An Examination of the Effects of a Social Communication Intervention on the Play Behaviors of Children with Autism Spectrum Disorder

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Abstract: This study examined the effect of a social-communication intervention on the play behaviors of children with autism. Six children between the ages of five and eight participated in this study that employed a single-subject, multiple baseline design. Children recruited from an urban Midwestern public school system participated in an intervention that utilized a plan-play-report format. A post hoc analysis was conducted to determine the effect of the intervention on peer communication, play behaviors and joint attention to determine if these behaviors were impacted by the intervention even though they were not specifically targeted. Results indicated that children demonstrate increases in their rates of the above behaviors. Discussion of results in light of known research in autism is highlighted.

Play is a medium through which children first begin to explore their environment. Babies explore by grabbing and mouthing toys and as children grow and develop, they begin to imitate what they see around them (Berk, 2000). These early skills lead children to the all important development of play. Play is means through which children develop language, social interaction and even literacy skills (Bodrova & Leong, 2003; Guralnick & Neville, 1997). It is a means for children to learn about the customs and cultures that surround them (Goncu, 1999) and it helps them to make sense of what they see in their environment and allows them to reenact scenes from their everyday life that may be confusing (Alvarez & Philips, 1998). Most importantly, play provides a context through which children can practice interaction skills.

Children with autism have difficulty with play behaviors. Lack of make-believe or social-imitative play is one of the diagnostic criteria listed in the DSM-IV (American Psychiatric Association, 1994). Characteristically, children with autism play in unusual ways. They may prefer to play in isolation or to use objects in a manner in which they were not intended. For example, a child with autism may take a plastic dinosaur and flip it back in forth in front of his face, manipulating the tail rather than having the dinosaur chase other animals or eat vegetation from a plastic tree. There are several theories as to why play and social interactions are difficult for children with autism including problems with theory of mind, interfering stereotypies, and low language skills (Baker, Koegel, & Koegel, 1998; Baron-Cohen, Baldwin, & Crowson, 1997; Lord & Pickles, 1996).

Although children with autism do engage in play, spontaneous pretend play seems to be lacking and children instead may engage what is referred to as sensorimotor play (Libby, Powell, Messer & Jordan, 1998). This type of play, as opposed to play where children use objects as they are intended (functional play), is seen when children use toys in a way that disregards their function and is often repetitive in nature (Roger, Cook, & Meryl, 2005). For example, a child may take building blocks or cars and bang them together or line them up end to end instead of building things or racing the cars around the floor. Libby et al. (1998) suggest that the reason children with autism produce less functional play than typically developing children may be because they

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lack the underlying categorical and conceptual knowledge that makes these toys have a function in the first place. Therefore, it would make sense that their immature play would mirror that of an infant who has yet to build concepts with which to interact with the toys in a more sophisticated way.

Play and language are not isolated skills. Language levels and social communicative behaviors in children with autism are linked in several ways. Lord and Pickles (1996) found that children with autism who demonstrated very little language usage also had more pronounced deficits in play and social behaviors than children with autism who used phrases (here defined as three word utterances) or had a greater command of language use. These authors also found children with autism frequently displayed some of the hallmarks of the disorder regardless of language use. That is, problems with eye gaze, facial expression and attending were visible in children regardless of language level or use. These findings are consistent with other studies of this type.

Another reason children with autism may have difficulty with social interactions and play could result from the difficulty involved in simultaneously demonstrating two novel skills. In a study comparing the play behaviors of preschool children with and without pervasive developmental disorders, Pierce-Jordan and Lifter (2005) found that when children were engaged in emerging play or trying out new play skills that were difficult for them, they were less likely to be socially interactive with their peers. When the children were engaged in social interaction in these situations, the interactions were not likely to be coordinated. This finding was evident for all children in the study supporting the idea that combining social interaction and coordinating play may be too taxing when both are areas of need. Children may need to become competent in one area prior to development in the other.

