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# Effects of video modelling on training and generalisation of social initiation and reciprocal play by children with autism

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## Abstract

Previous research using children with autism has shown that video modelling can be effective in enhancing a variety of skills. The present study was conducted to assess the effectiveness of video modelling intervention to promote social initiation and reciprocal play as well as to increase the likelihood of generalisation of the treatment gains across stimuli. Three children with autism participated in this study and experimental control was demonstrated using a multiple baseline across subjects design. Each child watched a short videotape showing a model and the experimenter engaged in a simple reciprocal play using one toy. When this behaviour was established, then programming for generalisation across four other toys in the absence of a videotape took place. For all children, video modelling appeared to enhance both the social initiation and play skills and also it facilitated the generalisation of this social behaviour across stimuli. The behaviour changes for these three children generalised across settings and subjects and maintained after a 1- and 3- month follow-up period.

**DESCRIPTORS:** autism, children, video modelling, social interaction, reciprocal play, generalisation.

Typically developing children continually learn from their environment throughout their waking hours from a variety of different ways such as exploration, creative play, modelling or conversation (Bredekamp & Copple, 1997). Children with autism, however, tend to have little skill or inclination to learn in this manner. Furthermore, they often fail to respond to the communicative efforts made by their peers or adults in their attempts to help them learn and as a result, children with autism usually experience frustration with tantrums in teaching situations. Likewise, it has been suggested that in comparison to their typically developing peers, the social difficulties of children with autism may be their most important deficit (e.g., Ingersoll, Schreibman, & Stahmer, 2001; Koegel, Koegel, Hurley, & Frea, 1992; Roeyers, 1995). The use of child-social initiations has been repeatedly identified as a key pivotal behaviour for any effective training programme in order to increase children's with autism learning opportunities (Koegel, Koegel, & Carter, 1999). Several studies have demonstrated that

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such engagement directly affects other behaviours even when these behaviours are not significantly targeted by the teaching programme. For example, in verbal children, both the frequency of language used and the development of novel vocabulary have been demonstrated to increase along with increases in social engagement (e.g., Krantz & McClannahan, 1993; Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995). Also, inappropriate behaviour has been shown to decrease during periods of active social engagement (Lee & Odom, 1996). Moreover, while children with autism can learn to respond to social initiations by others, they may face major difficulties in initiating complex social behaviours and as a result conversation and initiating play remain at low levels (Pierce & Schreibman, 1995). Thus, social engagement and particularly child-social initiations appear to be skills that lead directly to increased attainment of other important skills without the need for direct programming (Rogers, 2000). Social skills are related to the long-term adjustment of and prognosis for both typically and atypically developing children, and therefore, it is important that any treatment programme for children with autism includes teaching and promotion of valuable social skills to children with autism (Charlop-Christy & Daneshvar, 2003; Hwang & Hughes, 2000).

Fortunately, many studies have been conducted on how to teach children with autism the above skills, identifying a wide range of effective behavioural approaches, especially at increasing their social engagement with others, both adults and typical peers (e.g., DiSalvo & Oswald, 2002; Koegel, Koegel, Shoshan, & McNerney, 1999; McGrath, Bosch, Sullivan, & Fuqua, 2003; Newman, Reineche, & Meinberg, 2000). However, a critical and also difficult task for treatment providers is to develop strategies to increase learning opportunities for children with autism and to enhance their motivation to learn (Spradlin & Brady, 1999). Learning without being able to imitate others' behaviours would be extremely difficult, even impossible, as it is a natural method of teaching which occurs regularly in our everyday lives (Grant & Evans, 1994). Modelling as it is treated in the science of applied behaviour analysis can be a powerful tool for both teaching new behaviours and improving already acquired ones, allowing the learner to demonstrate new responses without errors (Miltenberger, 1997). In this way, modelling can be a constructional approach to behaviour change that specifies desirable behaviours to be emulated. Interestingly, literature has shown that modelling in autism can be an effective procedure in teaching among other things verbal behaviour, a wide variety of self-care skills, the reduction of unreasonable fears, improvement in communication, and the preparation of academic activities (e.g., Charlop, Schreibman, & Tryon, 1983; Freeman & Dake, 1996; Maurice, Green, & Luce, 1996).

Literature has also shown that another important defining characteristic of autism is the presence of inappropriate play. Therefore, there is a vast need for the development of play-based curricula and intervention strategies to teach play skills to children with autism (Sigafoos, Roberts-Pennell, & Graves, 1999). Also, it has been well documented that the behaviour gains obtained by children with autism often do not generalise in the absence of training, especially when it is based on traditional prompting and reinforcement procedures (e.g., Charlop-Christy, Le, & Freeman, 2000; Lovaas, Koegel,

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& Schreibman, 1979; McGee, Krantz, & McClannahan, 1985).

