Using Stimulus Pairing to Enhance Observational Learning of Peer Initiations for a Child with Autism in a Community Play Group

Vanessa A. Silla[1]

Mary J. Vesloski[2]

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Worcester, Massachusetts

[1] Education Department
University of Scranton
Jefferson Avenue
Scranton, PA 18510

[2] Autism Behavioral Services, Inc.
620 Wyoming Avenue
West Pittston, PA 18643

Abstract

The importance of play in child development and the barriers that individuals with autism face regarding play skills requires us to identify specific interventions which can assist in the development of such skills. Stimulus pairing, which has been documented as a procedure by which an event comes to elicit a response by being paired with an event that elicits that response (Chance, 1998), may be of benefit during play activities. This study attempted to evaluate the influence of the use of Stimulus pairing procedures to pair typical children with preferred tangibles and activities. This study also sought to identify whether observational learning of play skills can be enhanced through the use of such pairing procedures. Stimulus pairing was applied in this study by pairing typically developing peers with preferred tangibles (edibles, toys, etc.) and activities. Following preference assessments, each child with autism was paired with a typically developing peer who possessed primary reinforcers. Data was collected on the number and quality of social interactions between the children with autism and their peers across a series of ten 90-minute play sessions. The duration of time spent on activities initiated by children with autism was also examined. Findings for one particular play group participant, Caitlyn, were analyzed to see if there were any significant changes in her peer play behaviors. Although Caitlyn did not engage in any independent peer approaches of requests during the first nine sessions of the play group, on the tenth session she spent nearly half the play group time engaged with peers in activities she initiated. Implications of the findings and recommendations for future research are discussed.

Purpose of the Study

This study attempted to evaluate the influence of the use of Stimulus pairing procedures to pair typical children with preferred tangibles and activities. This study also sought to identify whether observational learning of play skills can be enhanced through the use of such pairing procedures.

The Role of Play in Development

Play skills are important in the development of social competence (Stone & La Greca, 1986) by allowing children to explore social roles and rules while working through social conflicts (Sroufe, Cooper, & DeHart, 1996). Although typically developing children naturally engage in play they find enjoyable, children with autism do not engage in play activities which stimulate their development (Lantz, Nelson, & Loftin, 2004). Their delayed communication skills (Guralnick, 1990), difficulty identifying and understanding others thoughts and feelings (Baron-Cohen, 1995) and restricted interests (Lantz, Nelson, & Loftin, 2004) impede their social play skills. Additionally, typically developing peers may not choose to interact with their peers with autism (Guralnick, Connor, Hammond, Gottman, & Kinnish, 1995) or may need training in order to engage them in purposeful play (Myles, Simpson, Ornsbee, & Erikson, 1993).

Play is a primary childhood occupation (Case-Smith & Miller Kuhaneck, 2008) which has been used measure others skills (Bundy, 1993) or as an indication of developmental level (Sparling, Walker, & Singdahlsen, 1984). Play has been linked to growth in memory, self control, symbol identification, oral language, and increased academic and literacy abilities (Leong & Bodrova, 2005). Sigman and McGovern (2005)

found that functional play skills were an early childhood predictor of adolescent language skills in individuals with autism. Play skills have also been linked to language in typically developing children (Lewis, Boucher, Lupton & Watson, 2000). There appears to be a reciprocal interaction between language and play (Sigman & McGovern, 2005) since children in a play situation can practice language and engage in verbal and nonverbal communication interactions with their peers (Schuler & Wolfberg, 2000).

Observational Learning

Children both with and without disabilities are not all alike when it comes to learning, just as they are not all alike regarding their likes and dislikes (Tomlinson, 2001). Similarly, children with autism have been shown to learn skills through a variety of instructional strategies such as prompting, explicit instruction, and reinforcement (Smith, 2001). Observational learning has been shown to be a powerful strategy for students who learn a new response by observing the behavior of a model (Bandura, 1977). In a study conducted by Biederman, Fairhall, Raven and Davey (1998) observational learning was found to be more effective in teaching skills to school-age children with mental retardation than hand-over-hand modeling. Similarly, observational learning was recognized as a possible factor in the acquisition of more learning skills by preschool-age children with autism when in a small-group instruction setting than in a one-on-one setting (Taubman , Brierley, Wishner, Baker, McEachin, & Leaf, 2001).

