Behavioral Interventions
Behav. Intervent. **18**: 87–108 (2003)
Published online in Wiley InterScience (www.interscience.wiley.com). **DOI**: 10.1002/bin.129

PROMOTING SOCIAL INITIATION IN CHILDREN WITH AUTISM USING VIDEO MODELING

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A large number of studies have shown that children and youths with autism can improve their social skills when provided with appropriate and well planned treatment strategies. Here, a video modeling procedure was implemented with seven developmentally delayed children, using a multiple-treatment design. Each child watched a videotape showing a model and the experimenter engaged in a simple social interactive play in an adapted play setting. Afterwards each child's behavior was assessed in this setting, while the experimenter's behavior remained the same as that shown in the videotape. The video modeling training enhanced the social initiation skills of four children. It also facilitated appropriate play engagement, which generalized across settings, peers, and toys. These changes maintained after a 1- and 2-month follow-up period. The intervention was evaluated as a time-efficient teaching tool as well as a means of enhancing appropriate play skills. Copyright © 2003 John Wiley & Sons, Ltd.

Autism is the most widely recognized developmental disorder characterized by severe and pervasive impairments in several areas of development: reciprocal social interaction skills, communication skills and the presence of restricted repetitive and stereotyped patterns of behavior, interests, and activities (American Psychiatric Association, 1994). Moreover, many researchers have suggested that the social impairment of children with autism may be their most important deficit (Koegel, Koegel, Hurley, & Frea, 1992; Roeyers, 1995). Although this problem is pervasive, a large number of studies have proved that children and youths with autism can improve their social skills when provided with appropriate and well planned treatment strategies (Swaggart et al., 1995). For instance, peer-implemented pivotal response training (Pierce & Schreibman, 1995, 1997), peer incidental teaching (McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992; McGee, Morrier, & Daly, 1999), and classwide peer tutoring (Kamps, Barbetta, Leonard, & Delquadri, 1994) are among the behavioral procedures that have been successful in producing positive changes in the social behavior of these children.

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In many social situations, the behavior of engaging in social initiation is crucial for enhancing social interaction (Haring & Lovinger, 1989). While children with autism can learn to respond to social initiations by others, they may face major difficulties in initiating complex social behaviors and as a result conversation and initiating play remain at low levels (Pierce & Schreibman, 1995). The importance of this skill is underlined by other findings which suggest that when the social initiation rate of children with autism increases, then their social behavior improves significantly (Strain, Kerr, & Ragland, 1979). Accordingly, a number of studies have dealt with this specific aspect of social interaction (see, e.g. Brady, Shores, McEvoy, Ellis, & Fox, 1987; Zanolli & Dagget, 1998; McGee et al., 1999; Zanolli, Dagget, & Adams, 1996).

One procedure, video modeling, could be an alternative method to enhance social initiation in children with autism. Video modeling is defined as the instances of modeling in which the model is not a live one, but one that is videotaped, in an effort to change existing behaviors or learn new ones (Grant & Evans, 1994). After discrimination of a model's behavior has been established, then it is expected that the observer will demonstrate that specific behavior in natural settings (Haring, Kennedy, Adams, & Pitts-Conway, 1987; Morgan & Salzberg, 1992). Video modeling as a treatment procedure has been effective in increasing normal pre-school children's social interaction and social play involvement (Ballard & Crooks, 1984) and in training adults with severe mental retardation on employment-related skills (Morgan & Salzberg, 1992).

In the area of autism published studies of video treatments have concentrated on teaching generalization of purchasing skills across community settings (Haring et al., 1987), enhancing conversational skills (Charlop & Milstein, 1989; Sherer et al., 2001), increasing play-related comments of children with autism towards their siblings (Taylor, Levin, & Jasper, 1999), and reducing disruptive transition behavior (Schreibman, Whalen, & Stahmer, 2000). Currently there are no published studies examining video modeling and social initiation. Accordingly, this study examined (i) the effectiveness of a video modeling intervention in promoting social initiation in an adapted play setting, (ii) whether increases in appropriate play are facilitated when social initiation occurs, and (iii) generalization and maintenance of the behavior change after one and two month follow-up periods.

METHOD

Participants

Seven children, ages 9–15 years, who were attending a residential school for children with developmental and learning disabilities, participated in the study. All

children had restricted nonverbal imitation repertoires. John W. was a 9-year-old boy diagnosed with autism and profound mental retardation. He displayed very little appropriate toy play without direct supervision and continuous prompting. Most of his speech consisted of delayed echolalic phrases and his receptive language was limited to a few words and very simple instructions. Other aspects of his behavior included lack of social or emotional reciprocity and lack of interaction with other children. Also, he displayed a variety of stereotyped and repetitive motor mannerisms and he exhibited challenging behaviors.

Thomas was 15 years old with autism and profound mental retardation. He had no speech and almost totally lacked any response to people. Nevertheless, he could respond to a few familiar instructions. He engaged in passive behavior most of the time and lacked interest in toys apart from a few specific puzzles.

Gordon was a nonverbal 10-year-old boy diagnosed with autism, profound mental retardation and polymorphic epilepsy. He displayed self-injurious behavior, lacked eye contact and interactions with people, and was interested only in a narrow range of toys. His receptive language largely consisted of a few words. He frequently emitted aggressive behaviors to others and he engaged in a few stereotyped behaviors such as hand flapping and wringing of hands.

David was a nonverbal 10-year-old boy diagnosed with autism, mental retardation, and epilepsy. He displayed a variety of challenging behaviors and was unresponsive to people generally. His receptive language was limited to a few words and familiar instructions. He engaged in a few stereotyped behaviors, mainly spinning objects and playing with sand.

Donald was an 11-year-old boy with autism, who had some speech, mainly single words in response to visual prompts, and he could make simple requests. He liked books, drawing, painting, puzzles, and a few games on the computer. He did not interact with other children and had no eye contact.

Steven was a 13-year-old boy with autism, having some speech, mainly echolalic. His receptive language consisted of a few words and simple two-word instructions. He did not interact with other children and was generally unresponsive to people preferring solitary activities.

