

Peer Imitation:

Increasing Social Interactions in Children with Autism and Other Developmental Disabilities in Inclusive Preschool Classrooms

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A single subject research design was conducted across four participants to evaluate the effectiveness of a peer imitation intervention. Three of the participants were preschool children with autism, and one of the participants was a preschooler with developmental delays. The intervention was implemented as part of the integrated classroom regular small-group activity. Data were collected at small-group time to assess the implementation and effectiveness of the intervention. Data were collected at free play, the generalization setting, to assess any changes in peer imitation behaviors, nonimitative social behavior, and nonsocial engagement. Results of the intervention indicate that the participants increased peer imitation behaviors in small-group and in free-play settings. Increases were also seen in social behavior (both in proximity to peers and in number of interactions) as well as in levels of nonsocial engagement. The results are discussed in terms of the importance of how interventions are planned, the importance of measuring the effects of interventions broadly, and the importance of developing interventions that teachers are likely to use.

Children with and without disabilities have been shown to learn skills in a variety of ways. For example, in the case of discrete trial teaching, children learn skills through explicit instruction, prompting, and reinforcement (e.g., Smith, 2001). In the case of instructive feedback, children learn information that is not directly taught or reinforced (see Werts, Wolery, Holcombe, & Gast, 1995 for a review). In the case of observational learning, children learn skills that they have seen another, usually a peer, perform (Goldstein & Brown, 1989).

Few large-scale comparison studies measure the relative effectiveness of instructional strategies, and there is limited evidence that suggests that observational learning, or learning a new response by observing the behavior of a model (Bandura, 1977), is a powerful intervention strategy. Biederman, Fairhall, Raven, and Davey (1998) suggested that observational learning may be more effective in teaching skills to school-age children with mental retardation than hand-over-hand modeling or hand-over-hand modeling with a response-contingent verbal prompt. Other evidence has suggested that observational

learning may explain why preschool-age children with autism learned more educational skills in the context of small-group instruction than they learned in a one-on-one instructional setting (Taubman et al., 2001). Although this evidence should be viewed with caution and needs to be expanded and replicated before conclusions can be drawn, it is sufficient to suggest that observational learning is a valuable intervention strategy.

Observational learning has been used to teach young children with disabilities a variety of skills, including self-help and safety skills (Christensen, Lignugaris-Kraft, & Fiechtl, 1996; Griffin, 1992), discrimination tasks (Keel & Gast, 1992), and language skills (Egel, Richman, & Koegel, 1981; Goldstein & Brown, 1989). For children to take advantage of observational learning opportunities, they need to attend to multiple cues such as the model's behavior, the context, and the consequences of the behavior (Goldstein & Brown, 1989). Observational learning is also predicated on delayed imitation skills. That is, in order to be an observational learner, the target child must watch a model and imitate the model's re-

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sponse when in the same situation. Thus, to become a successful observational learner, a person must first be a successful imitator. To become a successful observational learner where the models are peers, a person must first imitate his or her peers.

Peer imitation, or matching one's behaviors to that of a peer, is thought to be a basic developmental process (Morris, Sharkey, & Redd, 1979) that facilitates learning social skills (Brody, Lahey, & Combs, 1978; Gresham, 1981; Gresham & Nagle, 1980; Hwang & Hughes, 1995), enhances self-efficacy, and remedies skill deficits (Schunk, 1987). Unfortunately, many young children with developmental disabilities, particularly those diagnosed with autism, have deficits in generalized imitation skills (Dawson & Adams, 1984; Rogers, 1999) and in peer imitation skills (Apolloni, Cooke, & Cooke, 1977; Peck, Apolloni, Cooke, & Raver, 1978; Varni, Lovaas, Koegel, & Everett, 1979). Although there have been several decades of intervention research conducted to assess the efficacy of peer imitation intervention protocols, it remains an understudied area. The majority of work on peer imitation was conducted several decades ago. For example, Apolloni and his colleagues developed and evaluated the Peer Imitation Training (PIT) protocol (Apolloni et al., 1977; Cooke, Apolloni, & Cooke, 1977; Peck et al., 1978). PIT was an instructional procedure where adults prompted children with disabilities to imitate the behavior of a typically developing peer. Sessions consisted of the target child and the peer sitting across from one another. The peer emitted a motor behavior, and the teacher prompted the target child to make the same behavior. Correct performance received social reinforcement. Concomitant changes in other social behavior and maintenance and generalization of the imitative behavior were measured. These studies yielded the following five conclusions:

1. Children with disabilities can learn to imitate their peers.
2. There may be some increases in social interaction between the target child and the peer model during training.
3. The typically developing child only imitated the target child if the imitation was directly reinforced.
4. There is some increase in social interaction in generalization settings.
5. There is little generalization of peer imitation across settings.

Since the PIT studies were conducted, Ihrig and Wolchik (1988), Werts, Caldwell, and Wolery (1996), Wolery, Cybriwsky, Gast, and Boyle-Gast (1991), and Venn, Wolery, Werts, Morris, and Morris (1993) have also developed and empirically tested interventions for increasing peer imitative behavior in children with disabilities. Werts et al. (1996), Wolery et al. (1991), and Venn et al. (1993) tested an intervention where progressive time de-

lay was used to increase the target child's independent peer imitations. Interestingly, Charlop and Walsh (1986) also used a time delay procedure but were not successful at increased peer imitation behaviors.

