

## Teaching Social Communication Skills to Young Urban Children with Autism

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*Abstract: This study examined effects of an intervention designed to improve the social-communication skills of children with autism. Five boys and one girl, with an age range of six to eight years and a diagnosis of autism, participated in the study. Children were paired in dyads and a multiple baseline design was used to evaluate the effectiveness of the plan-play-report intervention. Unique because two children with autism received intervention at the same time, results indicated that the intervention was successful in increasing peer-directed commenting, language diversity, and complexity. Results of this study indicate that a plan-play-report intervention provided simultaneously to two children with autism is a viable method for improving the social communication skills of both children.*

It is generally accepted that encouraging and facilitating social interactions and friendships for children with autism can have a significant effect on their later social ability (Frea, 1995). Studies have shown that the social interaction and communication skills of children with autism can be improved through direct instruction (Coe, Matson, Fee, Manikam, & Linarello, 1990), script fading (Sarokoff, Taylor, & Poulsen, 2001), pivotal response training (Koegel, Koegel, & Schreibman, 1992), and milieu teaching (Hancock & Kaiser, 2002). Research has also demonstrated that self-management techniques (Koegel & Koegel, 1990; Kopp, 1988; Stahmer & Schreibman, 1993), teacher mediated interventions using priming or social scripts (Loveland & Tunali, 1991; Zanolli, Daggett, & Adams, 1996), and peer-mediated interventions (Goldstein, Kaczmarek, Pennington, & Schafer, 1992) can be effective ways to teach social and communication skills to children with autism.

Most research methods mentioned above investigated the impact of social communication interventions on children with autism utilizing teacher or peer mediated strategies where children with autism were paired with

one or two typically developing or higher functioning peers (when other children were involved in the intervention) (Garfinkle & Schwartz, 2002; Garrison-Harrell & Kamps, 1997; Goldstein et al., 1992; Wolfberg & Schuler, 1993). These peers helped to support the child with autism as they tested out their new skills.

Though language interventions have paired children with autism with siblings, parents, typically developing peers, and peers with other disabilities, there is a paucity of research investigating interventions that involve the use of dyads in which both individuals display autism. One study in this area that used more than one child with autism in the intervention was completed by Wolfberg and Schuler (1993). Using peer directed mediation with adult support, they found that children with autism (ages 7.1 – 7.10 years) who were involved in play groups that included other children with autism and typically developing children decreased isolated and stereotypic play and made gains in interactive play and functional object use. As the children played, the interventionist stood outside the play area and directed the children to interact. A limitation of this study was that although more than one child with autism was involved in the play group, there was only one interventionist monitoring the group. Instruction and scaffolding of play could only be given to one

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child with autism at a time, unless the children with autism happened to play together.

Though social interactions are difficult for children with autism, and children may not appear interested in peers or peer interaction, one study has shown that children with autism can learn skills simply by sitting next to and attending to a peer model. The effects of teaching through trial and error were compared to learning through peer modeling by Charlop, Schreibman, and Tryon (1983) who discovered that even low-functioning children with autism (mental age measured at less than half of chronological age) can learn previously unknown receptive labels simply by observing a peer with autism successfully learn and label this item. The study consisted of four dyads of children with the instructor teaching the peer model an expressive or receptive label (according to ability) while the target child observed. The results indicated that children with autism can benefit and learn from modeling procedures, especially with a similarly functioning peer-model. This type of research and the studies mentioned above set the stage for the following discussion of cognitive-social learning models as the basis for teaching social-communication skills to children with autism. As the discussion will demonstrate, this strategy has not yet been applied to pairs of children with autism.

Building on these concepts, the cognitive-social learning model for communicative skill training developed by Ladd and Mize (1983) and adapted by Gresham and Elliott (1993) emphasizes language, social, and cognitive skills. Four essential procedures are proposed as techniques for social communicative skill training: 1) Instruction: The child is provided with information, either verbal or modeled, about a particular social concept of behavior, 2) Rehearsal: The child is given repeated practice of social skills in order to promote retention of the skill concept and more effective behavioral performance, 3) Feedback and Reinforcement: The child is given feedback that provides them with information that corresponds his/her social skill performance to a standard of performance with the presentation (positive reinforcement) or removal (negative reinforcement) of environmental events that increase the frequency of targeted behavior, 4) Skill Maintenance and Generali-

zation: Once the child has demonstrated the ability to perform a skill with the aid of an adult or instructor who provides guidance and supervision, the focus of training shifts towards increasing the child's independence and control over both skill performance and evaluation.

It is important to consider context when implementing a social communicative intervention. Play provides contexts for children to practice interaction skills and, in particular, socio-dramatic play allows children to make sense of the actions of adults around them by re-enacting potentially confusing scenes from their everyday life (Alvarez & Philips, 1998). Play may be difficult for children with autism due to interfering stereotypic behaviors and lack of intrinsic motivation, however routine or familiarity can increase the enjoyment of an activity so a play theme may become more enjoyable over time (Brown & Murray, 2001). Furthermore, research indicates that more normalized intervention studies, such as those that go on in the context of play, are more effective than more formal or discrete-trial training in improving the language of children with autism (Delprato, 2001).

Two previous studies, conducted by Craig-Unkefer and Kaiser (2002, 2003) utilized the social-cognitive model as a basis for intervention procedures. In both studies, strategies to improve the social communication skills of at-risk preschool children were examined. Using a multiple baseline design across three dyads of preschool children (boys and girls, matched in gender mixed dyads) who were at risk for language delays and behavior problems, children were taught to plan their play, use conversational social interaction strategies and self-evaluate their play interactions. This intervention model followed the techniques laid out by Ladd and Mize (1983) and used a three part intervention containing a play organizer, a play session, and a review session. Results from both studies indicated that following the implementation of the treatment condition, all children displayed increases in social communicative behaviors. The children also showed increased use of descriptive and request utterances. In the second study (Craig-Unkefer & Kaiser, 2003), children used the newly learned skills in a generalized setting with an untrained peer. In this phase, the

children maintained increased use of social language.

While previous research indicates children with autism can be taught social communicative skills and that social cognitive learning models are effective in teaching children with mild language impairments, there is a gap in the literature around the use of the social cognitive learning model with children with autism, especially when two children with autism are paired together. In a study by Pierce and Schreibman (1995), peer-implemented pivotal response training (PRT) was utilized to teach two children with autism complex social behaviors. Using a multiple baseline design, two 10-year-old children were paired in dyads consisting of one typical child and one child with autism. Results indicated that peer implemented PRT was effective in increasing complex social behaviors such as initiations, joint attending behaviors, and language skills.

While Pierce and Schreibman (1995) were able to demonstrate gains and used a model which encompassed the four techniques for social skill training as suggested by Ladd and Mize (1983), the intervention was conducted using a typical peer as the primary instructor. The strict training guidelines for the peer did not allow for much individualization of treatment as children stuck to a prescribed treatment package. In the current study, intervention was provided by a skilled adult and treatment was more responsive to the individual needs of the targeted children. Furthermore, both children in the dyad had a diagnosis of autism and treatment was being provided simultaneously.

The current study determined the effectiveness of the three part intervention to improve social communication (Craig-Unkefer & Kaiser, 2002; 2003), with an entirely different population of subjects. Using the social-cognitive model as the theoretical basis for the intervention, children with mild to moderate autism were paired in dyads and received a plan-play-report intervention (Gresham and Elliott, 1993; Ladd & Mize, 1983). The children in this study were educated in self-contained settings. Like many children with autism that are educated in self-contained settings (U. S. Department of Education 2001), it is important to research the impact of the intervention on children who have only

other children with autism to play and interact with. Since both children had the same disability, this may increase the likelihood that appropriate behaviors will be reinforced, generalized, learned and practiced in age appropriate contexts. Furthermore, this study allowed for the intervention to be conducted with two children simultaneously. Research indicates that children with autism need prompts to interact socially with others and that even typically developing peers must be taught to interact with the child with autism (Laushey & Heflin, 2000; Swaim & Morgan, 2001). If both children need prompting to interact (regardless of disability status), it may be a more effective use of teacher time and resources to make both children the focus of the intervention, rather than having one child instructed simply to act as a trainer.

Through examination of the collected data, the following research questions were answered:

What effect did the intervention have on peer-directed language, specifically descriptives and requests?

What effect did the intervention have on language diversity and complexity?

How much support did the interventionist provide to the children?

Were there differences in pre and post language assessments?

## Method

### *Participants*

*Recruitment procedures.* Subjects were recruited from the Chicago Public School system. One school with a high percentage of students with autism was selected. Teachers of students with autism were provided with a checklist of screening criteria which included: a child between the ages of five- and eight-years-old, who had a diagnosis of mild/moderate autism, and had passed the Chicago Public Schools annual hearing assessment.

