Using Point-of-View Video Modeling to Teach Play to Preschoolers With Autism

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This study evaluated the effectiveness of point-of-view video modeling in teaching selected toy-play skills to two preschoolers with autism. This type of modeling involved the experimenters carrying or holding the video camera at eye level (from the child's perspective) and without recording models (persons]) to show the environment as a child would see it when he or she was performing the targeted skills. The researchers used a multiple-probe design across two children and two behaviors to evaluate the effect of the point-of-view modeling on the children's acquisition and maintenance of play actions. They used generalization probes to assess the degree to which the participants used the new skills across novel toys and during classroom activities. The results indicated that point-of-view modeling was an effective tool for teaching toy-play actions to preschoolers with autism. The authors discuss the extension of current video modeling research and implications for home and school interventions.

Play involves a number of diverse and complex behaviors and is viewed as central to children's development (Jordan & Libby, 1997). Young children with autism often are described as having impairments in play (Jarrold, 2003; Jarrold, Boucher, & Smith, 1993; Jordan & Libby, 1997; Ungerer & Sigman, 1981; Van Berckelaer-Onnes, 2003), and they often do not develop spontaneous play (Van Berckelaer-Onnes, 2003). Libby, Powell, Messer, and Jordan (1988) showed that children with autism had similar levels of functional play as children with Down syndrome and young children with typical development, but they had impairments in symbolic (pretend) play. Toy play is an essential forerunner for symbolic play (Van Berckelaer-Onnes, 2003) and perhaps for social play (Pierce-Jordan & Lifter, 2005).

Learning through observation and imitation of others can account for acquisition of some behaviors, and simply watching another child receive reinforcement (vicarious reinforcement) for a behavior often increases rates of that behavior (Bandura, 1965). In vivo modeling (using live models) is effective in teaching various developmental skills to children with autism (Charlop, Schreibman, & Tryon, 1983), including appropriate play (Stahmer, Ingersoll, & Carter, 2003). For modeling strategies to be effective, the child with autism must attend to another person, must attend to that person's actions, and must be imitative. The developmental course of imitation in children with autism is unclear. Dawson and Osterling (1997) suggested that imitation is a fundamental mechanism for learning and, in particular, a precursor for learning social skills. Young children with autism seem to imitate actions on toys more readily if sensory feedback occurs than if it is absent (Ingersoll, Shreibman, & Tran, 2003), which suggests a lack of motivation for acting on toys; thus, studies of interventions featuring supplementary reinforcement contingencies are needed.

Technology, particularly video modeling, provides another way to promote observational learning. Video modeling interventions can include any number of components, but they generally involve the following:

1. edited images of appropriate or new behavior shown on a monitor to a child;
2. repeated clips of the same behavior or multiple exemplars of the behavior shown to the participant;
3. discrete practice sessions or role-playing of the new skills;
4. assessment of skill generalization (e.g., probes across settings, people, or materials); and
5. periodic review of tapes, if needed.

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Stahmer et al. (2003) suggested that video modeling may succeed when other methods have failed, especially for children who do not learn when social interactions are involved. Researchers have used video modeling to teach individuals with autism such skills as purchasing (Alcantara, 1994; Haring, Kennedy, Adams, & Pitts-Conway, 1987), conversation (Charlop & Milstein, 1989; Sherer et al., 2001), perspective taking (Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003), spelling (Kinney, Vedora, & Stromer, 2003), and daily living (Shipley-Benamou, Lutzker, & Taubman, 2002). Video modeling also can be used to promote play skills in children with autism. Taylor, Levin, and Jasper (1999) used video modeling to teach two children with autism to engage in play-related statements with their siblings. D'Ateno, Mangiapanello, and Taylor (2003) used video modeling to increase children's use of complex play sequences.

Video modeling has several advantages over in vivo modeling, including (a) being more time and cost efficient; (b) depicting a variety of naturalistic settings that would be difficult to create in vivo in a clinic or classroom; (c) having more control over the model, because the tape can be recreated until the desired scene is obtained; (d) presenting the model repeatedly without the person modeling the desired behavior being present; and (e) reusing videotapes with other individuals, which means that more children can be treated (Charlop-Christy, Le, & Freeman, 2000). Zihni and Zihni (2005) pointed out that video modeling takes advantage of the visual skills of children with autism, eliminates the social context that occurs during in vivo modeling, increases the predictability and controllability of the model, and allows extraneous features to be filtered out, which makes learning easier. Video modeling also can promote generalization by exposing participants to a sufficient number of exemplars and response variations. Haring et al. (1987) demonstrated generalization of purchasing skills to three community settings using video modeling with adults with autism and noted that video modeling was an effective way to promote generalization. Charlop and Milstein (1989) demonstrated generalization of conversational speech involving untrained topics (new toys, unfamiliar persons, siblings, peers, and other settings).

