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Using Video Instruction Procedures with and Without Embedded Text to Teach Object Labeling to Preschoolers with Autism: A Preliminary Investigation

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Three preschoolers diagnosed with autism were taught how to expressively label common food items using video instruction with and without embedded text. Twenty unknown stimuli were randomly assigned to either the embedded text or no-embedded text condition. Using a commercially available video editing program, a DVD was created that presented test stimuli (photographs of food items) with the auditory instruction: "What is it?" followed by the auditory presentation of the name of the stimulus. Stimuli in the embedded text condition also included the typed name of the item below the picture. All instruction was presented via a DVD player and viewed on a 19-inch television. Probe sessions were conducted after teaching sessions via the DVD player to assess correct responses. While the impact of including embedded text was somewhat unclear, all participants acquired expressive object labeling skills by watching the DVD.

Expressive language is a common area of deficit for children with autism spectrum disorders (ASD). These children often have difficulty expressing their wants and needs, commenting on things within their environment, and initiating conversation (Sundberg & Partington, 1998). Researchers in the field of applied behavior analysis have documented success in teaching expressive language skills to children with ASD in numerous studies (see Maurice, Green, & Luce, 1996, for a summary). Teaching children with autism to label items is one expressive language skill that is often taught as soon as the child has learned to echo words and imitate. For young children with autism, one pivotal skill to learn is labeling, because it is necessary for the development of more complex language such as commenting and question asking.

Several strategies may be used to teach children with autism to label objects. Most often a verbal stimulus, such as "What is it?" is provided along with the object (e.g., an apple or picture of an apple) followed by a verbal model of the correct response (e.g., "apple"). Eventually, the verbal model is faded, and later the verbal stimulus is faded so that the child learns to spontaneously label the object in the natural environment (Sundberg & Partington, 1998).

With recent advances in computer and video technology, researchers have sought to create technology-based instructional techniques. One technique used in teaching individuals with disabilities has been video instruction. In video instruction, a computer program or DVD/videotape provides the student with instructions and opportunities to respond rather than a teacher. In a recent review of the literature on instructor-created video programs for individuals with disabilities, Mechling (2005) found three studies that used interactive video for instruction or video prompting and seven studies that utilized computer-based video instruction. This review of the literature was conducted from 1999-2003 and included only studies with experimental designs that had been published in peer-reviewed journals.

All three of the studies that Mechling (2005) reviewed that used video instruction were done with students with mental retardation or moderate mental retardation. In the first study, Kyhl, Alper, and Sinclair (1999) successfully taught three students sight words that related to grocery shopping by videotaping grocery aisle signs and providing reading instructions to the students while they watched the video.

The second study (Branham, Collins, Schuster, & Kleinert, 1999) was a comparison using constant time delay in three different instructional formats to teach three secondary students community tasks: mailing letters, cashing checks, and crossing streets. The first condition used classroom simulation and community-based instruction. The second condition used videotaped modeling and community-based instruction. The third condition used classroom simulation, videotaped modeling, and community-based instruction. Classroom simulation and community-based instruction condition was the most time efficient, but the classroom simulation, videotaped modeling, and community-based instruction condition required the fewest teaching sessions.

The last study reviewed used video prompting and video modeling to teach three elementary students with mental retardation self-help skills (Norman, Collins, & Schuster, 2001). The videos were filmed from the participant's point of view, with specific segments of the video model serving as video prompts. Results indicated that video prompting and video modeling combined were effective in teaching all three participants self-help skills. Moreover, the skills generalized with new instructors and materials and maintained over time (Norman et al., 2001).

Of the seven studies that utilized computer-based video instruction (CBVI) in Mechling's (2005) review, one used social stories to teach hand washing and on-task behavior to three boys diagnosed with autism (Hagiwara & Myles, 1999); another used video captions with still photographs to teach two students with intellectual disabilities photograph recognition for use with augmentative communication devices (Mechling & Langone, 2000); one assessed the use of an interactive CD-ROM program (Lancaster, Schumaker, & Deshler, 2002); two studies used CBVI to teach grocery shopping skills (Mechling & Gast, 2003; Mechling, Gast, & Langone, 2002) – one of which used textual prompts (Mechling & Gast, 2003); two others used CBVI to teach purchasing skills (Ayres & Langone, 2002; Mechling, Gast, & Barthold, 2003); and the last study used video prompting and video modeling in a computer-based program to teach debit card use (Mechling, Gast, & Barthold, 2003). These studies show the promising results of video instruction with a variety of populations and age groups to teach a variety of skills. However, none of the articles reviewed focused on teaching young children with autism expressive language skills. On the other hand, the promising results reported suggest that video instruction may be potentially beneficial for other populations and age groups, such as preschoolers with autism.

