Video Modeling: Why does it work for children with autism?

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Video modeling is a well-validated intervention documented in the behavioral sciences. It has been used to target a variety of behaviors across many areas of functioning including language, social behavior, play, academics and adaptive skills. The methodology appears particularly efficacious for children with autism. In this review of research applications of video modeling, we explore several plausible explanations that contribute to the unique benefits of television/video methodology. We discuss the specific characteristics of autism that may provide a rationale for using visually cued instruction that restricts the field of focus while not imposing too much demand on social attention or interaction. The unique aspects of video presentation are presented within a social learning context (Bandura, 1977, 1986). We also discuss additional explanations pertaining to the features video offers, such a restricted field of focus, repetitive presentation of models and situations, and a context that is typically associated with recreation and is thus viewed with greater receptivity and motivation.
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Autism is a severe neurodevelopmental disorder characterized by qualitative impairment before the age of three in verbal and nonverbal communication, reciprocal social interaction, and a markedly restricted repertoire of activities and interests (American Psychiatric Association, 1994). In addition to these core features, children with autism often exhibit overselective attention (Lovaas et al., 1979) or a restricted field of focus demonstrating a clear ability to sustain attention for extended periods of time (Garretson et al., 1990; Buchsbaum et al., 1992; Casey et al., 1993). Individuals with autism often benefit from visually cued instruction (Quill, 1997) and show strengths in processing visual rather than verbal information as demonstrated across many studies using standardized intelligence tests (DeMyer et al., 1974; Shah & Frith, 1983; Happe 1994a; Freeman et al., 1985; Asarnow et al., 1987; Lincoln et al., 1988). Further, children with autism exhibit atypical responses to the social environment. As such they may selectively avoid attending to socially relevant stimuli (Prior & Ozonoff, 1998). These reports suggest a rationale for using visually cued instruction that restricts the field of focus while not imposing too much demand on social attention or interaction.

Bandura's Social Learning Theory (1977) underscores that human behavior is primarily learned by observing and modeling others. These opportunities provide a platform for which one may generalize to new experiences. Observational learning refers to the cognitive and behavioral change that occurs as a result of observing others engaged in similar actions (Bandura, 1986). Modeling is defined as the process by which an individual or model demonstrates behavior that can be imitated. The modeled behavior can be presented in vivo (live), recorded (e.g. filmed, videotaped), or imagined.

In observational learning there are four distinct processes that mediate and facilitate observational learning: attentional, retentional, production and motivational (Bandura, 1986). The *attentional process* refers to the initial act of vicarious acquisition that occurs when an individual is attending to and accurately perceiving a model or event. The attentional process requires the intake of sensory stimuli and focus on a specific task or event. The *retentional process* requires the capacity of the learner to symbolically process the modeled behavior. Retention occurs when modeled events are internally coded into meaningful symbols and subsequently stored in

memory. The retention of material is enhanced through concurrent visual monitoring, cognitive rehearsal, and behavioral reproduction (Carroll & Bandura, 1986). The *production process* occurs when the learner accurately reproduces and rehearses the modeled behavior. The motor production process is the stage in which the symbolic representations become actions. As such, the capacity to perform the rudimentary elements of the task must be within the individual's repertoire and then built upon. In the process, he or she may need to rely on feedback from a model so that self-corrective adjustments may be made. Lastly, the *motivational process* refers to learning that occurs in the presence of reinforcement. Whether or not an individual will adopt a modeled behavior is dependent upon the frequency that the behavior is perceived to result in a desired outcome. Naturally, an observed behavior has a greater likelihood of being adopted if it is viewed as being reinforcing either externally (e.g., social reinforcement, edibles), vicariously (e.g., learning from other people's success or failure) or via self-produced reinforcement (e.g., self-reward, self-punishment).

Video modeling is a well-validated behavioral intervention well documented in the behavioral sciences (Dorwick & Jesdale, 1991) that has been developed to facilitate observational learning. It has been used successfully to train skills as diverse as parent training for conduct disordered children (Webster-Stratton, 1990; Webster-Stratton et al., 1989), social skills in children with social deficits (Dorwick & Jesdale, 1991), and instruction for speech therapists (Irwin, 1981). It generally involves the subject observing a videotape of a model engaging in a behavior that is subsequently practiced and imitated.

