeburn, 1977).

Trainer presence in conjunction with the edited video may have allowed optimum learning and shaping of behaviors in some children. More research is needed to determine whether the gains exhibited in this study were a result of the interactions with the investigators, the VSM intervention, or a combination of both. It seems unlikely that the participants simultaneously-on application of the intervention-reached a level of comfort with the researchers that allowed them to double their rate of responding. More research is also needed to determine

whether there is a threshold level in developmental maturity or severity of cognitive disability related to attending skills at which VSM would no longer be effective.

### FUTURE RESEARCH SUGGESTIONS

This study suggests positive outcomes for increasing appropriate responses to questions posed in play situations. Determining whether the intervention generalized across questions, persons, and environments would require the study to be replicated, with additional questions being asked during the intervention and withdrawal stages and progress being assessed in different settings. Procedures might include questions similar to those in the study, such as "Did you go to school today?" or more abstract questions such as "What's new?" These extensions to the present study could provide answers to whether this intervention could encompass other behaviors and whether a videotape could be used as a blanket intervention tape to cover general areas of behavior. It would also be helpful to lengthen the withdrawal phase of the study to enable researchers to determine more clearly how participants reacted to the elimination of the intervention.

Another question that might benefit from additional research is how VSM affects self-recognition and personal awareness in children with autism. The researchers noted an interesting behavior exhibited by Matt during the study. Although the tapes were intended to contain only positive examples of responding, there was a small fragment of video that showed an image of Matt "handflapping" and making odd verbalizations while one of the questions was asked. This behavior was not omitted because it was not a targeted behavior and Matt did give an appropriate verbal response. Every time Matt observed this segment of the tape he grimaced or reacted adversely to what he saw. He obviously was aware that he was watching himself and that his behavior was inappropriate. We suggest caution in using negative behaviors as examples, especially with persons with limited cognitive or language skills. Nevertheless, there may be cases where self-observation of negative examples of behavior, coupled with other methods such as social stories or other role-playing activities, could help shape positive behaviors and self-awareness.

### Conclusion

The results of this research suggest that VSM may offer a positive and relatively unobtrusive type of intervention for children with autism. Certainly, this method offers several advantages over traditional methods used for children with autism and fits well with the 1997 Individuals with Disabilities Education Act requirements for positive behavior supports. VSM is technologically friendly and can readily be learned by parents, teachers, and clinicians. It

also has the benefit of relatively quickly producing results that seem to generalize effectively across persons and settings. Buggery (1995b) theorized that the positive generalization effect that appears throughout the literature on VSM may result from stimulus control (i.e., reliable circumstances can become discriminative for a behavior). If children see themselves performing behaviors, they become part of the learning environment and, thus, are always present when the behavior is called for. Whatever the reason for the generalization effect, it warrants additional research because weak generalization is a frequent criticism of many traditional interventions. Advances in behavioral intervention are greatly needed for children with autism. VSM seems to be an option worthy of further examination, because it would be difficult to find a more user-friendly and time-efficient way to modify behaviors.

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### REFERENCES

- Alger, I. (1969). Therapeutic use of videotape feedback. *Journal of Nervous and Mental Disease, 148*, 430-436.
- American Academy of Pediatrics (1982). The Doman-Delacato treatment of neurologically handicapped children. *Pediatrics, 70*, 810-812.
- Bailey, A., Phillips, W., & Rutter, M. (1996). Autism: towards an integration of clinical, genetic, neuropsychological, and neurobiological perspectives. *Journal of Child Psychiatry, 37*, 89-126.
- Bailey, K., & Sowder, A., (1970). Audiotape and videotape in self-confrontation in psychotherapy. *Psychological Bulletin, 74*, 127-137.
- Bandura, A. (1969). *Principles of behavior modification*. New York: Holt, Rinehart & Winston.
- Boyd, H., & Sisney, V. (1967). Immediate self-image confrontation and changes in self-concept. *Journal of Consulting Psychology, 31*, 291-294.
- Bray, M. A., & Kehle, T. J. (1996). Self-modeling as an intervention for stuttering. *School Psychology Review, 25*, 358-369.
- Buggery, T. (1995a). An examination of the effectiveness of videotaped self-modeling in teaching specific linguistic structures to preschoolers. *Topics in Early Childhood Special Education, 15*, 434-458.
- Buggery, T. (1995b). *Efficacy of videotaped self-modeling with preschoolers with language delay*. Memphis, TN: University of Memphis. (ERIC Document Reproduction service No. ED 390 211)
- Charlop, M. H., & Milstein, J. P. (1989). Teaching autistic children conversational speech using video modeling. *Journal of Applied Behavior Analysis, 22*, 275-285.