The PIT studies indicated that there may be increases in social interactions during imitation training, but these increases were recorded only in studies where social imitation and social interaction between the target child and the peer were socially reinforced by the teacher (Peck et al., 1978). Tyron and Keane (1986) also reported this type of increase in social interaction, perhaps a result of using play as the context for the imitation training. Werts and colleagues (1996) did not report any increases in social interaction, perhaps because there was minimal opportunity for interaction between the target child and the peer during intervention.

Since the PIT studies, little current work has examined the conditions under which typically developing children imitate the target child. The work by Peterson, Peterson, and Scriven (1977), however, suggested that children with disabilities are imitated by their peers but less frequently than are their typically developing peers. One contributing factor for this is hypothesized to be peer status. That is, children who are more socially preferred by peers tend to be imitated more than those who are less preferred.

Similarly, few studies have measured social interaction in generalization settings following peer imitation intervention. In those that have been conducted, there are mixed results. Like the PIT findings, Strichart and Gottlieb (1975) reported generalized social behavior. Strichart and Gottlieb suggested that this finding may be related to having used an intervention where the target children imitated the peers and were imitated by the peers. Werts et al. (1996) reported no increases in social interaction in the generalization setting; however, the intervention was designed to teach the target children to imitate nonsocial response chains (i.e., pencil sharpening). This target behavior may have been insufficient or the wrong type to generate social behavior.

Finally, although the PIT results suggested that target children do not generalize the peer imitation skills across settings, Carr and Darcy (1990) used a procedure where a peer model performed a single action on a single material, and the target child was prompted to perform the same action. After the target child imitated the peer independently, an additional material and action were added. Once the target child mastered 10 materials and actions, 10 additional materials and actions were presented in a new environment. The target child independently imitated the peer's actions on the new materials in the new environment. This generalization of peer imitation skills across materials and settings is hypothesized to be the result of a strategy often associated with generalization outcomes, training multiple exemplars (Stokes & Baer, 1977).

In summary, although peer imitation is an important developmental skill and a necessary skill for observational learning, there is little intervention research on the topic. The majority of the existing literature was conducted in one-on-one sessions in decontextualized settings. These conditions do not necessarily represent activity-based classrooms or current recommended practices (Sandall, McLean, & Smith, 2000), and as such the findings from these studies may not be applicable to today's early childhood special education classrooms. Even without current information, peer imitation remains a skill that is continually taught to young children with special needs (Lowenthal, 1995).

Thus, there is a need for continued work in developing and evaluating interventions designed to teach young children with special needs peer imitation skills. Five reasons follow:

1. Peer imitation is an important developmental skill.
2. Effective teaching strategies (i.e., observational learning) are predicated on peer imitation skills.
3. Children with special needs often have deficits in peer imitation skills.
4. There has been little empirical work that has evaluated strategies designed to be taught in the context of contemporary preschool activities.
5. Few studies have examined the broad effects of learning peer imitation skills.

Therefore, the purpose of the present study is (a) to evaluate the effects of a peer imitation intervention package designed using strategies from various previously ex-

amined protocols (i.e., typically developing children imitate the target child; provide attending cues and other verbal information; train multiple exemplars; provide effective and efficient prompting) adapted for use in an activity-based, integrated preschool classroom; and (b) to measure the effectiveness of the intervention broadly, including peer imitations during the training sessions, peer imitation in a generalized setting, social interactions in the training sessions, social interactions in the generalized setting, the number of imitations made of the target child by typically developing peers, and other broad measures of social and learning skills.

METHOD

Participants

Four young boys enrolled in an integrated university-affiliated preschool were the target participants in this study. Three of these children were diagnosed with or were in the clinical range on diagnostic tests for autism. The other child did not have a formal diagnosis but had a documented developmental delay. All the children had significant social, communication, and cognitive delays, and all qualified for special education services. These deficits manifested themselves, in part, in poor social skills and the inability to interact with their peers. The behavioral characteristics of participants are described in Table 1. Classroom staff and the first author observed the target children independently imitating the gestures and motor actions of the adults in the classroom. In general, these imitations were observed during teacher-directed activities (i.e., group responding during circle) and were the response the teacher expected from children in the class. Poor social skills, low level of peer in-

TABLE 1. Description of Participants

Participant	Age	Disability	Level of expressive language	Description of play
Boyd	4.10	Autism	Protests by screaming; some echolalia; uses the Picture Exchange Communication System (PECS; Bondy & Frost, 1994)	Will imitate adult actions, especially gestures in songs; does not play near peers
Oriel	3.7	Autism	Protests by screaming; lots of echolalia; some spontaneous one-word utterances; uses PECS	Will imitate the actions/gestures of adults in familiar routines; stays on the perimeter of the play space; does not play with peers
Rowen	4.4	No diagnosis	Some echolalia; uses some single words; dependent on PECS to make requests	Imitates adult actions/gestures; plays near but not with peers; interactions with peers are typically requests for toys
Xanthus	5.5	Autism	Frequent echolalia; limited functional speech	Imitates adult actions/gestures; plays near peers; social interaction with peers is characterized by preservative greeting and request for toys

teraction, the ability to imitate adults, no observed instances of peer imitation, and parental consent qualified the children to participate in the study.

Boyd was 4 years 10 months old at the beginning of the study. Boyd had been recently identified as having special needs, and this was his first year receiving any type of therapeutic or educational services. Although he did not have a medical diagnosis, Boyd scored within the autistic range on the *Childhood Autism Rating Scale* (CARS; Schopler, Reichler, Devellis, & Daly, 1980) and will be referred to as autistic in the context of this study. His attendance at preschool was irregular. His social interactions with adults and peers were limited. The social initiations he did make were typically requests for a highly desired toy. When playing with a preferred toy, Boyd could engage in independent play for long stretches of time, although much of the play was stereotypic. He showed no interest in novel toys, and when prompted to use new materials, he often refused.

