

## Incorporating Video Feedback into Self-Management Training to Promote Generalization of Social Initiations by Children with Autism

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### Abstract

Self-monitoring is a well-studied and widely used self-management skill in which a person observes and records his or her own behavior. Video feedback (VFB) occurs when an instructor videotapes a child's performances and reviews the footage with the child and potentially allows the child to score or evaluate their own behavior. A multiple-probe design across participants was used in the present study to evaluate the effects of self-monitoring during VFB on the frequency of social initiating for three students with autism who failed to exhibit the previously mastered skills upon entering a general education classroom. The frequency of initiating increased in general education settings when VFB was introduced. Data also indicated that initiating generalized across settings and people not previously associated with VFB and were maintained in the absence of VFB for two of three participants.

Keywords: autism, generalization, self-monitoring, social initiations, video feedback

Children with autism often have difficulty with social interactions, social reciprocity, relationships, and play skills (American Psychiatric Association, 2000). Deficits in initiating social interactions with peers may be exacerbated by reduced opportunities to engage with others (Weiss & Harris, 2001). Although children with autism can acquire a wide variety of social and peer interaction skills through direct instruction in special education classrooms (Weiss & Harris, 2001), these social skills often fail to transfer to general education settings or be maintained over time (Rhode, Morgan, & Young, 1983).

Transfer and maintenance of skills are core concepts of generalized behavior change (Cooper, Heron, & Heward, 2007), one of the defining characteristics of the field of applied behavior analysis (Baer, Wolf, & Risley, 1968). Stokes and Baer (1977) and Stokes and Osnes (1989) described a variety of techniques to program generalization of skills, including teaching with many examples, and teaching self-

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management skills. Self-monitoring is a well-studied and widely used self-management skill in which a person observes and records his or her own behavior. Often the act of self-monitoring is the only intervention necessary to change the behavior in the desired direction (Cooper et al., 2007). Teaching self-monitoring may result in the generalization of target skills because learners are often taught to produce salient verbal or covert discriminative stimuli when assessing their own behavior across multiple relevant settings. Osnes and Stokes referred to this programming for generalization strategy as incorporating functional mediators that can be employed when a child transitions into a new setting (e.g., from a self-contained classroom to a general education setting) where direct instruction and performance feedback are less likely to occur.

Although many students learn to monitor their own behavior during live performance, students can also learn to self-monitor via video feedback (VFB) with filmed footage of their performance with different people and materials and in different settings. During VFB, an instructor reviews previously filmed footage of a child's behavior with the child so that the child can assess his or her own behavior and discriminate between appropriate responding and inappropriate responding (Maione & Mirenda, 2006). Video feedback differs from a more widely used and researched procedure known as video modeling where an actor is filmed engaging in the target behavior appropriately followed by an opportunity for imitation of the target behavior (Charlop-Christy, Le, & Freeman, 2000). During video modeling, however, the learner does not receive training in evaluating aspects of his or her own behavior as they would during a VFB condition.

Video feedback has been used to teach social skills to individuals with a wide range of disabilities (Chung et al., 2007; Embregts, 2000; Kern-Dunlap, Dunlap, Clarke, White, & Stewart, 1992; Maione & Mirenda, 2006; O'Reilly et al., 2005; Thiemann & Goldstein, 2001). In one study, Kern-Dunlap et al. (1992) assessed the effects of VFB on the pro-social behavior of five boys with severe behavioral problems in two different social skills groups. Examiners videotaped participants in small group activity sessions as they played board games. Before the next session, the investigators provided participants with individualized VFB and reinforcement for appropriate behavior during the previous day's group activity sessions. The results of the study indicated that VFB plus reinforcement for appropriate behavior during activity sessions increased appropriate social interactions and decreased aggressive interactions for each participant during activity sessions.

