

A COMPARISON OF PEER-INITIATION AND TEACHER-ANTECEDENT INTERVENTIONS FOR PROMOTING RECIPROCAL SOCIAL INTERACTION OF AUTISTIC PRESCHOOLERS

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We compared two procedures for improving the social interactions of three autistic children. In a peer-initiation condition, confederates were taught to initiate interaction with the autistic children. In a teacher-antecedent condition, teachers prompted the autistic children to initiate with confederates, who had been taught to reciprocate. Using an alternating treatment design, differential effects were found. The peer-initiation procedure reliably increased the social responses of the autistic children, whereas the teacher-antecedent condition increased the initiations *and* responses of the autistic children. In addition, longer chains of social interaction occurred during the teacher-antecedent condition.

DESCRIPTORS: autistic children, peers, preschool children, social interaction, prompting

Autistic children rarely interact with their peers (Rutter, 1978). One strategy for increasing the social interactions of autistic children—peer-initiation— involves teaching socially competent peers to initiate interaction with the recipients of the intervention (Odom & Strain, 1984a). When using a peer-initiation intervention with three school-aged autistic children, Ragland, Kerr, and Strain (1978) found increases in the children's positive social interactions and also noted positive increases among nontargeted children in the play setting. Other investigations have found that peer-initiation interventions are primarily effective in increasing the social responses of autistic children (Odom, Hoyson, Jamieson, & Strain, 1985; Odom, Strain, Karger, & Smith, 1986); however, the social initiations made by these children tend to remain at a low rate.

Teacher mediation of social interaction represents a second type of intervention. The most typical form of teacher mediation is the delivery of reinforcement, such as attention or praise, to a child engaged in positive social interaction (Allen, Hart, Buell, Harris, & Wolf, 1964; Hart, Reynolds, Baer, Brawley, & Harris, 1968). Although social reinforcement produces substantial increases in positive social interaction, a drawback to this technique is that it may disrupt the ongoing social exchange (Strain & Fox, 1981), resulting in very brief episodes of interaction. Such disruptions may be minimized by combining well-timed teacher prompts (i.e., instructions to initiate a social interaction) with social praise or edible rewards delivered later (e.g., Brady et al., 1985; Fox et al., 1984; Romanczyk, Diament, Goren, Trunell, & Harris, 1975).

Social interaction is, by nature, reciprocal; children must respond to the social behavior of a peer for an interaction to occur (Strain & Shores, 1977). Target behavior selection for social interaction is often based on its success in eliciting a positive response from a peer (Tremblay, Strain, Hendrickson, & Shores, 1981). In fact, the degree of social reciprocity found in social interactions may be determined by the extent to which children respond to the social behavior of their partners. For autistic children, social experiences with peers contain lit-

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tle, if any, social reciprocity. They rarely, if ever, initiate to peers and tend to extinguish peer initiations by their lack of responsiveness.

To date, behavioral interventions have not fully capitalized on the strengths of teacher- and peer-mediated interventions to promote the reciprocal nature of peer social interaction. Teachers may prompt autistic children to initiate to their peers, but these initiations will be of little use if the peer group does not respond to them. Moreover, peer response must be relatively independent of direct teacher assistance because, as noted earlier, when a teacher intervenes after the interaction has begun, children tend to stop what they are doing and attend to the teacher. The purpose of this study was to compare two interventions designed to increase the reciprocity of peer social interactions of autistic children. In a teacher-antecedent strategy, the teacher prompted autistic children to initiate interaction with their peers, who had been trained to reciprocate by responding to the autistic children. In a peer-initiation intervention, peers were trained, prompted, and reinforced for initiating initiations with autistic children.

METHOD

Subjects

Three preschool autistic children participated in this study. Randal was a 4-year-old boy who exhibited frequent motoric (e.g., finger flipping, rocking, jumping in place) and occasional vocal (e.g., delayed echolalia) stereotypic behavior. He usually averted his gaze when adults talked to him and had little expressive communication, although he could follow simple vocal and gestural directions from adults. Leon was a 4-year-old boy who displayed a low rate of motoric stereotypes (i.e., finger flicking, spinning objects). He would follow simple verbal directions from the teacher, but he rarely communicated gesturally or verbally with the teacher or peers. When not engaged in a task, Leon isolated himself in a corner of the classroom. Geoff was a 4-year-old boy who also exhibited motoric stereotypic behavior (e.g., hand gazing,

spinning objects) when not engaged in a task. Unlike the two other subjects, who simply ignored their peers, Geoff would, at times, actively avoid his peers. When a peer approached, he would often make a loud noise and move away. On standardized assessment measures, all three children failed to achieve a basal score on the McCarthy Scales of Cognitive Abilities, were below the fifth percentile for their chronological age on the California Preschool Social Competency Scale (CPSCS), and were rated by an independent tester, from a videotape of the McCarthy assessment, as severely autistic on the Childhood Autism Rating Scale (Schopler, Reichler, DeVellis, & Daly, 1980). These children were enrolled in different classes in a preschool center for emotionally disturbed children.