Ellen was a 9-year-old girl with Asperger's syndrome and attention deficit hyperactivity disorder (ADHD). She could speak quite fluently, but when her anxiety increased, her speech could become inappropriate. Often her speech was not directed to anyone in particular. She displayed a variety of challenging behaviors and needed to be supervised and directed most of the time. She did not interact with other children, but could seek adult attention. She had a very limited concentration span and liked transferring from one activity to another very quickly. She engaged in stereotyped, restricted, and repetitive patterns of behavior.

Overview of Procedure

Children were taken to one of three rooms (room 1) to view a 35 s video of one of three models, either a familiar adult, a peer, or an unfamiliar adult, engaged in a simple activity using a particular toy with the experimenter. In the video, the experimenter was shown entering room 2 with the model and going to a chair placed opposite a number of toys (the numbers of toys varied across conditions). The experimenter then sat on the chair. The model spent a few seconds wandering around the room and then approached the experimenter, taking him by the hand, saying 'Let's play', and leading him to a particular toy. This toy was closer to the experimenter's seat than the other toys and is referred to here as the 'pertinent toy'. Across a number of conditions, the toy selected to be the pertinent toy was varied. Together the experimenter and model played with the pertinent toy for about 15 seconds.

After watching this video sequence only once, each child was taken into the experimental room (room 2, which was the same room as that shown in the video) by the experimenter. At no time were any instructions given to the child and no reference was made to the video just watched. While in the room the experimenter engaged in the same behavior as shown in the video. The child's behavior during the experimental session, which lasted up to 5 minutes, was videotaped. Behaviors measured included (i) latency to social initiation with the experimenter and (ii) time spent in appropriate play with the experimenter using any toy (i.e. pertinent or other).

Stimulus Materials

Toys

The range of toys used across conditions included a ball, a basin with sand and other toys in it, a set of tambourines, a toy with two hammers called 'Whack Attack®', a trampoline, and a plastic tea set, cones, and footstools. These toys were selected because all participants were familiar with them and this also meant that guidance and instructions on how to play with the toys, which was never given at time in the study, would not confound the effects of the independent variables being studied.

Videotapes

Three videotapes were constructed in which the models used were a non-handicapped peer, an unfamiliar adult, and a familiar adult. Each videotaped scene was approximately 35 seconds in duration. The models were selected according to the characteristics indicated by other research studies (Grant & Evans, 1994; Martin & Pear, 1999) and their behavior was as natural as possible, avoiding a slow or exaggerated pace. Also, adults and peers were used as previous research suggested

that children with autism could learn equally well from both types of model (Ihrig & Wolchik, 1988). The seven participants were classified into two dyads and one triad. Children in each group viewed the same model throughout the study and each group viewed a different model.

Settings

Children viewed the video presentations in an adapted room of the school (room 1) that was unknown to them. The room measured 4.2 by 1.7 meters. A 14 inch television was used and a chair was placed 1.5 meters away. Next to this room, another room unknown to the children (room 2) was used as the experimental room. This measured 5 by 3.7 meters. A Sony® 300x video camera mounted on a tripod with a wide-angle lens was used to record each session. The video camera was placed on the corner diagonally across from the experimenter's seat. A cloth which covered most of the camera and tripod made them invisible to the children and a table obstructed any approach to them. Generalization tests took place in another room (room 3), which measured 4 by 4.7 meters.

Dependent Measurements

Data were collected for the following two behaviors during the five minutes spent in rooms 2 and 3.

Latency to Social Initiation

A social initiation was defined as the targeted child approaching the experimenter, emitting any verbal (e.g. 'Let's play') or gestural (e.g. taking him by the hand) behavior previously viewed on the videotape and leading him towards the pertinent toy. Previous research suggests that '. . . following the presentation of the model, the imitative behavior is emitted within a designated response interval (e.g. 10 seconds)' (Cooper, 1987, p. 366). However, because 15 s elapsed before the experimenter sat on the chair (during this time, the model explored the room), a social initiation was scored as being imitative when it was emitted within the first 25 s of entering room 2. Any other form of social initiation, including initiations different from those modeled on the tapes (e.g. the child presenting any other toy to the experimenter), was scored separately.

Time Spent in Appropriate Play

Recordings were made of the total time spent by each child when engaged in play with the experimenter using any toy (i.e. pertinent or other) in the manner for which it was intended.

Experimental Design

A multiple-treatment design was used for six children (Steven, John W., Donald, Thomas, Ellen, and Gordon) and an A–B design was used for one child (David). In all conditions, data from baseline, intervention, and generalization probes were collected in room 2. Room 3 was used to collect data on generalization across settings. During all sessions no specific consequences were provided by the experimenter. However, on occasions when challenging behaviors occurred it was necessary to intervene if the situation became dangerous for the child. Two to five sessions were conducted each day.

Procedure

Pre-training

At the beginning of the study, all children were assessed to see whether they were able to attend to the TV for at least one minute. Various TV morning zone programs were used for this assessment. For children who could not attend for one minute (Gordon & David), training included verbal instructions and modeling. Positive reinforcement in the form of edibles and praise was used throughout.

Baseline

Baseline sessions were conducted in the absence of any video presentations. There were two kinds of baseline: those with all toys present (baseline (P1, P2, P3)) and those with only the pertinent toy present (BL (P1) and BL (P2)). The rationale of having two different kinds of baseline was the following. If a video presentation followed baseline (P1, P2, P3) and did not decrease the latency to social initiation, it would be difficult to determine whether (i) this is because video modeling was not possible with this child or (ii) the inclusion of other toys interfered with control by the pertinent toy shown in the video.

At the beginning of each session in baseline (P1, P2, P3), both the child and the experimenter entered room 2 and the experimenter approached the chair and sat down. In the room, one of the three toys that functioned as the pertinent toy in different conditions had already been placed on the floor close to the experimenter's seat (i.e. 1.35 meters from it). The other toys (including the other two toys that would later function as pertinent toys) also had been already spread on the floor with the nearest toy about 1.35 meters from the pertinent toy; each pertinent toy was used for at least two sessions. Baselines BL (P1) and BL (P2) were identical to baseline (P1, P2, P3), except that only the toy shown in the video was placed close to the experimenter's seat (i.e. other toys were removed).

Each session was scheduled to last five minutes. However, if the child emitted a social initiation and afterwards played with the experimenter using any toy, the session ended after this particular play had been completed. An interval of between five to eight minutes separated each session. During this time the child was taken away from the experimental setting.