Video instruction may have several potential benefits for children with autism. First, some children with autism demonstrate a tendency to imitate and echo back the contents of videos (Haymes & Martin, 2002). Thus, video instruction may take advantage of existing student tendencies and preferences. Video instruction may also be beneficial for providing consistent, repeated practice. This may be beneficial for teachers in classrooms with high student-to-teacher ratios in that video instruction may allow students to practice skills without requiring the teacher to directly provide these instructional opportunities.

Furthermore, the use of video technology with young children has been supported by the National Association for the Education of Young Children (NAEYC, 1996) and the Council for Exceptional Children's (CEC) Division of Early Childhood (DEC). Several studies have shown that computer-assisted instruction (CAI) has been successful with preschool children with and without disabilities to teach a variety of skills. In particular, Hitchcock and Noonan (2000) taught five preschoolers with disabilities to match shapes, colors, numbers, or letters. These three primary skills were taught using guided practice and constant time delay by CAI or by teacher-assisted instruction (TAI) and compared using an alternating-treatments design. Results indicated that the CAI condition was superior or equal to the TAI condition. Other studies using technology with young children with and without disabilities have focused on facilitating social interactions (Lau, Higgins, Gelfer, Hong, & Miller, 2005); letter recognition (Boone, Higgins, Notari, & Stump, 1996); and phonological sensitivity (Lonigan et al., 2003). Results of these studies help support the efficacy of using instructional technology with younger children with disabilities.

An additional strategy that has been used with children with autism to teach labels, requests, and fill-ins (e.g., "A cat says ___," and the child responds "meow.") has been to use textual prompts (written words) in addition to the verbal or nonverbal instructional stimulus (Finkel & Williams, 2001; Hale et al., 2005; Judd, Endicott, & Sundberg, 1997). Hale and colleagues used textual stimuli to teach labels of action to a 6-year-old boy diagnosed with autism who could not reliably identify actions. Results indicated that the child consistently performed better when textual prompts were provided, possibly because it eliminated the need to interact with an adult.

Judd et al. (1997) implemented a textual menu of choices to a 9-year-old male with autism, who frequently engaged in self-injury and aggression when he could not access an item that he wanted. They found a decrease in self-injury and aggression as well as an increase in requests when a typed menu of preferred choices was offered. In a comparison of the effectiveness of textual and echoic prompts on the acquisition of intraverbal behavior (answering social questions; e.g., "How old are you?"), Finkel and Williams (2001) demonstrated that the textual prompts were more effective than the echoic prompts for the participant. Text has also been used successfully with script and script fading procedures to teach children with autism to engage in conversation (Krantz & McClannahan, 1993, 1998; Sarokoff, Taylor, & Poulson, 2001).

Textual prompts may be effective with children with autism in part because of the reinforcing properties they find within textual stimuli. Researchers have found that approximately 10% of children with autism are hyperlexic (e.g., they are able to recognize words at a higher level than their age-equivalent peers). However, although these children can read, they often do not have the cognitive ability to understand what they read or use the words appropriately in conversation (Silberberg & Silberberg, 1967).

In summary, researchers have shown that individuals with autism have benefited from various types of video interventions, specifically video models (see Ayres & Langone, 2005, for a review) and video feedback (Thiemann & Goldstein, 2001). Previous researchers, however, have focused primarily on teaching social skills and functional skills. Thus, the literature is sparse on video intervention studies targeting academic skills with young children with autism, and no video studies were found on early language skills such as labeling. Only one study was identified that implemented computer-presented video models to teach spelling to an 8-year-old girl with ASD (Kinney, Vedora, & Stromer, 2003). Additionally, some researchers have explored the use of textual prompts in teaching children with autism language skills.

Given the potential benefits of video instruction, the primary purpose of this study was to investigate the effectiveness of video instruction in teaching preschoolers with autism how to label objects. Further, given the success of intervention strategies employing text, a secondary purpose of the study was to compare the effectiveness of video instruction with and without embedded textual prompts.