Despite the aforementioned concerns, children with autism can learn needed social and play skills through peer-mediated sessions (Sawyer, Luiselli, Ricciardi, & Gower, 2005), typical peer models (Garfinkle & Schwartz, 2002), adult priming (Zanoli & Daggett, 1998), video modeling, and script fading (Sarokoff, Taylor, & Poulson, 2001) techniques.

Given the relationship between play and language in children with autism, this study examined whether an intervention which successfully increased peer-directed commenting, language complexity and diversity in dyads of children with autism (Loncola & Craig-Unkefer, 2005) also had an effect on play behaviors; specifically joint attention, talk with their play partner, and different developmental levels of play. This study is unique because two children with autism were paired together and provided the intervention at the same time. The following research questions were addressed in this inquiry: 1) What effect does a social communication intervention have on joint attention? 2) Were there changes in the amount of peer talk from baseline to intervention across participants? 3) What types of play behaviors did the participants engage in and were more interactive play behaviors observed from baseline to intervention?

Method

Participants

Six children between the ages of five and eight years-old participated in this study. To determine eligibility for participation, an initial screening assessment was completed by the classroom teachers. In order to participate in the study, a child needed to be between the ages of five- and eight-years-old, have a diagnosis of mild/moderate autism, and passed the Chicago Public Schools annual hearing assessment. Once a child met the initial criteria, they were further assessed on language and adaptive behavior functioning. The three criteria relative to language and adaptive behavior included: 1) a score of at least one standard deviation (SD) below the mean on measures of expressive and receptive vocabulary based on the Peabody Picture Vocabulary Test–III [PPVT-III] (Dunn & Dunn, 1997) and the Expressive Vocabulary Test [EVT] (Williams, 1997); 2) a score within two stan-
standard deviations of the mean in nonverbal cognitive ability as measured by the Leiter International Performance Scale-Revised (Roid & Miller, 1995); and 3) a deficit in at least one subscale measured by the Vineland Adaptive Behavior Scales: Classroom Edition (Sparrow, Balla, & Cicchetti, 1985).

Children were excluded from the study if they met one or more of the following exclusion criteria: 1) a diagnosed hearing impairment, 2) a diagnosis of severe/profound autism, 3) a primary diagnosis other than autism, 4) a secondary diagnosis of mental retardation, serious emotional disturbance, hearing loss, or low vision, 5) were under the age of five years, one month or over the age of eight years, 1 month, or 6) English was not their primary language. No participants were excluded based solely on sex, race, or ethnic group. Characteristics of the participants are described below.

Child A1 was a 6-year-old Hispanic girl with very low language and social skills and an average IQ. On the PPVT, her age equivalent was below 1-9 and on the EVT she scored an age equivalent of 2-1. She scored 2 SDs below the mean on the communication, daily living, and socialization sections of the Vineland Adaptive Behavior Scale. Her brief IQ as measured by the Leiter yielded a score of 85. Both Spanish and English were spoken in the child’s home and the teacher indicated that Child A1 understood and spoke both languages. During classroom activities, Child A1 needed frequent redirection to attend to tasks. In free play activities she would approach other children and take desired toys, but did not interact with other children or use spoken language despite a large, single word vocabulary. Teacher reports indicated that the child only used spoken language when prompted or very upset. Child A1 regularly attempted to run from the classroom and the child’s classroom door was gated at all times to prevent her from running from the room. She was included with the regular education kindergarten for physical education and library.

Child A2 was a 6-year-old Caucasian male with low language skills, an average IQ, and deficits in adaptive behavior. In tests of Expressive and Receptive vocabulary, Child A2 received age equivalent scores of below 1-9 and 2-8 respectively. According to the Vine-
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 phrased most spontaneous statements in the form of a question. For example, at snack time he would say “more cookies” and when he the teacher did not respond, he would say “I want more cookies, please.” When referring to a picture he drew, Child B2 would ask questions such as, “Is this a dragon?” rather than stating “This is a dragon.” Finally, Child B2 had many unintelligible verbal stereotypes and would often revert to clicking and squealing noises.