Video modeling interventions have used other-as-model (adults or peers doing target behaviors) and self-as-model (participants act as their own models) formats. In the latter instance, the video is edited to show the child performing only the desired behaviors. Self-as-model videos have been effective in increasing responding behaviors (Buggey, Toombs, Gardener, & Cervetti, 1999), requesting (Hepting & Goldstein, 1996; Wert & Neisworth, 2003), and conversation skills (Sherer et al., 2001) in children with autism. Sherer et al. (2001) compared the efficacy of self versus other video modeling and found no overall differences in the rate of acquisition. An alternative to other- and self-models is observer point-of-view modeling, which involves recording tapes using the perspective of the person who is the target of the intervention and showing him or her the target behavior from the viewer's vantage point but without showing the entire person who is modeling the behavior. Schreibman, Whalen, and Stahmer (2000) used point-of-view modeling to reduce problematic behaviors in difficult transitions by taping what the transition would look like as the child did it (e.g., taking different routes through a mall). Shipley-Benamou et al. (2002) taught daily living skills to children with autism via this procedure. They suggested that point-of-view modeling eliminates the need for staging performances and editing tapes, which can be time-consuming in self-as-model videotapes. In addition, using the child's point of view avoids having to identify which model characteristics (e.g., peer or adult, familiar or unfamiliar) are most effective when teaching new skills.

To date, researchers have had success in teaching new skills to participants using other persons or the child as models in video modeling studies, and positive effects have been most evident for participants older than preschool age. In this study, we attempted to extend the literature by teaching symbolic (pretend) play to preschool-age children with autism and evaluated the use of point-of-view video modeling. Only two studies (Schreibman et al., 2000; Shipley-Benamou et al., 2002) used point-of-view modeling, and only five studies included children with autism age 5 years of age or younger. Although some studies (e.g., Nikopoulos & Keenan, 2004) focused on play skills, only one study addressed symbolic (pretend) play (D'Ateno et al., 2003). In this study, our goal was to evaluate the effectiveness of point-of-view video modeling on the play of preschoolers with autism using materials during sensory bin activities. We posted the following research questions:

1. Will preschoolers with autism readily imitate actions seen through point-of-view video modeling?
2. Will any acquired skills generalize to children's classroom sensory activities and across untrained materials?

Method

Participants

Our participants were two girls. Christine was 30 months old at the beginning of the study, and Kaci was 43 months old. Both girls were verbal, but their communication, social, and play skills had been targeted as intervention goals. Both participants met the criteria for autism of the *Diagnostic and Statistical Manual of Mental Disorders–*

Fourth Edition (*DSM-IV*; American Psychiatric Association, 1994). According to teacher reports, both children participated regularly during sensory bin activities and consistently contacted materials. Christine's sensory bin play often involved repetitive movements, usually with one object. Kaci's play involved repetitive manipulation of toys and stereotypic behavior. Both girls needed instruction on how to use the toys. From teacher and parent reports, both children enjoyed watching videos at home and school. Both girls were accustomed to leaving the classroom with another adult. We administered the *Motor Imitation Scale* (Stone, Ousley, & Littleford, 1997). Christine scored 29 and Kaci scored 30 (32 was the ceiling), indicating that they readily imitated simple adult actions with materials.

Settings and Materials

The study occurred at an inclusive, full-day, university-based preschool program accredited by the National Association for the Education of Young Children. The participants attended for the full day and were in separate classrooms. Each classroom contained 10 to 14 children (5 to 7 with disabilities) and 2 to 4 adults. Video modeling sessions occurred in the preschool therapy room. The therapy room (3 m × 4.5 m) contained an office desk (2 m × 1 m) with the experimental materials on it. During all sessions, the first author, the participant, and a graduate student observer were present. Materials generalization probes occurred in the same therapy room. Settings generalization measurement occurred in the child's classroom and during sensory table activities at a large table with the sensory bin on it. Other classmates and adults were present during the settings generalization probes.