Children were excluded from the study when they met the above criteria but also fulfilled one or more of the following exclusion criteria: (a) had a diagnosed hearing impairment; (b) had a diagnosis of severe/pro-

found autism, (c) had a primary diagnosis other than autism, (d) had a secondary diagnosis of mental retardation, serious emotional disturbance, hearing loss, or low vision, (e) were under the age of five years, one month or over the age of eight years, 1 month, or (f) spoke a language other than English without also speaking English. No participants were excluded based solely on sex, race, or ethnic group.

*Screening procedures.* Children were assessed on the following domains: receptive and expressive vocabulary, non verbal cognitive ability, and adaptive behavior. To determine receptive and expressive vocabulary ability, the Peabody Picture Vocabulary Test –III (PPVT-III; Dunn & Dunn, 1997) and the Expressive Vocabulary Test (EVT, Williams, 1997) were used. To determine nonverbal cognitive ability, the Leiter International Performance Scale- Revised (Roid & Miller, 1997) was used and to determine adaptive skill ability, the communication, daily living skills, and socialization domains of the Vineland Adaptive Behavior Scales: Classroom Edition (Sparrow, Balla, & Cicchetti, 1985).

Assessments of receptive and expressive vocabulary, as well as nonverbal cognitive ability were completed by the investigator. Behavioral assessments were completed by the child's teacher. These assessments were chosen for the following reasons: (1) they are recommended for use with children with autism, (2) they have been utilized in previous

research targeting children with autism (Laushey & Heflin, 2000; Oke & Schreibman, 1990; Pierce & Schreibman, 1995), and (3) all four measures include children with disabilities in the norming sample (Dunn & Dunn, 1997; Roid & Miller, 1997; Sparrow, Balla, & Cicchetti, 1985; Williams, 1997).

*Participants.* Eight children were screened and six children were found eligible to participate in the study. Participant characteristics are described in Table 1. All children received related services in school including speech language pathology and social work services.

Child A1 was a 6 year old Hispanic girl with fewer language and social skills than her peers. She primarily used one or two word phrases. She understood and spoke both Spanish, her home language, and English. In the classroom Child A1 required frequent redirection to tasks. During free play activities she would approach other children and take desired toys but did not actively engage with other children. She required monitoring as she regularly attempted to run from the classroom.

Child A2 was a 6 year old Caucasian male with low language skills, and poor socialization and daily living skills. He spoke English in one or two word utterances, but did not use language in social situations. He preferred to play with adults and his communication skills with adults were better than with children.

Child B1 was a six year old bilingual Arabic male who displayed deficits in socialization

**TABLE 1**  
**Characteristics of Participants**

	<i>Child</i>	<i>Age</i>	<i>Race</i>	<i>Gender</i>	<i>PPVT<sup>1</sup></i>	<i>EVT<sup>2</sup></i>	<i>Leiter<sup>3</sup></i>	<i>Areas of Adaptive Behavior Deficit<sup>4</sup></i>
Dyad 1	A1	6-01	Hispanic	F	<1-09	2-01	85	1, 2, 3
	A2	6-05	Caucasian	M	<1-09	2-08	80	1, 2, 3
Dyad 2	B1	6-09	Arabic	M	3-03	5-01	77	2
	B2	8-00	African-American	M	3-01	4-05	73	1, 2, 3
Dyad 3	C2	7-03	Caucasian	M	3-00	2-07	87	1, 2, 3
	C2	7-10	Hispanic	M	2-05	3-07	70	1, 2, 3

<sup>1</sup> Test Age Equivalent

<sup>2</sup> Age Equivalent

<sup>3</sup> Brief IQ

<sup>4</sup> Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1985) To show deficit child must have standard score - 2 SD from the mean. 1 = Communication 2 = Daily Living Skills 3 = Socialization

daily living skills. Despite low language scores he communicated well in both English and Arabic. Child B1 used language all of the time and frequently kept a running commentary on what was going on around him, often talking over others and ignoring their responses to questions. He had problems with syntax and made most statements into questions by adding, “okay?” at the end.

Child B2 was an English speaking eight year-old African-American male who also had an undisclosed medical condition that effected his large and small muscle movements and necessitated the use of a wheelchair. Child B2 had many words and could communicate in full sentences when prompted. He would use as few words as he could, unless prompted for more and he phrased most spontaneous statements in the form of a question.

Child C1 was a seven year old Caucasian male who first language was Polish. He spoke English at school and Polish at home. Child C1 had low language scores and deficits in all areas of adaptive behavior. Child C1 was heavily dependant on visual schedules for working and transitions and though Child C1 used language infrequently in social exchanges, he talked his way through all of the steps on his visual schedules. Child C1’s spontaneous language was very repetitive and used a few stock phrases over and over.

Child C2 was a seven year old boy of Hispanic descent, who spoke only English. He had low language scores and obvious needs related to socialization and behavior. Child C2 had his own full time assistant and prior to the beginning of this study, Child C2 had been pulled from school for two weeks while his parents and doctor attempted to get his aggressive behavior under control. Child C2 used language only when prompted and then used one word utterances. He had little interest in socializing with peers or adults and if left unattended would sit quietly and look at books for hours.

Children were paired into three dyads, with one mixed gender dyad and two same gender dyads. As autism affects more boys than girls, it was not possible to recruit enough girls for three mixed gender dyads and no child was excluded on the basis of gender. Children were paired according to scores on the PPVT

and EVT and according to schedule availability. An attempt was made to pair a child with lower language scores and a child with slightly higher language scores, though all children showed significant delays in expressive and receptive vocabulary.

### *Setting*

Study sessions were conducted at the school. Baseline and Intervention sessions occurred in a sectioned off area of a large hallway in the school. Two accordion style dividers were constructed each measuring 8 feet long by 4 feet high. Dividers were placed in an L shape against a wall sectioning off a “U” shaped space that measured 8 feet by 8 feet and enclosed on three sides with the camera and tripod at the open end of the U. The area contained a table and two chairs.

### *Materials*

Materials used in the baseline and intervention sessions were representative of play materials commonly found in classrooms of young children and consisted of dramatic play items including themes (grocery store, kitchen) and role playing materials (doctor, veterinarian). Manipulative items such as blocks and cars also were used. Materials were grouped into seven different play themes: Doctor, Vet/Zoo, Construction, Grocery Store, Farm, House-keeping/ Kitchen, and Airport. Play themes and play materials are listed in Table 2.

### *Study Personnel*

*Interventionist.* One interventionist collected all baseline and intervention data. A doctoral candidate in special education, she had a master’s degree in special education and six years experience teaching young children with autism.

The interventionist trained for this study according to the Peer Language and Behavior Code: Manual and Coding Protocol (PLBC; Craig-Unkefer, Williams, & Kaiser, 1998). First the interventionist transcribed at least eight minutes of previously videotaped interaction using Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 2000) as the transcription program. Next all transcripts

**TABLE 2****Play Themes and Materials Used in Baseline and Intervention**

<i>Play Theme</i>	<i>Play Materials</i>
Doctor	White shirts, doctor kits, x-ray machine, assorted dolls, phones, ace bandages
Veterinarian/Zoo Keeper	Assorted stuffed animals, cardboard blocks, vet kit, white shirts, assorted vegetables
Farmer	Fischer Price® barns, plastic vegetables, straw hats, bandanas
Grocery Store	Cash register, wallets, pretend money, plastic and boxed food, grocery cart, McDonald's® play food, assorted dolls
Kitchen/ Housekeeping	Plastic stove and sink, plastic pans, dishes, utensils, and cups, microwave, assorted food, vacuum, feather dusters, phones, assorted dolls
Construction	Plastic construction hats, Home Depot® plastic tool sets, plastic blocks, screws, bolts, dump trucks, assorted dolls
Airport	Airport block set, airplanes, helicopters, trucks with blocks, emergency vehicles, assorted dolls

were verified for accuracy. Transcripts were then coded and at least one code was assigned to the end of each line of a word or phrase. Finally a summary of the coded data was provided for each speaker. The interventionist also reviewed tapes of a previous study (Craig-Unkefer & Kaiser, 2002) and discussed technique with the first author.