Oriel was 3 years 7 months old. Oriel had a medical diagnosis of autism. This was Oriel's first year receiving special educational services. In addition to the preschool placement, he attended an inclusive childcare program for 20 hours a week. Oriel preferred to interact socially with adults. However, he often initiated these interactions with inappropriate behaviors such as screaming. At the beginning of the school year, Oriel exhibited some aggression toward his peers but only when they were in close proximity to him. The classroom teacher was able to eliminate this aggressive behavior before the start of the study. Oriel had poor play skills and rarely interacted with any materials. He preferred to roam the room, going from material to material without engaging in a meaningful way with any of them.

Rowen was 4 years 4 months old. Rowen had been receiving early intervention services since he was 1 year 3 months, but this was his first year in this particular class with this particular teacher and these particular peers. When Rowen was 1 year 7 months, he was hospitalized for head injuries that he acquired in a car accident. After the accident, Rowen's mother reported no change in Rowen's already delayed behavior. Rowen seemed to enjoy interacting with preferred adults and would initiate to them by saying "C'mon" to get their attention. Rowen was comfortable playing near his peers; however, he did not respond to his peers' social initiations. Rather, Rowen's peer interactions were limited to occasional greetings. These greetings were minimal, and he did not make eye contact, nor did he maintain or extend the social interactions. He did not participate in group activities but would play independently with materials on the sensory table.

Xanthus was 5 years 5 months old. He had recently received a medical diagnosis of autism. This school year was the first time he had received therapeutic or educa-

tional services. His speech was characterized by the use of rote phrases that were irrelevant to the context and some echolalia. He, however, had some spontaneous, appropriate speech and would greet both peers and adults. Xanthus was not able to maintain any social interaction beyond greetings. It was more common for Xanthus to use adults as tools and to ignore his peers. If his peers had toys or materials he wanted, he would grab them. He had few independent play skills and would often go from material to material without engaging in any appropriate play. When prompted, however, he would play appropriately for limited periods of time. This play could be extended by the use of additional teacher prompts.

Boyd and Oriel attended the same class in which there were 14 other children. Seven classmates received special education services, and seven of the children were typically developing. Rowen attended a different class with 14 other children, 8 of whom were receiving special education services. The other six children were typically developing. Xanthus attended a third class that included 14 other children, 8 of whom were receiving special education services. The children in all three of the classes ranged in age from 3 to 6 years.

Setting

The intervention took place in the children's classrooms as part of the ongoing classroom activities. No changes were made in the structure of the day or to the curriculum in order to accommodate the intervention. The preschool program lasted 2 hours and 15 minutes, and all of the participating classrooms followed a similar schedule of small-group activities, large-group circle, snack, outside time, free play, and a second large-group circle. In all the classrooms at least 40 minutes elapsed between small group and free play. During free play, there were learning centers for dramatic play, art, sensory exploration, manipulatives, and fine motor activities. In Boyd and Oriel's classroom there was also a gross motor activity (e.g., swing, rocking horse) available in the room during free play. In all of the classrooms different materials rotated through each area weekly, except for the art area, where the activity changed daily. All of the children attended school in these classrooms for a minimum of 4 months before the start of the study. One head teacher, one assistant teacher, and two classroom aides were in the class daily and responsible for the education of all students enrolled in the class. In all of the classes a speech-language pathologist and an occupational therapist provided therapy in the classroom on alternating days.

In all cases, the assistant teacher was responsible for implementing the intervention. In Boyd and Oriel's class, the assistant teacher had 6 years' experience working in integrated preschool classrooms, had a bachelor's degree, and was a second-year graduate student working toward

teacher licensure and a master's degree in early childhood special education. In Rowen's case the assistant teacher had 15 years' experience working in self-contained and integrated preschool classrooms. She also had a bachelor's degree in a related field. In Xanthus's class, the assistant teacher had 1 year of experience in a birth-to-3, inclusive, center-based program and 1 year of experience in the integrated preschool, had a bachelor's degree, and was a second-year graduate student working toward teacher licensure and a master's degree in early childhood special education.

EXPERIMENTAL DESIGN AND CONDITIONS

Baseline

A multiple baseline design across four participants in three classrooms was used. The peer imitation training was initiated after a baseline period. Baseline data were collected simultaneously for all children. The intervention was initiated for all the children in the same classroom at the same time (i.e., in Boyd and Oriel's class). Although this timing does not help to establish experimental control, it does help assess the utility of the intervention. Rather, experimental control was established through a three-tier multiple baseline design. Three of the target children participated in a post-peer imitation training follow-up condition. (Boyd did not participate in the follow-up phase of the study due to absenteeism.)

Small Group. Small group consisted of the same four or five children and the assistant teacher each day. Some of the children had disabilities, but other members of the small group did not. Each child was encouraged to participate in the small group activity for 15 minutes. Children had identical materials, and teachers introduced the small-group activity by providing examples of how the materials could be used. The teachers encouraged the children to take part in the activity and supported all of the children's appropriate behaviors as well as their communicative attempts.