Video modelling is based on the principles applied to modelling, which appears to offer many advantages to individuals with autism (Krantz, MacDuff, Wadstrom, & McClannahan, 1991; Lasater & Brady, 1995). For example, a variety of different behaviours can be presented in realistic contexts (e.g., Haring, Kennedy, Adams, & Pitts-Conway, 1987), and it can be a useful medium for learners who cannot take advantage of print materials or complex language repertoires (Browning & White, 1986). Also, video can efficiently display numerous examples of stimulus and response variations, taking advantage of the observed attentional skills of children with autism to graphical presentations (Garretson, Fein, & Waterhouse, 1990). It can also provide new opportunities for addressing the generalisation deficits displayed by children with autism. In addition, video modelling could serve as an efficient cost-effective tool, negating the high cost of live models employed in many kinds of training programmes (Racicot & Wogalter, 1995). Although, literature has demonstrated that video modelling can be effective in teaching a variety of different behaviours such as teaching generalisation of purchasing skills across community settings (Haring et al., 1987, 1995), functional living skills (Shipley-Benamou, Lutzker, & Taubman, 2002), perspective taking (Charlop-Christy & Daneshvar, 2003), verbal and motor responses (D'Ateno, Mangiapanello, & Taylor, 2003), and generative spelling (Kinney, Vedora, & Stromer, 2003), promoting social initiation (Nikopoulos & Keenan, 2003), enhancing conversational skills (Charlop & Milstein, 1989; Sherer et al., 2001), increasing play-related comments of children with autism towards their siblings (Taylor et al., 1999), reducing disruptive transition behaviour (Schreibman, Whalen, & Stahmer, 2000) currently there are no published studies examining the generalised effects of video modelling in the enhancement of social initiation and reciprocal play by children with autism.

Accordingly, the present study was designed to examine: a) the effectiveness of a video modelling intervention in promoting social initiation and reciprocal play using a single stimulus (i.e., one toy), in the absence of any experimenter-implemented consequences or prompts, b) whether success with one toy using video modelling could increase the probability of success with new toys in the absence of video, c) whether alteration of video display components (i.e., angle, environment etc.) could influence the effectiveness of video modelling, d) whether increases in reciprocal play are facilitated when social initiation occurs, and e) generalisation and maintenance of the behaviour changes after 1- and 3- month follow-up period.

## Method

### Participants

Three children (Kirsty, Niko, & Jamie) participated in this study. They all met the DSM-IV (American Psychiatric Association, 1994) criteria for autism, and an independent diagnosis of autism had been conferred by outside agencies. After a complete description of the study and its objectives, formal written parental consents were obtained for all of the participants. Also, the Childhood Autism Rating Scale

(CARS, Schopler, Reichler, & Renner, 2002) was administered for the adaptive behaviour rating of the children.

Kirsty was a 10.5-year-old girl with autism, having some speech, mainly echolalic. According to the Childhood Autism Rating Scale (CARS) she scored within the range of moderate autism, having a total of 36.5 points. Kirsty interacted with adults in the form of compliance and she displayed limited interactions with other children during simple social or free play activities. Other aspects of her behaviour included limited concentration span, lack of interest in toys, marked impairments in the use of non-verbal behaviours, and extreme active behaviour. Occasionally, she displayed non-functional routines or rituals as well as repetitive and stereotyped patterns of behaviour.

Niko was an 8.5-year-old boy with autism, having some speech, though not clear enough, as he did not sound the ends of the words. He was classified within the mild-moderate range of autism, scoring 36.5 points on the CARS. Niko displayed limited interaction with other children or adults as well as marked impairments in the use of non-verbal behaviours. He was spending most of his time in "reading" rather than playing with toys or participating in social games. His main characteristic was a persistent desire to follow set patterns of behaviour and a performance of repetitive motor mannerisms such as playing and talking to his hands in a puppet like fashion.

Jamie was 7.5 years old and diagnosed with autism. His score on the CARS was 33.5 points, indicating a mild-moderate range of autism. Jamie had some speech, but he could not speak in complete sentences. He displayed limited interaction with other children, and therefore he could not develop peer relationships appropriate to developmental level. That was especially evident during simple social play or games wherein he rarely participated, preferring solitary activities. Also, Jamie lacked eye contact and sometimes he followed set patterns of behaviour in his interaction with others.