Method

Participants/Setting

Three males with diagnoses of autism—Braden, age 3.5, Sawyer, age 4.5, and Stewart, age 3.9—participated in this study. Results from the Childhood Autism Rating Scale (CARS) (Schopler, Reicher, & Renner, 1988) indicated that Braden had a mild degree of autism, and Sawyer and Stewart demonstrated behaviors in the mild-moderate autism range. All three were able to expressively identify numerous objects, but were unable to label the common food items included in the study. While none of the participants had been involved in a formal reading program, all were able to read their names and expressively identify uppercase and lowercase letters of the alphabet. Braden was able to read approximately 20 words, Sawyer was able to read approximately 10 words and Stewart could not read any words.

Materials

An open area of a university-based preschool classroom was used for all experimental sessions. The area included a television and DVD player on a stand, a white dry-erase board, a large table, and four small chairs. Customized instructional DVDs were created for each participant using the following software packages: Picture This ... Professional Edition V3.0 (2003), and Vegas 4+DVD Architect software (2003). Picture This ... Professional Edition V3.0 photo software was selected because the pictures of real food items were very clear and the software contained a variety of images in color. Further, the software was easy to use and was compatible with the computer and other software used in making the instructional DVDs. The Vegas+DVD Architect software was the standard video editing software used in the university computer labs where the DVDs were created. All pictures were displayed against a white background. The Vegas+DVD Architect software was used to edit and burn the DVDs on an IBM-compatible personal computer equipped with a DVD burner. The video instruction DVDs were viewed on a JVC 19-inch color television and were played on a Mitsubishi DVD player.

Response Definition and Measurement

During each experimental session, the participant viewed all 20 test stimuli. Test probes were then conducted in which all 20 items were presented in random order. No verbal or textual prompts were given during probe trials, and no programmed consequences were provided for student responses. Each response was recorded on a data sheet. Participants were given 5 seconds to respond to the instructional stimuli (objects presented via video). A correct response was scored if the participant produced each phoneme in the target response within 5 seconds of the video presentation of the target. For example, a correct response was scored if the participant said "apple" within 5 seconds of the video presentation of an apple. An incorrect response was scored if the participant (a) did not respond, (b) did not respond within 5 seconds of the video presentation of the target, or (c) identified the wrong stimulus. For example, an incorrect response would be scored if the participant said "carrot" within 5 seconds of the video presentation of an apple.

Procedures

The experimental design was an alternating-treatments design. Twenty unknown food items (2-syllable words) were used for each participant and were randomly assigned to the two treatment conditions (with text and without text). Sessions consisted of all 20 items being presented by the DVD one after the other in random order. In each condition a stimulus (picture of the food item) was presented, and the participant was asked via the video, "What is it?" After a 5-second delay, the video verbally prompted the correct response. For stimuli assigned to the with-text group, the video verbally prompted the correct response and the correct response was displayed on the screen in textual form in all upper-case letters beneath the photo of the stimulus on the center of the screen. If the participant responded correctly or gave an approximation, the observer delivered praise ("Way to go!") and brief physical reinforcement such as a pat on the back. At the conclusion of the video, a probe was conducted whereby all 20 stimuli were presented again without verbal or textual prompts, and the participant's verbal response to each stimulus was scored by an observer. No feedback was given by the video or the observer during probes.

In an attempt to prevent rote responding, three versions of the instructional and probe trial DVDs were created for each participant, presenting the items in different sequences. The DVDs were alternated across sessions. Trained graduate and undergraduate students observed the participants viewing the instructional video and scored correct responses, approximations, and incorrect responses during the probe condition. A second trained observer independently recorded the participants' performance for 18 sessions to assess interobserver agreement (IOA). IOA was taken during six sessions for Sawyer, averaging 95.83%, with a range of 90-100; four sessions for Braden, averaging 95%, with a range of 90-100%; and eight sessions for Stewart averaging 98.75%, with a range of 95-100%.