Video Modeling

In room 1, children viewed, only once, a 35 s video of one of three models. Then they were assessed in room 2 in the same way as they were assessed in the baseline (P1, P2, P3). Steven and John W. watched a video with a familiar adult as a model, while the model for Donald and Thomas was an unfamiliar adult and the model for Ellen, Gordon, and David was a peer. During the video presentation the experimenter provided a prompt to watch the TV if the child withdrew attention for 5 seconds. A mirror which had been hung a few meters away enabled the experimenter to measure the time each child spent watching the TV (see Table 1).

Following the video presentation in room 1, the child entered room 2. As in baseline (P1, P2, P3), a number of toys were placed on the floor and the same pertinent toy as viewed in the video had already been placed near the experimenter's seat. The sequences of different pertinent toys used for each child are shown in Table 2. Thus, for Steven, the first pertinent toy (P1) was the Whack Attack®, the second pertinent toy (P2) was the trampoline, and the third pertinent toy (P3) was the ball. For those toys used by more than one child, the order of the presentation was varied randomly to control for order effects. The sequence of the toys was varied across children. Also, each child was assessed while all the toys but the pertinent toy were removed. These assessments were introduced to control for any potential effects caused the presence of all the other toys.

As in all baselines, each session lasted up to five minutes. An interval of between five and eight minutes separated each session and the child was taken away from room 2. General praise or a small piece of food was given to the child if he/she had

Table 1. Percentage of time on task (i.e. time spent watching) during the video presentation

Child	*Mean*	*Range*
Steven	91%	78–100%
John W.	82%	11–96%
Donald	85%	33–100%
Thomas	80%	55–96%
Ellen	92%	22–100%
Gordon	51%	11–93%
David	41%	7–96%

Table 2. Toys for each child arranged in the sequence of engagement

Child	*Training toys*			*Generalization toy*
	P1	*P2*	*P3*	*P4*
Steven	WA®	trampoline	ball	
John W.	WA®	trampoline	ball	
Donald	ball	WA®	trampoline	
Thomas	ball	tambourines		
Ellen	ball	WA®	basin with sand	plastic tea set
Gordon	tambourines			
David	tambourines			

The abbreviation WA® stands for the toy Whack Attack®.

played with the experimenter. This was done to maintain general responding within the play context.

Self-Modeling

Self-modeling is defined as the positive behavior change that results from watching oneself on videotapes performing exemplary behaviors (Kehle, Owen, & Cressy, 1990). This condition was used with Thomas only, because, although he attended to the TV adequately, the first video implementation failed to produce a social initiation response.

A videotape of Thomas was made in which he performed in a way similar to the model presented on the original video modeling tape. For this, he was given verbal instructions and the required behavior was modeled *in vivo*. Then the distance between Thomas and the live model was increased (spatial fading). Edible reinforcers and praise were delivered contingent on Thomas' correct performance.

The new tape was used in the self-modeling assessment. In summary, then, self-modeling and video modeling were exactly the same procedures with one exception, the original video modeling tape had been replaced by Thomas' tape. A short baseline (BL (P2)) was taken again in order to determine whether any gains in performance had occurred.

Extended Appropriate Play (EAP)

This was used only for Ellen. At the start of the study the staff had reported that she only ever engaged in appropriate play with an adult for about 1 min at a time. In this condition all of the previous pertinent toys were placed in room 2. No instructions were given and the experimenter simply played with Ellen in response to any social initiation emitted by her. There was no time limit for this condition.

Criterion Performance

When a child succeeded in emitting a social initiation response within the first 25 s in three consecutive sessions when all toys were present, then he/she was transferred to the next condition. However, if this criterion was met when only the pertinent toy was present, another assessment with all the toys present was conducted before each child experienced the next condition that included the next pertinent toy.

Generalization

Toys (GT)

This procedure was exactly the same as baseline (P1, P2, P3) except that the 'next' pertinent toy was used and the previous pertinent toy was removed. These probes assessed whether a video presentation with the next pertinent toy was necessary for the child to emit a social initiation response. All probes were conducted during the general assessment of the video modeling for all three toys.

For Ellen there was an additional assessment. When probes had been used there was no evidence of generalization. By the end of the video modeling assessment all of the pertinent toys had been used as probes. It was necessary, therefore, to introduce a new toy. However, a decision had to be made regarding whether or not this toy would be presented with other toys or on its own. It was felt that perhaps previous failures to generalize might have been due to the presence of other toys when probes were presented. It was decided therefore to introduce a new toy on its own for Ellen before other toys were added.

Settings (GS)

This procedure was exactly the same as baseline (P1, P2, P3), except that room 3 was used. During each of three sessions a different pertinent toy was used. John W., however, was assessed using the three different pertinent toys and procedures similar to those in baseline (BL (P1)). This was done because his latency for emitting a social initiation response was greatest in conditions that contained all of the toys. It was felt, then, that using only a familiar pertinent toy in a new setting might increase the likelihood of generalization.

Peers (GP)

This procedure was exactly the same as baseline (P1, P2, P3) apart from the use of a different experimenter. The peer who participated in the generalization sessions had learning disabilities. Only two participants (Steven & Donald) were assessed for generalization across peers.

Follow-up

Follow-up measures were initially obtained 1 month after the final measurements had been taken. Three sessions for each pertinent toy were conducted for each child except for John W., who was assessed across six sessions. John W. was assessed initially with all toys present and subsequently in the presence of the pertinent toy only, because he failed to emit a social initiation response in the presence of all the toys. A 2 month follow-up assessment was also conducted for each child. This assessment was identical to the 1 month assessment; John W. was assessed while only the pertinent toy was present. The setting during follow-up sessions was identical to the setting used during all the baseline sessions.

Social Validity

Ten mothers of school-aged children assessed the social validation of the treatment outcome. These mothers were not familiar either with the participants or with the purpose of the study. They watched videotaped vignettes that consisted of three baseline and three intervention sessions; two vignettes with each pertinent toy. The scenes were selected and presented in random order. The observers had to identify those scenes in which the child emitted a social initiation and afterwards played appropriately with the experimenter.

Interobserver Agreement

This was assessed on 31% of all observations and at least one reliability session was conducted for each participant during each condition. The second observer was naive to the experimental conditions. Average reliability was 98% (range 92–100%) across children. For all measurements it was calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying the result by 100. The percentage agreement across each dependent measurement was (i) latency to social initiation 100% and (ii) time spent in appropriate play 97% (92–99%).