Four other children, also enrolled in the center, served as the confederate peers. Confederate 1 (C1), who worked with Randal, was a 5-year-old boy who engaged primarily in positive social interactions with his classmates, had age-appropriate cognitive and communication skills, and usually complied with teacher requests. Confederate 2 (C2) was a 4-year-old boy who worked with Geoff. He had been enrolled at the center for 3 weeks prior to the beginning of the study. He exhibited age-appropriate expressive language and usually complied with adult requests. However, his percentile rank on the CPSCS was quite low and his behavior became increasingly more disruptive as the school year progressed. Confederate 3 (C3) was a 4-year-old girl who worked with Geoff. She was a highly verbal child who was observed to have a variety of positive social and play skills. At the beginning of the study, her interactions with the teachers were usually positive, although she occasionally had tantrums and would not comply with teacher requests. Confederate 4 (C4), was a 5-year-old boy who worked with Leon and Geoff. He was a creative player, although most of his play was with older children in the classroom. His communication and social skills appeared to be at age-level, and he consistently complied with teacher requests. All the confederate peers had been referred to the preschool center because of behavior problems in

other placements. Their percentile rankings on the CPSCS were 88 for C1, 6 for C2, 42 for C3, and 48 for C4. Leon and C4 were the only confederate-subject pair enrolled in the same class.

Setting

The study occurred in a classroom located at the center. Intervention sessions took place in one portion of a classroom during a freeplay period regularly scheduled from 9:00 a.m.–9:45 a.m. A single play activity was chosen for each session; this choice was based on the success of interventions in various play activities in a previous study (Odom & Strain, 1984b). These sessions included such activities as sand table, "doctor" play, cars and trucks, block building, pretend cooking and "McDonald's." The specific activities were randomly distributed throughout the study. The location of the intervention in the classroom depended on the activity assigned for any one day (e.g., dramatic play area for cars and trucks, "large motor" area for sand table). Although other children in the class entered and left the activities while the intervention sessions were in progress, the subject and confederate were typically the only two children in the activities. All the subjects and all but one of the confederates were enrolled in other classes in the center and came to the intervention classroom setting to participate in the study. The same teacher was involved for all intervention conditions in all the experimental sessions.

Design and Procedures

An alternating treatment design (Tawney & Gast, 1984) was used for Randal and Leon: a baseline condition was followed by a comparative treatment condition, and finally a single intervention condition. The experimental design for Geoff was slightly different. An initial baseline was followed by three initial training sessions with C2. However, during training, C2 refused to interact with the subject and was withdrawn from the study. A short baseline was then reinstated and the training and intervention sessions began with C3.

Before the end of the study, C3 became very non-compliant and was withdrawn from the study. A third brief baseline was subsequently instituted with C4. In the concluding phase of the study, C4 implemented the intervention conditions, with no training sessions at the beginning of the phase because he had been trained with Leon. This resulted in an AB₁AB₂AB₃ design for Geoff, with an alternating treatment condition occurring in all of the B phases.

Baseline. Subjects and confederates were brought to the play activity and told that they would be playing together for "a little while." The teacher sat near the activity and intervened only when necessary to maintain order or to direct the children to stay in the activity. After the children had played for 6 minutes, they were told that it was time to go, and were taken back to their classroom.

Intervention comparisons. During the intervention comparison phases of the study, two treatments were used. The treatment conditions occurred on different but adjacent days, with the order of the treatments randomly determined (McReynolds & Kearns, 1983). So, in this phase of the study, when two data points occur on the same session number in the figures, the interventions actually took place on different days. During the comparative treatment phases, the same play activity was used on both comparison days.

Training. Confederates were trained to assume different roles in the peer-initiation and teacher-antecedent conditions. During the peer-initiation training sessions, confederates learned to direct social initiations that had a high probability of gaining a response from the autistic children. In the teacher-antecedent training sessions, confederates learned to respond to the autistic children's initiations and to extend the interaction.

The training occurred in 20-minute sessions before the intervention play sessions and coincided with the beginning of each comparative treatment phase. Thus, for C1, C3, and C4 (with Leon), training began when the comparative treatment phase began. C2 only remained in training for 3

days. Also, when C4 began working with Geoff, he was not trained again at the beginning of the comparative treatment phase (B₃ in this replication). The training was conducted individually for each confederate.

Because of their effectiveness in promoting social interactions in previous studies (Odom et al., 1985; Odom et al., 1986), sharing and play organization were chosen as target behaviors for this study (see behavioral definitions). The components of the training sessions were: (a) introduction, (b) verbal discussion with confederate verbal responding, (c) adult model with a second adult playing the role of the subject, (d) confederate practice with the adult playing the role of the subject, (e) adult model of the appropriate social behavior with the subject (who had been brought into the training session at this point), and finally, (f) confederate practice of the targeted behavior with the subject, with adult feedback. A script used in these training sessions may be obtained on request from either author. During these sessions, the teacher instructed the confederates to ignore the stereotypic behaviors of the subjects.