Freeplay. For Boyd and Oriel, free play took place 40 minutes after small group ended, lasted for 30 minutes, and took place in the same classroom as small group, although it used more of the room's space. For Rowen and Xanthus, free play took place 1 hour after small group ended, lasted for 30 minutes, and took place in the same classroom as small group, although it used more of the room's space. During free play, Rowen and Xanthus and their respective classmates had access to the following learning centers: a sensory table, a book area, a computer area, music, a free art shelf, and the materials from the small-group activity. During freeplay, Boyd, Oriel, and their classmates had access to the following learning

centers: a sensory table, a book area, gross motor activities, and the materials from the small-group activity. The differences between the classrooms reflect the teachers' preferences. The target children, the small-group peers, and the rest of the students in the class all participated in free play. Individualized Education Program objectives were addressed during this time, but all the instruction was embedded within the context of the children's play. The classroom staff members were directed to continue to interact with the children in the same way that they had for the 4 months previous to the start of the study.

Small-Group Peer Imitation Training

The same peers and teachers who participated in the baseline small groups were used in the training groups. Just as in baseline conditions, the training also took place in the same space using the same environmental artifacts (i.e., table, chairs) that were used during baseline, and the children had identical sets of materials. The intervention consisted of a four-step intervention and was continued until each child in the small group (including the target child) had the opportunity to be the "leader" twice. The four steps of the intervention were (a) teacher instructions to the small group, (b) leader selection, (c) prompts to promote imitation, and (d) praise of imitative acts. The entire intervention took about 10 minutes of each small-group time. In the remainder of the small-group time, the children were free to explore the materials in their own way.

Teacher Instruction to the Small Group. At the start of the small-group time, the teacher said, "Today kids can have turns to be leaders. When you are a leader you can (the teacher named some possible, appropriate uses for the small group materials). When you're not the leader you can do what the leader is doing."

Selecting the Leader. After the teacher gave the instruction to the entire small group, a child was chosen to be a leader. Each leader was selected in one of three ways: (a) a child volunteered to be the leader, (b) the teacher asked a child to be the leader, or (c) the teacher assigned the leader. The teacher decided which strategy to use based on the children's actions. For example, if a child asked to be the leader (which the children often did once they were familiar with the intervention), the teacher complied with the request as much as possible. If there were competing simultaneous requests to be the leader, the teacher would decide who was the leader and assure the other child that he or she could be the next leader. The only other time a child's request to be the leader was denied was if the same child requested to be the leader to the extent that the other children would not have time to have their turns as leaders. If there were no requests to be a

leader then the teacher asked a child to be the leader. If the child said "no," the teacher said, "Okay, tell me when you are ready." For the children in the small group who were either nonverbal or did not have a large repertoire of small-group play skills, the teacher would assign the child to be the leader when he or she was playing appropriately with the materials. Using these strategies, the teacher ensured that all of the children (with and without disabilities) in the small group had the opportunity to be the leader twice during each training session and that the actions the children were exhibiting while they were the leader were age appropriate and appropriate for the particular material.

Prompts to Promote Imitation. Once the leader was established, the teacher provided verbal prompts designed to cue the children to imitate their peers and to bring attention to the salient behaviors that were appropriate for imitation. For example, the teacher would say, "Ernest is the leader, let's do what he's doing, he's squeezing glue." As the children had experience with the intervention, some of the children began saying things like, "I'm the leader, and I'm pounding." If this happened, the teacher did not provide any of this type of verbal prompt.

For some children, the prompts to attend to the leader's actions and instructions to follow the leader's actions were sufficient to elicit peer imitation. For other small-group participants (including the target children), additional prompts were necessary. A least-to-most prompting strategy was used, meaning that prompts moved from less to more intrusive and that prompting was terminated as soon as the child imitated the leader. The following prompts were used:

1. The teacher asked an individual child, "What is (*leader*) doing?"
2. The teacher said, "(*Leader*) is playing with (*material*). Where is your (*material*)?"
3. The teacher physically guided the target child's hand to pick up the material the leader was using.
4. The teacher physically helped the child do what the leader was doing with the material.

After a prompt was given, the teacher waited 3 seconds to see if the child would imitate the leader. If the child imitated, the teacher provided no more prompts. If the child did not imitate the leader after 3 seconds, the teacher gave the next prompt.

Praise of Imitative Actions. Regardless of the level of prompting, if a child imitated the leader's actions, the child received contingent verbal praise. The praise took the following form: "(*Child*) is (*imitated action*), just like (*leader*) is!"

The small-group teacher provided prompts and praise until all small-group members were simultaneously imitating the leader's actions. As soon as this unison was achieved, the teacher announced it was time for a new leader, and Steps 2 through 4 were repeated. Each day's intervention consisted of each child being the leader twice. This process took approximately 10 minutes daily.

Generalization and Maintenance

Free Play. Even after small-group training sessions were started, the conditions at free play remained the same as they were during baseline. No intervention-specific training or prompting occurred during free play. The classroom staff members were instructed to continue to interact with the children in the same manner that they had all year, and our data indicated that no prompting for peer imitations to the target or the nontarget children occurred during freeplay.

Follow Up. After small-group training was discontinued, the follow-up phase started. During follow up, small group returned to baseline conditions. That is, the same children were present at the group, they had identical sets of materials, and they were expected to participate in the activity. The children received no prompts either to volunteer to be the leader or to imitate any peer's actions. When a child asked to be the leader in the follow-up period, the teacher encouraged the child to be the leader but did not provide any prompts to any of the small-group members. Data were collected at small group and at free play for all of the target children except Boyd. No follow-up data were collected for Boyd due to excessive absenteeism. At free play, the conditions continued to remain as they had since baseline.