## Overview of procedure

Three children participated in this experiment and a multiple baseline design across subjects was used. Children were taken to Room 1 to view a 35-s video of a typically developing peer engaged in a simple activity using a particular toy with the experimenter. In the video, the experimenter was shown entering a room with the model and going to a chair close to a particular toy. The experimenter then sat on the chair and the model spent a few seconds wandering around the room. Then, the model approached the experimenter, took him by the hand saying, "Let's play" and led him to that particular toy. Together the experimenter and model played with the toy for about 15 seconds.

After watching this video sequence once, each child was taken into the experimental setting (Room 2; different from the one displayed in the video) by the experimenter and experienced Condition B. The experimenter engaged in the same behaviour as shown in the video, without providing any instructions to the child regarding the video just watched.

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When a child succeeded in emitting a social initiation response within the first 25 s in three consecutive sessions during Conditions B, C, D, E or F, then he/she was transferred to the next condition. Conditions C, D, E and F were exactly the same as Condition B except that no video was displayed and a different toy was used in each condition. If a child failed to emit a social initiation response in three consecutive sessions, during any condition, then he or she experienced the preceding condition, just once. In that condition, if a child succeeded in emitting a social response to the experimenter, then he/she was transferred again to the next condition. This procedure of a child transferring from one condition to another remained until he or she was assessed with the fifth consecutive toy in Condition F.

Each session lasted a maximum of 5 minutes and it was videotaped for the recording of the dependent measurements. These included a) social initiation, b) reciprocal play, c) object engagement, and d) other behaviours.

Settings

Three different rooms at the participants' school were used, the room shown in the videotape (Room 1; 2m x 2.5m), the experimental room (Room 2; 3.2m x 3.9m), and the generalisation room (Room 3; 3m x 3m). All rooms were unknown to the participants, especially the generalisation room, which was a tent designed for the purposes of the study. In an arranged place outside of Room 2, a 17-inch television and a chair about 1.5 meters away from it were located for videotape viewing. It is worth mentioning that no effort was made to adapt Rooms 1 and 2 for any potential experimental reasons. That is, both rooms were alike normal classrooms with all the relevant stimuli present. However, furniture or other hardware that could obscure participants' movements had been taken away. A video camera mounted on a tripod with a wide-angle lens was used for recording all sessions across all conditions. The video camera was placed on a cupboard so that the participants were not able to reach it.

Stimulus materials

Toys. Across all conditions five different toys were used; a wooden train, a ball, a game called "Hungry Frogs®", a set of tambourines, and a trampoline. One of the primary concerns of the study was to avoid providing the children with any guidance or specific instructions. Thus, these toys were selected because they were easy-to-use, and all children had at least a minimum experience on how to handle them appropriately.

Videotape. A 35-s videotape was constructed, and a typically developing peer was used as the model. This videotape depicted the model and the experimenter engaging in a simple social play using a specific toy (i.e., the "Hungry Frogs®"). All the participants viewed the same videotape. The selection of a typically developing peer as a model was based on the finding of our previous study (Nikopoulos & Keenan, 2003) wherein all three different models (i.e., a familiar adult, an unfamiliar adult, & a typically developing peer) were equally effective. Also, previous research has suggested that children with autism could learn equally well from both adults and peers as models (Ihrig & Wolckik, 1988).

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Dependent Measurements

During all conditions data were collected for a) social initiation, b) reciprocal play, c) object engagement, and d) other behaviours.

Social initiation. 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) behaviour previously viewed on the videotape and leading him towards any toy. Latency recording was used for measuring social initiation.

Reciprocal play. This behaviour was defined as a child engaged in play with the experimenter using any toy in the manner for which it was intended. Total duration and a 10-s partial interval recording systems were used.

Object engagement. Object engagement was defined as a child engaged in isolated play with any toy. A 10-s partial interval recording system was used.

Other behaviours. Behaviour that could not be included in any of the above categories was scored as other behaviour (e.g., looking through the window, sitting on the table or floor without doing anything, engaging in stereotypic speech etc.). A 10-s partial interval recording system was also used.

Experimental design

A multiple baseline design is considered as a method of establishing the reliability of an environmental intervention in changing a behaviour (Horner & Baer, 1978). Accordingly, a multiple baseline across subjects design was used for the three participants (i.e., Kirsty, Niko, & Jamie). During baseline, intervention, and generalisation across subjects data were collected in Room 2, whereas data for generalisation across settings assessment were collected in Room 3. In all conditions, no specific consequences were provided by the experimenter. Two to three sessions were conducted each day.