Child C1 was a 7-year-old Caucasian male. He spoke English at school and Polish at home and both of his parents were fluent in English. Child C1 had low language scores with age equivalents of 3-0 and 2-7 on the PPVT and the EVT, deficits in all areas of adaptive behavior, and an average IQ measured at 87. He was educated in a full day, self-contained autism classroom and was included with the first grade for physical education and music. Child C2 was heavily dependent on visual schedules for working and transitions and although Child C1 used language infrequently in social exchanges, he talked his way through all of the steps on his visual schedules. He also gave himself verbal reminders such as, “snack is finished, time for reading.” Child C1’s spontaneous language was very repetitive and repeatedly used a few scripted phrases. He seemed very interested in playing with other children, but did not seem to know what to communicate to peers.

Child C2 was a 7-year-old boy of Hispanic descent who spoke only English. He had low language scores, deficits in adaptive behavior, and a low-average IQ. On the PPVT, Child C2 had an age equivalent of 2-5 and the EVT his age-equivalent was 3-7. He displayed deficits in areas of communication, daily living, and socialization on the Vineland and his brief IQ was 70. He was placed in a full day, self-contained autism classroom and was included with the regular education first grade for Library, Physical Education, Music, and Computer. Child C2 had a full time assistant assigned to him and, prior to the beginning of this study, Child C2 had been removed 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 typically used only 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. All children in the study received related services for Speech and Language and Social Work.

Children participants were paired into three dyads; one mixed gender dyad and two same gender dyads. As autism affects more boys then 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, although all study participants showed significant delays in expressive and receptive vocabulary.

Setting

The study was conducted at a public elementary school located in a large Midwestern city. The school’s population consisted of preschool through 8th grade children and included programs for both general education and special education students. Special education programs at the school served students with visual impairments, children with physical disabilities, and housed self-contained programs for students with autism. Demographic information for the school indicates the racial/ethnic breakdown of the school was 53.4% Caucasian, 27% Hispanic, 10.5% Asian/Pacific Islander, 5.4% African American, and 3.6% Native American. Forty-six percent of the students enrolled at the school at the time of the study had low-income status and 15.3% were considered Limited English Proficient (LEP) and qualified for transitional bilingual programs.

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. These dividers were placed in an
L-shape against a wall sectioning off a “U” shaped space that measured 8 feet by 8 feet 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 (e.g., grocery store, kitchen) and role playing materials (e.g., doctor, veterinarian). Manipulative items such as blocks and cars were also used. Materials were grouped into seven different play themes: Doctor, Vet/Zoo, Construction, Grocery Store, Farm, Housekeeping/Kitchen, and Airport. The doctor play theme consisted of white shirts, play doctor kits, an x-ray machine, ace bandages, and telephones. The vet/zoo theme had stuffed animals, blocks for building the zoo walls, a veterinarian kit, and assorted vegetables for feeding the animals. When playing with the construction theme, children had access to plastic construction hats, a plastic tool kit, plastic blocks, screws, bolts, dump trucks and assorted dolls. Grocery store items were comprised of a cash register, wallets, pretend money, plastic and boxed food, grocery cart, and McDonald’s® play food. In the Farm theme, children could play with a Fischer Price® barn, plastic vegetables, straw hats and bandanas. Housekeeping/kitchen, the most popular theme with the children, had a plastic sink and stove, plastic dishes, utensils, and cups, a microwave, assorted foods, a vacuum, feather dusters, and phones. Finally, the airport theme contained an airport block set, airplanes, helicopters, trucks, and emergency vehicles. All themes except the farm and veterinarian contained assorted dolls.

Experimental Design

This study utilized a multiple baseline design 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 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. The two experimental conditions for this study were baseline and intervention. All children received at least five baseline sessions and between 10 and 12 intervention sessions.