Data Collection

During the baseline, intervention, and follow-up phases of the study, data were collected during small-group activities and during free play. All data were collected live, over a 5-month period, through observations in the classrooms. Data were collected during small-group activities in order to assess the treatment fidelity and the effectiveness of the intervention, which occurred there. Data were collected during free play in order to assess the generalization of the imitations of peers and to measure the effect of the intervention on nonimitative social interactions and the other broad measures of social skills (i.e., proximity) and learning (i.e., nonsocial engagement with materials). In freeplay the number of times the target child was imitated by his or her peers was also recorded, as were the number of prompted peer imitations as a way to assure that freeplay remained a true generalization site (i.e., that no training occurred).

Small-Group Measures. Data were collected at least once a week during small-group activities in order to assess the effects of the independent variable. Target child absenteeism and school-related events (e.g., fire drills, field trips, picture day) affected the selection of the particular day to be coded. With the exception of these events, the day was randomly selected but rotated so that the data represent a cross section of the behavior that occurred. Observations were made for 5 minutes. The timing of the observation within the small-group period was also rotated so those data were not always collected during the same 5-minute period of the 10-minute training session. All data were recorded live using an interval observation system.

The target child was the focus of the data collection; however, data were collected on the peers when they imitated or socially interacted with the target child. The observation system used 10-second intervals. Observers were cued to the intervals by an audiotape through an earphone. Any social interaction or imitation of peers (as defined below) that occurred during the interval were recorded:

Social initiations were nonimitative verbal and nonverbal behaviors directed at peers in an attempt to gain a social response. Initiations were only recorded at the onset of social interaction.

Positive responses were nonimitative verbal and nonverbal behaviors that in some way acknowledged and complied with the social initiation.

Negative responses were nonimitative verbal and nonverbal behaviors that in some way acknowledged but did not comply with the request made in the preceding social initiation.

No responses occurred when the social initiation was not responded to or when it was ignored.

Independent peer imitations were scored when the target child copied a peer's behavior, in the same context as the original behavior, in a time immediately after the original behavior without verbal or physical prompting from an adult.

Prompted peer imitations were scored when the target child copied a peer's behavior, in the same context as the original behavior, in a time immediately after the original behavior without verbal or physical prompting from an adult as a result of a verbal or nonverbal instruction from the teacher. This code was recorded to assist with treatment fidelity.

Freeplay Measures. During free play, data were collected four times a week rather than five because the classes all had a gym time once a week that conflicted with the freeplay time. Also, school-related events (e.g., fire drills, assemblies) and child-related events (e.g., tardiness, absenteeism) sometimes interfered with data collection, reducing the number of times data were collected

for that week. Data were only collected in free play if the child had participated in the small-group training that day. All measures recorded during the free-play data sessions were collected live and were considered to be generalized results because no training occurred during freeplay. The 10-minute data recording blocks were rotated so that the data were recorded at different times within the 30-minute free-play period.

The categories that were recorded during the small-group period were also recorded during free play using a similar interval observation system. In order to answer the research questions, additional categories of behavior were coded during free play. These behaviors were as follows:

Nonsocial engagement was recorded when the target child was attending to, and interacting in a developmentally appropriate way with, materials in his or her environment.

Proximity was recorded when the target child was within 4 feet of a peer and in the same clearly defined play area.

Prompt was recorded when a teacher or therapist verbally or nonverbally gave the child a directive or support. This was done to support the children's appropriate behavior, to ensure that children remained appropriately engaged, to mediate conflicts, and to teach the acquisition of new skills. This code was not used if a child was prompted to imitate another child; rather, "prompted peer imitation" was used.

Treatment Fidelity. The first author was present and observed the small-group implementation of the intervention and determined the degree to which the teachers were implementing the intervention as planned. In addition, data were collected on the number of imitations made by the target child, the level of prompting the child received, and how often peers imitated the target child. Based on these observations and data, feedback was given to the teachers about the implementation of the intervention. If the data indicated that the intervention was not implemented as planned, then the first author discussed the intervention protocol with the teacher. The teacher in Boyd and Oriel's room implemented the intervention with a high degree of fidelity throughout the study. The teacher in Rowen's room had initial difficulty implementing the intervention. The following steps were taken to improve treatment fidelity: (a) the teacher observed the correct implementation of the intervention in Boyd and Oriel's room; (b) the first author demonstrated the intervention with Rowen's small group; (c) the first author coached Rowen's teacher through the intervention until she was comfortable; and (d) support was provided until a high degree of fidelity was achieved; this took 2 weeks. The teacher in Xanthus's room implemented the treatment with a high degree of fidelity but would often

brainstorm with the first author on ways to use the materials that were to be available for small group.

Social Validity Assessment. At the end of the study, after the data collection period was completed, the classroom staff and the support staff completed a social validity questionnaire. The questionnaire was anonymous and consisted of five questions whose answers were rated on a 5-point Likert-type scale. These questions were concerned with the ease with which the teachers could use the intervention in nonexperimental conditions, its effects on the children in the classroom, and the likelihood that respondents would use the intervention again. Three open-ended questions gave the classroom staff members an opportunity to respond freely and elaborate on their feelings about the intervention and its effects on the children in their classroom. A space was provided for suggestions, possible changes in the intervention, and additional comments.