RESULTS

Social Initiation

The results of video modeling procedures for Steven and John W. can be seen in Figure 1. During baseline (P1, P2, P3), Steven did not meet criterion with any of the pertinent toys. When the video modeling procedure was implemented with a familiar

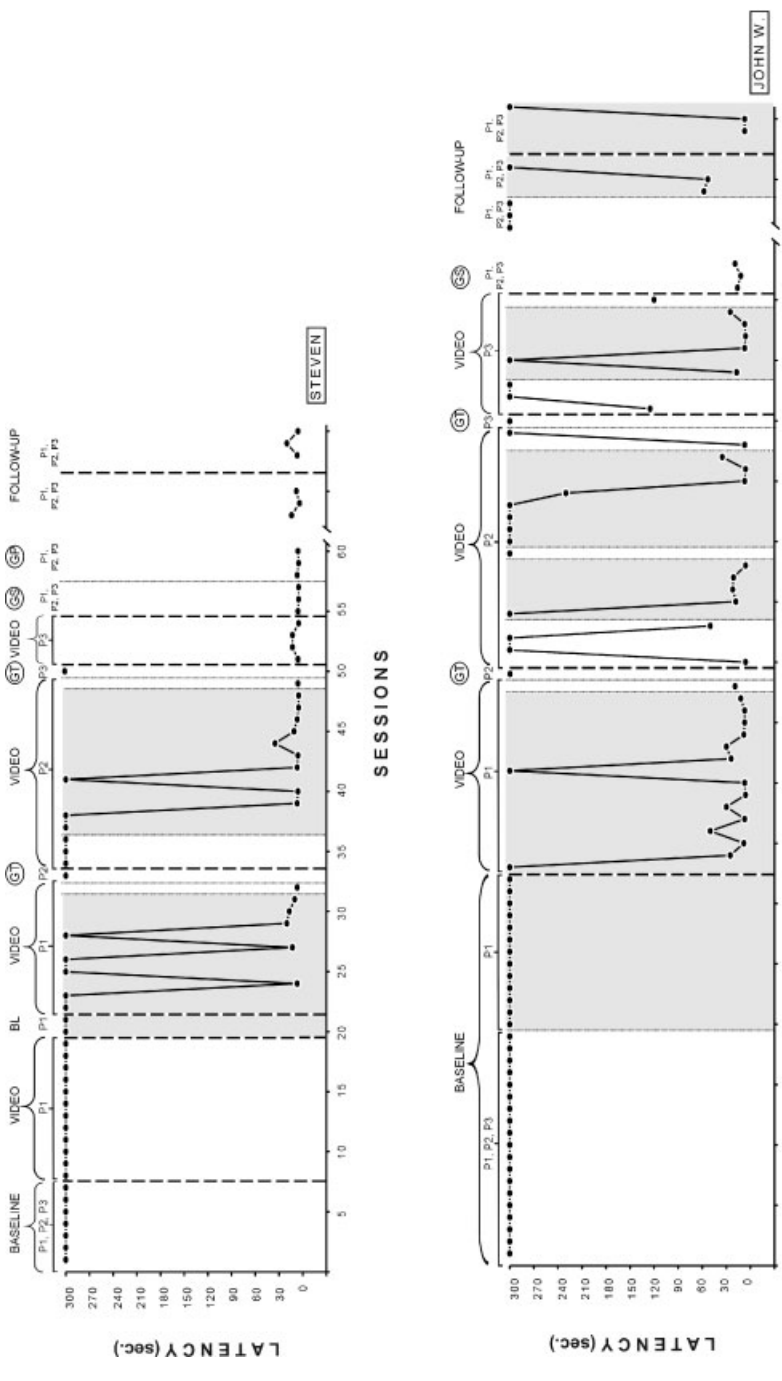

Figure 1. Upper and lower panels indicate respectively the latency with which Steven and John W. emitted a social initiation towards the experimenter across conditions. The pertinent toy in each condition was either P1, P2, or P3. Shaded areas indicate those occasions when only one toy was present. GT, GS, and GP indicate the generalization sessions across toys, settings, and peers respectively.

adult as the one of the two models (video (P1): all toys present), Steven did not emit any social initiation responses after 12 sessions. Following two baseline sessions (BL (P1)) where again social initiation did not occur, video modeling (video (P1): only one toy present) was introduced. Here, Steven met the criterion within ten sessions. Following a similar performance in video (P1) with all toys present, responding did not generalize to a different toy (GT: session 33). Video modeling for the second toy was then implemented (video (P2): all toys present). Again, responding did not meet criterion until all the toys were replaced with only the pertinent toy (video (P2): only one toy present). When all the toys were reintroduced, the latency to social initiation remained very low. In the subsequent generalization probe (GT: session 50) responding again did not generalize. When video modeling for the third toy was implemented (video (P3): all toys present) criterion responding occurred after only four sessions. This performance generalized across settings (GS) and across peers (GP). Similar results were obtained at follow-up.

Results for John W. were generally similar to those for Steven. That is, social initiation was generally more likely to occur when only the pertinent toy was present across all conditions. Unlike Steven, however, performance deteriorated at follow-up.

Figure 2 depicts the latency with which Donald and Thomas emitted a social initiation response across all conditions. The results for Donald are very similar to those for Steven and John W.; a social initiation response was more likely to occur initially when only the pertinent toy was present. Responding in the first month of follow-up was similar to Steven. However, responding deteriorated in the second month.

For Thomas, a completely different set of results was obtained. Across all conditions there was no evidence of social initiation. Similar findings were obtained for Gordon and David (Figure 3, bottom panels respectively). Results for Ellen are shown in the top panel of Figure 3. Apart from instances in baseline (P1, P2, P3), BL (P1), and video (P1), in which Ellen engaged in social initiation using a toy other than the pertinent one (i.e. the modeled toy), social initiation occurred when the pertinent toy only was present. This responding was sustained in the following condition when all toys were reintroduced (video (P1: all toys present)). However, in the subsequent probe (GT: session 36) and in the early sessions of video (P2: all toys present), responding was disrupted. Thereafter, the latency to respond was substantially reduced. This improved performance was sustained throughout the remaining conditions.