#### *Data Collection*

Baseline and intervention sessions were videotaped by the interventionist using a digital camcorder (Sony DCR-TRV17). Sessions were digitally transferred to a computer and transcribed from digital video using Systematic Analysis of Language Transcripts (SALT v 6.1; Miller & Chapman). All sessions were first transcribed by the interventionist and reviewed for accuracy prior to coding. Coding was completed by the interventionist according to the PLBC (Craig-Unkefer, et al., 1998). Prior to the beginning of this study, the interventionist trained to a criterion of 80% accuracy on the PLBC using previously coded criterion tapes. The interventionist also practiced transcribing utilizing the SALT program. Transcription within SALT requires that the transcriber mark bound morphemes and verb tenses, enter pauses, mark overlapping speech, mark unintelligible or incomplete utterances and enter codes specified by the PLBC (Craig-Unkefer, et al.; 1998; Miller & Chapman).

#### *Experimental Design*

A multiple baseline design was used to determine the result of an intervention designed to promote social communication skills in young children with autism (Kazdin, 1982). Each dyad in the study remained in baseline until a stable or decreasing baseline was demonstrated and for at least five sessions. The first dyad with a stable baseline was identified as Dyad One and the other two dyads remained in baseline until a clear treatment effect was visible for the second dyad, identified as Dyad 2 and so on. Following the multiple baseline design discussed above, the intervention was then introduced to Dyad Two and once effects were evident in the second dyad the intervention was introduced to the third dyad. The experimental conditions for this study were baseline and intervention

*Baseline.* Baseline sessions were conducted three times per week. During the baseline sessions, 10 minutes of play were videotaped and subsequently coded. The interventionist brought the two children in each dyad to the area designated for project use. The interventionist invited the children to play with the toys arranged on the carpeted floor or table. Toys consisted of a play theme randomly selected from those discussed above and rotated throughout the baseline sessions (see Table 2). One play theme was randomly chosen to start the baseline sessions and then taken out of the next random selection. Selection con-

tinued this way until all play themes had been used once. All play themes had at least two rotations in the selected order. During Intervention some children began to request certain play themes and the order was dropped. In baseline sessions, the interventionist did not prompt language or prohibit any behaviors except those that were harmful to the peers or materials (e.g. mouthing materials, hitting lockers).

*Intervention.* An intervention that incorporated the cognitive-social learning model (Ladd & Mize, 1983) was used as a means to promote social communication skills for children with autism. The intervention had three components: 1) a play organizer session, 2) a ten minute play session, and 3) a review session. The first component, the advanced play organizer, lasted approximately five minutes. During this component, the interventionist and the children developed a play plan specific to a play theme designated for the session. The same play themes used in the baseline sessions were used in the intervention sessions. The interventionist began the advanced play organizer portion of the session by telling the children the designated play theme (e.g. "Today we are going to play grocery store."). Together, the interventionist and the children labeled the toys to be used. Then the interventionist asked the children how they will play with the toys within the theme. If the children could not make a play plan independently, the interventionist suggested roles for the children and ways to talk with each other (e.g. "Herb, you could pick out groceries and Wayne, you could check them out."). The interventionist role-played with the children and modeled ways to use the toys and to talk to each other (e.g. "Tell the grocer, 'I want some bananas.'"). After the toys were labeled and a play plan was developed, the interventionist told the children it was time to play. The interventionist moved away from the immediate play area and stood approximately five feet from the children, near the location of the digital camcorder.

The second component was a 10-minute play session. During this component, the children played with the toys and materials provided. The interventionist sat away from the play area, watching the children, and used verbal redirects and reflective statements to

sustain and maintain the children's play interaction. The interventionist did not prompt or comment while the dyad was engaged in an interaction. Four forms of redirects were used: redirecting attention to a peer, redirecting attention to a toy, adult verbal directives, and redirecting to a play area. Redirecting attention to a peer occurred when a child was playing alone or talking to the interventionist. Instead of answering the child's question the interventionist would say, "Ask Chip" or "Tell Julie." Redirecting attention to a toy occurred when a child was not engaged in play or was using a toy inappropriately. The interventionist would redirect the child to play appropriately with the toy or suggest a new toy to play with. For example, "Cook the carrots on the stove" or "Play with the airplane." Adult verbal directives occurred when the interventionist gave the child specific words to use in a situation. Examples include "Tell Ellen, 'I want the horse'" and "Ask Dan say, 'Is that a chair?'" Finally, redirecting to a play area occurred when the child attempted to leave the designated play area. When this occurred the interventionist would say, "Play over here" or "Stay in this area." The interventionist determined the types of redirects to use based on the degree of support needed by the child and the particular play situation. During this phase, the interventionist also made reflective statements and comments about the toys, the themes, or the children's play. Reflective statements did not specifically prompt child actions or model language. The purpose of reflective statements was to keep the children focused on the play theme by suggesting an appropriate activity within the play theme (e.g. "The baby wants to be fed.").

The third component of the intervention, the review session, took place immediately following the play session and lasted approximately 5 minutes. The interventionist re-entered the play area and sat near the children. The interventionist and the children discussed the play that occurred in the preceding component. The interventionist asked the children what they played with during the play session. If the general question did not elicit a response from the children, the interventionist asked the children specific questions about how they played with the toys and what verbal exchanges had occurred between the children

(e.g. “What did you give the baby to eat?” and “What did you say to Herb?”). At the conclusion of the review session, the interventionist asked the children if they had fun playing together and if they wanted to play again. Finally, she thanked the children for their participation and gave verbal praise for language use and play skills.

#### *Descriptive Measures*

Descriptive measures of the children include the results of measures to assess vocabulary, cognition and behavior and include the Peabody Picture Vocabulary Test – Third Edition (PPVT-III; Dunn & Dunn, 1997), The Expressive Vocabulary Test (EVT; Williams, 1997), Vineland Adaptive Behavior Scales (VABS; Sparrow, et al., 1985), and the Leiter International Performance Scale - Revised (Roid & Miller, 1997). All measures were given prior to baseline. The PPVT and the EVT were repeated after the intervention had been completed.

#### *Child Communication*

Child social communicative behaviors observed were descriptives, requests, and verbal others. Descriptives consisted of comments, one word comments, play organizer statements, and acknowledgement responses. The request category consisted of information requests, yes/no questions, clarification repeats, verbal signaling, clarification requests, and action and stop action requests. The verbal other category included repeating a child comment, repeating an adult comment, verbal others, social graces, laughing, singing, and unintelligible screaming, as well as off camera comments (see Table 3 for complete definitions). Child utterances counted as a descriptive, a request, or a verbal other. Furthermore, if a child utterance was counted as a verbal other (such as a child repeating himself) that episode, although it was technically a comment, was not counted in the descriptive category. This made for a clearer distinction between actual communication attempts and language that was stereotypic or nonsensical.

Diversity and complexity of child language was determined from transcripts of each session using Systematic Analysis of Language

Transcripts (SALT, Miller & Chapman, 2000). Diversity was automatically counted by the SALT program and was reflected in the total number of different root words in the transcribed sample. Complexity was calculated through the Mean Length of Utterance (MLU) and was figured automatically by the SALT program. SALT calculates MLU by taking the total number of words in each child utterance and dividing this by total utterances in the sample. Total number of words used and number of four or more word utterances were also calculated for each baseline and intervention session.

#### *Interventionist Behaviors*

Interventionist behaviors were measured in two categories: responses and redirects (Craig-Unkefer et al., 1998). Responses consisted of stop action requests, responses to questions, reflective statements, adult praise, adult questions, acknowledgement responses by adult, adult repeats, adult others, and adult verbal signaling. Redirects consisted of redirecting attention to a peer, redirecting attention to a toy, adult verbal directives, and redirecting a child to a play area. All measures of interventionist behavior were counted by dyad, not by response to a particular child.

#### *Fidelity of Treatment Measurement*

All intervention sessions were carried out by the interventionist. Fidelity of treatment was calculated using the scores from a checklist in which the investigator rated herself on the implementation of strategies outlined in the play organizer component of the intervention and the ten minute play session. These strategies included announcing the play theme, discussing and demonstrating the materials to be used, and allowing the children to make play idea suggestions. An independent observer completed a fidelity treatment checklist for a randomly selected 20% of all sessions that were completed by the interventionist. The criterion level for implementation of the intervention was completion of 80% of the ten items on the checklist. The average for the interventionist was 98% with a range of 80-100%.