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 told the children to play with the toys arranged on the carpeted floor or table. The toys consisted of a play theme randomly selected from those discussed above and rotated throughout the baseline sessions. One play theme was randomly chosen to start the baseline sessions and then taken out of the next random selection. Selection continued in this manner 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 the 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 described the toys, how to play with toys, how to share toys, and how to get your partner’s attention specific to a play theme designated for the session. Children were encouraged to contribute to this discussion. The same play
themes used in the baseline sessions were used in the intervention sessions.

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, but redirected children when they were engaged in inappropriate or isolating behaviors. 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. In this phase of the intervention, the Interventionist reentered the play area and sat near the children. The Interventionist and the children discussed the play that occurred in the preceding component including what the children had played with and what scenarios they had enacted. If the children were not forthcoming with specifics, the Interventionist reviewed what was done, thanked the children for participation, and gave verbal praise for language and play skills. A complete description of the intervention is provided Loncola and Craig-Unkefer (2005).

Data collection. Baseline and intervention sessions were videotaped by the Interventionist using a Sony DCR-TRV17 digital camcorder. These sessions were then transferred to DVD for coding. In order to determine if there were changes across measures as a result of the intervention, the last three baseline and intervention sessions were coded utilizing the criteria below. This procedure is consistent with those established by Craig-Unkefer and Kaiser (2003).

Measures

Different types of children’s play were coded according to the Peer Play Code (Craig-Unkefer et al., 1998). The Play Code was developed from Parten (1932) and Rubin (1989). Six categories of play were observed: aggression, solitary, onlooker, parallel play, associative play, and cooperative play. The coding categories can be seen in Table 1. A graduate student in Educational Psychology completed all of the coding. Coding was completed with pen and paper and the coder watched 15-s of video and then recorded for 5-s. Categories were assigned when the coder noted 8-s of continuous play behavior thus excluding the possibility that more than one type of play could be observed in any one interval. Each interval was also coded for peer talk if the child talked to their peer for at least 10-s of the interval. Given the nature of autism, codes were modified to take into account both echolalia, stimming and singing. Echolalia and singing were coded as no peer talk and stimming behaviors were coded as solitary play.

In addition, the intervals that children attended to their play partner were also coded. Joint attention was coded when both peers were observing or attention is focused in same
direction for at least 5 seconds. Commencement of joint attention starts once a peer has requested the attention of the other peer using behaviors such as pointing, showing or verbal comments (e.g. “Look at the ball”). Other behaviors indicating joint attention include self-referential. Joint attending is a dyadic code and both peers need to be engaged in the action in order for the behavior to be coded as occurring.

Results

The purpose of the study was to determine the effects of an intervention to promote social communication on the play behaviors of six children diagnosed with Autism Spectrum Disorder. Behaviors associated with play were measured to determine if there were changes as a result of participating in the intervention and describe those changes that are specific to appropriate play interactions. Those behaviors that were measured included: types of play children engaged in, amount of joint attention, and amount of peer talk. The interobserver agreement of the play behaviors is also reported.

TABLE 1
Coding definitions for Play Behaviors

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggression</td>
<td>Aggression refers to non playful physical with another child. It is almost antagonistic in nature. Acts of aggression include hitting, kicking, and grabbing.</td>
</tr>
<tr>
<td>Solitary</td>
<td>The child is within the physical vicinity of peer, the child does not interact with the peer for at least 8 seconds. Solitary play is coded when the child is isolated from the play area or wanders without noticing the peer. Code solitary when the child is obtaining visual or auditory information form an object (physical manipulation of component of a toy—rolling a wheel on a car).</td>
</tr>
<tr>
<td>Onlooker</td>
<td>The child is watching the peer for at least 10 seconds but does not engage in play or interactive activity. The child may talk to the peer (offer suggestions or asking questions) but does not overtly enter into the play activity of the peer. In this play category the child is definitely observing the peer.</td>
</tr>
<tr>
<td>Parallel Play</td>
<td>The child plays independently but with toys that will bring him or her closer to the peer. The child plays beside but not with the peer. The child plays with toys as he/she sees it, and does not seem to influence or modify the activity of the peer.</td>
</tr>
<tr>
<td>Associate Play</td>
<td>The child plays with the peer. There is an exchange of materials. A conversational; exchange occurs about common activity which has the potential to bring the other peer into the activity, but each child engages as he/she wishes. There is no division of labor and no organization of the activity towards the development or creation of a mutually contrived project or play theme.</td>
</tr>
<tr>
<td>Cooperative Play</td>
<td>Both children engage in an organized and purposeful activity. The child directs the activities of other peers the play interaction for some purpose necessitating a division of labor and an organization of roles. The play is goal driven so that efforts of one peer are supplemented by those of the other peer.</td>
</tr>
<tr>
<td>Peer Talk</td>
<td>Child is talking for at least 10 seconds of the interval to their peer. Peer talk does not include echolalic behavior or singing.</td>
</tr>
<tr>
<td>Joint Attention</td>
<td>Both peers are observing the same object or attention is focused in the same direction for at least 5 seconds. The commencement of joint attention starts after a peer has requested the attention of the other peer either by pointing, showing or a verbal comment.</td>
</tr>
</tbody>
</table>