Appropriate Play

Figures 4–6 show the time spent in appropriate play for each child during each condition. During the last three sessions of the first exposure to video (P1: only one toy present), the time spent in appropriate play had increased to an average of about 215 s for Steven (Figure 4, upper panel), 90 s for John W. (Figure 4, lower panel), and

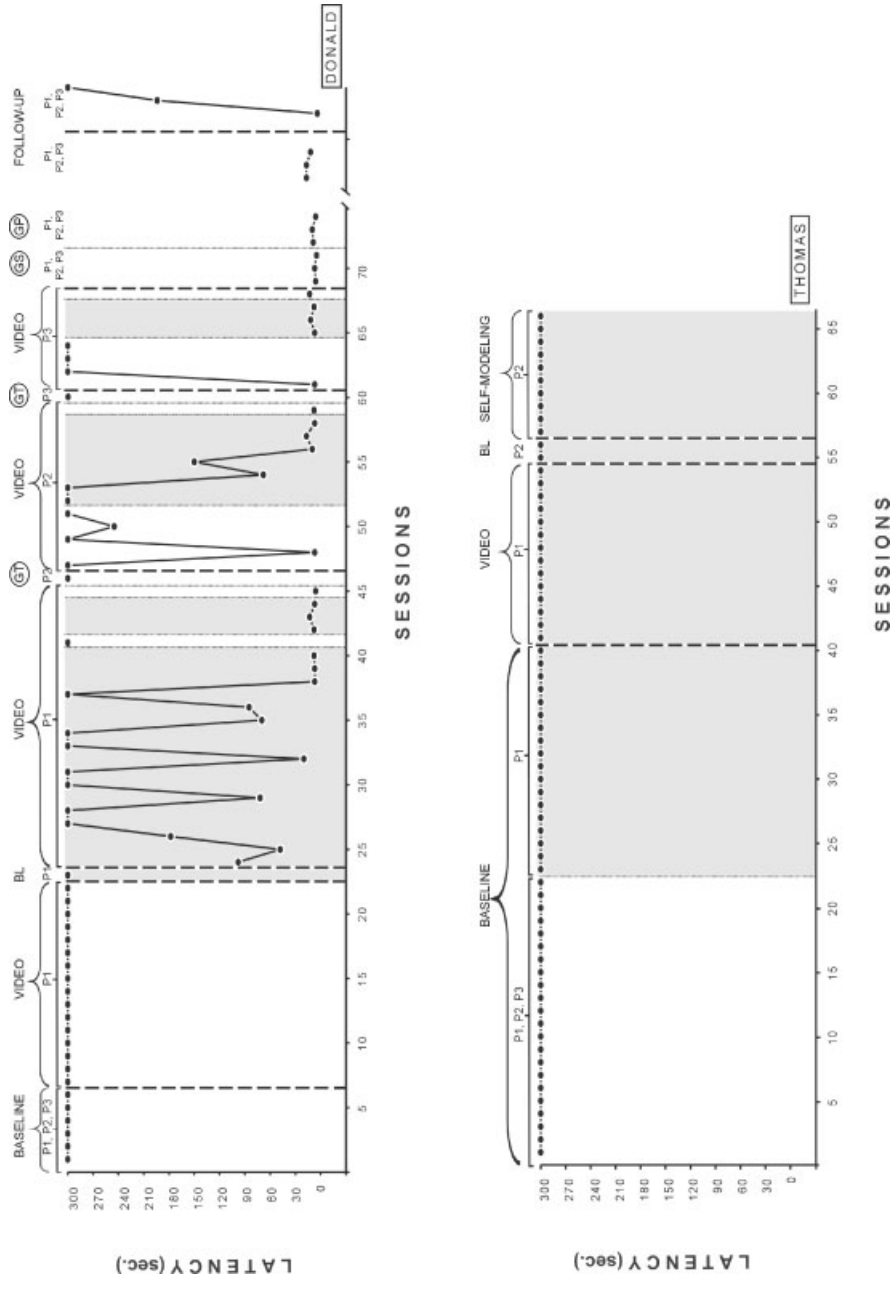

Figure 2. Upper and lower panels indicate respectively the latency with which Donald and Thomas emitted a social initiation towards the experimenter across conditions. The pertinent toy in each condition was either P1, P2, or P3. Shaded areas indicate those occasions when only one toy was present. GT, GS, and GP indicate the generalization sessions across toys, settings, and peers respectively.