Four sessions were planned to train the confederates to engage in the two target behaviors in the two different intervention roles. The order of training for the confederates was peer-initiation (sharing) on the first day; teacher-antecedents (sharing) on the second day; peer-initiation (play organization and sharing) on the third day; and teacher-antecedents (sharing and play organization) on the fourth day. To move from one training day to the next, the confederate had to engage in eight targeted social initiations in the peer-initiation condition or eight targeted responses to initiations and a follow-up response in the teacher-antecedent condition, during the subsequent intervention session. If the confederate did not meet this criterion, the training session was repeated the next day. All confederates but C2 met criterion after each training session. C2 reached criterion after the second training session for peer-initiation, sharing, did not reach criterion after the first training session for teacher-antecedent sharing, and then was withdrawn from the study.

Token reinforcement system. During the intervention sessions, a token reinforcement system was used for the confederates only. The teacher held, within view of the confederate, a 5" × 8" unlined index card with a series of small, black circles drawn on it. Each time the autistic child responded to the confederates' initiations in the peer-initiation intervention, or each time the confederates responded to a subjects' initiations *and* extended the social interactions in the teacher-antecedent condition, the teacher drew a happy face in the circle. When all the circles were filled with happy faces, which indicated that the confederate had met criterion, the confederate could exchange the card for any one of a variety of rewards (e.g., stickers, toy soldier, crayon). White index cards were used on the peer-initiation intervention days, and blue ones were used on the teacher-antecedent days to provide a visual cue to the confederates about their role in the intervention. The reinforcement was awarded to the confederates outside of the intervention setting to prevent the subjects from observing the event. Teachers also socially praised the confederates after the sessions when they met criterion but provided no social reinforcement during the intervention sessions. If the confederate did not reach criterion on any single day, the teacher had the confederate count the circles that were filled and not filled, and restated what the criterion would be on the next day. Each day the teachers provided praise to the subjects that was independent of any level of interaction for that day (e.g., "You played nice today").

Peer-initiation condition. At the beginning of each session the teacher said to the confederate, "Remember, today you are going to be a good teacher. It is your job to get (autistic child) to play with you." The teacher then suggested ideas that were appropriate for the specific play activity. During the session, the teacher verbally prompted the confederate to initiate to the subject when necessary. At the end of the session, the teacher awarded the reinforcement, if appropriate.

Teacher-antecedent condition. At the beginning of the session the teacher reminded the confederate of his or her role by saying, "Today you

need to stay close to (autistic child) so that you can play together. If he asks you for something or wants to play with you, then you should be quick to play back with him." The teacher then told the autistic child, "Today, I want you to play with (confederate)," and suggested ideas to both children that were appropriate for the play activity. After the play session began, the teacher verbally prompted the autistic child to share a play material with the confederate and waited 5 seconds. If the autistic child did nothing, the teacher repeated the verbal prompt and physically prompted him to share. At the end of the session, the teacher awarded the reinforcement to the confederate if appropriate.

Single-intervention phase. For Randal and Leon, the final phase of the study contained only the teacher-antecedent condition. The school year ended before the teacher-antecedent condition alone could be implemented with Geoff.

Observational System

A nine-category, continuous event recording system was used to code peer behaviors directed to the autistic children, and the behaviors that the autistic children directed to other children. The categories are listed below:

Play organizer: Verbalizations or responses to verbalizations wherein a child specifies an activity, suggests an idea for play, or directs a child to engage in a play behavior.

Share: Offers or gives an object to another child or accepts an object from another child by taking the object in his or her hand or using it in play.

Share request: Asks a child to give an object to the speaker.

Assistance: Helps another child complete a task or desired action which he or she could not complete or do alone.

Assistance request: Asking another child to help the child complete a task or action that he or she could not complete alone.

Complimentary statement: Verbal statement indicating affection, attraction, or praise.

Affection: Patting, hugging, kissing, or holding hands with another child.

Negative motor-gestural: Hitting, pushing, sticking out tongue, taking unoffered objects, destroying others' construction.

Negative vocal-verbal: Crying, shouting, calling another child an ugly name, refusal to engage in a requested behavior, corrections.

Although we were primarily interested in increases in share and play organization, this broad-based categorical system was used to detect any collateral changes in nontargeted behavior. These observational categories were based on the previous work of Tremblay et al. (1981) and Strain (1983).

In addition to recording the behavioral category and the child who emitted the behavior, observers also coded each behavior as an initiation or response. Initiations were social behaviors that started an interaction with a peer and were operationally defined as any behavior directed to a peer that had not been preceded by a behavior from that peer in the previous 3 seconds. A response was operationally defined as any behavior to a peer that had been preceded by a behavior from the peer in the previous 3 seconds.

During the sessions, teacher verbalizations were audiotaped and teacher prompts to confederates and subjects were coded after the session ended. Teacher verbal prompts were any statement that asked a child to engage in a codable social interaction with his or her peers. Teacher physical prompts were also coded. A physical prompt consisted of the teacher placing his hand on the subject's arm or shoulder and moving the subject's body to produce a share behavior. Thus, a physical prompt could be hand-on-hand assistance or a tap on the shoulder.