We chose sensory activities as the focus of this study for several reasons. First, sensory bin activities occurred daily in the children's classrooms, as well as in many other early childhood classrooms, making generalization of play skills relevant. Second, the sensory bin materials allowed the children to do a variety of appropriate actions that were not dictated by the materials themselves. This allowed us to evaluate precisely the effects of the video modeling on the target children's behavior. Third, use of sensory bin materials in a nonrepetitive (stereotypic) manner allowed the children to appear more like their typically developing classmates. Fourth, these types of skills also provided new opportunities for object exploration, play expansions, social initiations and responses, and promotion of engagement (e.g., participating appropriately in an activity for more than 10 min). The same sensory material (e.g., potting soil) was used for the baseline, treatment, and maintenance phases for Christine; the only stimuli we changed were the toys used to manipulate the sensory material. In Kaci's case, the sensory material was changed to colored rice in Session 48. During material generalization probes, the toys used to manipulate the materials were unfamiliar to both participants. A list of toys used for all conditions is provided in Table 1. We chose toys based on their availability in most early childhood classrooms (e.g., shovels and pots) and because they could be categorized as a pretend play set (i.e., gardening toys or cooking toys). At the start of each session, the sensory bin was placed on the floor or on another storage bin so the materials were at the child's height. A laptop computer used for video viewing was placed on a storage bin, and the child could watch it while sitting or kneeling on the floor.

Video Production

We presented the modeling video clips, which we created using a digital video camera, on a laptop computer. These videos showed a pair of adult hands performing the actions with the toys to manipulate the sensory material. A screen shot of the video clips viewed by the participants is shown in Figure 1. The hands on the video performed the specific actions with the toys, manipulating the sensory materials discretely. The video clip depicted exactly what the child's viewpoint should look like: two hands, a few toys (e.g., shovels and buckets), and a tub containing the sensory materials (e.g., potting

TABLE 1. Materials Used in Both Tasks and During Materials Generalization Probes

Gardening set materials	Cooking set materials
3 toy shovels (1 shovel)	3 cooking spoons (1 cooking spoon)
3 small planter pots (1 plastic bucket)	3 plastic toy plates (1 toy plate)
3 synthetic aquarium plants (2 red plants)	3 measuring scoops (1 scoop)
10 large flower bulbs (5 flower bulbs)	3 plastic toy bowls (1 toy bowl)
	2 small tin pots (1 tin pot)

Note. Materials used during materials generalization probes are shown in parentheses.

FIGURE 1. Screen shot of a video clip viewed by participants.

soil). We chose this viewpoint so the camera could focus on manipulations being made to the materials, thus controlling the model characteristics and other irrelevant cues to which the children might have attended. We identified the actions shown in the video modeling through observing the play actions of typical children during sensory time.

During intervention, each participant viewed two separate videos containing one behavior set: gardening play and cooking play. Each video clip containing the desired actions was less than 2 min in length and contained three examples of each action to expose the participant to a variety of exemplars of the desired actions with a variety of objects belonging to the same stimulus class.

Dependent Measures

The number of different types of modeled actions performed during each probe was the dependent measure. A research assistant used a digital video recorder to videotape each daily probe and practice session, which the first author then coded. We trained graduate student observers via the use of a training video and actual clips of the participants during practice sessions. The measurement system used a coding sheet listing the modeled actions the participant could imitate from the video clip (six for the gardening task and five for the cooking task). When the child exhibited one of the modeled actions at any time during the probe, the action was marked as completed. A list of each measured action type is shown in Table 2.

We selected increasing the use of modeled actions as a dependent measure for four reasons:

1. Studies of pretend (symbolic) play often measure actions on materials from which a theme, routine, or narrative can be inferred—in this case, gardening and cooking.
2. Increasing children's appropriate actions may reduce repetitive actions, which in turn may promote opportunities for social exchanges with peers at the sensory bin.
3. Increasing children's actions on materials would increase the number of behaviors on which adults could comment (addressing communicative goals) and expand (promoting play goals).
4. Increasing actions on sensory bin materials would reduce the apparent differences between the participants and their classmates.

Design

We used a multiple-probe design (Horner & Baer, 1978) across two behaviors (gardening task and cooking task) and across two participants to evaluate the effectiveness of the point-of-view modeling. The intermittent probes provided an alternative to continuous baseline measurement to reduce (a) time involved in measurement and (b) reactivity (Horner & Baer, 1978). Each target child participated in three phases for each of the two behaviors: a baseline phase, a treatment phase, and a posttreatment maintenance phase. For each child, we collected data during baseline probes, daily treatment probes, daily treatment practice sessions, and posttreatment maintenance probes. Daily treatment probes occurred prior to each daily video viewing to assess acquisition in the absence of immediate video viewing. Setting and material generalization probes were taken at least once in both the baseline and maintenance conditions.