Interobserver Agreement of Play Behaviors

Reliability data were collected on 20% of the play sessions using the Peer Play Code (Parten, 1932; Rubin, 1989). The sessions were independently viewed and coded by the second author. Interobserver reliability was assessed using an exact agreement formula in
which the total number of agreements was divided by the total number of agreements plus disagreements and multiplied by 100. Reliability was assessed separately for play and joint attention. The overall IOA for peer play was 90%. The range for all sessions was 70–98%. The overall reliability for joint attention was 84% with a range of 65–97%.

Amount of Joint Attention between Peers

The mean percentage of intervals of joint attention displayed by dyads is presented in Figure 1. Dyad Two attended to each other more than their peers in the other dyads having the greatest number of intervals of joint attention in the baseline with approximately 5% increase in the average number of intervals from baseline to intervention. Dyad Three also demonstrated gains from baseline to intervention with an average 10% of the intervals during baseline to 15% of the intervals during intervention. Dyad One remained stable across phases with a minimal increase of 1% on average of joint attending from baseline to intervention.

Intervals of Peer Talk

The mean percentage of peer talk is displayed in Figure 2. All dyads had increases from baseline to intervention. Dyad Two had the greatest gains with an average of 50% of the intervals where the children engaged in talk during baseline to 75% of the intervals in the intervention phase. Dyad Two averaged 7% of the intervals in peer talk with increases to an average of 24% during the intervention phase.

Dyad One averaged 20% of their sessions in peer talk during the baseline phase. During the intervention phase, they average 39% of intervals of peer talk.

Peer Play

Individual play behaviors as well as categories of play behaviors are reported. Four of the six children (A1, A2, C1, C2) increased the percentage of intervals they spent in solitary or onlooker play from baseline to intervention. Only the two children in Dyad Two decreased solitary and onlooker behaviors from baseline to intervention. Given the increases in solitary and onlooker behaviors for the four children, there were also decreases in parallel and associative play behaviors from baseline to intervention. Only the children in Dyad Two (B1 and B2) had a mean increase of 3.8 mean intervals to 6.6 mean intervals engaged in more complex play.

To characterize the play of the dyads beyond discrete behaviors, the six individual play behaviors were grouped into three play classes. Isolate play is the combination of aggressive and solitary play. Independent play is a combination of onlooker and parallel play. Interactive play is a combination of cooperative and associative play. Table 2 displays the mean percentage of intervals of these play categories for the three dyads. Dyad Two decreased in isolate play and increased in independent play primarily with minimal increases in interactive play from baseline to intervention. Dyad Three decreased in the average number of intervals of isolate play and conversely increased in independent play with no
occurrence of interactive play in either phase. Dyad One increased in their isolate play behaviors and decreased in their independent play behaviors on average from baseline to intervention. There was no change in interactive play across the phases.