Procedure

Informal reports from the teachers and caregivers of the children indicated that all participants enjoyed watching TV or videotapes. Therefore, no specific training for attending to videos was required prior to the video modelling intervention.

Baseline (Condition A). During baseline sessions both the experimenter and the child entered Room 2, without previously viewing any videos. The experimenter then sat on a chair. One of the five toys had already been placed near that chair, approximately 1.5 meters away. These five toys were randomly alternated across sessions, and therefore each child was assessed in the presence of each toy at least once.

Each baseline session lasted a maximum of 5 minutes. However, in cases where a child emitted a social initiation response and played with the experimenter using the toy near the chair, then the session ended after this reciprocal play had been completed. In addition, an interval of 5- to 8- minutes separated each baseline session and the child was guided to a supervised outside play area.

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Video modelling (Condition B). Children were required to view a 35-s video of the experimenter and the model in Room 1. Afterwards, the effectiveness of the video presentation was assessed, as the children were taken into Room 2. In that room, the same toy as shown in the videotape (i.e., Hungry Frogs®) had been placed in the same location as in the video; about 1.5 meters away from the experimenter's chair. During this assessment, the experimenter's behaviour remained similar as in baseline and there was no reference to the video or to the behaviour engaged in at any time.

As in baseline, the duration of each session was maximum 5 minutes and a 5- to 8-min interval separated the sessions.

Generalisation

Toys (Conditions C, D, E, & F). After each child had experienced Condition B – the only video modelling condition – then he/she was assessed without previously viewing any video in Conditions C, D, E, and F. Therefore, these conditions were exactly the same as baseline. Specifically, in Condition C each child was assessed in the presence of a ball, in Condition D in the presence of a set of tambourines, and in Conditions E and F in the presence of a trampoline and a train, respectively.

Settings (GS). This procedure was exactly the same as baseline, in terms that each child was assessed across all toys in the absence of any video display. Due to building constraints this test for generalisation across settings was conducted in an outside tent (Room 3). This tent was designed for the purposes of this study and the children had never been in it previously.

Peers (GP). This procedure was also exactly the same as baseline except that a different experimenter participated. As in the other generalisation conditions, each child was assessed across all of the five toys.

During the intervals between all sessions and across all conditions, including baseline and video modelling, each child was taken out of the experimental setting to an outside playground area; general social praise was given to each child along with edibles on some occasions. This was done to maintain general participation within the experimental context (Tryon & Keane, 1986).

Criterion performance

The criterion for each child to be transferred to the next condition was to emit a social initiation response within the first 25 s in three consecutive sessions. However, if this criterion was not met, then each child experienced the previous condition just once, before he or she was assessed in the condition that the criterion failed to be met.

Follow-up

Follow-up measures were initially obtained one month after the final measurements had been taken. Each child was assessed across all five toys once. In addition, a three-month follow-up assessment was conducted for each child, which was

identical to the one-month assessment. The setting during follow-up sessions was the same as the setting used during all the baseline sessions.

Social validity

Eight school-aged children assessed the social validation of the treatment outcome. These children were not familiar either with the participants or with the purpose of the study. They watched videotaped vignettes that consisted of two baseline and four intervention sessions, in a way that none of the children would watch the same subject at both baseline and intervention conditions. The scenes were selected and presented in a random order. These children had to identify the subjects that they would be more likely to play with them. It is worth mentioning that the children who participated in the social validity assessment were Greek and therefore they did not speak the same language as the subjects of the study. Thus, they identified the possible play partners only by seeing the subjects play with the experimenter.

Inter-observer agreement

Inter-observer agreement data were obtained for all the four dependent measurements in at least 43% of sessions across all conditions. The percentage of the inter-observer agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Total inter-observer reliability was 97% (range, 92% to 100%). Specifically, the percent agreement across each depended measurement respectively, was: a) Social initiation 100%; b) Reciprocal play 98% (93% - 100%); c) Object engagement 96% (92% - 99%); d) Other behaviours 94% (92% - 97%).