Baseline Procedures. We conducted baseline measurement for each of the two sequences of behavior. For the baseline probes, each participant knelt in front of the bin in the therapy room. The investigator placed the first toy set (e.g., gardening toys) in the bin and verbally cued the child to play with the toys. No further instructions on how to use the toys or what to do with the materials were given. After an interval of 2 min, the investigator removed the first toy set, and the child watched a 2-min cartoon. The investigator then gave the child the second toy set (e.g., cooking toys). Only the toys to which the child was to be exposed during the video modeling were used for the probes. The order in which the toys sets were given was randomized for each session.

Video Modeling Treatment Procedures. The treatment sessions consisted of three segments: a daily probe of the behavior being modeled, a video modeling/viewing segment, and a daily practice segment. Each instructional session lasted a maximum of 15 min (2-min for the daily probe, 3 to 5 min for viewing the video, 3 min for practice, and 3 min were reserved for transitioning between these segments). Video modeling sessions occurred at the same time of day for each participant. We conducted probes each day prior to viewing the videotape to assess acquisition in the absence of immediate video viewing. Treatment probes were identical to baseline probes except only the materials for the toy set were available. The investigator gave the child the set of materials to be viewed in the video and then cued her to play with the materials for 2 min. At the end of each probe, the investigator provided verbal praise and tangible rewards (e.g., edibles) for on-task behavior (i.e., staying at the sensory bin). Reinforcement was contingent on contacting the toys and staying at the bin; it was not delivered for performing specific actions (including modeled actions) with the toys.

After the probe, the investigator turned on the laptop, and a clip of the child's favorite cartoon prefaced the video modeling clip. We chose the cartoons through informal interviews with the participants' parents. The cartoon introduction helped the child attend to the computer screen, but it did not overly upset the child when turned off. The cartoon played for 2 min, after which the video modeling clip began. The clip showed the first set of materials (e.g., a bin of potting soil, three toy shovels, three pots). A recorded female voice unfamiliar to the participants said, "Play with your toys!" A pair of hands entered the screen and modeled the appropriate actions. The video showed the hands picking up each object, performing a specific action, putting the object down, picking up the next object, performing the same action, and so forth, until the action had been performed once with each exemplar in the set. After the hands modeled the action with each object, the same female voice said, "Great job playing with your toys!" and the cartoon played for another 60 s. The investigator provided the child with the materials used on the video and told her to play with the toys. No further instructions on how to use the toys or what to do with the materials were given during these practice sessions. The practice sessions lasted 3 min, and the child only received prompts for standing at the bin and playing with the toys, not for performing the modeled actions. The investigator did not deliver reinforcement for imitating the modeled actions at any time during the baseline, treatment, or maintenance conditions.

TABLE 2. Play Actions Modeled During the Video Modeling Sessions

Gardening behavior set	Cooking behavior set
1. Uses shovel to dig hole	1. Uses scoop to scoop soil
2. Puts soil into empty pot	2. Scoops soil into pot using only the scoop
3. Puts flower in pot	3. Uses spoon to mix in pot
4. Puts seed in the ground	4. Pours soil from pot to plate only
5. Covers seed with soil	5. Uses spoon to dish soil from pot to bowl
6. Covers plant with soil	

During the maintenance phase, we withdrew the video treatment and the practice sessions. The maintenance probe procedure was identical to the baseline probe procedure in that the child was given 2 min. to play with each set of materials separately. No instructions on how to use the toys were given, and reinforcement was limited to staying at the sensory bin and making contact with the materials.

Adapted Procedure. We adapted the procedure for Kaci beginning in the eighth session of the treatment phase during the cooking behavior set. We decided that adaptation was necessary due to Kaci's apparent satiation with the materials, which had resulted in decreased responding during both the treatment probes and the practice sessions. First, we changed the sensory material (potting soil) to colored rice to introduce novelty to the task. The toys used to manipulate the materials were the same. We then provided a specific prompt (e.g., "Do what you saw on the video") to Kaci prior to each treatment probe and practice session. Third, during only the practice sessions, we reinforced the modeled actions on a fixed-ratio-1 schedule. Reinforcement consisted of specific praise (e.g., "Good job! You did what you saw on the video!") and a small edible reward.