Video modeling appears to be particularly beneficial for teaching a variety of skills to individuals with autism including increasing vocalization and communication (Charlop & Walsh, 1986; Charlop & Milstein, 1989), social and play skills (D'Ateno et al., 2003; Taylor et al., 1999; Wert & Neisworth, 2003), emotion processing (Corbett, 2003), perspective taking (Charlop - Christy & Daneshvar, 2002; LeBlanc et al., 2003), academics (Kinney et al., 2003) and adaptive behavior (Shipley-Benamou et al. 2002). Charlop and colleagues have pioneered much of the work that uses video modeling as a behavioral treatment for children with autism. Charlop and Walsh (1986) used a time delay procedure to teach four children with autism to make affectionate statements to a familiar person. The treatment resulted in the children producing spontaneous verbalizations of affection (e.g., "I like (love) you") in response to a familiar person or parent, respectively. An early application showed the effectiveness of using video modeling procedures for the acquisition and generalization of conversational skills in three children with autism (Charlop & Milstein, 1989.) The study employed a multiple baseline design using scripted conversations on the topic of toys. The results indicated that the children acquired basic conversational speech following exposure to the video modeling procedure. Video modeling techniques have also been used effectively to promote generalization of shopping skills in young adults with autism and other moderate to severe disabilities (Haring et al., 1995; Haring et al., 1987).

In the design of the videos one must consider the type of models to be used. Previous studies have used a variety of models including adults (Charlop-Christy & Daneshvar, 2002; D'Ateno et al., 2003; LeBlanc et al., 2003; Kinney et al., 2003), typically developing peers (Corbett, 2003; Nikopolous & Keenan, 2003), siblings (Taylor et al., 1999), self-as-a-model or self-modeling (Wert & Neisworth, 2003) as well as first-person perspective using modeling of actions (Shipley-Benamou et al., 2002). Ultimately, when the target behavior involves interactions with other children, such as in social and play skills, then the utilization of peer models (Corbett, 2003) or siblings (Taylor et al., 1999) may be the best choice. Another underutilized technique is self-modeling in which the child is initially prompted on video to demonstrate the target behavior with instruction or prompts. The sequences are edited together to

show only the desired behavior and then shown to the subject. Wert & Neisworth (2003) used self-modeling based in a school setting to facilitate spontaneous requesting in three children with autism. To date, most video modeling procedures employ full models in the scenes; however, merely the model's hands or movements may be taped when the target behavior pertains to an action or a motor response. For example, Shipley-Benamou et al., (2002) filmed a variety of motor tasks from the subject's perspective as he or she would be viewing the tasks using only the hands of the model with voice narration providing instruction.

Why is video modeling so effective for children with autism? As previously eluded to, it has also been speculated that features of autism, such as over-selective attention (Charlop-Christy & Daneshvar, 2002; Lovaas et al., 1979) a restricted field of focus (Garretson et al., 1990; Buchsbaum et al., 1992; Casey et al., 1993), preference for visual stimuli (Kinney et al., 2003; Shipley-Benamou et al., 2002), and avoidance of face-to-face attention (Charlop-Christy et al., 2000) may actually be capitalized on while using video modeling. Individuals with autism often benefit from visually cued instruction (Quill, 1997) and show strengths in processing visual rather than verbal information (DeMyer et al., 1974; Shah & Frith, 1983; Happe 1994a; Freeman et al., 1985; Asarnow et al., 1987; Lincoln et al., 1988). In addition, video modeling offers a way to learn through social models without initial face-to face interactions.

As previously noted, Bandura (1986) indicated the importance of attention, retention, production and motivation for observational learning to occur. We hypothesize that video supports these processes in the following ways. The television and video monitor by design provides for a restricted field of focus. Thus, video modeling appears to improve the attention of individuals with autism by selectively focusing his or her attention on relevant stimuli (Dowrick & Jesdale, 1991; Shipley-Benamou et al., 2002; Charlop-Christy et al., 2000; Charlop-Christy & Daneshvar, 2002). In the process, extraneous visual and auditory stimuli are removed and the child is able to focus on the pertinent information presented on the screen.

Secondly, retention is facilitated in the video modeling procedures through repetition of the target behavior. All video modeling interventions include presenting the subject with repeated exposures of the event that help to establish and maintain the behavior in memory. Under some designs, the child is provided with the exact stimuli or situations as presented in the video. For example, in order to improve play-related comments, Taylor and colleagues (1999) presented the target child with the same toys as they observed in the video. This method may facilitate the association between the stimuli and the response and the transfer of behavior from video to live modeling. Thus, video permits the repetition of the same model and precise procedures (Dowrick & Jesdale, 1991; Thelen et al., 1979) leading to the production of the behavior - - the next essential component of observational learning.