In another study, O'Reilly et al. (2005) assessed the effectiveness of VFB on the pro-social behavior of children with severe behavioral

difficulties and average IQ. Unlike Kern-Dunlap et al. (1992) who provided reinforcement for appropriate behavior during activity sessions, O'Reilly et al. (2005) provided reinforcement for accurately identifying aggressive and pro-social behavior during VFB sessions. O'Reilly et al. (2005) videotaped the behavior of participants during daily recess periods and conducted individual VFB sessions 24 hr later. The results indicated that delayed VFB was only effective for one participant though when immediate VFB was introduced with the other participant aggressive behavior decreased and pro-social behavior on the playground increased. This demonstration of the positive effects of immediate VFB confirmed an earlier finding of Embregts (2000) who successfully taught pro-social behavior to six children and adolescents with mental retardation with evidence of decreased aggression, skill maintenance and generalization to new settings within the residential facility.

Three studies have examined the effects of multi-component packages for teaching social skills to individuals with autism. Thiemann and Goldstein (2001) combined social stories, visual graphics, and immediate VFB to teach social language skills to five children with autism in a group setting. The examiners videotaped 10 min small group interactions and then immediately reviewed it with the children (i.e., VFB) for the targeted skill. Three participants demonstrated an increase in 3 of 4 targeted skills while the other two increased in 2 of 4 skills during subsequent small group interactions. However, skill maintenance and generalization across settings was limited and no child with autism met the mastery criteria established based on the behavior of age-matched typically developing peers. Similarly, Chung et al. (2007) assessed the effects of immediate VFB in combination with peer-mediation (i.e., peer prompts for appropriate behavior and redirection for inappropriate behavior) and a token economy on the pro-social behavior of four children with high functioning autism during small group social skills instruction. Appropriate talking increased and inappropriate talking decreased for each participant after the treatment package was introduced, but maintenance and generalization were not assessed. Because Chung et al., used an AB design, it cannot be determined whether the treatment package was responsible for the observed changes. Finally, Maione and Mirenda (2006) assessed the effects of adding VFB after video modeling alone did not sufficiently improve the social language of one child with autism in his home and in a small group with typically developing peers. Though increases were observed in the video modeling condition for two activities, the effects were insufficient for a third activity. When VFB was added as a second treatment component, social language improved to

the mastery level for that activity as well. Each of these studies suggest that VFB might be useful for targeting social behavior in group settings but lack of component analyses, limitations in experimental designs and assessment of maintenance and generalization.

Although studies have reported using VFB as part of more comprehensive treatment packages to teach a variety of social skills to participants with emotional and behavioral disorders (Kern-Dunlap et al., 1992; O'Reilly et al., 2005), mental retardation (Embregts, 2000) and autism (Chung et al., 2007; Maione & Mirenda, 2006; Thiemann & Goldstein, 2001), no studies to date have evaluated the effects of VFB alone on the social skills of children with autism. The purpose of the present study was to evaluate the effects of VFB on social initiating for three children with autism. Previously, the children had acquired social skills in a special education setting, but failed to generalize the skills in general education settings with typically developing peers. It was expected that VFB would (a) increase the frequency of social initiating, (b) promote generalization of social initiations in general education settings, and (c) promote maintenance of social initiating skills.

## Method

### *Participants*

The participants were three boys who had been diagnosed with Autistic Disorder by an independent agency. Charlie (age 6), Jason (age 5) and Trevor (age 7) originally received their education in a self-contained special education classroom for children with autism in a public school and were in the process of transitioning to a general education classroom. Each participant had a one-to-one instructional aide, and attended a social skills group for 30 min per day, two days per week, in which the principles of applied behavior analysis were used to teach classroom and peer interaction skills. Their teachers reported that these children demonstrated appropriate attending, turn-taking, and social initiating skills in the self-contained special education settings, but they did not socially initiate or initiated too infrequently in the general education classroom.

### *Settings and Materials*

Prior to the start of the experiment, participants were videotaped during their usual social skills training in the special education classroom and in the following general education settings: center time, lunch, and the playground. These videos were then viewed by the experimenter to identify clips in which each participant did or did not socially initiate to a peer when it was appropriate to do so. These edited clips were used later as discrimination aids at the start of each

VFB teaching session. Participants were also videotaped for feedback sessions in one of three general education settings in a public school: (a) the cafeteria during lunch, (b) the playground during recess, or (c) the classroom during center activities. Daily individualized VFB with new footage was conducted in a small special education classroom with a table, chairs, video camera, and rewards displayed in a school store. In addition, "Buddy" classrooms were created by pairing classes from different grades (e.g., a kindergarten class and a second grade class) in a single general education classroom not associated with VFB (i.e., no video clips from this classroom were ever used during VFB sessions). Interaction with students in the "Buddy" classrooms served as a probe for generalization of social initiating skills because the peers in the "Buddy" classroom were also not associated with VFB teaching.