## Results

Figure 1 depicts the results of latency to social initiation (Y-axis on left) and total time spent in reciprocal play (Y-axis on right) obtained during all conditions for the three participants. Data for social initiation and total time engaged in reciprocal play with each toy have been plotted. During baseline, Kirsty did not meet the criterion for any of the toys. However, social initiation leading to play occurred when the video modelling procedure with the first toy (i.e., Hungry Frogs®) was implemented in Condition B. Specifically, Kirsty emitted a social initiation within the first 5 s of each session and played with the experimenter for the rest of the session (approximately 295 s). Similar results were obtained during Condition C in which another toy was used in the absence of any video display. Initially, responding did not generalise to a different toy during Condition D. However, when Kirsty experienced a return to the preceding condition (Condition C) just once, then the criterion performance was met during Condition D within the minimum three sessions. Thereafter, Kirsty's social initiation response remained at very low levels. The total time engaged in reciprocal play was near a mean of 292 s whenever a social initiation had been emitted. This performance using all five toys

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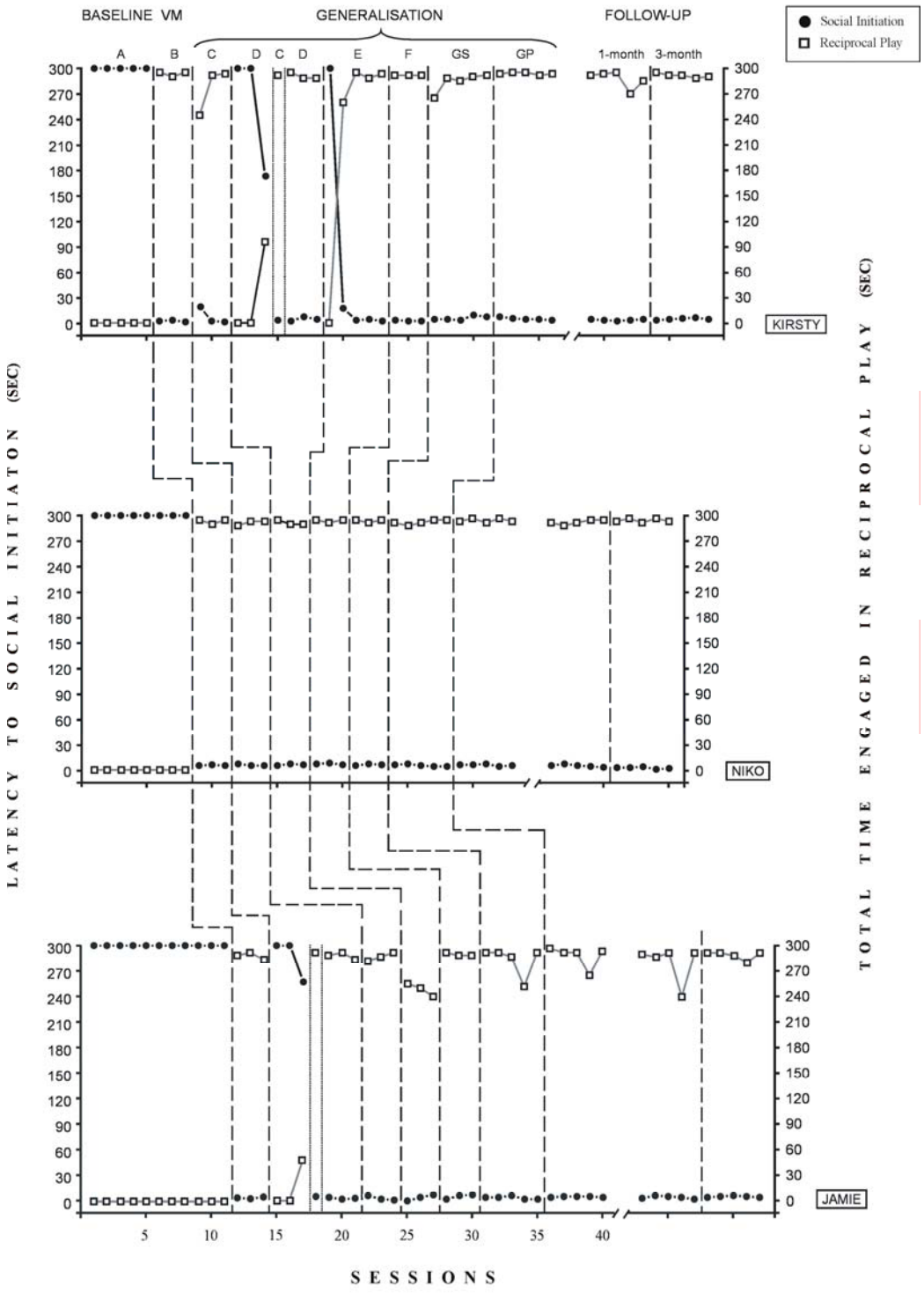
**Figure 1**



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generalised across settings (GS) and across peers (GP), and maintained at 1-month and 2-month follow-up periods.