The primary observer coded the behavior of subjects and confederates for a 6-minute period each day. To hear all verbalizations, the observer stood or sat within 3 m of the subjects. For reliability purposes, the observer recorded the social interactions within 10-second intervals; an audiotape cued the observer through an earphone to change intervals. For 39% of the total sessions, a reliability observer recorded the behavior of subjects and peers simultaneously with the primary observer. These reliability sessions were distributed

across all conditions, phases, and subjects in the study.

In addition to coding and tabulating the frequencies of the behavior described above, the mean length of social interaction (MLI) between the confederate and subject was also computed. The length of an interaction was defined as an initiation plus all the responses that follow it. However, no more than two responses from the same child could occur in a row. For example, a share initiation from a subject followed by a share response and then a subsequent play organizer response by the confederate, followed then by a play organizer response from the subject, would be counted as a four-unit interaction. Conversely, a share initiation to which there was no response was counted as a one-unit interaction. MLI is computed by adding the lengths of interactions in a session and dividing by the total number of interactions. It should be noted that, unlike other systems that measure length in terms of duration (Brady et al., 1985), this system is frequency-based and measures length in terms of number of social behaviors in the interaction sequence.

Peer Confederate Questionnaire

At the end of the study, the teacher completed a 5-point, Likert rating scale designed to assess the quality of the confederates' participation in the intervention. The 7-item questionnaire assessed spontaneous initiations, responses to subject's initiations, compliance with adult prompts, play ideas, persistence, negative motor-gestural behavior, and negative vocal-verbal behavior. A separate analysis of this questionnaire revealed an interrater reliability coefficient of 0.88.

Interobserver Agreement

Analyses of both component or interval level agreement and composite or session level agreement were conducted. Kappa coefficients were computed to assess interval agreement for behavioral categories, initiations, responses, teacher verbal prompts, and teacher physical prompts; the mean coefficients (and ranges) were, respectively: 0.90 (0.71—0.96); 0.87 (0.75—1.00); 0.91

(0.84—1.00); 0.94 (0.85—1.00) and 0.96 (0.36—1.00). To analyze composite agreement, Pearson Product Moment correlations were computed for the total number of events recorded by the primary and reliability observer each day. The correlation coefficients are as follows: 0.98 for initiations; 0.99 for responses; 0.99 for verbal prompts; 0.99 for physical prompts; 0.99 for play organizer; 0.99 for share. Correlations were not computed for complimentary statements, assistance request, assistance, negative motor-gestural, or negative vocal-verbal behavior categories because occurrences were recorded by either one or both observers on less than 10 reliability sessions.

RESULTS

Implementation Measures

To determine the integrity of the independent variables, two measures were collected. The confederate's social behavior, as either a social initiation (for the peer initiation condition) or a response (for the teacher-antecedent intervention) was one critical element of the independent variable in this study. The frequency and nature of teacher prompts was a second aspect of the independent variable. Both these data are presented below.

Confederate behavior. The left panel of Figure 1 shows total positive social initiations (e.g., shares, play organizers, etc.) exhibited by the confederates. During baseline, confederates' initiations occurred very infrequently. As dictated by the procedure, initiations increased substantially during the peer initiation condition for Randal's and Leon's confederates. Although several different children served as confederates for Geoff, the relatively higher frequency of initiations was also clear for those confederates.

The total social responses to the subjects are shown in the right panel of Figure 1. Social responses did not occur during baseline for any of the confederates. In the comparative treatment phase of the study, social responses increased substantially in the teacher-antecedent condition for most confederates. The separation between treat-