Settings Generalization Probes. We conducted settings generalization probes once during each baseline and maintenance phase, using the same stimuli from the treatment sessions. The child was in the classroom and standing at the sensory table. We gave the child each set of materials separately for 3 min and told her to play with the toys. Measurement was identical for both the baseline and treatment phases. No rewards were provided for imitating the modeled actions.

Materials Generalization Probes. Generalization probes occurred at least once during the baseline and maintenance conditions. Probes occurred in the therapy room and were procedurally identical to baseline probes, with the only difference being the availability of untrained toys. Stimulus generalization materials were not shown in the videos. Probes involved objects and toys similar enough to the trained stimuli so that the child could discriminate which action to perform with them. The directions provided to the child were the same as in the baseline condition, and we delivered reinforcement only for attending to the materials.

Social Validity

Upon completion of the study, 20 graduate students in special education rated videotapes of the pretraining and posttraining sessions. We randomly assigned these graduate students to view four video clips. Ten of the graduate students viewed two pretraining tapes for Christine, and two posttraining tapes for Kaci. Ten of the graduate students viewed two pretraining tapes for Christine, and two posttraining tapes for Kaci. They completed a five-item questionnaire for each segment in which they rated the child's engagement, manipulation of materials, appropriate use of materials, enjoyment of the activity, and need for help using the materials on a 5-point Likert-type scale (1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree,* 4 = *agree,* 5 = *strongly agree*). Taped sessions were selected based on the degree to which the child exhibited the modeled actions (i.e., no modeled actions for preintervention tapes and five to six modeled actions for postintervention tapes). The rater was not informed as to whether the video clip was from before or after implementation of the video modeling intervention.

Interobserver Agreement

We collected interobserver agreement (IOA) measures for at least 25% of the baseline, treatment, and maintenance sessions in each condition for each child. We calculated IOA by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. We rated a response as an agreement if both observers marked the same action as being performed by the participant within the session. The IOA for this study was 97.7% for the gardening task and 100% for the cooking task. For Kaci's measured behaviors, IOA was 100% agreement; for Christine, it was 98.0% agreement.

Procedural Fidelity

To assess the degree to which all intervention sessions were executed according to protocol, all observers and the experimenter completed a procedural fidelity checklist outlining the procedure for each session. Procedural fidelity was assessed for at least 25% of all sessions in each condition for each child. Observers completed a task list containing all of the behaviors that were to occur in each phase and condition of the study, including placement of toys, placement of sensory bin, verbal cues for the child to play with the toys, reinforcement for contacting materials, absence of experimenter-implemented reinforcement for correct responding, and order of intervention steps (e.g., probe, video viewing, practice session). Procedural fidelity results showed that the baseline, treatment, maintenance, and generalization session protocol was followed with 95% accuracy (range = 83.3%–100%) throughout the study.

Results

Probe and Practice Session Data

The number of action types performed on the gardening and cooking tasks for Christine and Kaci are shown in Figure 2. The highest number of action types possible was six for the gardening task and five for the cooking task. The open circles represent the number of actions from the probe sessions across the three conditions: baseline, video modeling, and maintenance (no video). During the video modeling condition, these probe sessions occurred each day before the children watched the video. Figure 2 also contains data from the video modeling condition on the number of actions performed dur-