Reliability

We assessed interobserver agreement by having two observers independently, but simultaneously, code behaviors. Before the baseline period, observer training was conducted. Observer training consisted of reading the Observation Code, which was developed as part of this study, containing the definitions of the dependent variables as well as examples and nonexamples of each behavior. The first author and the observers then observed some nonstudy participants and talked about the particular child's behavior as it related to the Observation Code. This aspect of training took 2 hours a day and lasted for 2 weeks. When the observer felt comfortable with the Observation Code, she practiced taking data using the audio cue and the code sheet. Once the observer felt fluent in using these materials, the observer and the first author independently, but simultaneously, recorded the behavior of nonstudy children. Seven sessions (small group and freeplay) were coded and point-by-point reliability was computed. All training sessions had high interobserver agreement; thus observer training was complete. By the end of the training period, the observers had achieved a mean of 85% (range 78%–100%) interobserver agreement. During experimental conditions, reliability was coded in 25% of the 82 small-group observations and in 30% of the 128 free play observations. Overall interobserver agreement was calculated using point-by-point agreement. That is, each recording in each category for each interval had to match to be coded as an agreement. Interobserver agreement was then calculated by totaling the number of agreements and the number of disagreements. Then the number of agreements was divided by the number of agreements plus the number of disagreements and multiplied by 100. Interobserver agreement was

high for all participants, all categories, and all settings; thus only the overall reliability data will be presented. The reliability for small-group observations (all the observations on all behaviors across participants) ranged from 96% to 100% with a mean of 98%. Interobserver agreement for the free play (all the observations on all behaviors across participants) ranged from 83% to 90%, with a mean of 86%. Interobserver agreement for Boyd (all behaviors and all contexts) had a mean of 92% with a range from 83% to 100%; for Oriel (all behaviors and all contexts), a mean of 91% with a range of 83% to 98%; for Rowen (all behaviors and all contexts), a mean of 93% with a range from 90% to 96%; and for Xanthus (all behaviors and all contexts), a mean of 92% with a range of 87% to 97%.

RESULTS

Small-Group Imitation Training with Peers

The bar graph in Figure 1 represents the number of peer imitations recorded during small-group sessions. The data in Table 2 indicate the percentage of those imitations (shown in Figure 1) for which the target child needed any level of prompting beyond what was given to the entire small group. The line graph represents the total number of nonimitative social interactions (i.e., the sum of the initiations and responses) exhibited by the target child at small group.

None of the target children exhibited any peer imitations during baseline. All of the target children exhibited variable but low levels of social interactions at baseline. Figure 1 indicates that following the implementation of the small-group training, all of the participants exhibited an increased but still small number of peer imitations, but the levels of social interactions remained low, variable, and consistent with baseline behavior. Further, the data in Table 2 indicate that the participants required different amounts of prompting to imitate their peers. Xanthus and Boyd were able to independently imitate their peers in at least half of the training sessions, whereas Oriel and Rowen required higher levels of prompting.

The follow-up data in Figure 1 indicate that only in Boyd's case did the peer imitation behavior maintain into the follow-up period of the small-group data collection session, and this happened on only 1 day. Further, for all participants, the level and amount of social interaction recorded in follow up was consistent with the social behavior recorded in the baseline and intervention phases.

The data for all four target children show that the independent variable (small group, peer imitation training) was implemented sufficiently (and not implemented at baseline or follow-up phases). The data indicate that there is variability in all the participants' behavior, but all participants were able to imitate their peer's behavior,