For Niko and Jamie the latencies to social initiation as well as the total time engaged with each toy were similar to those for Kirsty. That is, Jamie's responding during Condition D met the criterion after Condition C had been re-introduced for one session. This did not happen, however, with Niko whose social initiation was close to 5 s at each session during all conditions. Total time spent in reciprocal play for Niko was about 295 s across all sessions, while for Jamie it varied between 240 and 295 seconds. The performance of these two children also generalised across settings (GS) and peers (GP). Similar results were obtained at the two follow-up conditions.

Figure 2 shows the percentages of intervals engaged in reciprocal play, object engagement, and other behaviours for all three children. In Condition A (Baseline, sessions 1-5) for Kirsty 66% of intervals were occupied by object engagement and other behaviours occupied 34% of intervals. In the subsequent Conditions B and C both of these behaviours dropped to zero level, while reciprocal play rose to near 100%. Nevertheless, object engagement and other behaviours increased again during the first implementation of Condition D, with a mean of 69% and 19% of intervals per session, respectively. Thereafter, however, reciprocal play increased at a level of 100% and predominated across all conditions of the study, with an exception at Session 19. For Niko, a similar pattern of results was obtained. That is, following baseline and across all conditions both object engagement and other behaviours decreased substantially to zero levels, while reciprocal play increased to 100%. In Condition A and in the first introduction of Condition D for Jamie, object engagement and other behaviours occupied 41% and 56% of intervals, respectively. However, these two behaviours had decreased to zero level at the first video exposure (Condition B) and at the first test for generalisation across toys (Condition C), so that by Session 18 (reintroduction of Condition C) reciprocal play predominated thereafter.

## Discussion

Data from this study showed that video modelling was an effective procedure for promoting social initiation and enhancing reciprocal toy play when a single stimulus was present in all three children. Furthermore, it was demonstrated that successful responding generalised across four other different toys in the absence of a video display and that it was not influenced by the differences in the video and experimental settings. Importantly, behaviour changes generalised across settings and peers and were maintained at 1- and 3-month follow-up for all of the participants. In addition, data obtained from the social validity assessment showed that the eight typically developing school-aged children would play with the subjects presented during the treatment conditions (i.e., video modelling & generalisation), while playing with the experimenter.

Unfortunately, the impact of video-based modelling on generalised behaviour change has rarely been examined (Reamer, Brady, & Hawkins, 1998). In the present

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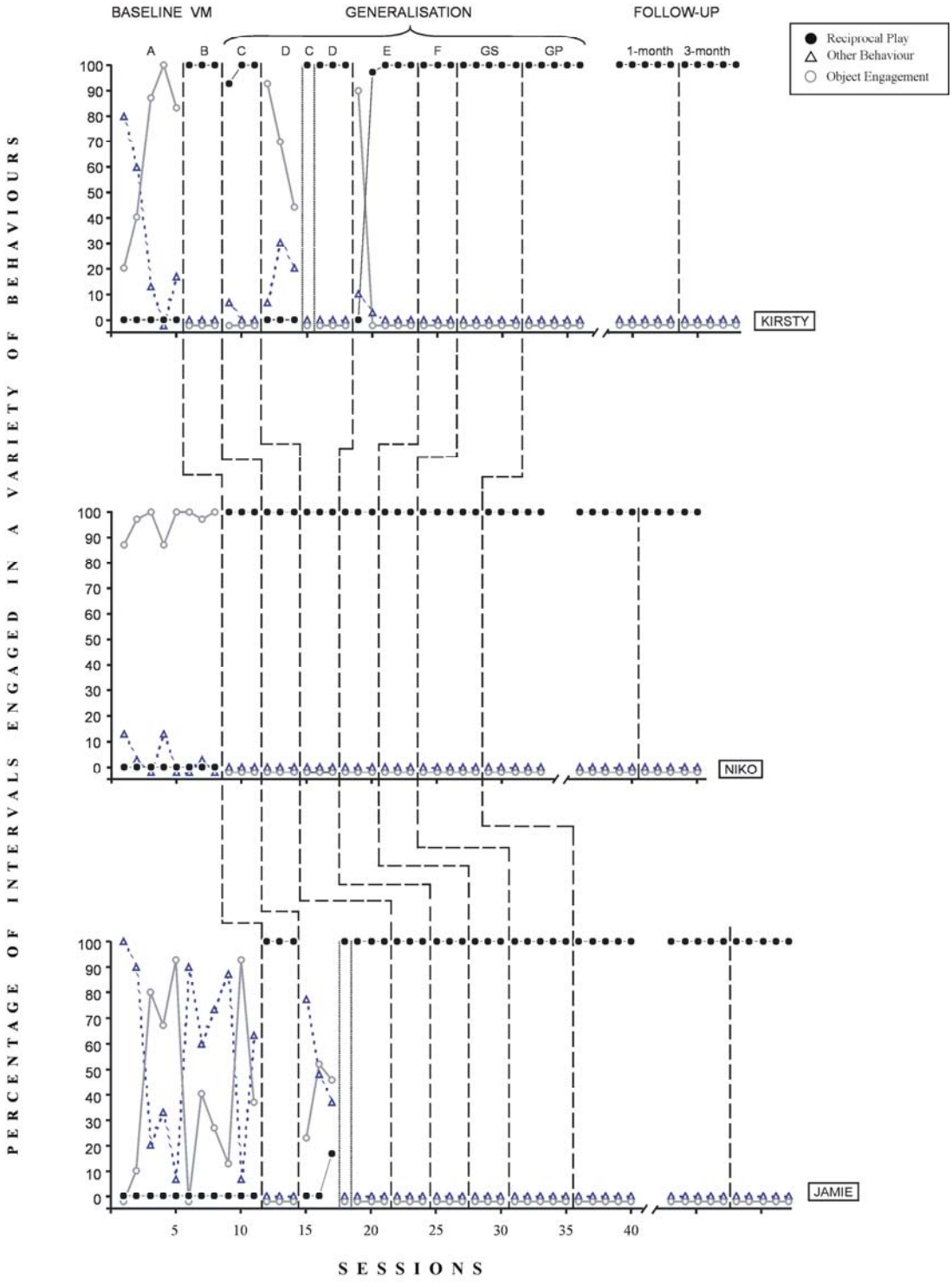
**Figure 2**