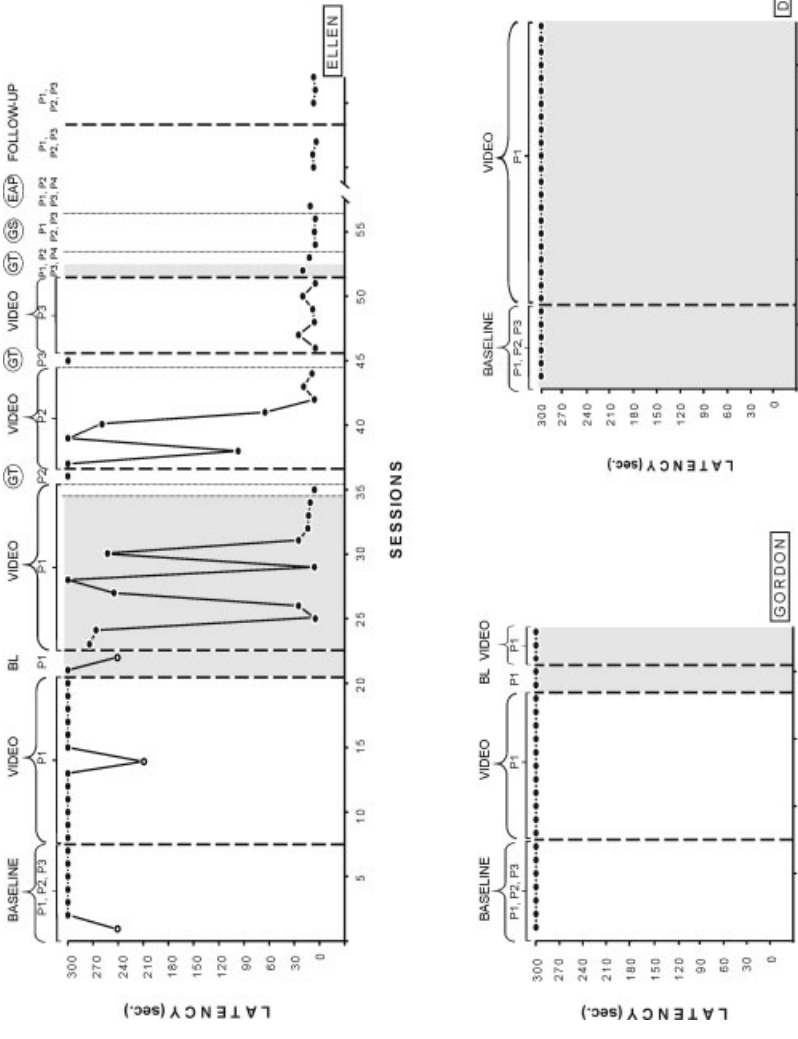

Figure 3. Upper and lower panels indicate respectively the latency with which Ellen, Gordon, and David emitted a social initiation towards the experimenter across conditions. The pertinent toy in each condition was either P1, P2, or P3. Open circles indicate the instances when a different toy from the pertinent one was used. Shaded areas indicate those occasions when only one toy was present. GT, GS, and EAP indicate the generalization sessions across toys, settings, and extended appropriate play respectively.

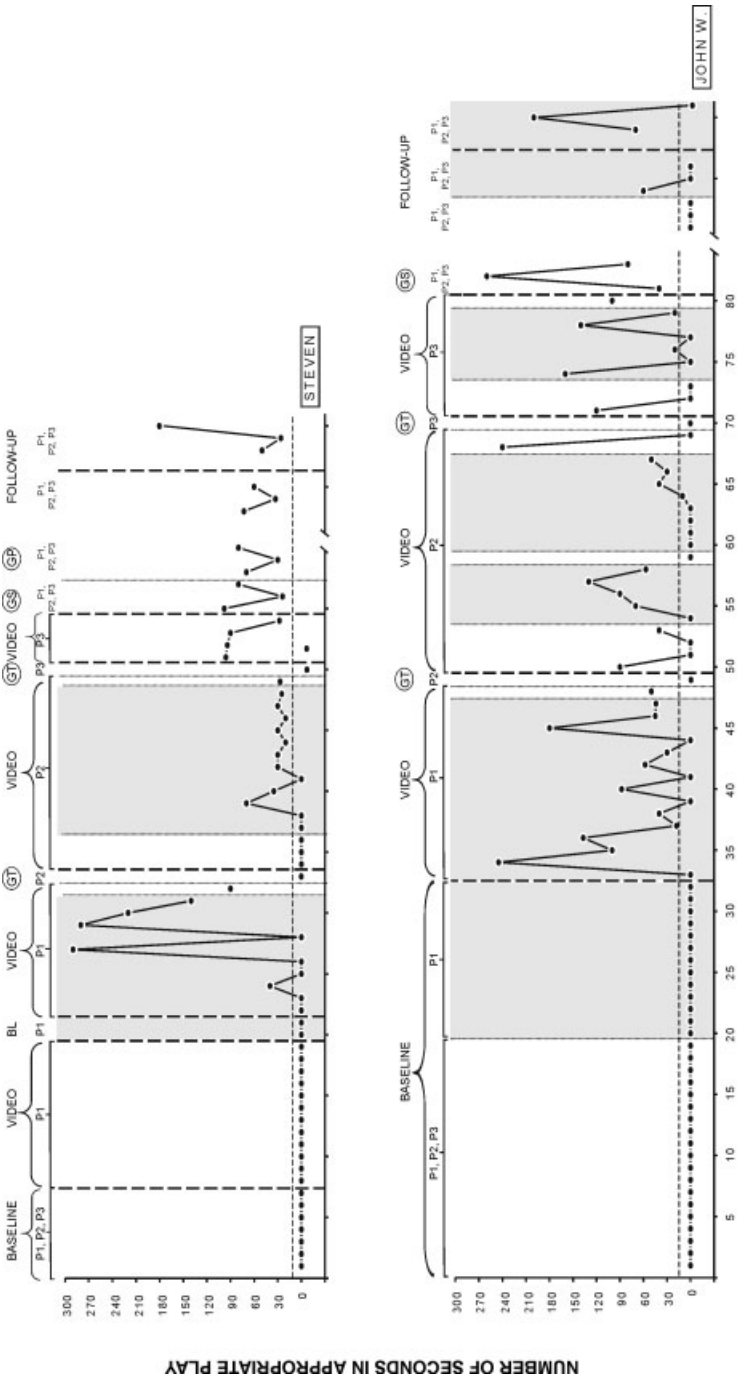

Figure 4. Upper and lower panels indicate respectively number of seconds engaged in appropriate play for Steven and John W. across conditions. The pertinent toy in each condition was either P1, P2, or P3. Shaded areas indicate those occasions when only one toy was present. GT, GS, and GP indicate the generalization sessions across toys, settings, and peers respectively. The dashed horizontal line defines the duration of the appropriate play displayed on the videotape during video modeling.

about 53.5 s for Donald (Figure 5, upper panel). Thereafter, there was a general tendency for time spent in appropriate play to be highest when only one toy was used.

There were, however, some exceptions to this finding. For example, by the time Steven and Donald had engaged in appropriate play during video (P3: all toys present) this performance was sustained across subsequent sessions.

For Ellen, the time spent in appropriate play tended to increase across conditions though it fell substantially during each of the generalization probes (Figure 6, top panel). The average duration at 1 month and 2 month follow-up was about 4 minutes and 1.5 minutes respectively. By the time condition EAP had been introduced she spent 40 minutes in appropriate play. Thomas (Figure 5, bottom panel), Gordon and David (Figure 6, bottom panels) did not engage in appropriate play across all conditions.

DISCUSSION

Previous research using children with autism has shown that video modeling can be effective in enhancing both conversational skills (Charlop & Milstein, 1989; Sherer et al., 2001) and play-related comments (Taylor et al., 1999) as well as reducing disruptive transition behavior (Schreibman et al., 2000). The main objective of the current study was to examine the effectiveness of video modeling in promoting social initiation in children with autism. It was found that out of seven participants video modeling enhanced both social initiation and appropriate toy play in four children across a number of conditions. Responding in these children also generalized across settings, peers, and toys; these results were maintained at 1 and 2 months follow-up. In addition, a social validity assessment using video vignettes of the baseline and intervention sessions found that mothers were able to identify those scenes in which children had emitted a social initiation and had played appropriately with the experimenter.