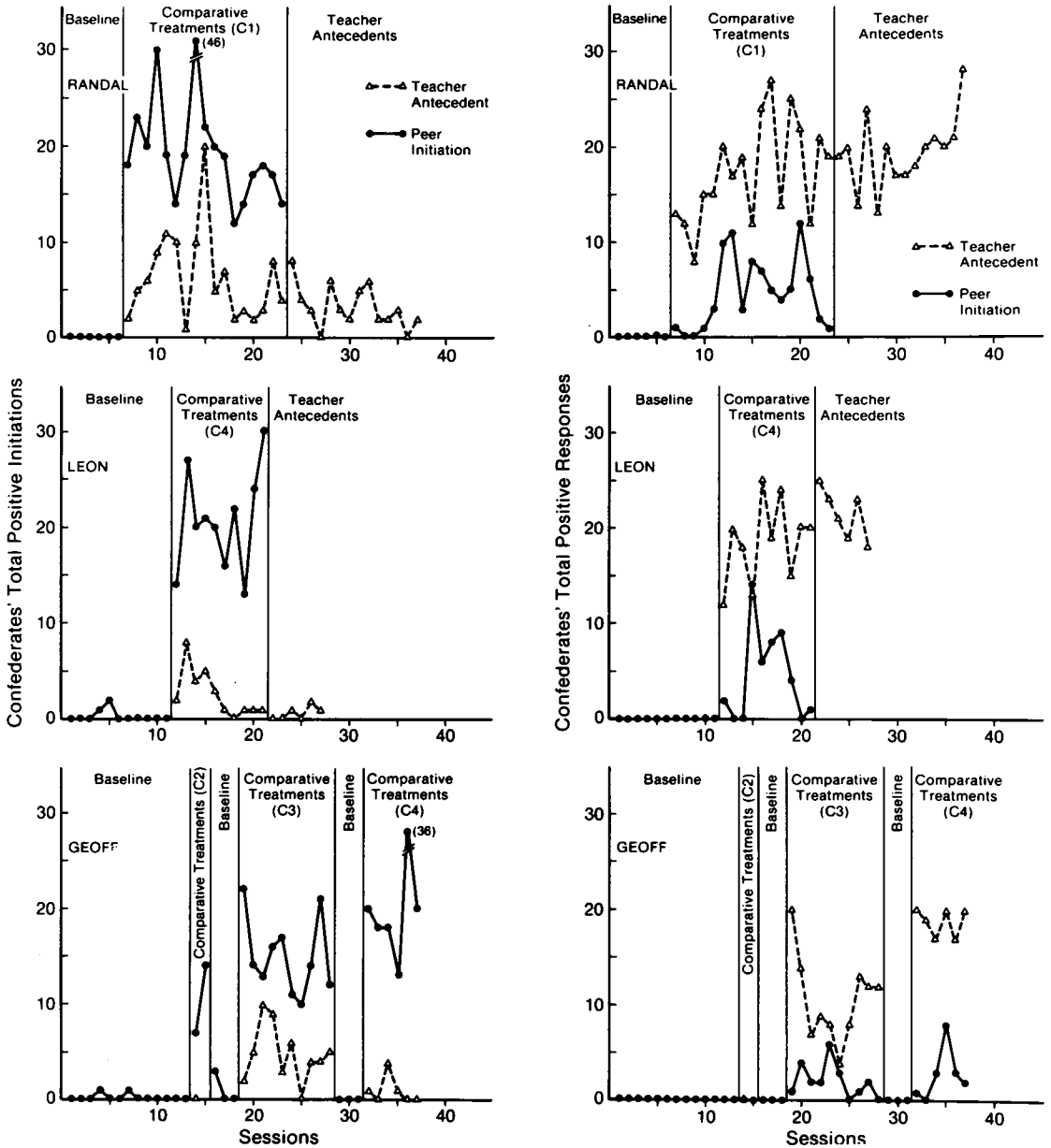


Figure 1. Confederates' total positive initiations (left panel) and responses (right panel) across experimental conditions.

ments is clear for Randal's and Leon's confederates, and for two of Geoff's confederates. However, the graph of Geoff's first confederate (C2) reveals virtually no responding. In fact, during the third day of training, C2 refused to interact at all with the subject.

Teacher prompts. Teacher verbal prompts were

to be provided to the confederate in the peer-initiation condition, but not in the teacher-antecedents condition. Conversely, both physical and verbal prompts were to be provided to the subject in the teacher-antecedents intervention. Table 1 documents the implementation of these components of the intervention.

Table 1
Mean (and Range) of Teacher Physical and Verbal Prompts to the Autistic Children and Their Confederates

	Comparative treatment							
	Baseline	Peer-initiation	Teacher-antecedent	Teacher-antecedent				
Randal								
Physical	0	0	9.06 (6-12)	9.15 (6-13)				
Verbal	0	0	13.67 (9-18)	12.06 (9-15)				
Confed. 1								
Verbal	0	16.2 (12-21)	3 (0-10)	2.5 (0-11)				
Leon								
Physical	0	0	7.8 (3-10)	2.33 (0-4)				
Verbal	0	0	15.3 (11-19)	13.56 (10-18)				
Confed. 2								
Verbal	0	13.2 (5-20)	2.4 (0-5)	3.78 (1-12)				
	Comp. treatment with C3				Comp. treatment with C4			
	Baseline 1	Comp. treatment with C2	Baseline	Peer-initiation	Teacher-antecedent	Baseline	Peer-initiation	Teacher-antecedent
Geoff								
Physical	0	0	0	0.18 (0-2)	8 (4-12)	0	0	8.83 (7-10)
Verbal	0	0	0	0.27 (0-3)	11.3 (6-70)	0	0	13.5 (11-15)
Confederates								
Verbal	0.07 (0-1)	16.5 (14-19)	0	15.55 (9-20)	5.13 (0-9)	0	8.67 (7-11)	1.00 (0-2)

During baseline, virtually no teacher prompts were recorded. In the first comparative treatment phase, teacher verbal prompts occurred frequently for the confederates in the peer-initiation condition, but no prompts were directed to the subjects. In the teacher-antecedent intervention, the teacher verbally and physically prompted the subjects to make social initiations. The teacher was able to reduce the level of physical prompting for Leon by the end of the intervention, but physical prompting continued to be required by the other subjects.

In most cases, very low levels of verbal prompts were directed to the confederates during the teach-

er-antecedent condition. These verbal prompts typically occurred outside of the interaction and were reminders to the confederates to wait until the subject played with them first. C2 (for Geoff) was the exception; he required both frequent and direct prompts to respond to the subject's initiations. Physical prompts to the confederates never occurred and thus are not listed in the table.