study, however, successful responding of the participants (i.e., social initiation and reciprocal play) generalised across stimuli (i.e., toys), settings, and peers. In particular, the generalisation across stimuli during four different conditions (i.e., Conditions C, D, E, & F) was a remarkable finding as the children viewed a short video clip during only one condition (i.e., Condition B). Specifically, children's behaviour during baseline sessions was measured as object engagement or other behaviours. Then, when video modelling was introduced that behaviour changed into an imitative response (e.g., social initiation, reciprocal play). Thus, video modelling can be explained as an antecedent strategy (Cuvo & Davis, 1998; Heflin & Alberto, 2001; Winett, Leckliter, Chinn, Stahl, & Love, 1985) which exerted stimulus control over children's performances. However, after a short video modelling intervention children's behaviour changed even in the absence of any video display providing evidence that children's performance was not under the strict stimulus control (Dunlap & Johnson, 1985). It seemed that children's responding was not under the stimulus control of the video display, but rather under the stimulus control of the toy(s) or the experimenter/peers (cf. Dunlap & Johnson, 1985). In addition, stimulus generalisation might have occurred, because responding in the presence of the modelled toy had been reinforced by playing, and then, the frequency of that responding remained high or even increased in the presence of a different but similar stimulus (Mundschenk & Sasso, 1995). The only similarity between the stimuli across all conditions was that all shared topographical similarities and were members of the same stimulus class; they were all toys. Thus, it seemed that generalisation was facilitated due to that similarity (cf. Bernard-Opitz, Sriram, & Nakhoda-Sapuan, 2001).

It is a quite frequent phenomenon that the behaviour gains obtained by children with autism do not generalise in the absence of training (e.g., Charlop-Christy et al., 2000; McGee et al., 1985). Thus, large numbers of training sessions may be necessary to provide subjects with sufficient history of performance so that their learnt behaviours will be more likely to be exhibited in natural or generalisation situations (e.g., Chandler, Lubeck, & Fowler, 1992). Moreover, it has been well documented that a treatment is regarded effective as long as it obtains generalised effects. That is, the greater the effects of a treatment the greater amount of generalisation occurs (e.g., Zifferblatt, Burton, Horner, & White, 1977). Remarkably, for all participants in this study, the experience of only three video modelling sessions (i.e., Condition B) proved adequate to promote generalisation across stimuli, settings, and peers. It might be a case that the stimulus elements (i.e., toy, model, & experimenter) had been captured close enough together in terms of the two-dimensional TV screen, and therefore all these important cues enhanced the acquisition of the stimulus control of the successful responding (cf. Rincover & Ducharme, 1987). Also, this generalisation may have occurred due to the similarities between the environments presented in the videotapes and in vivo (cf. Bernard-Opitz et al., 2001). That is, the nature of a structured testing procedure might assist the children with autism to exhibit the imitative responses while distractions were minimised (McDonough, Stahmer, Schreibman, & Thompson, 1997). Likewise, Alcantara (1994) proposed that the use of videotape instructions may provide a sufficient training for

children with autism, which is as realistic as in the natural environment, mainly because of the high degree of similarity between the videotape experience and the real experience. Consequently, video modelling proved to be a cost-effective intervention tool for the target behaviours across the three children with autism.