Additional materials used included a digital video camera, video tapes, laminated feedback pictures, pennies (tokens), a small glass jar for collecting pennies during VFB, hand held tally counters, reward items, and small bins for displaying reward items.

#### *Normative Criteria Establishment and Measurement*

To determine normative data regarding both frequency and socially valid topographies of social initiations, two age-matched typically developing peers were observed in the three general education settings for five days. The number of social initiations made by each child was divided by the number of minutes observed to obtain a per-min rate which was multiplied by 10 to obtain a target average frequency of social initiations to be used as the criterion for the 10-min periods in the present study. The criterion was 6 initiations per 10-min session for three consecutive sessions. Examples of social initiations used by the typically developing peers during the observations were recorded (e.g., "Hey guys, look what I made," "What do you have?" or "Chase me!") and used to create a suggestion list used by the experimenter during VFB sessions (e.g., "you could say 'Can I have a turn?'").

During VFB sessions, data were also collected on the percentage of opportunities in which each participant accurately identified "good talking" or "not good talking." During experimental sessions, social initiations were operationally defined as questions or comments not contingent upon a peer's immediately prior utterance (Maione & Miranda, 2006). Examples included: (a) introducing a new idea or topic, (b) requesting an action, object, or information, (c) commenting about current observable events or something other than the current activity, (d) complimenting the peer or one's self, (e) attempting to gain the

peer's attention, and (f) expressing enjoyment or displeasure regarding the on-going interaction with a peer. The dependent variable was the frequency of social initiations made by each participant to peers during 10-min sessions. A trained observer in the room used a hand-held tally counter to score the frequency of initiations during the 10-min sessions. The first author scored video footage of all sessions to evaluate interobserver agreement. IOA was calculated on 100% of sessions. Total agreement was calculated by dividing the smaller obtained frequency by the larger obtained frequency and converting the result to a percentage. Agreement for Charlie ranged from 88% to 100% with a mean of 98%, Jason ranged from 88% to 100% with a mean of 98%, and Trevor ranged from 75% to 100% with a mean of 96%.

### *Design and Procedures*

The effects of VFB on social initiations were examined using a multiple-probe across participants design. Data were collected during daily observations in the natural environments as described above. No prompts or explicit reinforcement was ever provided for appropriate social initiations to peers in these general education setting observations.

*Preference assessment.* Each participant was presented with an array of favorite edibles and small toys that were chosen by each participant's parents and the investigator. Examples included candy, small rubber balls, erasers, rub-on tattoos, small plastic animals, decorated pencils, noise makers, trading cards, and small toy cars. Each participant was asked to select 10 items, one at a time, without replacement. These items were then priced from 1 to 10 cents each in reverse order of selection rank (i.e., number 10 was priced at 1 cent, number 9 at 2 cents) and placed in a school "store." This entire procedure was repeated approximately every 9-10 sessions during the course of the study for each participant. Items placed in the store were available at the end of VFB sessions in exchange for pennies earned for correct responding.

*Baseline.* During each baseline session, each participant was videotaped for the first 10 min in the special education classroom where the children typically received social skills instruction, for the first 10 min in one of the three general education settings (i.e., center time activities in the child's general education classroom, lunch in the cafeteria, recess on the playground), and the first 10 min during free play in their general education "Buddy" classroom as a generalization probe. No prompts or programmed consequences was provided by the experimenter during these 10-min periods in which the children were being videotaped. Participants were free to interact with the materials

present in each setting and with any peers present.