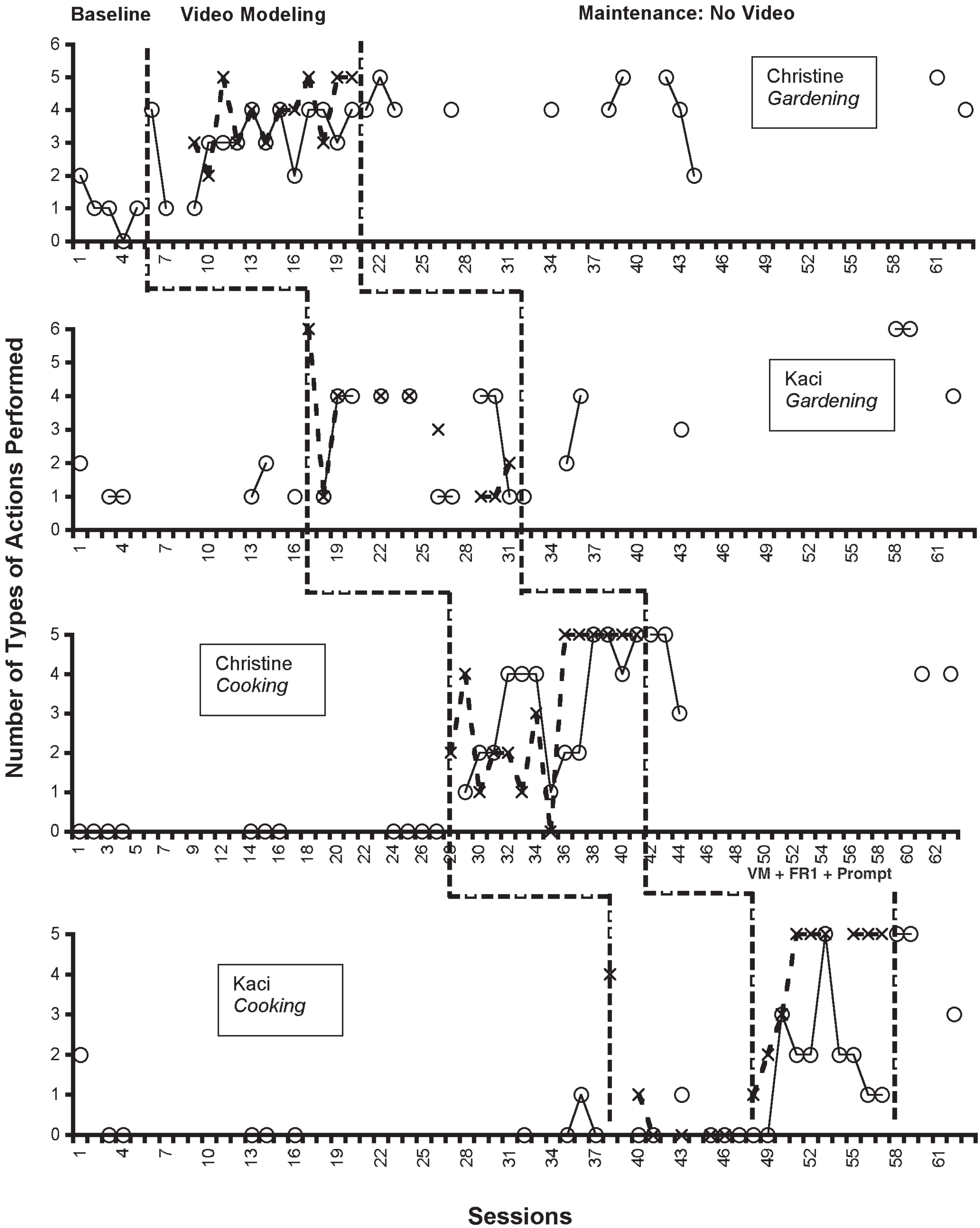

FIGURE 2. Multiple probe data across two participants and two behaviors, with number of types of play actions performed during baseline, treatment, and posttreatment maintenance sessions. Probes are marked as open circles connected by a solid line. Practice sessions are marked as an "x" connected with a dotted line.

ing practice sessions (depicted by an ×). These sessions followed the daily viewing of the video; thus, they occurred only during the video modeling condition.

The top panel of Figure 2 represents the number of action types used by Christine in the gardening task. During the baseline condition in the probe sessions for the gardening task, Christine had between none and two action types per session, with one action in 3 of 5 sessions. With the introduction of the video modeling condition, Christine displayed four action types in the first session, dropped to one action in the next 2 sessions, and then increased to three or four action types for the remainder of the condition (with one exception on the 10th datum point of the condition, which had two action types). In 11 of 14 probe sessions during the video modeling condition, she performed three or four action types per session, exceeding the highest level (i.e., two) obtained during the baseline condition. During the 12 maintenance assessments with no video modeling, Christine performed at least four action types in all sessions except for 1. In 4 of 12 maintenance assessments, she performed five action types per session, which was a greater number than occurred during video modeling. The practice sessions (depicted by an "×" in Figure 2) occurred only during the video modeling condition, immediately after she watched the video. Christine performed between two and five action types each session, with 3 of the last 4 sessions resulting in five action types each.

The second panel of Figure 2 shows Kaci's data on the gardening task. During baseline, Kaci performed one or two action types per probe session, with four of six probe sessions being one action type. With the introduction of the video modeling, she performed one action in the first session and then four action types during each of the next four sessions. This dropped to one action per session for the next two sessions, increased to four action types for two sessions, and then dropped to one action type for the last session of the condition. During the maintenance condition, Kaci performed between one action type and six types per session, with four of seven maintenance probe sessions containing four or more action types per session. On the practice sessions in the video modeling condition, Kaci performed from one action type to six action types per session. She tended to do more action types per practice session early in the condition as compared to later in the condition.