**TABLE 3**  
**Coding Definitions for Child Communication Measures<sup>1</sup>**

<i>Category</i>	<i>Subcategory</i>	<i>Definition</i>
Descriptives	Comments	Declarative sentences or phrases that describe the child's own activity or the activity of a peer (e.g., This carrot tastes like wood).
	One Word Comments	Single word or noun that describes play or is related to what the child is doing (e.g., car, ball, Elmo).
	Play Organizer Statements	Verbalizations where a peer specifies an activity or non-activity, suggest an idea for play, or directs a peer to engage in a play behavior (e.g., You be the grocer).
	Acknowledgement Responses	A response to share or not share an understanding, following an initiation (comment or request) by a peer (e.g., okay, yeah, sure, um huh, no).
Requests	Information	Questions that ask for information beyond acknowledgement (e.g., What is it?)
	Yes/No Questions	The peer requests from another peer a yes/no form of response.
	Clarification Repeats	The peer repeats what the other peer has just said for the purpose of checking to see if that is actually what the peer just said.
	Verbal Signaling	A peer states the other peer's name for the purpose of obtaining their attention.
	Clarification	When a peer says "What?" or "Tell me again" in response to another peer's utterance because the peer did not hear or understand what the other peer said.
Other Verbal Behaviors	Repeat child	A peer responds to another child's utterance by repeating what was said. There is no rising intonation. Code a repeat child when a peer repeat his or her own comment or request beyond the third utterance.
	Play verbalizations	Comments or requests directed to an inanimate play object or toy.
	Play noises	Play verbalizations with a fantasy role-includes non speech sounds (e.g., raspberries, clucks, roommm).
	Off camera	Comment or request (including tattling) made by the peer that is directed at the adult.

<sup>1</sup> Peer Language and Behavior Code: Manual for Training and Coding Protocol (Craig-Unkefer, Williams, & Kaiser, 1998).

*Interobserver Agreement*

Interobserver agreement was calculated on the coding for the Peer Language and Behavior Code (PLBC; Craig-Unkefer et al., 1998) during the baseline and intervention phases.

Prior to beginning the study, both the investigator and an independent coder were trained to 80% reliability on all data collection systems. Training for the investigator consisted of a five step process. First, the investigator read through the PLBC (Craig-Unkefer

et al., 1998). Second, the interventionist transcribed at least eight minutes of previously videotaped interaction using Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 2000). Third, all transcripts were verified for accuracy. Fourth, the transcripts were then coded and at least one code was assigned to the end of each line of a word or phrase. Finally a summary of the interventionist-coded data was provided for each speaker and compared to previously coded data to check for errors. The independent coder was the first author of the PLBC.

The investigator coded all of the above transcripts. A random selection of 20% of baseline and intervention sessions from all three dyads was coded by an independent coder. A sequential comparison was made of the coded data sheets on a point-by-point basis. The number of agreements was divided by the number of agreements plus disagreements, multiplied by 100, resulting in a percentage (Kazdin, 1982). As mentioned above, interobserver agreement was calculated on 20% of the sessions. For child behaviors in baseline, the agreement was 82% with a range of 72-90 and in intervention agreement was also 82% with a range of 70-94. Interobserver agreement percentage for interventionist measures, which occurred only during intervention, was 80% with a range of 71-89.

## Results

### *Social Communicative Behaviors: Commenting and Requesting*

To determine the effect that the intervention had on social communicative behavior, frequency of peer directed descriptive statements and requests were measured. Descriptive statements included comments (e.g., I have a ball), one-word comments (e.g., ball), play organizer statements (e.g., You be the cashier and I'll be the customer), and acknowledgement statements (e.g., yes, no, okay). Requests included requests for information (e.g., yes/no questions), verbal signaling (e.g., using another child's name to gain attention), action requests that require a response from the other child (e.g., give me that car, hand me the train) and action requests that do not

require a response from the other child (e.g., see it, look).

### *Total Descriptive Statements*

Total descriptive statements for each child are presented in Figure 1. During baseline, children in Dyad One (Child A1, Child A2) had low rates of descriptives, using a combined average of 20 or less descriptive statements per session. Average total descriptive statements used by Child A1 were 2 and Child A2 was 8. Once the intervention was introduced, both children increased in their use of total descriptive statements. Child A1 averaged 16 descriptive statements and Child A2 averaged 29 descriptive statements.

Children in Dyad Two (Child B1, Child B2) had higher overall average rates of descriptives (33 and 20) but their rates of these behaviors decreased to an average of 16 and 14 respectively during the final three baseline sessions. Once the intervention was introduced, both children increased their use of descriptive statements. In the intervention phase, Child B1 averaged 47 descriptive statements and Child B2 averaged 23.

Child C1 and Child C2 from Dyad Three used very few descriptive statements, averaging less than 10 per session. Average total descriptive statements in baseline for Child C1 were 7 and Child C2 was 2. Once the intervention was introduced, both children in Dyad Three increased their total descriptive statements. Child C1 averaged 29 descriptive statements and Child C2 averaged 12 descriptive statements.

Use of specific types of descriptives varied among dyads. Of the three types of descriptive statements comments and one word comments were used most often. All of the participants increased in their use of comments from baseline to intervention. In Dyad One, Child A1 increased commenting and one word commenting from a baseline average of 1 and 1 respectively to an intervention average of 10 for commenting and 6 for one word commenting. Child A2 increased from a baseline average of 6 comments and 3 one word comments to 22 and 6 in intervention. In baseline, Dyad Two Child B1 averaged 30 and 1 for commenting and one word commenting and increased to an average of 42 comments.

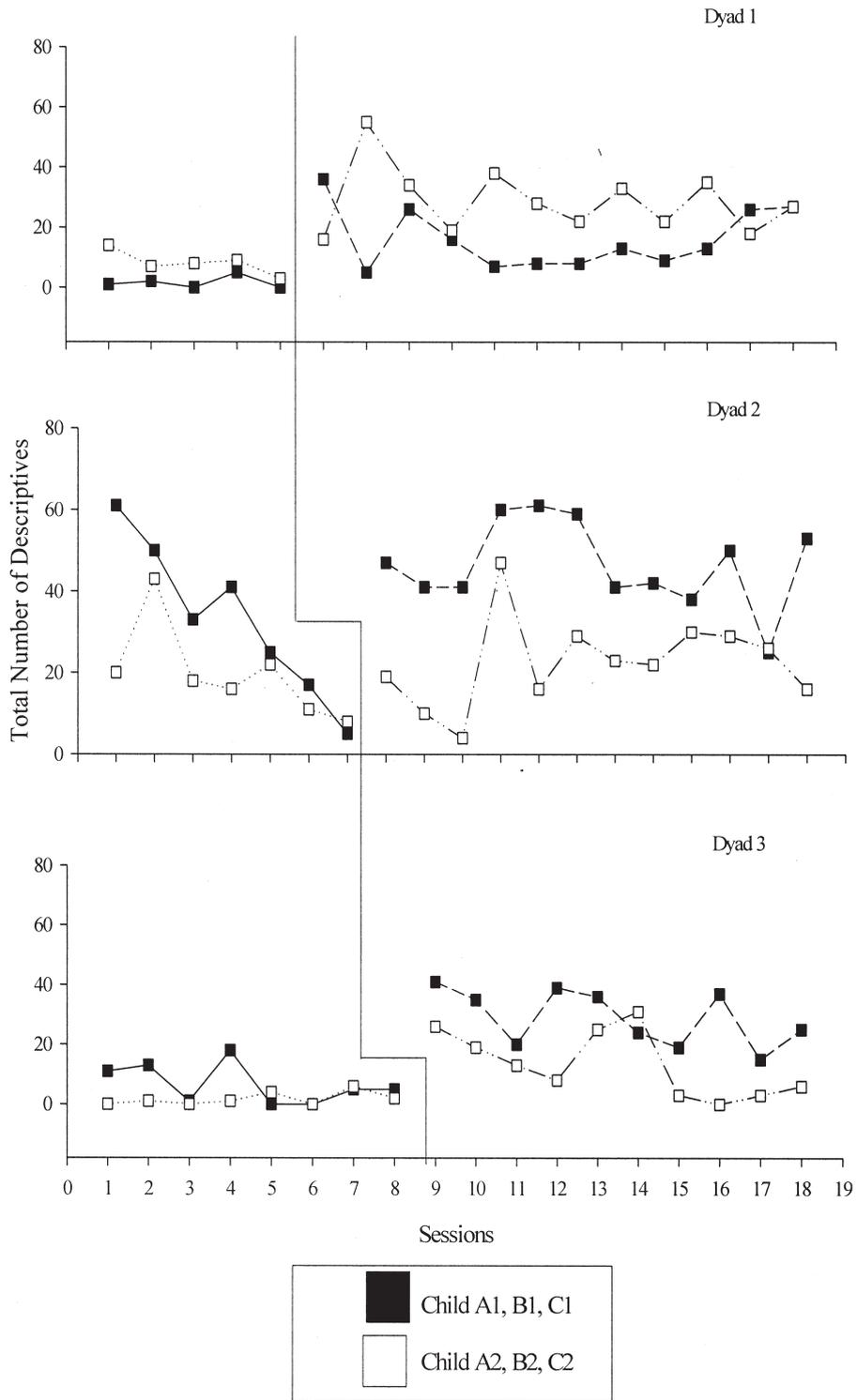


Figure 1. Total number of descriptives.