Thirdly, video modeling techniques are generally active processes that allow for the production of the observed behavior through practice (Taylor, Levine & Jasper, 1999; Nikopoulos & Keenan, 2003). For example, Taylor et al., (1999) included behavioral practice as part of the acquisition of play-related comments in two children with autism. After the subjects were provided with the toys as in the video modeling scenes, they were required to engage in similar behavior after viewing each scene. In the process, the children were rewarded for repeating scripted and unscripted play comments from the video. Behavioral practice is also a key element of many video modeling procedures and has been utilized in several instances of video modeling interventions (Rehfeldt et al., 2003; Nikopoulos & Keenan, 2003; Kinney et al., 2003; Shipley-Benamou et al., 2002; Wert & Neisworth, 2003). Shipley-Benamou et al. (2002) determined that video modeling using first person perspective scenes resulted in the acquisition of functional

living skills such us making orange juice, preparing a letter to mail and table setting in children with autism.

Lastly, in terms of motivation, children with autism display an affinity for excessive television and video viewing, which has resulted in significant parental stress, related to their attempts to manage this predilection (Nally, Houlton, & Ralph, 2000). Video watching is typically associated with recreation and thus may be viewed with greater receptivity and enthusiasm. Several researchers posit that video modeling interventions by virtue of the visual medium are inherently motivating and naturally reinforcing to individuals with autism (Corbett, 2003; Charlop-Christy et al., 2000; Wert & Neisworth, 2003; D'Ateno et al., 2003; Charlop-Christy & Daneshvar, 2002). Nevertheless, these ideas do not in and of themselves fully explain the utility of the medium since typically developing children also find it rewarding but appear to learn equally well from live modeling procedures. In order to more carefully explore the unique aspects of video, Charlop-Christy et al. (2000) demonstrated that video modeling led to faster acquisition of skills and greater generalizability than in vivo modeling in children with autism. Video modeling interventions have led to generalization across settings (Wert & Neisworth, 2003; Rehfeldt et al., 2003; Nikopolous & Keenan, 2003), stimuli (Charlop-Christy & Daneshvar, 2002; LeBlanc et al., 2003; Nikopolous & Keenan, 2003), generative skill acquisition (Kinney et al., 2003), peers (Nikopolous & Keenan, 2003) and spontaneous, unscripted verbal behavior (Taylor et al., 1999).

In terms of other more practical considerations of video as a learning medium, Thelen and colleagues (1979) describe several general advantages, which include: 1) the ability to present a variety of examples and settings to facilitate maintenance and generalization of the learned behavior, 2) greater control over the modeling procedure, 3) the repetition of the same model(s), and 4) the reuse of videotapes for individuals. Video procedures also offer significant time and cost saving benefits. In addition to being a more efficacious treatment for children with autism, video modeling also was shown to take approximately one-third of the time with one-half the cost when compared to in vivo procedures (Charlop-Christy et al., 2000). In a few studies, the acquisition of specific skills were previously targeted using other behavioral techniques, such as discrete trial training, that had resulted in minimal or low frequency acquisition of the skill (Corbett, 2003; Wert & Neisworth, 2003). Subsequently, the implementation of video modeling techniques resulted in more rapid acquisition, maintenance and generalization of the behavior. It has been suggested that video modeling often leads to more efficient learning of skills because the medium is intrinsically reinforcing and it helps to compensate for stimulus overselectivity (Charlop-Christy & Daneshvar, 2002).

The explanations for the benefit of video modeling are exploratory. Thus, it is still unclear what specific aspects of the visual medium are necessary and sufficient for treatment. Naturally, comparison studies between live and video modeling procedures will serve to replicate findings of better attainment and generalization of behavior in children with autism (Charlop-Christy et al., 2000; Haring et al., 1987). Clarification of the role of selective attention and restricting the field of focus may be explored through the use of presenting the stimuli through a narrow or restricted view. For example, live stimuli may be presented to the subject while they are required to observe through a framed view analogous to a television monitor. It is also possible that the dynamic presentation of the stimuli (e.g., motion) may contribute to the effectiveness of the treatment. As a result, a contrast between dynamic and still pictures may elucidate this concept.

Seemingly, one of the most important components of a modeling procedure is behavioral rehearsal. However, it may be possible that with the use of video modeling this active practice of

the modeled behavior may not be as critical as previously asserted. In this way, it will be important to study whether mere exposure to the model may be as beneficial as engaging in practice of the observed behavior. Another consideration needing exploration is context or the meaningful associations that are provided in the video scenes, which likely facilitates the encoding of information as well as the generalization of learned behavior. It will be important for future investigations to attempt to design studies in which these components are systematically removed in order to clarify the necessary and essential features of video modeling treatment for children with autism.

In summary, the elucidation of the aforementioned factors pertaining to the processes of observational learning (i.e., attention, retention, production and motivation), characteristics of autism (e.g., selective attention, visual processing strengths), and the unique components of video (e.g., restricted field of focus, repetitive display) will be critical in order to extrapolate behavioral treatment applications for and beyond video modeling.

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