Discussion

The purpose of this study was to determine how an intervention to promote social communication skills with children with Autism Spectrum Disorder changed the play skills of the participants. In order to determine if the intervention did affect the play of the participants, the amount of joint attention, talk, and specific play behaviors were measured. Results from this study indicated that a social communication intervention can increase joint attention in children with autism. Children increased the amount of intervals they engaged in peer talk. Increases in interactive play were also seen from baseline to intervention.

One of the primary characteristics of this population is the absence of joint attending to others. Given the relationship between joint attention and expressive language development (Mundy et al., 1990), the need to promote this skill increases the likelihood that language development may occur. For the children in this study there were increases in joint attending, particularly for Dyads Two and Three. Conversely, there were increases in peer talk for all three dyads. Changes in play behaviors were also apparent.

Several conclusions can be drawn from the results of this investigation. First, the children in this study all engaged in joint attending. Two of the dyads (Dyads Two and Three) increased their levels of joint attending from baseline to intervention while one remained stable (Dyad One). Joint attention has been defined as the ability of two children to coordinate social activity and engage with another partner, and is often measured via responses to shifts in eye gaze and pointing (Dawson et al., 2002; Mundy et al., 1996). In this study, joint attention was coded when both children focused on the same object or activity for at least 5-s. The fact that all children displayed joint attending behaviors during baseline and increases in joint attending for two of the dyads occurred is notable, especially given that both children in the dyad were diagnosed with autism. Jones and Carr (2004), in an extensive review of the literature on joint attending, suggested that changes in joint attention will only be “modestly improved by relatively simple manipulations of social and play contexts.” (p. 17). The results of this study do support previous findings, but with an added dimension. While most changes in joint attention have been seen in adult directed interactions, the findings of the present study suggest

| TABLE 2 | Mean Percentage of Intervals of Isolate, Independent, and Interactive Play Behaviors During Pre-Intervention and Post-Intervention Sessions By Dyad |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | Pre-Intervention | Post-Intervention |                |                |                |                |                |
|                | Mean            | Range           | Mean            | Range           | Mean            | Range           |
| Dyad 1 Isolate| 89.9            | 85.4 – 93.7     | 93.9            | 91.1 – 96.6     | Dyad 2 Isolate | 83.9            | 78 – 89.5       |
|                | 6.1             | 5.5 – 13.6      | 3.3             | 3.3 – 8.8       |                | 5.6 – 18        |
|                | 0               | 0 – 1           | 0               | 0               |                | 2.9             |
| Independent   | 13.3            | 6.6 – 18        | 21.1            | 14.4 – 27.7     | Interactive   | 0 – 2.8         |
|                | 2.9             | 0 – 3.3         | 3.3             | 0 – 3.3         |                | 3 – 5.2         |
|                | 4.7             | 3 – 5.2         | 8.8             | 5.5 – 12.0      |                | 0               |
| Independent   | 4.7             | 3 – 5.2         | 8.8             | 5.5 – 12.0      |                | 0               |
| Interactive   | 0               | 0               | 0               | 0               |                | 0               |

| TABLE 3 | Mean Percentage of Intervals of Peer Talk During Pre-Intervention and Post-Intervention Sessions By Dyad |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | Pre-Intervention | Post-Intervention |                |                |                |                |
|                | Mean            | Mean            | Mean            | Mean            | Mean            | Mean            |
| Dyad 1         | 20.7            | 38.9            | Dyad 2          | 50.6            | 75.4            |
| Dyad 3         | 7.2             | 24.2            |
that these changes may also be observed in child-directed interactions even when both children have autism.

Changes in the amount of time children spent talking to each other were evident in all three dyads. These increases occurred across dyads and indicate that all children were more engaged in social conversation during the intervention period. While types of language use and skill level among the different children is not analyzed in this study, a previous study (Loncola & Craig-Unkefer, 2005) indicated that not all children conversed at the same level. Children in Dyads One and Three demonstrated very basic levels of conversation while children in Dyad Two had more advanced levels of conversation and the greatest diversity in word use. These differences may be helpful in understanding the data related to play behaviors and will be discussed momentarily.