Observational learning has been used to teach children with disabilities safety and self-help skills (Christensen, Lignugaris-Kraft & Fiechtl, 1996; Griffin, 1992), language skills (Goldstein & Brown, 1989), and discrimination tasks (Keel & Gast, 1992). In a recent study conducted by Mechling, Gast and Krupa (2007) observational learning was

used to teach students with intellectual disabilities to match and read target grocery words on a SMART board.

Stimulus Pairing

Staats and Staats (1957) showed how stimulus pairing might explain how prejudices are learned when they conducted an experiment with college students. They paired ethnic words with either emotionally-laden or emotionally neutral words the researcher's spoke to the participants. Staats and Staats (1957) found that the feelings associated with the ethnic words depended on the emotional value of the words with which they had been paired.

Hamilton and Ghatala (1994) note how human adaptability has been strengthened by stimulus pairing. We respond not only to the stimuli which can bring us great benefit or harm but also to the stimuli which signal the approach of those stimuli. For example, even though we cannot see it, we respond as if there was a snake when someone shouts "snake". The snake may not ever come close enough to bite us because of our response to abandon the physical area.

Stimulus pairing occurs at a very high rate in the classroom environment (Hamilton & Ghatala, 1994). Students and teachers acquire certain emotional responses to stimuli in their environment because those stimuli have been associated with stimuli which elicits a strong emotional response (Hamilton & Ghatala, 1994). For example, some children with autism can become anxious when in a social situation such as recess because in the past they have not been able to meet the demands of such situations (Epp, 2008).

Although we have seen the extension of stimulus pairing to many environments

and situation, there have been few research studies conducted on the use of such pairing procedures to encourage peer initiations in children with autism. Solberg, Hanley, Layer, and Ingvarsson (2007) examined the effects of reinforcement pairing and fading on preschoolers' snack selections. They assessed preferences for snack options via repeated paired-item preference assessments. Paired reinforcement was found to be initially effective in increasing preference for the originally less preferred snack options (Solberg et. al, 2007). This study will examine the use of stimulus pairing to increase peer initiations through the pairing of preferred items and activities with the presence of typical peers.

Interpersonal Skills of Children with Autism

Jordan and Powell (1995) report that individuals with autism engage in impaired and delayed social development and interpersonal development reflects even more exaggerated delays. The continuum of autism spectrum disorders is reflective of the spectrum of interpersonal and social delays. Those individuals at the low end of the spectrum may be solitary and withdrawn. Individuals in the middle of the spectrum may not initiate interactions but act in a passive way when approached by others. Those at the high end of the spectrum, although active in their interactions with others, those interactions appear as odd (Jordan & Powell, 1995).

Some children with autism engage in minimal imitative play skills and many engage in sustained odd play (Keebler, 2003). Pretend play rather than sustained odd play requires children to engage in communication responses as they delineate roles of peers and use of props as well as sequencing of activities (Leong & Bodrova, 2005). Play with peers can be encouraged in individuals with autism by providing play opportunities

(Leong & Bodrova, 2005). Such play can be helpful in enhancing the pre-academic readiness skills of attending, concentration, and responsibility (Leong & Bodrova, 2005).