*Video feedback.* During the VFB condition, each child was videotaped as in baseline to determine the frequency of social initiations in the special education, general education, and generalization probe "Buddy" classrooms. In addition, before the start of the school day, the prior day's filming in a general education activity was viewed with the student in a small self-contained classroom. Video feedback teaching sessions were 15 to 20 min in duration. The experimenter showed the participant the items available in the school store and then said, "We are going to watch a video together. You can earn pennies while we watch the video. When we are all done, you can use your pennies to shop in this school store." On the table were pennies and a penny jar, a video camera, and a laminated white sheet with two round face drawings that were 6 cm in diameter. The drawing on the left was a green smiling face with the words "Good talking" beneath it. The drawing on the right was a red frowning face with the words "Not good talking" beneath it. The investigator then asked "Are you ready to watch the video?" to prompt attending by the participant.

Next, the experimenter presented two of the video model clips as a discrimination aid. One clip showed the participant socially initiating to a peer while the other did not show an initiation when one would have been appropriate. During the initiation clip, the experimenter pointed to the green smiling face and said, "Good talking." During the non-initiation clip, she pointed to the red frowning face and said, "Not good talking." The experimenter then said "Your turn" and presented the 10-min videotape from the previous day. Five examples of initiating and five examples of failing to initiate were presented. The experimenter paused the video after an instance of appropriate social initiating or when there was an opportunity for social initiating but no social initiation was made. Each time the tape was paused, the experimenter asked "Was that good talking or not good talking?" while pointing to the sheet with the smiling and frowning faces.

Correct discrimination of social initiations resulted in specific verbal praise using an excited tone of voice (e.g., "Wow! You said, 'Mary, let's play cars.' That was good talking.") and a penny in the jar. Correct indication that there had been no social initiation resulted in a penny in the jar and a suggestion of what the participant could have said (e.g., "Next time, you could say, 'Mary, let's play cars.'") provided in a neutral tone. If the participant attempted to point to the incorrect picture, the investigator placed her hand on the participant's hand to block the response and pointed to the correct picture. No penny was dropped into the jar and the experimenter provided specific feedback

(e.g., "That was good talking, you said 'Look at me'" or "That was not good talking, next time you could say, 'Look at me'") in a neutral tone. If the participant responded with an incorrect verbal response, or if the participant failed to respond within 5 s of the videotape being paused, the investigator pointed to the corresponding smiling or frowning face drawing, provided neutral feedback as described above, and did not drop a penny in the jar. At the conclusion of each VFB session, the experimenter said "We're all done. Let's count your pennies." followed by an opportunity to exchange the pennies for reward items in the school store. The VFB condition continued for each participant until at least three sessions with six initiations per 10-min period was achieved in the general education setting.

*Maintenance.* After the first two participants reached criterion for frequency of social initiations, the videotaping of daily play continued but no VFB sessions were conducted. No maintenance data were collected for the third participant because the school year ended before they could be collected.

#### *Procedural Integrity*

All VFB sessions were conducted by the first author. An observer scored 33% of VFB sessions for procedural integrity. The observer used a checklist to score whether the experimenter had all materials ready, paused the video when appropriate, prompted a response from the learner, provided accurate consequences for learner responses, prompted counting of the pennies, and provided the store exchange opportunity. Integrity was calculated by dividing the number of correctly implemented treatment steps by the total number of steps, then multiplying by 100. Procedural integrity was 100% for all VFB sessions for all participants.

#### *Social Validity*

To assess social validity, the participants' general education classroom and special area teachers (Gym, Art, Spanish, Computers, Library) were asked to use a three-point rating scale to assess the participants' initiating skills over the course of one typical school day, both pre- and post-treatment. Teachers were instructed to select 1 if the teacher never or rarely observed the participant initiating, 2 if the teacher sometimes observed the participant initiating, or 3 if the teacher frequently observed the participant initiating. An average rating for each participant was then calculated.

### **Results**

During baseline, all participants demonstrated initiating skills in the special education settings, but rarely did so in the

general education classroom during center activities, the playground during recess, or the cafeteria during lunch (see Figure 1).