Child B1's one word comments remained steady at 1. Child B2 also displayed an increase in comments from 15 in baseline to 18 in intervention, but one word comment showed a slight decrease from 3 to 1. Both children in Dyad Three showed increases in comments and one word comments once the intervention was in place. Child C1 moved from baseline rates of 5 and 1 respectively to an intervention average of 26 and 2. Child C2 moved from 1 and less than 1 to 9 and 3. Only Dyad Two used Play Organizer Statements and Acknowledgement Statements in both phases and their rate of increase for each of these types of descriptives was minimal.

### *Requests*

*Total requests.* The average number of total requests and a breakdown of requests by type is displayed in Table 4. Children in Dyad One (Child A1, Child A2) displayed low rates of requests in baseline, with both children averaging one request per baseline session. Once the intervention was introduced, Child A2 had an average rate of 7 requests per session. Child A1 remained at baseline levels and continued to average less than one request in intervention.

Both participants in Dyad Two had high rates of requests in baseline. Child B1 averaged 15 requests in baseline and Child B2 averaged 8. These levels remained stable during the intervention phase.

Average total requests for the children in Dyad Three (Child C1, and C2) were 3 and 0 respectively. When the intervention was introduced, Child C1 increased his requests to an average of 7 per session while Child C2 remained stable and averaged less than one request during intervention.

*Requests for information and Yes/ No questions.* Children in Dyad One displayed low levels (averaging less than one) of both requests for information and Yes/No questions in baseline. In the intervention phase, Child A2 increased his average amount of requests for information to 2 and his average amount of Yes/No questions to 1. Child A1 remained stable with intervention averages of one or none per session.

Children in Dyad Two showed a little more variation in their results than did Dyad One. Child B1 averaged 2 requests for information

and 4 Yes/No questions during baseline. In the intervention phase Child B1 increased his average requests for information to 4, while Yes/ No questions remained stable at 4. Child B2's baseline average of requests for information was 1 while his average amount of Yes/No questions was 3. During the intervention Child B2's level of requests for information remained stable at 1 while his average Yes/No questions decreased slightly to 2. Both children in Dyad Three displayed low levels of request for information and Yes/ No questions in baseline (zero) and these levels were maintained in the intervention phase.

*Verbal signaling.* Both children in Dyad One did not use verbal signaling during baseline. In the intervention phase Child A2's verbal signaling averaged 3. Child A1 did not use this behavior. In Dyad Two, Child B1 and Child B2's average verbal signaling during baseline was 1 and 0 respectively. During the intervention phase, Child B2 increased his average verbal signaling to 3 and Child B2 increased to 1. In the baseline phase, Child C1's verbal signaling averaged 2 while Child C2 averaged 0. Once the intervention was introduced Child C1 increased his average verbal signaling to 4. Child C2 also increased his verbal signaling but still remained under 1. During the baseline phase, only two of the children in this study used verbal signaling to gain the attention of a peer. After the intervention was introduced, all but one of the children (Child A1) used verbal signaling in at least two intervention sessions with four of the children using verbal signaling in at least half of the intervention sessions.

*Action requests.* Two types of action requests were made by the children in this study: action requests that require a response (e.g. give me that car, hand me the train) and action requests that do not require a response (e.g. see it, look). Dyad One participants used few or none of both types of action requests during the baseline period, with both children averaging less than 1 in each category. In the intervention period, both children either remained at a baseline rate (Child A1) or showed little increase (Child A2) averaging one of each request type. Children in Dyad Two displayed the highest rates of action requests. In the baseline phase, Child B1 averaged 4 action requests that do not require a

TABLE 4

Average Number of Requests and Average Number of Components of Request category Used During Baseline and Intervention

	Average Total Requests		Requests for Information Yes/No Question		Verbal Signaling		Action requests that do not require a response/Action requests that do require response		
	Baseline (Range)	Intervention (Range)	Baseline (Range)	Intervention (Range)	Baseline (Range)	Intervention (Range)	Baseline (Range)	Intervention (Range)	
Dyad One	Child A1	.40 (0-2)	.25 (0-1)	0/0 (0/0)	.17/0 (0-1/0)	0 (0)	0 (0)	.40/0 (0-2/0)	0/0 (0/0)
	Child A2	.20 (0-1)	6.58 (1-22)	.20/0 (0-1/0)	2.08/.92 (0-7/0-3)	0 (0)	2.50 (0-14)	0/0 (0/0)	.58/.50 (0-4/0-2)
Dyad Two	Child B1	15.29 (3-30)	14.67 (8-20)	2.29/4.71 (1-4/1-8)	4.42/4 (0-8/0-11)	1.43 (0-4)	2.5 (0-7)	3.86/2.29 (0-12/0-6)	2.58/1 (0-7/0-5)
	Child B2	8.43 (0-22)	6.83 (1-10)	1.29/2.86 (0-8/0-6)	.92/1.33 (0-7/0-3)	0 (0)	.75 (0-3)	2.57/1.71 (0-7/0-6)	1.5/1.59 (0-5/0-5)
Dyad Three	Child C1	3 (0-9)	7 (0-27)	0/0 (0/0)	.40/.10 (0-3/0-1)	1.63 (0-5)	4.20 (0-20)	.13/0 (0-1/0)	.60/.30 (0-3/0-1)
	Child C2	0 (0)	.20 (0-1)	0/0 (0/0)	0/0 (0/0)	0 (0)	.20 (0-1)	0/0 (0/0)	0/0 (0/0)

response and 2 action requests that do require a response. In intervention these rates decreased to an average of 2 and 1 respectively. Child B2 averaged 3 action requests that do not require a response and 2 action requests that do require a response in the baseline phase. These remained relatively consistent in the intervention phase at 2 and 2. In Dyad Three, Child C1 increased his use of both types action requests from baseline to intervention though his average in intervention still remained at one per session. Child C2 did not use this type of requesting behavior at all in baseline or in intervention.

Overall, there were small increases in the use of action requests that did not require a response for Child A2, and Child C1. These two children also showed modest increases in action requests that did require a response. Their partners, Child A1 and Child C2 remained at baseline levels or in the case of A1 showed a slight decrease in action requests that that did not require a response. The children in Dyad Two had a small decrease of use for both categories of action requests when the intervention was introduced.

*Other Verbal Behavior*

Another category of child behaviors measured in the intervention was Verbal Other that con-

tained all child statements that could not be considered descriptives or requests. Of the thirteen possible Verbal Other categories only four occurred with enough frequency to warrant discussion here. These were the codes for repeat child, play verbalizations, play noises, and off camera. Table 5 displays the average baseline and intervention levels of verbal others by category. Average repeat child codes for Dyad One decreased in intervention for Child A1 and increased for Child A2. Both children in Dyad Two (B1, B2) decreased their average repetitive talking in intervention. In Dyad Three, both children increased their average repetitive talking in the intervention phase.

Average use of play verbalizations during intervention decreased for both children in Dyad One. The children in Dyad Two and Dyad Three all showed decreases in average play verbalizations once the intervention was introduced. Average play noises increased during intervention for both children in Dyad One and also for one child in Dyad Two (Child B1). The remaining children (Child B1, Child C1, Child C2) showed decreased average play noises during intervention.

Off camera comments and requests increased from baseline levels for both children in Dyad One (Child A1, Child A2) and decreased for both children in Dyad Two (Child B1, Child B2). The children in Dyad three

**TABLE 5**  
**Average Number of Verbal Others by Category Used During Baseline and Intervention**

Dyad	Subject	Average Repeat Child		Average Play Verbalization		Average Play Noises		Average Off Camera	
		Baseline	Intervention	Baseline	Intervention	Baseline	Intervention	Baseline	Intervention
		(Range)	(Range)	(Range)	(Range)	(Range)	(Range)	(Range)	(Range)
Dyad One	Child A1	.80 (0-3)	.17 (0-1)	1 (0-3)	0 (0)	.20 (0-1)	.75 (0-7)	.20 (0-1)	.67 (0-4)
	Child A2	.80 (0-2)	1.08 (0-6)	.20 (0-1)	1.08 (0-12)	1.60 (0-3)	1.83 (0-4)	3.20 (0-8)	7 (0-15)
Dyad Two	Child B1	14 (0-1)	0 (0)	3.14 (0-13)	1.17 (0-3)	1.14 (0-7)	2.75 (0-13)	8.57 (1-23)	4.25 (0-16)
	Child B2	3.29 (0-10)	.33 (0-1)	.86 (0-4)	.08 (0-1)	1.43 (0-8)	.17 (0-2)	14.29 (1-45)	6.83 (1-12)
Dyad Three	Child C1	.13 (0-1)	2.30 (0-7)	.63 (0-5)	.50 (0-2)	2.13 (0-13)	.50 (0-2)	.50 (0-3)	1.6 (0-5)
	Child C2	.25 (0-1)	.60 (0-4)	.38 (0-3)	0 (0)	1.75 (0-7)	.30 (0-2)	.75 (0-4)	.30 (0-2)

were split, with Child C1 displaying an increase in the use of off camera comments and requests and Child C2 decreasing in the use of these two behaviors.