Thus, there is a need for continued work in developing and evaluating interventions designed to teach children with autism observational learning of peer initiations. Six reasons follow:

1. Play skills are important in children's development (Stone & La Greca, 1986) and have been linked to language skills (Sigman & McGovern, 2005).
2. Children with autism do not engage in play skills which stimulate their development (Lantz, Nelson, & Loftin, 2004).
3. Typically developing peers may not choose to interact with their peers with autism (Guralnick, Connor, Hammond, Gottman, & Kinnish, 1995) or may need training in order to engage them in purposeful play (Myles, Simpson, Ornsbee, & Erikson, 1993).
4. Play with peers can be encouraged in individuals with autism by providing play opportunities (Leong & Bodrova, 2005).
5. Observational learning has been shown to be a powerful strategy for students who learn a new response by observing the behavior of a model (Bandura, 1977).
6. Stimulus pairing may be a beneficial strategy for enhancing observational learning of play skills, particularly peer initiations of children with autism.

Applying Stimulus Pairing in a Community Play Group: A Case Example

Chance (1979) identifies factors that need to be considered when attempting to

implement stimulus pairing. He notes that in order for good pairing to occur, the neutral stimulus should precede the unconditioned stimulus. A good example of this is when a teacher says “it’s time to work” and then before finishing the phrase rings a bell. Over time, as the teacher continues to pair the bell with the phrase, the students will respond to the bell alone as they initially responded to the bell and the phrase paired together. In this situation, the bell served as the conditioned stimulus and the phrase “it’s time to work” served as the unconditioned stimulus. For our play group, we paired peers, which served as conditioned (neutral) stimuli, with preferred items and activities that served as unconditioned (significant) stimuli.

The second factor that Chance (1979) identifies as a determinant of stimulus pairing is the interstimulus interval, which is the interval between the beginning of the neutral and the beginning of the unconditioned stimuli. Optimal stimulus pairing occurs when there is no more than a second interval delay. Therefore, for our play group, we instructed typical peers to present the preferred items and activities quickly (within one second of being in the play proximity of their friends with autism).

Chance (1979) also notes that establishment of a response is dependent upon the number of stimulus pairings as well as the number of times the neutral stimulus occurs alone. A conditioned response is more likely to be established when there are frequent pairings of the neutral and unconditioned stimulus. Effective stimulus pairing is also dependent upon few presentations of the neutral stimulus without the unconditioned stimulus. In general, the more times the neutral stimulus is presented without the significant stimulus, the less effective will be the pairing.

Characteristics of the learner affect the ease with which stimulus pairing will

occur. Although we know that there are internal factors which are probably genetically linked that influence the ease of stimulus pairing, we do know that moderate levels of arousal are associated with better pairing than low or high levels (Taylor, 1951). Research participants engaged in moderate levels of arousal during play group experiences which occurred in the late afternoon. Participants were not observed, nor was data collected in environments which resulted in very low or high levels of arousal, such as very early in the morning after awakening or during high energy activities.

Prior experiences with the neutral stimulus also affect the rate at which stimulus pairing occurs (Hamilton & Ghatala, 1994). For example, in our research study, our participants' prior experiences with typical peers affected the rate at which they were able to pair their peer interactions (neutral stimuli) with preferred tangibles and activities (significant stimuli). If our participants had been exposed to typical peers often in the past and it had never been followed by an unconditioned stimulus, in this case preferred tangibles and activities, it would take longer to establish the conditioned response than if the participants had little prior exposure to typical peers (Hamilton & Ghatala, 1994). Any repeated unpaired exposure to typical peers interferes with the ability of typical peers to become a conditioned stimulus. For this reason, the participants for our play group were asked to identify whether or not they had participated in play groups in the past. None of the participants documented prior play group participation.

The Structure of our Play Group

The first two play groups for this study took place in a community counseling center located in Wilkes-Barre, Pennsylvania, a town in Northeast Pennsylvania. This community represents an average to above-average socioeconomic status where parents

have the financial means to obtain training, education, and therapy for their children. These parents were also interested in social play groups. The counseling center housed mental health services for children and adults, inclusive of outpatient therapy, case management services, therapeutic staff support, medication management, and partial hospitalization programs. The last eight play groups took place in an associated building of the counseling center, which housed a children's psychiatric unit and children's medication management services.