Nowadays, there is still controversy about whether or not individuals with autism have specific impairments in imitation skills (Hobson & Lee, 1999). The positive, but limited, outcomes of the present study with children who had restricted play skills and imitation repertoires contribute to this debate because social initiation was dependent on imitation skills. Almost all instances of social initiation and play with the pertinent toy that were exhibited by the children were those that had been previously demonstrated on the videotape; there was an exception with Ellen in three instances. Instructions such as 'Let's do the same' were not given at any time after the video viewing (cf. Charlop & Milstein, 1989) nor was there any previous training on the video display (cf. Taylor et al., 1999). Also, it did not matter whether the videotapes included a speech component ('Let's play') or whether some participants had no speech.

From the design of the present study it was possible to determine those conditions that maximized the role of imitation. Specifically, it was found that social initiation

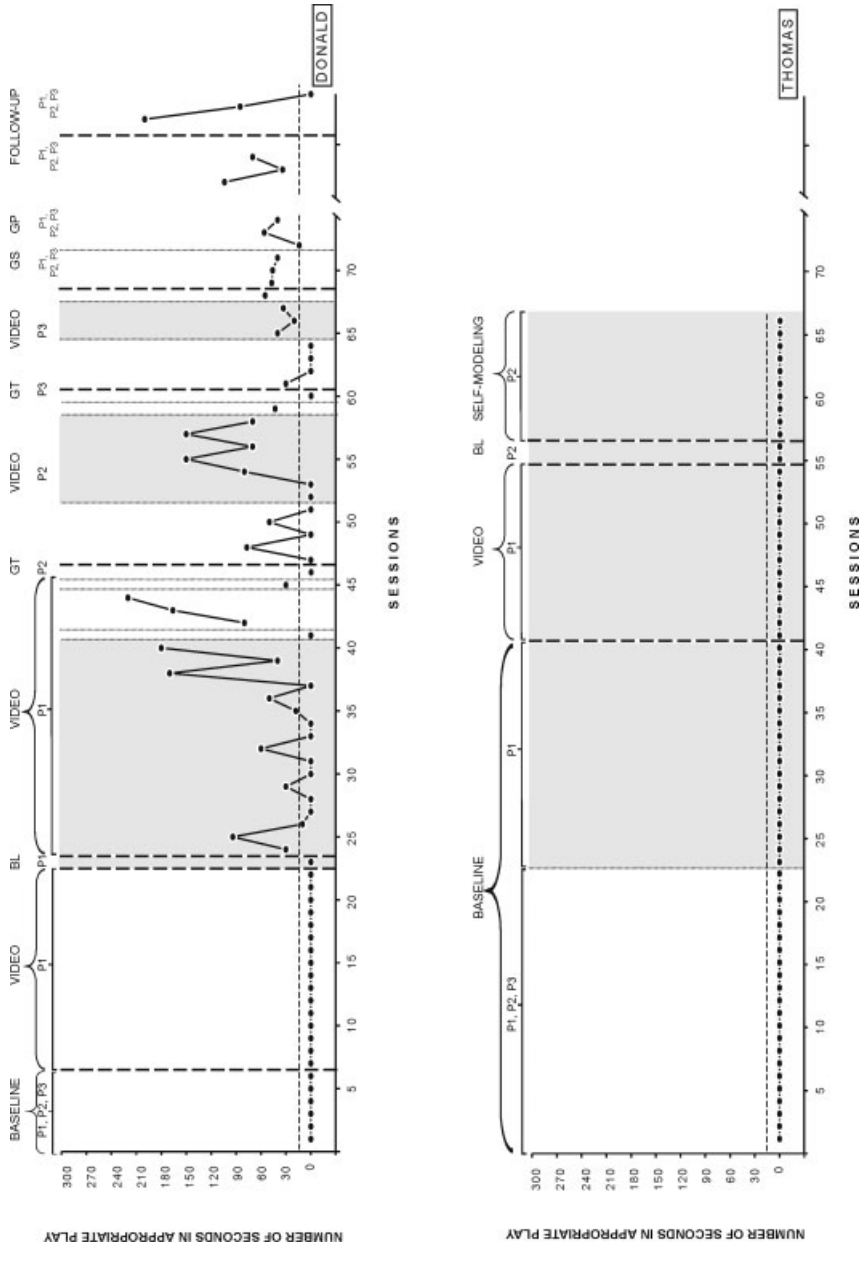

Figure 5. Upper and lower panels indicate respectively number of seconds engaged in appropriate play for Donald and Thomas across conditions. The pertinent toy in each condition was either P1, P2, or P3. Shaded areas indicate those occasions when only one toy was present. GT, GS, and GP indicate the generalization sessions across toys, settings, and peers respectively. The dashed horizontal line defines the duration of the appropriate play displayed on the videotape during video modeling.