The third panel of Figure 2 shows the number of action types performed by Christine on the cooking task. During 10 baseline probe sessions, Christine exhibited none of the action types. After introduction of the video modeling, Christine's performance of modeled actions during treatment probes increased to between one action type and five action types per probe session. In 3 of the last 4 sessions of the video modeling condition, she performed five action types per session. In 5 maintenance probes, she performed between three and five action types. Christine performed four action types in the last 2 maintenance probe sessions. During the practice sessions of the video modeling condition, she performed one to five action types per session. In the last six sessions, she performed five action types per session.

The fourth panel of Figure 2 represents Kaci's data on the cooking task. In 10 baseline probe sessions, Kaci ranged between no actions and two action types per session. In the first baseline session, she performed two action types; in the 9th probe session, she performed one action, but in all other baseline probe sessions no actions occurred. Introduction of the video modeling did not change Kaci's behavior. In 6 probe sessions, she had no actions in 5 sessions and one action in 1 session. This resulted in the adaptation described previously: the investigator changed the sensory materials to colored rice, told Kaci before each probe and practice session to play with the toys like she saw on the video, and reinforced actions on the toys on a fixed-ratio-1 schedule during the practice sessions. The investigator did not deliver any reinforcement during the probe sessions. In the probe sessions, the adaptation resulted in an increase in the number of actions performed, but then a drop occurred to two actions or one action per session. For the practice sessions before the adaptation, most sessions resulted in no actions being performed. After the adaptation, the number of actions increased sharply, with the last 6 practice sessions containing five action types per session.

Generalization

Generalization Across Materials. Generalization data across materials for the gardening and cooking tasks are shown in Table 3. As shown, Christine and Kaci displayed few actions during the baseline materials generalization probes for the gardening task and increased the number of actions performed in the maintenance condition probes. This pattern was replicated for Christine in the materials generalization probes for the cooking task. Kaci performed no actions in the baseline probe sessions on the cooking task, and she performed only one action in the maintenance condition probe session.

Generalization Across Settings. The generalization across settings occurred in the girls' classrooms. As shown in Table 3, for the gardening task, Christine and Kaci displayed fewer actions in the baseline generalization probes than in the maintenance probe sessions. For the cooking task, however, neither girl displayed an increase in the number of actions performed in the setting generalization probes.

Social Validity Results

The results for the social validity assessment are shown in Table 4. For the engagement, use of multiple actions,

TABLE 3. Performance of Participants in Probes of Generalization Across Materials and Across Settings for Baseline and Maintenance Conditions

	Baseline			Maintenance		
Participant	# of assessments	*M*	Lowest–highest	# of assessments	*M*	Lowest–highest
			Generalization across materials—Gardening			
Christine	1	1	—	4	4	(2–5)
Kaci	2	1.5	(1–2)	3	4	(4–4)
			Generalization across materials—Cooking			
Christine	2	1	(1–2)	3	3	(0–5)
Kaci	3	0	—	1	1	—
			Generalization across settings—Gardening			
Christine	1	2	—	2	2.5	(1–4)
Kaci	2	0.5	(0–1)	2	3.5	(2–5)
			Generalization across settings—Cooking			
Christine	2	0	—	1	0	—
Kaci	3	0.67	0–2	1	0	—

appropriate use of materials, and enjoyment of the activity items, posttreatment means were higher than pretreatment means. For the needing help with materials item, the mean decreased. Children in the posttreatment clip were rated higher on their engagement in the activity, their use of multiple actions while manipulating materials, using materials appropriately, and enjoying the activity than children viewed in the pretreatment clip. Children viewed in the posttreatment videos were also rated as needing help in using materials less often. These results suggest that the raters viewed the treatment as socially valid.