Peer confederate questionnaire. The peer confederate questionnaire was designed to assess the quality of the confederates' implementation of the intervention. Out of a total possible score of 35, C4 obtained the highest score of 30 and C1, with

a score of 21, was the second highest. The two confederates who withdrew from the interventions because of their failure to implement the procedures obtained much lower scores (i.e., 12 for C2 and 18 for C3). These data indicate that the quality of implementation was highest for Leon and for Geoff when C4 was the confederate and next highest for Randal with C1 as the confederate.

Subjects' Measures

Four aspects of the subjects' social interactions were analyzed to detect differences related to the forms of treatment: (a) social initiations, (b) social responses, (c) mean length of interaction, and (d) behavioral categories. For the first three analyses, all positive behavioral categories were grouped.

Social initiations. The left panel of Figure 2 shows the frequency of positive social initiations for the subjects. Initiations occurred almost exclusively during the teacher-antecedent conditions. Interestingly, Geoff initiated several interactions with Confederate 3 during the peer-initiation condition, but these initiations declined by the end of the phase. After the third baseline, Geoff's initiations again increased to a stable level in the teacher-antecedent condition, but remained at a near zero level in the peer-initiation condition.

Social responses. The differential treatment effect on social responses was less clearly demonstrated, as revealed by data in the right panel of Figure 2. During the initial baseline, social responses were near a zero level to all confederates. When intervention was implemented in the comparative treatment phase, increases in social responses occurred for all subjects. The peer-initiation intervention appeared to have a stronger effect on social responses during the early phase for Randal, but these differences decreased as the study continued. Similarly, consistent but small initial differences occurred for Leon, with the peer-initiation treatment having a more powerful effect. For Geoff, treatment differences were not strong when the interventions were used with C3, but clear differences were apparent when C4 served as the confederate.

Mean length of interaction. The MLI per session is shown in Figure 3. During the comparative

treatment phase, the teacher-antecedent intervention produced generally longer MLIs for Randal and Leon, although the magnitude of difference was not great. When the teacher-antecedent phase was instituted in the final phase of the study for Randal and Leon, MLI either maintained (Leon) or increased slightly (Randal). The MLI for Geoff and his confederates reveals an interesting series of events. In the first baseline, the small bit of variability that occurred was the result of single interactions on days 4 and 7. When training was begun for C2, relatively brief interactions occurred. When the comparative condition was introduced with C3, no treatment differences were found, and the MLI was somewhat shorter than occurred for other subjects. After C3 was discontinued and C4 resumed the intervention, the treatment differences that occurred for the other subjects (i.e., longer MLI) also occurred for Geoff.

Behavior categories. The specific social behaviors occurring in each phase of the study for each subject are found in Table 2. The two types of social behaviors targeted for this intervention were sharing and play organizing. During baseline, virtually no social interaction occurred. Sharing increased substantially in both types of treatments, although play organization was less affected. Several low-frequency behaviors not listed in Table 2 also occurred for Geoff. During the intervention phases with C3 and C4, Geoff exhibited instances of affection to the confederates (mean frequencies ranged from 0.17 to 0.60 per session). Negative motor-gestural behavior occurred infrequently in the peer-initiation phase with C3 (mean frequency = 0.10) and the teacher-antecedent phase for C4 (mean frequency = 0.17). Negative vocal-verbal occurred at a low frequency in the teacher-antecedent phase for C3 (mean frequency = 0.30).

DISCUSSION

In this study, a peer-initiation treatment procedure and a teacher-antecedent (i.e., prompting) treatment procedure that incorporated peers as responders differentially affected the types of social behavior and lengths of social interactions of three