### Language Diversity and Complexity

To determine the effect that the intervention had on language diversity, the following components were measured: Mean Length of Utterance (MLU), total words used, vocabulary diversity, and number of four word utterances.

*Mean length of utterance.* Five children showed a gain in MLU from baseline to intervention. In Dyad One, Child A1 displayed a small decrease from a baseline average of 2.1 to an intervention average of 1.9. Child A2 displayed an increase from 2.2 to 2.4. Dyad Two children also showed a gain in MLU from baseline to intervention with Child B1 moving from 3.8 to 4.0 and Child B2 showing an increase from 2.8 to 3.4. Child C1 had one of the greatest gains in MLU, moving from 2.1 in

baseline to 2.8 in intervention. Finally, Child C2 also showed a higher MLU in intervention moving from a baseline average of 1.5 to an intervention average of 1.8.

*Total words used.* Total number of words, different words used, and number of four or more utterances used by each child was also measured and is displayed in Table 6. Total number of words used increased for both children in Dyad One with Child A1 increasing from 23 to 41 and Child A2 increasing from 40 to 109. Dyad Two was split as Child B1 increased total words used from a baseline average of 201 to an intervention average at 263 and Child B2 remained relatively constant with a baseline average of 102 and an intervention average of 98. In Dyad Three both children showed an increase in total words used. Child C1 moved from a baseline average of 38 to an intervention of 113 and Child C2 increased from a baseline average of 14 to an intervention average of 36. Five children showed an increase in total words used from

**TABLE 6**

**Average Total Words, Average Vocabulary Diversity, and Average Number of Utterances with Four or More Words Used in Baseline and Intervention Phases**

Participant	Total Words Used		Vocabulary Diversity		Four or More Utterances	
	Baseline (Range)	Intervention (Range)	Baseline (Range)	Intervention (Range)	Baseline (Range)	Intervention (Range)
Dyad One						
Child A1	23 (4–66)	41.08 (13–103)	8 (4–15)	15.83 (8–27)	1.63 (.22–4.4)	1.86 (1.3–3.25)
Child A2	39.60 (22–65)	108.91 (48–169)	20.40 (12–31)	46.92 (27–71)	2.58 (2–3.61)	3.78 (2–6.17)
Dyad Two						
Child B1	201.14 (49–327)	262.75 (109–366)	79.71 (34–113)	96.58 (57–131)	8.01 (7.6–12.06)	7.80 (3.41–12.92)
Child B2	102.29 (17–226)	98.92 (45–138)	34.57 (7–54)	39.75 (27–60)	4.03 (1.67–6.57)	3.57 (2.6–5.15)
Dyad Three						
Child C1	37.63 (4–84)	113.10 (63–137)	14.13 (0–33)	35.50 (24–48)	4.76 (0–11.57)	4.93 (3.21–6.57)
Child C2	14 (2–38)	35.5 (5–79)	6.13 (1–17)	14.80 (4–35)	2.17 (.22–4.75)	2.05 (.83–2.64)

baseline to intervention (Children A1, A2, B1, C1, and C2) while one child remained stable in both conditions (Child B2).

*Vocabulary diversity.* All children increased the number of different words used from baseline to intervention. Both children in Dyad One roughly doubled their baseline averages in the intervention phase, with Child A1 increasing from 8 to 16 and Child A2 increasing from 20 to 47. In Dyad Two, Child B1 increased the use of number of words from baseline, averaging 80 words to an intervention average of 97. Child B2 also had increased from 35 to 40. Children in Dyad Three displayed more than double the amount of different words used in baseline when they were in the intervention phase. Child C1 increased from 14 to 36 and Child C2 increased from 6 to 15.

*Four or more utterances.* This category counts all utterances with a length of four or more words. Child A1 and Child A2 from Dyad One both displayed stable levels of four plus utterances from baseline to intervention. Child A1 had a baseline and intervention phase average of 2. Child A2 had a baseline average of 3 and an intervention average of 4. Both children in Dyad Two displayed stable levels of four plus utterances with Child B1 averaging 8 in baseline and intervention and Child B2 averaging 4. Dyad Three also displayed stability in this category with both children averaging the same in baseline as in intervention. Child C1 averaged 5 and Child C2 averaged 2.

#### *Interventionists Behaviors*

*Redirect attention to a peer.* During the course of the intervention, the interventionist provided varying levels of support to different dyads depending on need. In the first category examined, redirect to a peer (reminding the child to talk to a peer vs. the interventionist e.g., "Tell Sophie" or to play with a peer "Give Herb some fruit"), the interventionist gave children in Dyad One an average of 7 redirects to a peer. Children in Dyad Two received an average of 12 redirects to a peer and children in Dyad Three received an average of 5 redirects to a peer.

*Redirect attention to a play area.* Average number of times the interventionist redi-

rected a child back to the play area was one of the least frequently occurring interventionist behaviors. Number of redirects to a play area was about 1 for Dyad One, less than one for Dyad Two, and 1 for Dyad Three.

*Redirect attention to a toy.* The interventionist's application of redirecting attention to a toy was consistent throughout all three dyads. Children in Dyads One and Two received an average of 3 redirects to a toy, while children in Dyad Three averaged 4 redirects to a toy.

*Verbal directives.* Amount of verbal directives given to each dyad varied. Dyad One received the greatest amount of verbal directives with an average of 5. Dyad Two averaged 1 verbal directive per session. Dyad Three received an average of 2 verbal directives per session.

*Reflective statements.* Number of reflective statements the interventionist made to different dyads varied greatly and ranged from 0 to 23. The interventionist provided Dyad One with an average of 7 reflective statements per session. Dyad Two was the recipient of the lowest amount of reflective statements, with an average of 3. The highest level of interventionist support in the form of the reflective statements was given to Dyad Three, with an average of 12.

#### *Changes in Receptive and Expressive Vocabulary*

Prior to acceptance in the study each child was given the PPVT-III (Dunn & Dunn, 1997) and the EVT (Williams, 1997). Upon completion of the intervention sessions, each test was re-administered. Approximately three months separated test administrations. Table 7 displays pre and post scores for the PPVT-III and EVT. On the PPVT-III, five children displayed an increase in raw score from pre to post test (Children A1, A2, B1, C1, and C2). Most gains in age equivalent were between the 0-3 month range, but Child B1 displayed an increase of eight months. Only Child B2 obtained a lower raw score and age equivalent in post testing. Expressive Vocabulary Test raw scores and age equivalents increased for four children (Child A1, Child A2, Child B1, and Child C1). Increases in age equivalent ranged from 2-9 months with children B1 and C1 increasing 5 and 9 months respectively. Child B2 and Child C2 showed decreases in post test scores.

**TABLE 7**

**Pre and Post Scores for the Peabody Picture Vocabulary Test-III and the Expressive Vocabulary Test**

Participant	Pretest Age Equivalent Raw and Standard Score		Posttest Age Equivalent Raw and Standard Score	
	PPVT	EVT	PPVT	EVT
Child A1	<1-09 R = 13, S = 40	2-01 R = 25, S = 40	<1-09 R = 14, S = 40	2-03 R = 26, S = 40
Child A2	<1-09 R = 17, S = 42	2-08 R = 30, S = 42	<1-09 R = 18, S = 42	2-11 R = 32, S = 43
Child B1	3-03 R = 40, S = 60	5-01 R = 50, S = 82	3-11 R = 49, S = 64	5-10 R = 57, S = 86
Child B2	3-01 R = 38, S = 45	4-05 R = 44, S = 54	2-11 R = 36, S = 41	3-11 R = 40, S = 44
Child C1	3-00 R = 37, S = 52	2-07 R = 29, S = 40	3-01 R = 38, S = 53	3-0 R = 33, S = 40
Child C2	2-05 R = 30, S = 40	3-07 R = 37, S = 40	2-08 R = 33, S = 40	3-02 R = 34, S = 40

**Discussion**

The purpose of this study was to examine effects of a social-communication intervention on the language and social interaction skills of children with mild to moderate autism. A multiple baseline design across three dyads was used and uniquely provided intervention to two children with autism at the same time. Results indicated the intervention was successful in increasing the social-communicative behavior of children with autism.