- Clark, E., Beck, D., Sloane, H., Goldsmith, D., Jenson, W., Bowen, J., & Kehle, T. (1993). Self-modeling with preschoolers. *School Psychology International, 14*, 83-89.
- Creer, T. L., & Miklich, D. R. (1970). The application of a self-modeling procedure to modify inappropriate behavior: a preliminary report. *Behavior Research and Therapy, 8*, 91-92.
- Dowrick, P. W. (1983). Self-modeling. In P. W. Dowrick & J. Biggs (Eds.), *Using Video: Psychological and social applications* (pp. 105-124). New York: Wiley.
- Dowrick, P. W., & Biggs, J. (1983). *Using Video: Psychological and social applications*. New York: Wiley.
- Dowrick, P. W., & Raeburn, J. M. (1977). Self-modeling: Rapid skill training for children with physical disabilities. *Journal of Developmental and Physical Disabilities, 7*, 25-36.
- Eisler, R. M., & Frederickson, L. W. (1980). *Perfecting social skills*. New York: Plenum Press.
- Eisler, R. M., Hersen, M., & Agras, W. S. (1973). Effects of videotape and instructional feedback on nonverbal marital interaction: an analogue study. *Behavior Therapy, 4*, 551-558.
- Esveldt, K. C., Dawson, P. C., & Forness, S. R. (1974). Effect of videotape feedback on children's classroom behavior. *The Journal of Educational Research, 67*, 453-456.
- Fireman, G., & Kose, G. (1991, April). *Video training as a means for enhancing self-awareness in problem solving among young children*. Paper presented at the biennial meeting of the Society for Research in Child Development, Seattle, WA.
- Fuller, F., & Manning, B. (1973). Self-confrontation reviewed: A conceptualization for video playback in teacher education. *Review of Educational Research, 43*, 469-520.
- Gerlach, E. K. (1995). *Autism treatment guide*. Eugene, OR: Four Leaf Press.
- Griffiths, R. D. (1974). Videotape feedback as a therapeutic technique: Retrospect and prospect. *Behavior Research and Therapy, 12*, 1-18.
- Haarmann, B. S., & Greelis, M. T. (1982). Video therapy case study: The therapeutic use of edited videotapes as a primary means of behavioral intervention in the shaping of appropriate grammatical and contextual use of language. *Journal of Special Education Technology, 5*, 52-56.
- Hosford, R. E. (1981). Self-as-a-model: A cognitive social learning technique. *The Counseling Psychologist, 9*, 45-61.
- Hosford, R. E., & Mills, M. E. (1983). Video in social skills training. In P. W. Dowrick & J. Biggs (Eds.), *Using video: Psychological and social applications* (pp. 125-140). Chichester, England: Wiley.
- Kahn, J. S., Kehle, T. J., Jenson, W. R., & Clark, E. (1990). Comparison of cognitive-behavioral, relaxation, and self-modeling interventions for depression among middle-school students. *School Psychology Review, 19*, 196-211.
- Kimball, H., & Cundick, B. (1977). Emotional impact of videotape and reenacted feedback on subjects with high and low defenses. *Journal of Counseling Psychology, 24*, 377-382.
- Koegel, L. K., Koegel, R. L., & Dunlap, G. (1996). *Positive behavioral support: Including people with difficult behavior in the community*. Baltimore: Brookes.
- Lasater, M. W., & Brady, M. P. (1995). Effects of video self-modeling and feedback on task fluency: A home-based intervention. *Education and Treatment of Children, 8*, 389-407.
- Lloyd, J. W., & Heubusch, J. D. (1996). Issues of social validation in research on serving individuals with emotional or behavioral disorders. *Behavioral Disorders, 22*, 8-14.
- Lonnecker, C., Brady, M. P., McPherson, R., Hawkins, J. (1994). Video self-modeling and cooperative classroom behavior in children with learning and behavior problems: Training and generalization effects. *Behavioral Disorders, 20*, 24-34.
- Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting Clinical Psychology, 55*, 3-9.
- McCurdy, B. L., & Shapiro, E. S. (1988). Self-observation and the reduction of inappropriate classroom behavior. *Journal of School Psychology, 26*, 371-378.
- McEachin, J. J., Smith, T., & Lovaas, O. I. (1993). Long-term outcomes for children with autism who received early intensive behavioral treatment. *American Journal on Mental Retardation, 97*, 359-372.
- Meharg, S. S., & Woltersdorf, M. A. (1990). Therapeutic use of videotape self-modeling: A review. *Advances in Behavior Research and Therapy, 12*, 85-99.
- Miklich, D. R., Chida, T. L., & Danker-Brown, P. (1977). Behavior modification by self-modeling without subject awareness. *Journal of Behavior and Experimental Psychiatry, 8*, 125-130.
- Montee, B. B., Miltenberger, R. G., & Wittrock, D. (1995). An experimental analysis of facilitated communication. *Journal of Applied Behavior Analysis, 28*, 189-200.
- Murray, J. B. (1996). Psychophysiological aspects of autistic disorder: Overview. *The Journal of Psychology, 130*, 145-158.
- Pigott, H. E., & Gonzales, F. P. (1987). Efficacy of self-modeling in treating an electively mute child. *Journal of Clinical Child Psychology, 16*, 106-110.
- Rasing, E. F., Coninx, F., Duker, P. C., & Van Den Hurk, A. J. (1994). Acquisition and generalization of social behaviors in language-disabled deaf adolescents. *Behavior Modification, 18*, 411-442.
- Schunk, D. H., & Hanson, A. R. (1989). Self-modeling and children's cognitive skill learning. *Journal of Educational Psychology, 81*, 155-163.
- Silk, S. (1972). The use of videotape in brief joint marital therapy. *American Journal of Psychotherapy, 16*, 417-424.
- Stoller, F. (1968). Use of videotape (forced feedback) in group therapy. *Journal of Research and Development in Education, 1*, 30-44.
- Thoresen, C., & Hosford, R. (1973). Behavioral approaches to counseling. In *Behavior modification in education: Seventy-second Yearbook of the National Society for the Study of Education, Part 1*. Chicago: University of Chicago Press.
- Wolfe, P. S. (1994). Judgment of the social validity of instructional strategies used in community-based instructional sites. *Journal of the Association for Persons with Severe Handicaps, 19*, 43-51.
- Woltersdorf, M. A. (1992). Videotape self-modeling in the treatment of attention-deficit/hyperactivity disorder. *Child and Family Therapy, 14*, 53-73.
- Zihni, F., & Zihni, F. (1998). *AZ method: The use of video techniques to develop language skills in autistic children* [On-line]. Available: <http://ourworld.compuserve.com/homepages/FZihni/azmethod.htm>

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