Discussion

This study evaluated the effectiveness of point-of-view video modeling on preschoolers' performance of play actions to determine if these skills generalized to novel materials and to the classroom. The results indicated that the video modeling was effective in teaching specific actions on toys and sensory materials to two girls with autism. In three of four behavior sets (gardening for both girls, and cooking for Christine), the children acquired new play behaviors in the absence of experimenter-implemented reinforcement for performing the video-modeled actions and without instructional cues on what to do with the materials. The addition of reinforcement during practice sessions and instructions to imitate the actions from the video allowed Kaci to acquire the behaviors of the cooking set. These findings extend those of D'Ateno et al. (2003) and Taylor et al. (1999), suggesting that viewing videotapes may change not only verbal behavior but also motor movements on toys in the absence of programmed reinforcers. Whether the increase in new actions constitutes symbolic or pretend play deals in part with the level of evidence required to infer pretense; however, this increase clearly provided the children with additional behaviors from which pretend routines and narratives could be displayed.

The children also generalized the skills to untrained materials for both tasks and generalized skills into the classroom for the gardening task but not for the cooking task. This finding indicates that generalization can be promoted through point-of-view video modeling involving multiple exemplars of materials. It confirms the findings of Haring et al. (1987) and Charlop and Milstein (1989) showing that multiple exemplars presented in videos result in generalized responding to novel stimuli. In this study, children generalized their actions across settings for the gardening task but not for the cooking task. The videotape did not contain multiple exemplars of location, and this reason—among other reasons—may account for the lack of generalization to the classroom for the cooking task. Other reasons may be (a) the limited number of classroom probes, (b) activities in the classroom competing for the target children's attention, and (c) satiation with the materials.

TABLE 4. Mean Responses and Standard Deviations for the Social Validation of Pre- and Posttreatment Video Clips

Questionnaire item	Pretreatment clip		Posttreatment clip	
	M	*SD*	*M*	*SD*
1. The child is engaged in the activity	3.73	1.04	4.78	0.42
2. The child uses multiple actions while manipulating materials	2.53	1.15	4.48	0.68
3. The child uses the materials appropriately	3.15	1.25	4.73	0.51
4. The child is enjoying the activity	3.43	0.68	4.18	0.75
5. The child needs help using the materials	3.45	1.24	1.50	0.60

Note. Scale: 1 = *strongly disagree, 5 = strongly agree.*

These findings suggest that point-of-view video modeling may be useful in helping young children with autism learn to perform actions on toys from which pretense can be inferred. We should note, however, that both participants readily imitated in vivo actions of adults with materials, contacted materials without adult prompting, and were verbal. Future research should explore the extent to which point-of-view modeling is successful with children who do not display these skills or who have variations of them.

This study has a number of notable limitations. First, acquisition of skills did not occur in the cooking task for Kaci until a verbal instruction to imitate the video and contingent reinforcement for doing so were used. Thus, watching the video by itself may not be sufficient to promote skill acquisition in some instances; other interventions may be needed. In some cases, a cue telling participants to do what they saw in the video was necessary for them to apply those skills in the training situation as well as across settings and materials. Previous studies have used reinforcement of correct imitative responding during the video modeling phase (Charlop & Milstein, 1989, Shipley-Benamou et al., 2002). Video modeling plus specific cues and reinforcement of correct responding may increase the rate at which skills are acquired, and in conjunction with the use of multiple exemplars may be more effective in promoting skill generalization. This assertion could be a focus of future studies.

Second, performance of modeled actions may have been more positively affected with a reduced number of probes. In the current study, we exposed the participants to the same materials once before the video (probe), during the video, and after the video (practice sessions) during each treatment session. Limiting sessions to just the video and practice, while probing once every few sessions, would decrease the amount of treatment time and may inhibit satiation. Also, alternating materials across sessions and thereby decreasing exposure may increase novelty, interest, engagement, and subsequent performance of the modeled actions. Procedures also could be altered so the child views the video clip in the classroom before the day's sensory bin activity. This may promote faster acquisition and more generalized responding due to more functional practice. Future studies could measure the diversity of play and the effects of using toys functionally on children's play sequences, repetitive actions, and social exchanges with peers.

Third, the study had relatively limited measures of generalization, especially for generalization to the classroom. Classroom measurement was made difficult by competing activities, which in conjunction with apparent satiation on trained materials made other activities and materials more interesting to the participants. In addition, the same adult was involved in implementation, observation, and reinforcer delivery, suggesting some stimulus control was possible over participants' performance. Evaluating children's behaviors with different adults as well as teachers' use of the procedures need to be studied.

Video modeling interventions capitalize on the visual strengths of children with autism, and teachers can use them in the classroom. This study indicates that positive effects occurred on play skills after introduction of point-of-view video modeling, which was efficient in terms of intervention preparation. Video modeling interventions can be included as resourceful methods to foster play in preschoolers with autism. ◆

AUTHORS' NOTES

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