As noted previously, most children with autism have difficulty with the development of spoken language (Shriberg, Paul, & McSweeney, 2001), and may prefer to spend their time engaged in solitary play (Volkmar, Carter, Grossman, & Klin, 1997). During the baseline phase of this study, four of the six children (Children A1, A2, C1, and C2) showed very little interest in their peer, had little interaction with their peer, and directed little language towards that peer. Only the children in Dyad Two made any attempts at interactive communication. Once the intervention was introduced, increases were seen in peer-directed language as well as language diversity and complexity across all three dyads. Differences in pre and post language assessments were also observed.

Some conclusions can be drawn from this study. First, the intervention was effective in increasing the use of social communicative behaviors such as peer-directed commenting. During the intervention all children displayed increased levels of commenting. In fact, children in Dyad One (Child A1 and Child A2) and Dyad Three (Child C1 and Child C2)

more than tripled their average rate of total descriptives from the baseline to intervention phase. Dyad Two (Child B1 and Child B2) also showed a positive change from baseline to intervention and increased their use of descriptive statements.

Second, the intervention was successful in increasing the complexity of the children’s language. MLU is one way to gauge language complexity. Five of the six children showed a gain in MLU from baseline to intervention. During the intervention the children talked more and used more words per comment. Four children displayed their highest MLU in the intervention phase.

Third, the intervention was successful in increasing the diversity of language displayed by the children. All of the children showed an increase in vocabulary diversity from baseline to intervention. Furthermore, five of the six children also displayed an increase in total words used from baseline to intervention. Children were able to spontaneously label toys in intervention and used more vocabulary specific to the toys with which they were interacting. All children used words in intervention that had not been used in baseline.

Fourth, the interventionist was consistent in the amount of support provided to each Dyad. Overall, the amount of interventionist support given to the three dyads was consistent although types of interactions differed based on the needs of each group. For example, children in Dyad Two received an average of 12 redirects to a peer while children in Dyad’s One and Three received an average of 7 and 5 redirects respectively. The higher level of sup-

port provided to Dyad Two in this category can be explained by looking at Dyad Two's high rates of off camera comments during baseline and their subsequent reduction during intervention. Reminding students to talk to each other rather than to the interventionist contributed to much lower rates of off camera comments during intervention. Another example can be seen in Dyad 3, which received the most redirects to a toy and also redirects to a play area. The higher levels for these children can be explained because these children were more likely to wander out of the play area and less likely to spontaneously pick up a toy and start playing.

Fifth, pre and post scores on the PPVT-III and EVT showed some changes. Five children showed increases in raw scores from pre to post test on the PPVT-III. Four children showed increases in post test scores on the EVT. Changes in pre and post scores should be interpreted cautiously. The level of error involved in these tests can be relatively large and there is some overlap between performance changes and range of error. For example, look at Child B1's performance on the EVT. With a 90% confidence interval, his pretest standard score is 82 (75-91) and his post test is 86 (78-96). This indicates that there is significant overlap in his scores. These standardized measures, which give a good idea of the children's general ability levels, are not the best tools for evaluating the effectiveness of this intervention. This may be because they are too broad and do not directly assess the same areas targeted for intervention.

Sixth, the intervention method of providing intervention to two children with autism at the same time resulted in gains for both children in the dyad. Children were initially paired in dyads by language skills with a higher functioning child placed with a slightly less able partner. Both children in each dyad showed increased levels of commenting, gains in MLU, and greater diversity of language. The levels of gain were often comparable across dyads, however, none of the lower functioning children were able to match the frequency, complexity, or diversity of their partner. This should not be interpreted as a negative effect, it simply shows that both children in the dyad made gains, and the gap that existed between

them when they were paired together remained consistent.

The intervention did not increase requesting behaviors of any of the children included in the study. In fact Dyad Two displayed a slight decrease in requests. Children with autism have been shown to be particularly resistant to initializing verbal interactions such as question asking (Koegel, Camarata, Menchaca, & Koegel, 1998). Thus, failure to demonstrate changes in requesting behaviors is consistent with other studies exploring language intervention with this population.

Though requesting behaviors as a category did not show a substantial increase from baseline to intervention, a subset of this category, verbal signaling, increased for five of the six children. Verbal signaling, or using a child's name to gain the attention of a peer, is an important skill involved in joint attending. Lack of joint attention behaviors is a critical part of the social communication skill deficits present in children with autism (Mundy & Crowson, 1997). Though joint attending (in the form of eye contact or other nonverbal behaviors) was not measured specifically in this intervention, the improved ability of some children to look to other children to share enjoyment or information is notable.

Though asking questions is typically a skill that is absent in children with autism, children in Dyad Two both engaged in high levels of asking questions that really served more as conversation fillers and seemed an attempt to elicit attention, also a characteristic found in some children with autism (Hurtig, Ensrud, & Tomblin, 1982; Koegel et al., 1998). Child B1 added, "okay?" at the end of sentences and Child B2 made statements in the form of questions, (e.g., "Is this a dog?" instead of "This is a dog"). Interventionist behavior for this dyad focused on redirecting these questions to a peer, and in the intervention phase both children in Dyad Two reduced the amounts of these types of questions.

### *Limitations*

There were several limitations of this study. First, time constraints precluded the inclusion of a generalization phase or a maintenance probe. Absenteeism was frequently a problem and when one child was absent, the interven-

tion could not take place for a particular Dyad. Another time related problem involved the end of the school year. School policy prohibited interventions during year end testing. Additionally, the scheduling of end of the year field trips, assemblies, carnivals and book fairs meant that the hallway space used for interventions was unavailable. Finally, the last day of school arrived before there was time to implement a maintenance or generalization phase. It is unclear how well results would have been maintained or if they would have generalized to another environment.

Another limitation relates to external validity and generality across behavior change agents. There was one interventionist who completed all intervention sessions and it is possible that the same results may not be achievable by another person. To combat this issue, a fidelity of treatment checklist was completed by the interventionist and also by an independent coder. Results indicate the interventionist was consistent in implementing the procedures outlined in the training protocol, thus increasing the likelihood that others who followed the same protocol would achieve similar results. Even with this check on external validity, the fact that something else in the interventionist's repertoire could be responsible for the results can not be ruled out.

#### *Extension of Previous Literature*

Results of this study extend the previous literature in several ways. First, the results extend social cognitive intervention research for children with autism. Results indicate that a plan – play – report intervention is successful in increasing the social communication skills of children with autism.

Second, this study demonstrated that intervention can be provided to two children with autism at the same time and that both children in the dyad show measurable gains in peer-directed commenting, language diversity, and complexity. While studies have demonstrated that children with autism can improve their social-communication skills when given an intervention involving a child without disability, finding a child to train and use as an interventionist poses some problems. First, it takes time away from the typically developing child's education. Given the current

mandates of the No Child Left Behind Act, schools must be accountable for improving academic performance and teachers may be reluctant to release typically developing students for valuable classroom instruction. Furthermore, the use of nondisabled peers as confederates may demonstrate a difference from real world stimuli.

An additional finding of this study is that both children in same gender dyads and children in mixed gender dyads made progress. Previous studies had utilized only mixed gender dyads (Craig-Unkefer & Kaiser, 2002; 2003). Research has shown that social engagement may enhance language and cognitive development (Ingersoll, Schreibman, & Stahmer, 2001). The results of this study support the idea that social engagement may enhance language development as children displayed much higher levels of language in the intervention phase when they were actively engaged with their peers.

Results of this study do not imply that students with autism should be excluded from participation in general education environments or that they do not need interaction with typically developing peers in order to become successful social communicators. All children have the right to be educated in the least restrictive environment and to be included in general education classes where appropriate. Rather this study provides support for the idea that children may begin to practice needed social communication skills prior to entering into the general education classroom. No Child Left Behind mandates include a provision that grants teachers control over their classrooms and allows them to remove disruptive students. This may mean a re-examination of inclusion practices especially as they pertain to students with challenging behavior. Some children with autism display very challenging behaviors (e.g. aggression, self-injurious behavior) that impact efforts to involve them in the general education classroom.

Results of this intervention may also have practical applications. Results in this study were seen with just 10 minutes of intervention three times a week. Given the minimal time investment and that similar play themes are readily available most classrooms, it is likely that a teacher would easily be able to imple-

ment this intervention in a classroom during free time or recess. Furthermore, intervention sessions took place in a crowded and highly trafficked hallway, indicating that the intervention might also be successful when conducted in a classroom or recess setting.