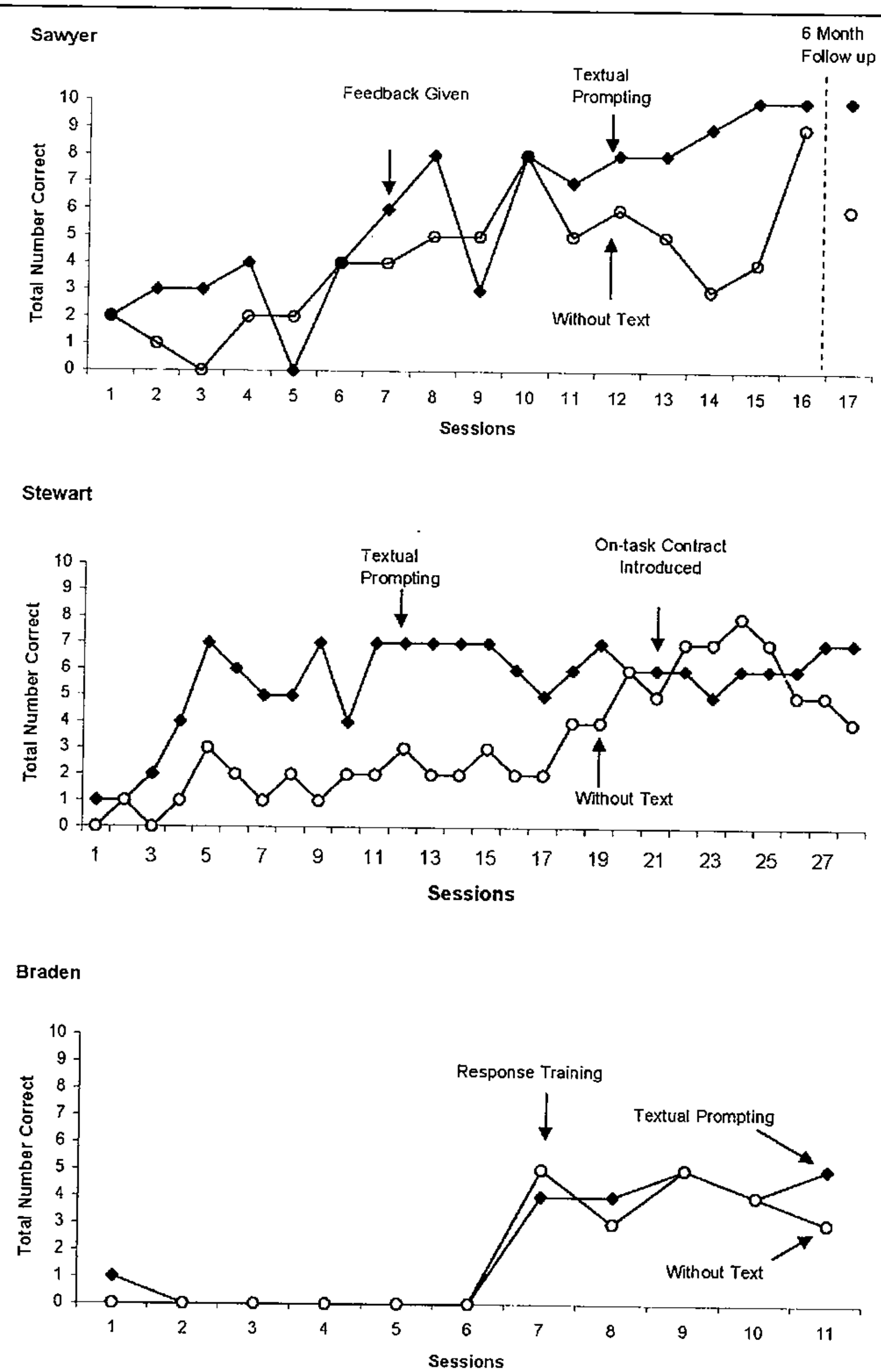
Several procedural modifications were made during the course of the study based on behaviors displayed by participants. Sawyer received feedback consisting of a gestural prompt (point toward the television screen) and a verbal instruction ("Look") after the sixth session in order to help maintain on-task behavior. Due to Braden's lack of correct responding during the first seven probes, a response training procedure was implemented to teach him to respond to the DVD instruction. A separate DVD consisting of five known labels was shown prior to the DVD instruction using the same probe procedure. When Stewart began to exhibit high levels of off-task behavior (looking away from the television screen) during the course of the study, a behavioral contract for on-task behavior was implemented with Stewart after the 20th session to reinforce attending to the television screen.

Results

Sawyer. Sawyer's data are presented in the top panel of Figure 1. Overall, Sawyer made more correct responses to stimuli with embedded text than without text. In the probe sessions Sawyer had a range of 0-4 correct labels in both conditions prior to feedback, a range of 3-10 correct labels from the with-text condition, and a range of

Figure 1

Results of the video instruction procedure both with and without textual prompts for Sawyer (upper panel), Stewart (middle panel), and Braden (lower panel). Data are presented as the number of correct responses for each session.



3-9 correct labels from the without-text condition after feedback was implemented. During the six-month follow-up probe, the instructional DVD was not shown, only the probe was done in order assess response maintenance. During follow up, Sawyer provided more correct responses to stimuli that were assigned to the with-text condition than to stimuli that were assigned to the without-text condition.