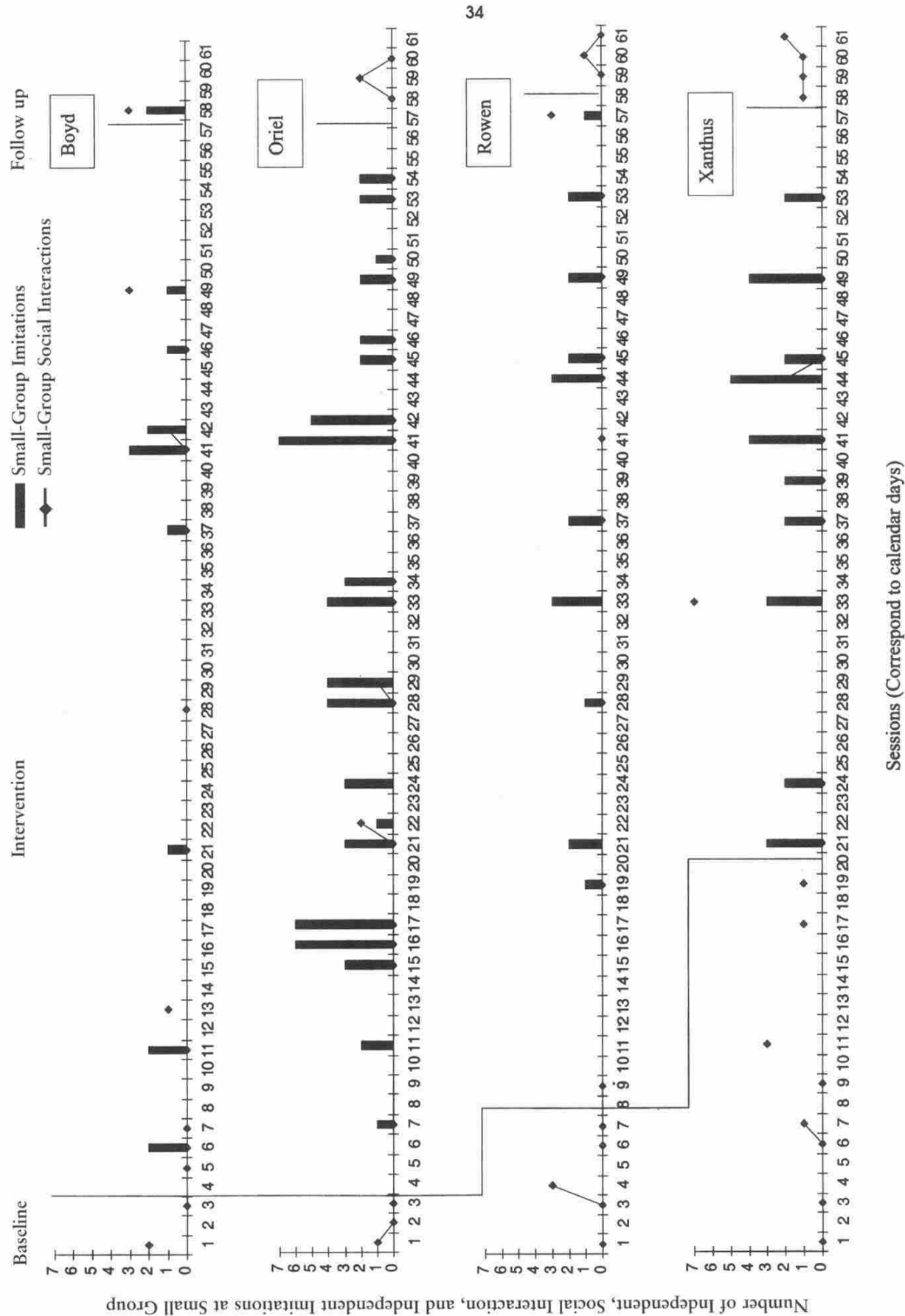


FIGURE 1. Imitation and total social interaction at small-group training.

TABLE 2. Overall Percentage of Prompted Imitations During Small-Group Training

Participant	Baseline (%)	Intervention (%)	Follow up (%)
Boyd	0	50	—
Oriel	0	81	0
Rowen	0	71	0
Xanthus	0	41	0

and at least a portion of the time these imitations were independent. The data also indicate that social behavior was not greatly affected by the training protocol during small group.

Generalization Setting

As in Figure 1, the bars in Figure 2 represent the total number of peer imitations made by the target child, and the line graph represents the total number of social interactions. Further, the sessions in both graphs correspond to the same calendar day. Unlike Figure 1, in Figure 2 all of the peer imitations are independent (nonprompted).

At baseline, there were no occurrences of peer imitations. After intervention was started at small group (indicated by the phase change line), there was a small increase in peer imitations, although the numbers of imitations made were low, variable, and not observed every day. The data in Table 3 indicate that all the participants except Oriel were imitating some peers who had not participated in their small-group intervention.

In baseline, all the participants' levels of social interaction were low, with minimal variability. After the implementation of the peer imitation intervention at small group, there was a minimal increase in levels of social interactions for all the participants. However, levels of social interaction remained relatively low and variable throughout the intervention stage, although for all participants the mean number of social interactions is higher in the intervention condition than in the baseline condition. Table 4 provides detailed information about the data displayed in Figure 2. Specifically, the data in Table 4 indicate that the social interactions seen in the intervention phase were initiated, fairly equally, by both the target child and the target child's peers.

Table 5 represents a summary of the data collected on the other dependent measures described in the Method section. They are provided to illustrate the concomitant changes in the participant's behavior that coincide with participation in the intervention. Table 5 shows the mean percentage of nonsocial engagement, proximity, and teacher prompts. The data indicate that for all participants, their rate of nonsocial engagement increased from base-

line levels during intervention and maintained above baseline levels through follow up. Table 5 further shows that the level of proximity of the target child to his or her peers increased over baseline levels for Boyd, Oriel, and Xanthus. Further, the number of teacher prompts (unrelated to peer imitation skills, which were not prompted in this condition) received by the target children decreased. These decreases maintained (as compared to the baseline rate) into follow up for all the participants.

Finally, in Table 6 the data indicate that the target participant's classroom peers imitated the target child in the generalized setting. Interestingly, this imitation of the target child was limited to the time that corresponds to the intervention time—it was not present in baseline and did not maintain into follow up.

Social Validity

Social validity was measured by five questions whose answers were rated on a 5-point Likert-type scale (1 = *not at all* and 5 = *a lot*) and by four free response questions. The results of the scaled portion of the questionnaire indicate that the adult participants in the study found the intervention easy to implement and important for the children. The results of the open-ended questions indicate that the adult participants made observations that support the results of the quantitative data without seeing the data.

The adult participants in the study rated, "The intervention was something I could do in my classroom" with a mean of 5. "I could implement the intervention into my regular curriculum" was rated with a mean of 4.5 (with a range of 4 to 5). "The target child benefited from the intervention" was rated with a mean of 4.7 (with a range of 4 to 5). "Other children benefited from the intervention" was rated with a mean of 4.7 (with a range of 4 to 5). "I would use this intervention again" was rated with a mean of 4.7 (with a range of 3 to 5).

In the free response portion of the questionnaire, the adult participants attributed the following changes (without having seen the quantitative data) in the target child to the intervention: more imitations of peers, more social initiations toward peers, more awareness of peers, and better play skills. The adult participants noted that as a result of the intervention, nontarget children in the classroom also became more aware of each other, had better imitation skills, and were better at waiting and taking turns. Interestingly, every adult participant noted that the nontarget children seemed to be more aware and accepting of the target child. All the adult participants said that they would use the intervention again. The only adaptations that were suggested were to use it in other times of the day (e.g., at gym) or to use it every other day so that small group could be used for instruction of other skills as well. Other comments reveal that the adult participants thought that in order to implement the intervention, a