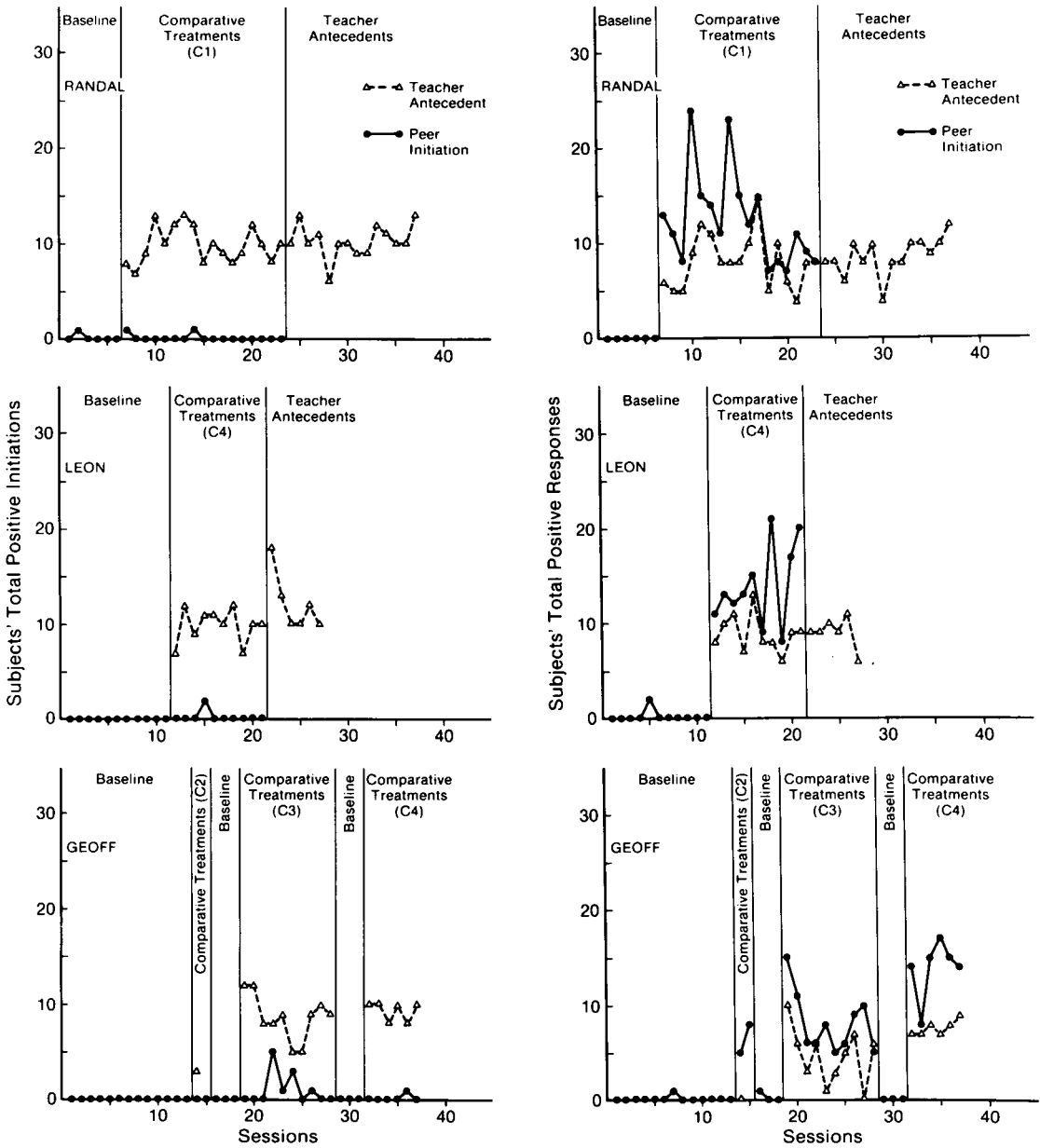


Figure 2. Subjects' total positive initiations (left panel) and responses (right panel) across experimental conditions.

autistic children and their peers. As in previous studies (Odom et al., 1985; Odom et al., 1986), the peer-initiation treatment approach supported the social *responding* of the autistic children. Responding to peer's social initiations in a positive manner is an important social skill. Strain (1983) found that social responding by severely handi-

capped preschool children to social initiations from peers was positively related to measures of social acceptance by the nonhandicapped children in their mainstreamed classes. Moreover, children who do not respond to the overtures of their peers may well extinguish future social initiations from peers (Strain, Odom, & McConnell, 1984).

Table 2
Mean Frequency per Session of Each Behavioral Category* for Each Experimental Phase

	Intervention			
	Baseline	Peer-initiation	Teacher-antecedent	Teacher-antecedent
Randal				
Play organizer	—	3.00	0.71	—
Share	0.13	9.53	16.00	18.93
Neg. motor-gestural	—	0.12	—	—
Leon				
Play organizer	—	3.10	1.60	0.20
Share	0.14	11.00	17.20	20.20

	Intervention			Intervention			Intervention		
	Baseline	Peer-initiation	Teacher-antecedent	Baseline	Peer-initiation	Teacher-antecedent	Baseline	Peer-initiation	Teacher-antecedent
Geoff									
Play organizer	0.07	—	—	—	0.90	—	—	1.17	—
Share	—	6.50	3.00	0.33	7.50	12.90	—	12.67	17.00
Affection	—	—	—	—	0.60	0.40	—	0.17	—

* Behavioral categories with zero mean frequencies for all phases were omitted.

When the teacher prompted the subjects' social initiations in a situation where the peer confederates had been taught to respond, the subjects' social initiations increased. Initiating or beginning a social exchange with a peer is an important skill that autistic children typically do not display. Moreover, when the autistic children initiated the interaction with trained confederates, the social interactions between the subjects and confederates became longer than those occurring in the peer-initiation intervention. If, as we have proposed, one measure of social reciprocity is the continuity of the social interaction beyond the initial social behavior in the exchange, the results of this study suggest that the teacher-antecedent intervention may foster a greater degree of social reciprocity between autistic and less handicapped peers.

The nature of the teacher's participation was a critical element in the two interventions. Other studies have documented the importance of teacher prompts to confederates for peer-initiation interventions (Odom et al., 1985). In the peer-initiation condition, the teacher was quite active in ver-

bally prompting the confederate to initiate to the subject. The teacher served a similar "prompter" role for the autistic children in the teacher-antecedent intervention. However, when the confederates were placed in the responder role in the teacher-antecedent condition, very few verbal prompts were required to support their social behavior. Thus, for both these interventions, it seems that the key function of the teacher behavior is in starting the interaction.