Braden. Braden's data are presented in the middle panel of Figure 1. As illustrated, Braden responded correctly once during the first six probes to a stimulus that was assigned to the with text condition. After response training was implemented, Braden provided a greater number of correct labels in both conditions. He had more correct responses during two out of the five probe sessions to the stimuli with text but provided more correct responses in only one out of the five probe sessions to stimuli without text. Braden made the same number of correct responses for stimuli presented in the with- and without-text conditions in two out of the five probe sessions.

Stewart. Stewart's data are presented in the lower panel of Figure 1. During probes, he initially responded correctly more to stimuli that were assigned to the condition with text. In the probe sessions he had a range of 0-7 correct labels in the with-text conditions and a range of 0-8 correct labels in the without-text condition. Stewart provided a greater number of correct labels in the without-text condition in four out of the eight sessions after a contract for responding was introduced.

Discussion

All three participants in the present study learned to label multiple objects as a result of the video instruction procedure. This suggests that video instruction may be a useful instructional procedure for teaching some types of language (i.e., labeling) to young children with autism. However, the results shed little light on the secondary research question regarding the impact of including textual prompts with the visual stimuli. While some of the data suggest that adding textual prompts to visual stimuli might facilitate student responding, this effect was not consistently demonstrated. A difference may be seen with students who are fluent readers. None of the participants in the current study had an extensive reading repertoire; but showed an interest in letters and text, and this may be why there was not a clear difference in responding to the text condition. The significant overlap in data points for all participants in the alternating-treatments design significantly limits the experimental control demonstrated within this study with regard to the comparison between stimuli with and without text. Future researchers may attempt to address this question using other types of experimental designs.

None of the participants had a prior history of responding to video instruction. For that reason, supplemental procedures were added for all three participants to promote responding to the DVD. Initially, Braden engaged in laughter when watching the instructional video and did not respond to the instructions presented. To counteract this behavior, response training was introduced in which he was taught to respond to the video-based instructions using a DVD comprised of five stimuli that he already knew how to label. Sawyer never responded incorrectly but became nonresponsive to the video instruction, possibly due to distractions within the classroom and/or the length of the DVD since the television was in the common area of the preschool where students and staff were entering and exiting. Stewart also appeared to be distracted in some sessions, particularly during the second half of the study.

Our experiences suggest that preteaching participants to respond to video instruction may be necessary at first with young children. The number of trials presented and the length (duration of instructional DVD) of the DVD should also be considered when developing video technology for young children with autism. Minimizing potential distractions within the environment may also be helpful. Another possible solution would be to have students wear headphones in order to limit ambient noise which may be a distraction. The current study evaluated the acquisition of object labels using pictures of unknown food stimuli; other stimuli may be used in future research. In future studies, researchers may want to embed reinforcement within the video by including praise statements and/or reinforcing video clips which may help young children attend for longer periods of time.

A limitation of the existing research literature on video instruction, including the present study, is the lack of data on the generalization of skills to realistic novel situations. Future researchers may address this problem by evaluating generalization of skills learned through video instruction to novel situations. Another limitation of the current study is that video instruction was not compared to traditional methods of instruction (e.g., flashcards presented by an instructor). Future researchers may conduct such a direct comparison to determine which method proves to be most effective.

Summary and Conclusions

In summary, this preliminary investigation expands upon the current video instruction literature by documenting that video instruction can be used to teach expressive language skills to young children with autism. This medium of teaching may be a beneficial tool for teachers with low staff-to-student ratios, in that it may provide opportunities for students to engage in independent and repeated practice. It may also take advantage of the tendency of some students with autism spectrum disorder to attend to and imitate videos. In addition, although the participants had difficulty attending continuously at the screen (for example, if a participant looked away from the screen for 5 seconds or longer the participant would miss an opportunity to respond to a discriminative stimulus), the training sessions in the current study only took approximately 5 minutes for both conditions. Teachers could customize the length of their instructional DVDs to the student's ability to attend to a video. In addition, it would be possible for teachers to embed reinforcing video clips into the DVD, which may increase student attention and response to the video. Finally, video instruction DVDs could be created so that they include stimuli that cannot be accurately depicted in a 2-dimensional fashion, such as emotions, actions, sequencing or recalling remote events – concepts that are often difficult for students with disabilities to grasp.

Future research and more data are required to clarify the effects of using video instruction to teach labels with and without text. Given the potential benefits of video instruction, future researchers should continue to investigate using this medium with students with autism and other disabilities.

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