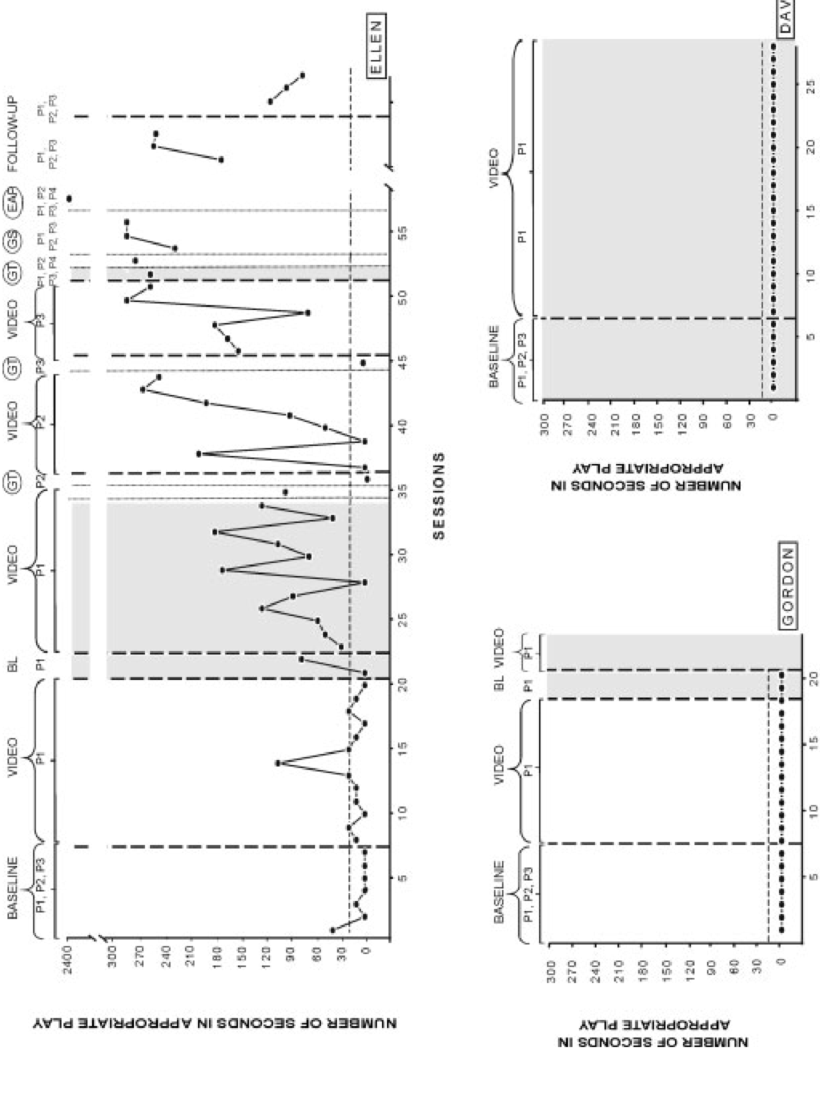

Figure 6. Upper and lower panels indicate respectively number of seconds engaged in appropriate play for Ellen, Gordon, and David across conditions. The pertinent toy in each condition was either P1, P2, or P3. Shaded areas indicate those occasions when only one toy was present. GT, GS, and EAP indicate the generalization sessions across toys, settings, and extended appropriate play respectively. The dashed horizontal line defines the duration of the appropriate play displayed on the videotape during video modeling.

was more likely to be imitated when a single stimulus (i.e. only one toy) was present. That is, with the video display remaining constant across conditions, the target behavior was initially reached in the presence of a single toy. A possible explanation of this finding could be that the presence of more than one toy in the play settings distracted the children.

In terms of other ongoing behaviors throughout the study it was noted from casual observation that when appropriate play increased for four out of seven participants, competing behaviors reduced respectively. For example, behaviors such as isolated play with any toy or sitting on the floor without doing anything particularly decreased dramatically for Steven and Ellen and appropriate play predominated when social initiations began to occur. Likewise, there was a general tendency for stereotypic speech and object manipulation for John W., as well as isolated play and hitting objects for Donald to decrease whenever a social initiation occurred and was followed by appropriate play.

Three participants (Gordon, David, & Thomas) did not engage in social initiation. This failure could be attributed to two things. Gordon and David engaged in disruptive behaviors, which did not permit them to watch the video display adequately. Although they had been trained to watch TV for at least one minute, these specific behaviors were predominant in their performance most of the time throughout the day. Thus, any additional effort to teach these children to watch videos failed within the time limitations of the study. Another factor that may have contributed to the failure of these children to initiate a social response is the fact that none of them had any play skills. During all sessions, for example, Thomas was either standing still or walking around the room. Self-modeling was implemented as a final option for him to see whether it could be used to prime imitation responding (Dowrick, 1999). Again, however, this proved to be unsuccessful. In comparison with the other children in the study, the performance of these three children suggests that the likely success of video modeling procedures is dependent upon the prior elimination of behaviors that interfere with the development of imitation skills. It may also be the case the more extensive training in imitation skills is a prerequisite for successful performance.

The participants of the present study were not so well matched. Consequently the sequence of conditions was slightly different for two children. Thus, because of their restricted nonverbal imitation repertoires, John W. and Thomas experienced video (P1) with only one toy present before video (P1) with all toys present. This was done because video (P1) with all toys present for Steven and Donald did not result in any change of behavior. The decision to do this did not compromise the integrity of the general findings, however, because John W.'s performance was not consistent during conditions with all the toys present and Thomas did not engage in the target response at all.

Despite the limited successes reported here there are a number of issues that remain unresolved. Firstly, it is not clear to what extent the selected play materials *per se* influenced the target behavior. For example, it is worth mentioning that three out of four children spent only a short period of time playing with the trampoline, probably due to its physical strength demands. We also do not know whether the presence of an adult (i.e. the experimenter) influenced the target behavior.

Notwithstanding these concerns, the focus of the current research suggests other avenues of inquiry. For example, future research could compare the relative effectiveness of video modeling and *in vivo* modeling with children who have few imitation skills initially (cf. Charlop-Christy, Le, & Freeman, 2000). Also, the benefits of the procedures developed here need to be assessed in relation to their effects on children's interaction with their teachers or classmates and in outdoor settings.

If we extrapolate from those occasions when the procedures were successful, there is a suggestion that video modeling intervention could be implemented in the design of a prolonged activity schedule (cf. McClannahan & Krantz, 1999). Activity schedules are usually constructed using booklets of pictures. It would be interesting to see whether short video clips could be used instead, as no specific training is required. This offers the possibility of a time-efficient and personnel conserving teaching tool (Charlop & Milstein, 1989). Within this context, it would useful to examine just how many sequences of behavior could be included in individual video clips. In addition, it is essential that methods are developed for determining either the necessary components of a video clip or the appropriate training history that would enable video modeling in a less structured environment. It may be the case, for example, that poor performances observed here were determined by a combination of factors. Prior imitation skills for these children may not have been sufficiently fluent and the behavioral sequence modeled on the tape may have been too complex. Tentative findings from ongoing research by the authors suggest that exposure to a reduced number of behavioral components in the video can have a remedial effect on performance.

ACKNOWLEDGEMENTS

This unfunded research was completed as part of the requirements for a D.Phil degree in Psychology by the first author. This paper was presented, in part, at the ABA International Convention, Venice, November, 2001.

We are grateful to the Principal, John Davidson, and to all staff of Linn Moor Residential School in Aberdeen, Scotland, for their co-operation and support in conducting this study. Special thanks is extended to all of the children who participated in the study.

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