Further research is needed to determine whether the results would generalize to classroom playtime and if the results would maintain over time. Past research has demonstrated that children with autism who displayed high intelligence (IQ above 60) and the development of speech before the age of five had the most favorable outcomes (Koegel, 2000). Additional research should also explore whether this intervention would be appropriate for children with more severe forms of autism.

The relationship between language development and the development of social skills is complex. There are many things we do not know about this relationship and research should focus on these areas. Results of this study suggest that significant changes can be accomplished with a social cognitive approach to intervention.

## References

- Alvarez, A., & Philips, A. (1998). The importance of play: A child psychotherapist's view. *Child Psychology and Psychiatry Review, 3*, 99–103.
- Brown, J., & Murray, D. (2001). Strategies for enhancing play skills for children with autism spectrum disorder. *Education and Training in Mental Retardation and Developmental Disabilities, 36*, 312–317.
- Charlop, M. H., Schreibman, L., & Tryon, A. S. (1983). Learning through observation: The effects of peer modeling on acquisition and generalization in autistic children. *Journal of Abnormal Child Psychology, 11*, 355–366.
- Coe, D., Matson, J., Fee, V., Manikam, R., & Linarello, C. (1990). Training nonverbal and verbal play skills to mentally retarded and autistic children. *Journal of Autism and Developmental Disorders, 20*, 177–187.
- Craig-Unkefer, L. A., Williams, C., & Kaiser, A. P. (1998). *The Peer Language and Behavior Code: Manual and coding protocol*. Unpublished manuscript, Vanderbilt University.
- Craig-Unkefer, L. A., & Kaiser, A. P. (2002). Improving the social communication skills of at risk preschool children in a play context. *Topics in Early Childhood Special Education, 22*(1), 3–13.
- Craig-Unkefer, L. A., & Kaiser, A. P. (2003). Increasing peer directed social communication skills of children enrolled in Head Start. *Journal of Early Intervention, 25*, 229–247.
- Delprato, D. J. (2001). Comparison of discrete-trial and normalized behavioral language interventions for young children with autism. *Journal of Autism and Developmental Disorders, 31*, 315–325.
- Dunn, L., & Dunn, L. (1997). *Peabody Picture Vocabulary Test Third Edition*. Circle Pines, NM: American Guidance Service.
- Freya, W. D. (1995). Social-communicative skills in high-functioning children with autism. In R. L. Koegel & L. K. Koegel (Eds.), *Teaching children with autism: Strategies for initiating positive interactions and improving learning opportunities* (pp. 53–66). Baltimore: Paul H. Brookes Publishing Co.
- Garfinkle, A. N., & Schwartz, I. S. (2002). Peer imitation: Increasing social interactions in children with autism and other developmental disabilities in inclusive preschool classrooms. *Topics in Early Childhood Special Education, 22*, 26–38.
- Garrison-Harrell, L., & Kamps, D. (1997). The effects of peer networks on social-communicative behaviors for students with autism. *Focus on Autism and Other Developmental Disabilities, 12*, 241–255.
- Goldstein, H., Kaczmarek, L., Pennington, R., & Shafer, K. (1992). Peer-mediated intervention: Attending to, commenting on, and acknowledging the behavior of preschoolers with autism. *Journal of Applied Behavior Analysis, 25*, 289–305.
- Gresham, F. M., & Elliott, S. N. (1993). Social skills intervention guide: Systematic approaches to social skills training. *Special Services in the Schools, 8*, 137–158.
- Hancock, T. B., & Kaiser, A. P. (2002). The effects of trainer-implemented enhanced milieu teaching on the social communication of children with autism. *Topics in Early Childhood Special Education, 22*, 39–54.
- Hurtig, R., Ensrud, S., & Tomblin, J. B. (1982). The communicative function of question production in autistic children. *Journal of Autism and Developmental Disorders, 12*, 57–69.
- Ingersoll, B., Schreibman, L., & Stahmer, A. (2001). Brief report: Differential treatment outcomes for children with autistics spectrum disorder based on level of peer social avoidance. *Journal of Autism and Developmental Disorders, 31*, 343–349.
- Kazdin, A. E. (1982). *Single case research designs*. New York: Oxford.
- Koegel, L. K. (2000). Interventions to facilitate communication in autism. *Journal of Autism and Developmental Disorders, 30*, 383–391.
- Koegel, L. K., Camarata, S. M., Menchaca, M. V., & Koegel, R. L. (1998). Setting generalization of

- question asking by children with autism. *American Journal on Mental Retardation*, 102, 346–357.
- Koegel, R. L., & Koegel, L. K. (1990). Extended reductions in stereotypic behavior of students with autism through a self-management package. *Journal of Applied Behavior Analysis*, 23, 119–127.
- Koegel, R. L., Koegel, L. K., & Schreibman, L. (1993). Assessing and training parents in teaching pivotal behaviors. In R. J. Prinze (Ed.), *Advances in behavioral assessment of children and families* (pp. 65–82). London: Jessica Kingsely.
- Kopp, J. (1988). Self-monitoring: A literature review of research and practice. *Social Work and Abstracts*, 24, 8–20.
- Ladd, G. W., & Mize, J. (1983). A cognitive-social learning model of social-skill training. *Psychological Review*, 90, 127–157.
- Laushey, K. M., & Heflin, L. J. (2000). Enhancing social skills of kindergarten children with autism through the training of multiple peers as tutors. *Journal of Autism and Developmental Disorders*, 30, 183–193.
- Loveland, K. A., & Tunali, B. (1991). Social scripts for conversational interactions in autism and Down syndrome. *Journal of Autism and Developmental Disorders*, 21, 177–186.
- Miller, J., & Chapman, R. (2000). *Systematic analysis of language transcripts*. Madison, WI: Language Analysis Laboratory.
- Mundy, P., & Crowson, M. (1997). Joint attention and early social communication: Implications for research on interventions with autism. *Journal of Autism and Developmental Disorders*, 27, 653–676.
- Oke, N. J., & Schreibman, L. (1990). Training social initiations to a high functioning autistic child: Assessment of a collateral behavior change and a generalization case study. *Journal of Autism and Developmental Disorders*, 20, 479–497.
- Pierce, K., & Schreibman, L. (1995). Increasing complex behavior in children with autism via peer implemented Pivotal Response Training. *Journal of Applied Behavior Analysis*, 28, 285–295.
- Roid, G. H., & Miller, L. J. (1997). *Leiter International Performance Scale-Revised*. Wooddale, IL: Stoelting Company.
- Sarokoff, R. A., Taylor, B. A., & Poulson, C. L. (2001). Teaching children with autism to engage in conversational exchanges: script fading with embedded textual stimuli. *Journal of Applied Behavior Analysis*, 34, 81–84.
- Shriberg, L. D., Paul, R., & McSweeney, J. L. (2001). Speech and prosody characteristics of adolescents and adults with high-functioning autism and asperger syndrome. *Journal of Speech, Language, and Hearing Research*, 44, 1097–1115.
- Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1985). *Vineland Adaptive Behavior Scales: Classroom Edition*. Circle Pines, MN: American Guidance Services.
- Stahmer, A. C., & Schreibman, L. (1992). Teaching children with autism appropriate play in unsupervised environments using a self-management package. *Journal of Applied Behavior Analysis*, 25, 447–459.
- Swaim, K. F., & Morgan, S. B. (2001). Children's attitudes and behavioral intentions toward a peer with autistic behaviors: Does a brief education intervention have an effect? *Journal of Autism and Developmental Disorders*, 31, 195–205.
- U. S. Department of Education. (2001). *To assure the free appropriate public education of all children with disabilities*. Washington, DC: Author.
- Volkmar, F., Carter, A., Grossman, J., & Klin, A. (1997). Social development in autism. In D. J. Cohen & F. K. Volkmar (Eds), *Handbook of autism and pervasive developmental disorders* (2<sup>nd</sup> ed., pp. 173–194). New York: Wiley and Sons.
- Williams, K. (1997). *Expressive Vocabulary Test*. Circle Pines, MN; American Guidance Service.
- Wolfberg, P. J., & Schuler, A. L. (1993). Integrated play groups: A model for the social and cognitive dimensions of play in children with autism. *Journal of Autism and Developmental Disorders*, 23, 467–489.
- Zanoli, K., Daggett, J., & Adams, T. (1996). Teaching preschool age autistic children to make spontaneous initiations to peers using priming. *Journal of Autism and Developmental Disorders*, 26, 407–422.
- Zanoli, K., & Daggett, J. (1998). The effects of reinforcement rate on the spontaneous social initiations of socially withdrawn preschoolers. *Journal of Applied Behavior Analysis*, 31, 117–125.