Literature has demonstrated that children with autism usually lack of imitative skills (e.g., Garfinkle & Schwartz, 2002; Harris & Weiss, 1998; Rogers, Royers, van Oost, & Bothuyne, 1998; Smith & Bryson, 1998), though there is still much debate (e.g., Hobson & Lee, 1998). However, the successes reported in this study were mainly relied on the ability of the participants to imitate the modelled behaviours, which was apparently facilitated from the video medium. That is, children became successful observational learners after being successful imitators (Brown & Murray, 2001; Garfinkle & Schwartz, 2002), as they were able to attend to multiple cues (e.g., Goldstein & Brown, 1989) in the videotapes and then to perform them in the reality. In fact, most instances of social initiation and play performed by two of the children (i.e., Niko & Jamie), were exactly the same as presented in the video. The same occurred during the conditions in which video was not present. That was an additional important achievement of the participants, as it has been stated that imitation skills may represent an altered route to social learning (Carpenter, Pennington, & Rogers, 2002; Lovaas, Freitas, Nelson, & Whalen, 1967; Quill, 2000) or to language development (e.g., Ross & Greer, 2003). That is consistent with the finding that even though children with autism develop more appropriate social responses they are unlikely to be able to sustain interactions with their peers for any length of time, in the absence of imitative or more complex play behaviours (Schopler & Mesibov, 1986).

In terms of other concurrent behaviours throughout the study, it was observed that all the competing behaviours reduced substantially as soon as social initiation and reciprocal play occurred. For example, behaviours such as isolated play, sitting on the floor, and exhibition of stereotypic speech and mannerisms which measured during baseline (Condition A), reduced to zero levels when reciprocal play predominated in all sessions during the subsequent conditions.

The video modelling procedures described here expand the literature in several ways. First, the function of video modelling was isolated from other methods in as natural an environment as possible (e.g., Morgan & Salzberg, 1992). Second, the videotape format used in this study obtained all the advantages of convenience, standardisation, and efficiency that may be difficult to achieve with in vivo formats (Poche, Yoder, & Miltenberger, 1988). Third, not only were short video clips shown to be effective (i.e., 35 secs), but also these video presentations resulted in rapid changes in behaviour, that required no further prompts (in terms of video presentations) in subsequent assessments across other stimuli. This is important since it is common for children with autism to become prompt dependent as intervention procedures are often based on continuous prompting techniques (Lasater & Brady, 1995; Odom, Chandler, Ostrosky, McConnell, & Reaney, 1992). Finally, the generalised outcomes that occurred are in keeping with the

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demand that research should focus on generalisation and maintenance of social behaviour (Chandler, Lubeck, & Fowler, 1992; Fox & McEvoy, 1993).

The present study provided further empirical evidence regarding the use of video modelling as an effective procedure in the treatment of complex skills such as social initiation and reciprocal play in children with autism. However, it would be interesting for future research to examine the effectiveness of video modelling on generalisation of behaviours belonged to different response class. That is, would the establishment of one set of behaviours (i.e., social initiation & reciprocal play) facilitate the generalisation of different but similar sets of other behaviours?

Becoming able to initiate and sustain reciprocal social interaction without external help may be accomplished through the use of video modelling. Inclusion of children with autism is now being considered as the main goal in special education research and practice (Harrower & Dunlap, 2001; Koegel, Koegel, Frea, & Fredeen, 2001), which realisation relies on the development of those key pivotal areas such as children's social initiations (Gena & Kymissis, 2001; Koegel, 2000). Specific support structures are necessary to be designed for these children in order to engage in reciprocal peer interactions (Zercher, Hunt, Schuler, & Webster, 2001); video modelling in this study was proved to be an effective one.

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## Figure Captions

Figure 1. The latency with which Kirsty, Niko, and Jamie emitted a social initiation towards the experimenter and peer and the total time engaged in reciprocal play during the baseline, video modelling, generalisation and follow-up conditions. GS and GP indicate the generalisation sessions across settings and peers, respectively.

Figure 2. Percentage of 10-sec intervals of reciprocal play, object engagement, and other behaviours for Kirsty, Niko, and Jamie, during all conditions. GS and GP indicate the generalisation sessions across settings and peers, respectively.

## Authors' note

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