The play groups consisted of six children with an autism spectrum diagnosis who were between 6 and 10 years of age as well as six typical children without an autism spectrum diagnosis who were between 4 and 14 years of age.

There were two play group facilitators, one who was a board certified behavior analyst (BCBA) with ten years experience working with individuals with autism and one who was a board certified associate behavior analyst (BCaBA) with twenty years experience working with students with autism and various disabilities. The professional background of the BCBA included school counseling, behavior consulting, curriculum and instruction, special education, and psychology. The professional background of the BCaBA included early intervention and behavior consulting. The group met biweekly during the school year, from June 8, 2004 through August 20, 2004.

Observational learning and stimulus pairing strategies were used throughout the play group sessions. An example of this would be a facilitator directing a child with autism to observe and model a typical peer engaged in appropriate play behaviors. Also, to encourage pairing, a group facilitator would ensure that the typical peers had preferred items or activities that were preferred by children with autism.

Method

Recruitment of Participants

Approximately 25 packets of information were sent out. Professionals sent out the initial packets of information introducing the study to the parents to maintain confidentiality. Packets informed parents of the purpose of the research study, explained the protocol, requested written permission to enroll their child in the study, and requested the name, address, and phone number for the child and parents. Included in the packet of information was an initial cover letter from the professional stating the title and purpose of the study and related paperwork in the packet, consent forms, and identifying and contact information for the investigators. A stamped envelope for return of the consent forms was also included. If interested, the parents made the initial contact with the investigators, at that time disclosing the child's name. Upon receiving the consent forms, the investigator made telephone contacts with the parents/guardians to arrange for participation in the play groups. Of the 25 parents notified, 6 gave permission for their children with autism to participate. Those six children remained in the research study throughout the duration. The same packets of information were sent to ten typical children, six of which consented to participate in the research study and remained in the study throughout the duration.

Reinforcement Inventory and Preference Assessment

Considerable progress has been made in the improvement of measures to systematically classify preferred stimuli that may function as reinforcers for individuals with developmental disabilities (Hagopian, Long, & Rush, 2004). The effectiveness of using preference assessments for individuals with disabilities has been documented to

assist in curriculum development (Logan & Gast, 2001) and the pairing of preschoolers' snack selections (Solberg et. al, 2007).

Direct appraisal measures involve systematically exposing individuals to stimuli while collecting data on their responses (Hagopian, Long, & Rush, 2004). Direct assessment procedures can be classified as either approach-based or engagement-based (Hagopian, Long, & Rush, 2004). Approach-based preference assessments involve the presentation of stimuli to individuals to determine selection-based preferences. Engagement-based preference assessments involve observation of the individual to note the duration of time the individual manipulates the item or engages in the activity.

The investigators of this study conducted both approach-based and engagement-based preference assessments with the participants in the study. For the approach-based preference assessments, the investigators utilized a one-on-one setting to present the children with various tangible items and activities and collected data on the tangibles and activities that the children selected. During the preference assessments, the investigators utilized a paired choice procedure for six trials. The participants were presented with two items at a time (each pair was presented only once). Following the presentation, the investigator waited five seconds for the child to approach the item or activity. If he approached the item or activity, the child was permitted access to it and the other item or activity was removed. The investigator would expose and re-present the item or activity if the child did not approach it and also utilized a block and re-presentation of the item or activity for multiple approaches. This procedure was repeated across twenty trials. During the trials, the investigator collected frequency data on the selected items or activities. That data was later analyzed to determine preferential items and activities. It

was important to collect this information, as these items and activities would serve as unconditioned stimuli for the pairing process. Engagement-based procedures involved the investigators recording the duration of engagement with items and activities. Through these two preference assessment approaches, the investigators were careful to identify strong unconditioned stimuli to utilize during the play group sessions. Results of a reinforcer assessment study conducted by Cote, Thompson, Hanley, and McKerchar (2007) suggest that both preference assessments and rankings are effective in identifying reinforcers for young children. Therefore, prior to the start of the play groups, parents were also sent reinforcement inventories to determine what served as reinforcers for the children across preferred tangibles and activities categories. The checklists asked parents to rank order from most to least preferred toys, auditory, social, visual, olfactory, edible, and tactile stimulation. Information from the checklists served as a guide for the group facilitators when preparing materials and activities for the play groups.