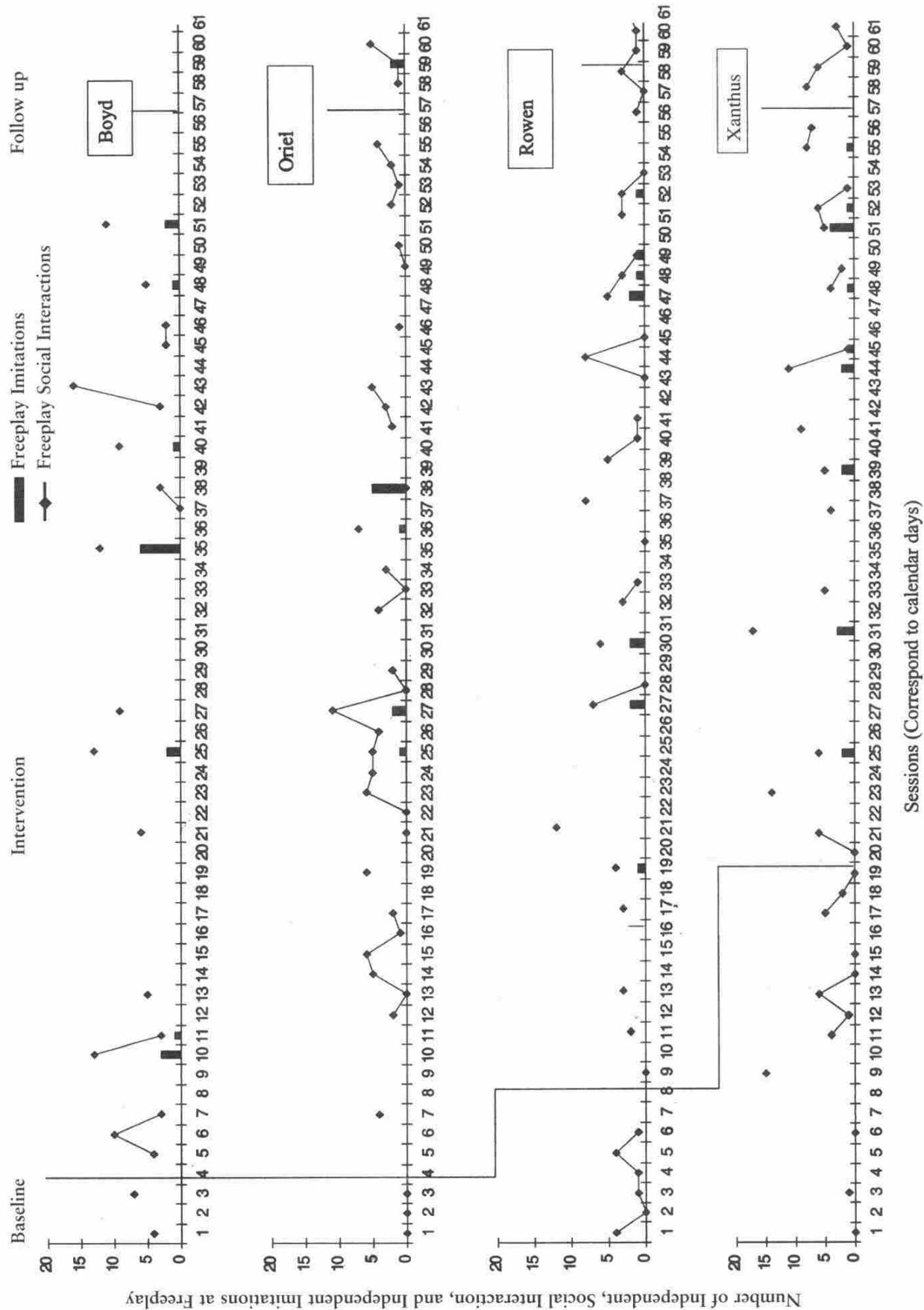


FIGURE 2. Imitation and total social interaction at the freeplay generalization setting.

certain skill level on the teacher's part was needed. It was also noted that some of the small-group activities were harder to adapt to the intervention than others.

The results of the social validity questionnaire show a high level of satisfaction with the intervention, although it should be noted that the teacher had participated in the intervention and knew the researcher, so this may not be an unbiased rating. In the time since the study was concluded, several of the teachers who were trained in the imitation protocol have continued to use the intervention. And the first author has had several requests to teach other children to imitate their peers and to train teachers in the protocol. These poststudy events further support the social validity of the questionnaire. ♦

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TABLE 3. Percentage of Target Child's Imitations (in the Generalization Setting) of Small-Group Peers

Participant	Baseline (%)	Intervention (%)	Follow up (%)
Boyd	0	38	100
Oriel	0	100	0
Rowen	0	22	none
Xanthus	0	35	none

TABLE 4. Percentage of Social Interaction Initiated by the Target Child and the Classroom Peers

Participant	Baseline (%)	Intervention (%)	Follow up (%)
Boyd	21	39	—
Peers	79	61	—
Oriel	0	44	14
Peers	0	56	86
Rowen	61	55	53
Peers	39	45	47
Xanthus	71	60	60
Peers	29	40	40

TABLE 5. Mean Percentage of Engagement and Proximity

Participant & category	Baseline (%)	Intervention (%)	Follow up (%)
Boyd			
Engagement	87	95	—
Proximity	74	84	—
Prompt	3	2	—
Oriel			
Engagement	63	81	92
Proximity	33	69	65
Prompt	45	15	3
Rowen			
Engagement	84	96	98
Proximity	75	74	83
Prompt	9	4	6
Xanthus			
Engagement	85	95	94
Proximity	68	79	53
Prompt	15	6	13

TABLE 6. Number of Imitations of the Target Child by Peers in the Generalization Setting

Participant	Baseline	Intervention	Follow-Up
Boyd	0	8	—
Oriel	0	7	0
Rowan	0	6	0
Xanthus	0	10	0

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