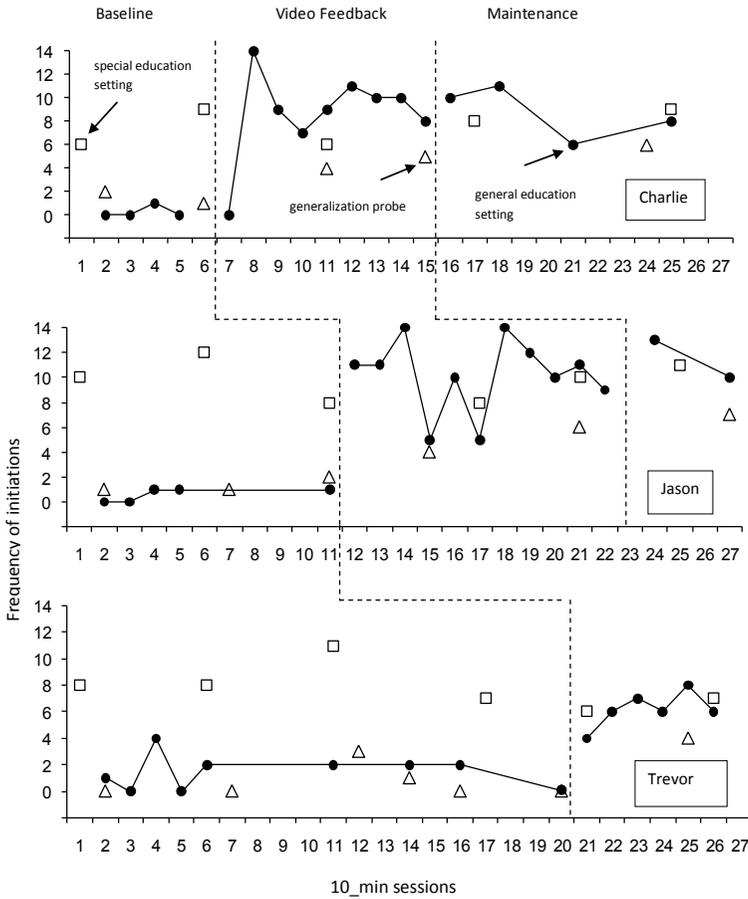


Figure 1 The frequency of initiations made by three children with autism in their special education classroom, general education settings, and generalization probe classroom during baseline, video feedback, and maintenance phases

The participants also rarely initiated in the "Buddy" classroom (generalization probe) settings. During VFB, Charlie's (top panel) initiations increased to above the target criterion and remained at that level during maintenance sessions even though no explicit reinforcers were ever provided during play. Similar increases were observed for Jason (middle panel) and those increases were also maintained after VFB was discontinued. Trevor's (bottom panel) social initiations also reached the criterion in the general education setting, but never reached the criterion level in the generalization setting and maintenance was not evaluated. Taken together, these results demonstrate that VFB was effective in increasing and maintaining the frequency of social initiations in general education settings for three learners with autism.

Clear improvements were noted in discrimination of responses as "good talking" or "not good talking" during VFB. Charlie's accuracy was 40% during his first session of VFB increasing to 90% by the 5<sup>th</sup> session through the remainder of VFB. Jason was accurate on 60% of the trials during his first session of VFB and reached 90% accuracy in the 2<sup>nd</sup> session. He maintained at least that level of accuracy for the remainder of his VFB sessions. Trevor was accurate on only 30% of the trials during his first session but reached 90% accuracy by his 4<sup>th</sup> session and maintained that level of accuracy or better for the remainder of the sessions.

The participants' general education classroom and special area teachers (Gym, Art, Spanish, Computers, Library) rated the participants' initiating skills both pre- and post-treatment. Charlie's six teachers rated him as rarely or never initiating a social interaction with his peers ( $M=1.0$ ) prior to treatment increasing to post-treatment rating of frequently (2) and sometimes (4) initiating a social interaction ( $M=2.33$ ). Five of Jason's six teachers rated him as rarely or never initiating a social interaction with his peers ( $M=1.16$ ) prior to treatment increasing to post-treatment ratings of frequently (2) initiating a social interaction and sometimes (3) initiating a social interaction while one continued to rate him as rarely or never initiating a social interaction with his peers ( $M=2.17$ ). Trevor's six teachers all initially rated him as rarely or never initiating a social interaction with his peers ( $M=1.0$ ) increasing to post-treatment ratings of frequently (2) and sometimes (4) initiating a social interaction ( $M=2.33$ ). Thus, the social validity data obtained for all three participants indicates that they were rated as engaging in more frequent social interactions than they had prior to treatment.