Play Group Format

The play groups lasted between sixty and seventy minutes in duration. The first play group served as baseline data, since the participants did not receive any direction on observational learning or pairing and the conditioned stimuli were not paired with the unconditioned stimuli. Data were collected from the remaining five play groups.

A typical one-hour long play group session was as follows:

- Toys and activities were already set up for the children before entering the room. Children came into the room and were greeted by the investigators.
- Unstructured free time in which the children were able to choose an activity such as play with a train set, engage in arts and crafts, play with a

singing Elmo doll. Group facilitators stood in the peripheral of the room and observed interactions. Group facilitators also were responsible for providing typical peers with the preferred tangibles and activities of their friend with autism. It was a primary role of the group facilitator to observe the interactions of the children and be sure to provide these unconditioned stimuli (preferred tangibles and activities) within one second of the two children being in close proximity of each other (within five feet or less). It was also the responsibility of the group facilitator to direct the typical peers on ways to encourage observational learning of appropriate play skills by their friends with autism. For example, the group facilitators might recommend to a typical peer that he or she push the car down the ramp or dip the paintbrush into the paint cup while verbalizing what he or she is doing. The typical peers were directed to engage in such behaviors when directly in front of their friend with autism, to ensure that their friend was able to observe them.

- Children were directed to the tables and chairs for a snack and a drink with their typical peers. During this time the preferred edibles and beverages of the children with autism were provided to the typical peers, who were directed to hand the snacks and drinks to their friends with autism.
- Structured activity in which the children were directed to engage in a circle time activity such as
- Children were directed that there is five minutes left to the play group and asked to pick up the toys and clean up the play room.

Investigators informed parents of their child's progress informally when the parents picked up their child at the end of the play group session. There was a formal report sent home to the parents at the end of the ten play group sessions which summarized the individual findings for each child, noting progress throughout the ten play groups.

Caitlyn's Progress

Data was collected on peer initiations which were noted as independent approaches to a peer friend. The duration of play for each initiation was also collected. Please refer to Tables 1 and 2 as well as Figure 1. Caityln's data indicate that although she did not independently approach a peer friend during the first nine sessions, on the very last session (session #10) she made three independent approaches to a peer friend. These approaches totaled 41 minutes in duration.

Table 1
Independent Approaches and Duration of Time with Peer Friend

Play Session	INDEPENDENT APPROACHES TO PEER FRIEND	DURATION OF INDEPENDENT TIME WITH PEER FRIEND
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	3	41 MINS.