All dyads displayed changes in the types of play they engaged in from baseline to intervention, though only one of the dyads (Dyad Two) displayed increases in more advanced and interactive play behaviors. Dyads One and Three displayed increases in more isolate play during the intervention. This information is best interpreted in light of the changes in language for the children as initially discussed in Loncola and Craig-Unkefer (2005).

Results from Loncola and Craig-Unkefer (2005) indicated that the intervention was successful in increasing social communicative behaviors such as commenting in all children. Further, increases were also seen in language complexity and diversity. The children in Dyads One and Three initially used the least amount of language, while the children in Dyad Two had more variation and used more complex language. A comparison of the results of both analyses revealed that during intervention sessions, the children in Dyads One and Three made gains in language, but increased the amount of isolated play. That is, they were talking to each other, but not playing together. Children in Dyad Two both increased the amount of language they used and were able to engage in more interactive play. The differences between the dyads may be explained by their language levels at the onset of the study. The children in Dyad Two were already relatively comfortable using language in social settings, thus they were able to simultaneously use language and engage in play. The children in Dyads One and Three may have concentrated on improving language and were not able to simultaneously use new language and engage in more interactive forms of play.

Results of a study conducted by Peirce-Jordan and Lifter (2005) substantiates this finding indicating that children with autism may have difficulty engaging in social and communicative actions at the same time because they compete for the same cognitive resources. A child who is learning language may not be able to also utilize higher levels of play. Likewise, a child engaging in more sophisticated play may not be able to use more sophisticated language during that play session. Given these findings, it is understandable that the children in Dyad Two might increase the amount of interactive play as they were learning new language. Play was not a drain on cognitive resources because they already had some skill in that area. On the other hand, the children in Dyads One and Three were not able to sustain more advanced levels of play because there cognitive resources may have been dedicated to absorbing and practicing new attention and language skills. These children reverted to a more comfortable level of isolate play as they used new language.

Another possible explanation for the increases in isolate play observed in Dyads One and Three is related to the coding scheme. The coding method may not have been sensitive enough to changes given the requirement during 15-s intervals of 8-s of continuous behavior within that interval to constitute the execution of the target behavior. Koegel, Werner, Vismara, and Koegel (2005) used 30 second intervals for analyzing play interactions between children with autism and typical peers. Extending the intervals from 15-s to 30-s may have produced different results. Additional time may have been needed to allow for the participants to gain momentum and sustain the play behavior.

Limitations

This study had several limitations related to time constraints, external validity and generalization of behavior change. Because the in-
tervention was conducted near the end of the academic year, there was not time to conduct a maintenance or generalization probe. Further one interventionist conducted all the sessions and though fidelity of treatment was performed, it is possible that there was something outside of the protocol and in the interventionist’s repertoire that contributed to the results. Finally, for the purposes of coding, joint attention was operationally defined as two children focused on the same object or activity for at least 5-s. Limitations in camera angle precluded the use of eye gaze or direct eye contact as a measure of joint attending which would have allowed for a more comprehensive look at this area. Additional detail on the limitations of this study, can be found in Loncola and Unkefer (2005).

Conclusion
This study contributes to the field in several unique ways. First, it establishes that, when paired together, children with autism can engage in social behaviors with minimal prompting. Second, this research indicates that promotion of social communication skills can also result in positive changes in other areas such as joint attention and play complexity. Third, the authors have identified an effective intervention technique that has multiple opportunities for children to practice skills, is peer mediated with intermittent adult support and occurs in a naturalistic environment. Finally, this study adheres to the Division for Early Childhood of the Council for Exceptional Children (DEC) recommended practices. Specifically, by employing single subject methodology, there was the opportunity to systematically individualize the intervention for each of the participants; taking into consideration a child’s current behavior and individualizing and adapting practices to meet the child’s changing needs (Wolery, 2000).

References


Received: 24 September 2008
Initial Acceptance: 20 November 2008
Final Acceptance: 19 September 2009

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