## Discussion

In prior studies, VFB has been used as part of more comprehensive treatment packages to teach a variety of social skills to participants with emotional and behavioral disorders (Kern-Dunlap et al., 1992; O'Reilly et al., 2005), mental retardation (Embregts, 2000) and autism (Maione & Miranda, 2006; Thiemann & Goldstein, 2001). Prior to the present study, no studies had evaluated the effects of VFB in isolation with children with autism. The results of the present study demonstrated that daily VFB sessions increased the frequency of social initiating for participants with autism in general education settings. The participants had acquired the social skills earlier in a special education setting, but had failed to demonstrate the skills in general education settings prior to the study. Increases in social initiations also generalized across general education settings and peers not previously associated with VFB. This occurred despite the fact that no explicit reinforcement was ever programmed for appropriate social initiations to peers in the general education settings. In addition, data for two of the participants, Charlie and Jason, indicated that they were able to maintain social initiating skills in the absence of VFB, thus increasing the functionality of the skill.

The acceptance of treatment outcomes by teachers of children with autism is important because it predicts that such treatment is likely to be supported by those teachers (Schwartz & Baer, 1991). Social validity data collected on the frequency of initiations in the present study demonstrated that the teachers of the participants rated them as increasing their social initiations from pre- to post-treatment. Thus, subjective ratings by teachers were in agreement with the objective outcomes collected during the present study.

Teaching multiple exemplars is one strategy to increase the generalization of target behavior from training to novel situations (Stokes & Baer, 1977; Stokes & Osnes, 1989). In the present study, during VFB, multiple variations of peers and social situations were presented to the participants across various general education settings. As a result, the different antecedent contextual features present in each social initiating scenario should result in the control of responding of social initiating. When new scenarios that share these features in which social initiating is appropriate are presented, they too should occasion correct responding. This use of multiple exemplars was likely responsible for the generalization of initiating observed in the present study.

Stokes and Osnes (1989) proposed that incorporating functional mediators is another strategy to promote generalization of target behavior from training to novel situations. They described a mediator as a stimulus that is present between the time of training and the

opportunity for generalization of a skill. One example is verbal or covert discriminative stimuli produced by a learner across multiple training situations. In the present study, learning to evaluate aspects of one's own behavior during VFB sessions, which varied across settings and social situations, may have established self-mediated covert discriminative stimuli (e.g., instances of what is "good talking" and "not good talking") that set the occasion for appropriate behavior in the generalization setting.

Although accuracy of self-monitoring during VFB sessions in the present study was not required, all participants reached high percentages of accuracy fairly rapidly and maintained those levels. These high levels of accuracy may have been produced by the presentation of tokens only when a participant correctly identified "good talking" or "not good talking." In the research literature, however, there is conflicting evidence about the importance of the accuracy of self-monitoring on the target behavior. Some researchers have found that highly accurate self-monitoring is correlated with increases in the target behavior (Marshall, Lloyd, & Hallahan, 1993) while others have found increases even when self-monitoring accuracy was low (Brodén, Hall, & Mitts, 1971). Thus, it is possible that engaging in self-monitoring, regardless of accuracy, may produce changes in the target behavior. Future studies might specifically examine the role of accuracy during self-monitoring to determine its effect on target behavior change.

It should be noted that informal observation during the present study revealed that one participant, Charlie, increased the frequency of his initiating in general education settings by making frequent initiations to many different peers, but he failed to engage in extended conversational exchanges. While this increased his social contact with peers, the interactions may have had limited functionality. Future studies should include the teaching of a conversational exchange following a social initiation to promote more natural social interaction between the learner and his or her peers.

Given the current emphasis on inclusion and educating students with disabilities in their least restrictive environments, it is important to investigate strategies that may promote learner independence and the transfer of skills across settings. In the absence of VFB, for example, an instructor may be required to facilitate social interaction between learners with autism and their typically developing peers (Weiss & Harris, 2001). One problem with this is that the presence of the instructor may promote prompt dependence for learners with disabilities, or the instructor may function as a perceived social barrier for typically developing peers. With VFB, however, the instructor is removed from the social situation. Thus, such teaching may promote learner independence while continuing to provide support.

### Author Note

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