The practical utility of both interventions investigated in this study is limited by the large number of prompts required from the teacher. Given the importance of the teacher's role in these interactions, a clear direction for future research will be establishing a procedure in which teacher prompts are not required. An approach is needed for transferring the stimulus control from the teacher to natural elements in the environment (e.g., toys, peers). A number of researchers have recently used multiple confederates and natural environments to increase the independent social interactions of autistic adolescents (Brady et al., 1985; Fox et al.,

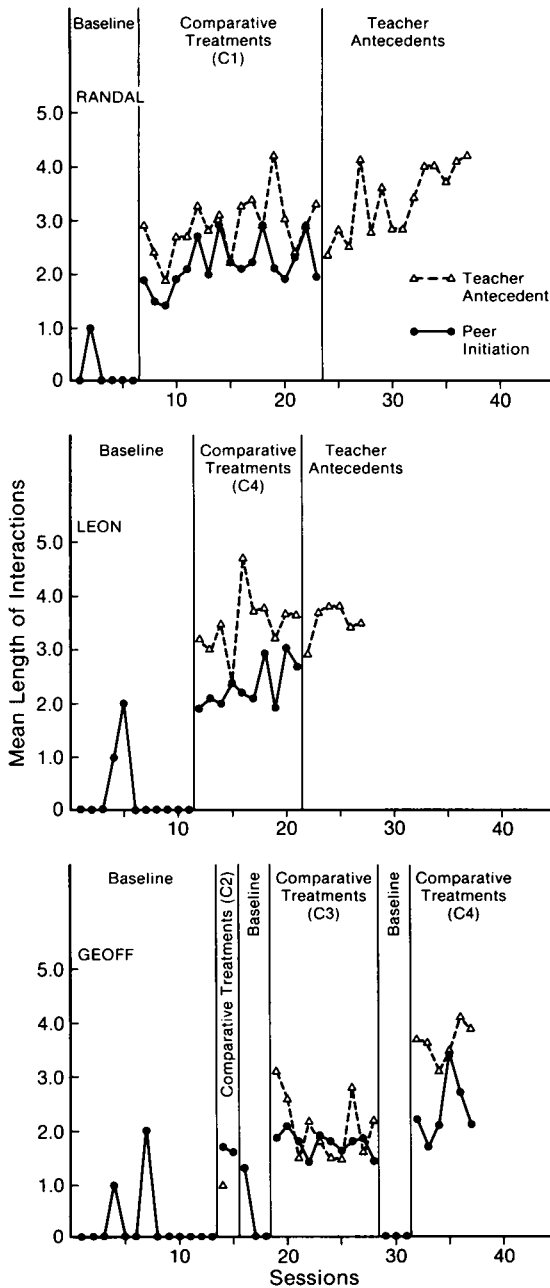


Figure 3. Mean length of interactions (MLI) for confederate-subject dyads across experimental conditions.

1984; Gaylord-Ross, Haring, Breen, & Pitts-Conway, 1984), but investigations have not occurred for preschool-aged autistic children and their peers.

One method for transferring stimulus control to the natural environment is to fade teacher prompts

systematically. For the autistic children in the teacher-antecedent condition, nearly all the initiations were prompted by the teacher. Prompts were moved to a less intrusive form (i.e., verbal prompts) for Leon during the course of the study, but physical prompts were required for Randal and Geoff throughout. Aside from the standard guidance system of prompting used, no formal procedure was used for reducing the level of teacher assistance. Future studies should investigate the use of time-delay and errorless learning procedures (Halle, Marshall, & Spradlin, 1979; Touchette & Howard, 1984) for reducing the level of teacher prompting and transferring stimulus control to the natural environment for the primary recipients of the intervention.

The differential treatment results were replicated for Leon and Randal, yet the replication for Geoff was less clear until the final phase of the study. After C2 failed to meet criterion, and in fact failed to respond at all, he was discontinued. Similarly, C3 was withdrawn from the study because she would not comply with teacher prompts and expressed a desire not to participate. As reflected in the confederate peer's questionnaire, the quality of these children's implementation was lower than for the other two confederates. As a result, Geoff's performance did not replicate the differential treatment findings of the other subjects. When C4 began to serve as the confederate in the final phase of the study, thus increasing the quality of treatment implementation, the differential treatment effects were noted. Although one cannot rule out the possibility that Geoff's behavior may have influenced the behavior of C2 and C3, C4's successful implementation of the treatment would suggest that the confederates' behavior was the main factor responsible for the early treatment effects observed for Geoff.

The problems encountered with two of the confederates in this study highlight the importance of choosing socially skilled peers as confederates in social interaction interventions. Odom and Strain (1984b) have mentioned several criteria for choosing potential confederate peers (e.g., compliance with adult interaction, age-appropriate play and

social skills, regular attendance). The absence of such socially skilled partners for social interaction may compromise social skill interventions.

This study demonstrated that different treatment procedures may affect different classes of autistic children's social behavior as well as the social reciprocity of interactions. The findings should be interpreted with caution because of the small number of children involved and the idiosyncratic nature of the autistic population. Similarly, these interventions only occurred for a 6-minute period each day. The utility of this approach for longer time periods and in different settings with different social requirements has yet to be examined. However, from the results of this study, it appears that complementary treatment strategies may be effective in promoting different classes of autistic children's social behavior.

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