Figure 1
Duration of Initiated Play

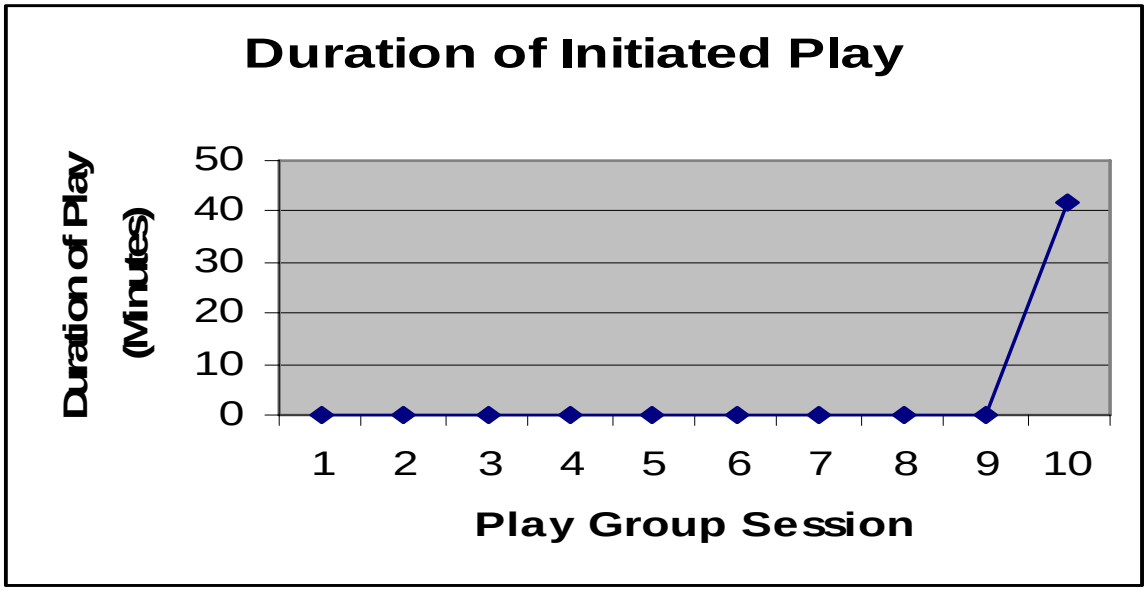

Table 2
Duration of Each Independent Approach to Peer Friend

	APPROACH 1	APPROACH 2	APPROACH 3
DURATION	5 minutes	2 minutes	34 minutes
INDEPENDENT REQUESTS	1	1	12
ACTIVITIES	Coloring	Coloring	Puzzles, books, fingernail game

As Table 2 indicates, Caitlyn's first approach to a peer friend lasted five minutes. Caitlyn and her peer friend engaged in a coloring activity. Her second approach lasted 2 minutes and this approach was made to a different peer than the first. She also engaged in a coloring activity during this second approach. What is most interesting is Caitlyn's third peer approach, which lasted significantly longer than the first two. At 34 minutes, the third approach to a peer friend involved 12 independent requests while engaging in

puzzles, books, and a fingernail game. This was significant progress for Caitlyn who did not engage in any independent approaches of a peer or make any independent requests of a peer friend during the first nine play sessions.

Discussion

Research has shown a need for continued work in developing and evaluating interventions designed to teach children with autism observational learning of peer initiations (Lantz, Nelson, & Loftin, 2004; Leong & Bodrova, 2005; Myles, Simpson, Ornsbee, & Erikson, 1993). This research attempted to apply stimulus pairing in a community play group in an effort to enhance the number of independent peer approaches and independent requests made by children with an autism spectrum diagnosis. The duration of time spent on activities initiated by children with autism was also examined. Findings for one particular play group participant, Caitlyn, were analyzed to see if there were any significant changes in her peer play behaviors. Although Caitlyn did not engage in any independent peer approaches of requests during the first nine sessions of the play group, on the tenth session she spent nearly half the play group time engaged with peers in activities she initiated.

It is unfortunate that due to imposed limitations regarding consent from the participating counseling center and participant consent forms there were only ten play groups for this research. It would be interesting to note whether Caitlyn's peer initiations and requests would continue across additional play groups. Follow up research involving extended play group sessions (beyond the ten outlined in this research study) may be helpful in increasing our understanding of the extended benefits of stimulus pairing within play group sessions.

Although Caitlyn increased her peer initiations and independent requests as well as the duration of her activities with peers, it would be interesting to see if these findings generalized to other settings and across other activities with peers not identified in this study. As generalization of skills has been documented as a deficit for individuals with autism, further research in this area could prove to be beneficial for skill acquisition and application.

Additional research should be conducted on the use of stimulus pairing for peer interactions across activities that extend beyond play groups. Researchers may want to examine the use of stimulus pairing for peer tutoring or peer assistance programs within an academic environment. Further research on the relationship between stimulus pairing and social skill acquisition in the work place may provide important implications.

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