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Training siblings as change agents for children diagnosed with autism spectrum disorders (ASD) has been shown to be beneficial in teaching a sibling to teach their brother or sister. There are very few interventions, however, that explore the range of effects that targeting particular skills has on sibling interactions. The purpose of this study was to assess the direct and collateral effects of training behavioral teaching techniques to a typically developing sibling. Four experimental conditions were assessed: baseline, sibling teaching toy play, baseline, and sibling teaching social play. Across all conditions, measures of teaching components and siblings’ interactions were assessed. Results of the assessment showed that the sibling was an effective change agent and that more favorable interaction and engagement occurred when social play skills were taught. The results of this sibling intervention and guidelines for condition changes are discussed in terms of sibling relationships.
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By

Sara Czekalski
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INTRODUCTION

Autism spectrum disorders (ASD) are characterized by social skills deficits, problems with verbal and nonverbal communication, and unusual, repetitive, or severely limited activities and interests (American Psychiatric Association, 2008). These deficits decrease the probability that a child with autism will engage in play and initiate or sustain interactions with another child, including their brother or sister. This makes it very difficult for children with autism to develop relationships and successfully integrate into social environments (Lifter, Ellis, Cannon, and Anderson, 2005). When a brother or sister has ASD the sibling relationship can be troublesome.

For siblings of children with autism, their brother’s or sister’s deficits can generate feelings of confusion, disappointment, loneliness, or resentment because their parents treat their brother or sister with autism differently. For a child with autism, their sibling can fulfill critical roles throughout their lifetime. These roles include companion (playmate), teacher, and potentially their caretaker when the child with autism grows up (Harris & Glasberg, 2003). Because siblings can share a long-term, important relationship, it seems logical that a sibling of a child with autism be involved in their brother’s or sister’s behavioral intervention program (Miller & Cantwell, 2000).

Behavioral teaching procedures can be effectively implemented by siblings of children with autism. In fact, research has shown that training sibling affected by ASD can benefit both the child with autism and the sibling. The child with autism acquires new skills and has consistency across multiple environments, which can lead to acquisition of desired behaviors and to a decrease in undesired or maladaptive
behaviors, while the sibling learns how to interact with his brother or sister (Miller & Cantwell, 2000).

Appendix A displays a description of previous ASD sibling research studies which investigated the effects of training typically developing siblings to use behavior modification procedures. This table describes in detail what each study taught the typically developing siblings, skills the siblings targeted when teaching their brother or sister, dependent measures, and the conclusion for each study. Overall, ASD sibling research studies have investigated the effects of training typically developing siblings to use behavior modification procedures. The ASD sibling literature is divided into two bodies of research. The firsts group of studies effectively established the sibling as a teacher for their brother or sister with autism (e.g., Cash & Evans, 1975; Celiberti & Harris, 1993; Colletti & Harris, 1977; Randall, 2000; Schreibman, O'Neil, & Koegel, 1983). In these studies, the teaching behaviors taught to the typically developing siblings included prompting, modeling, giving instructions, and calling attention, providing praise and punishment. The targeted skills for the child with autism included matching, expressive and receptive language, writing letters, learning math and money concepts, stringing beads, and spelling. The dependent measures included the occurrence and accuracy of the typically developing sibling's teaching behaviors, the child with autism's compliance to their sibling's instructions, and the acquisition of targeted skills. The results supported that siblings could acquire behavioral teaching techniques (e.g., Cash & Evans, 1975; Celiberti & Harris, 1993; Colletti & Harris, 1977; Randall, 2000; Schreibman, O'Neil, & Koegel, 1983) and that these techniques would maintain over time (Cash & Evan, 1975; Celiberti & Harris, 1993), generalize to
untrained settings (Randall, 2000; Schreibman, O’Neil & Koegel, 1983) or with a novel toys (Celiberti & Harris, 1993), and improve social satisfaction (Schreibman, O’Neil & Koegel, 1983).

The second group of ASD sibling research studies included broader measures of change occurring within sibling interactions when the sibling was effectively established as a playmate for their brother or sister with autism (e.g., Baker, 2000; James & Egel, 1986; Merker, 2005). With sibling relationships as a goal, Baker (2000) taught siblings how to incorporate repetitive activities or obsessions of the child with autism into games that siblings can play together. Within these games Baker observed joint attention and social interactions between the siblings. In addition, Baker measured the siblings’ positive and negative affect, joint attention, nonengagement, ritualistic behaviors, and social play between siblings. These contrived thematic games successfully increased social interactions and joint attention between siblings and generalized to new games and different settings. James and Egel (1986) taught siblings how to prompt, model, and reinforce reciprocal interactions within toy play settings, across four different toys. James and Egel measured positive reciprocal interaction between siblings. The results showed direct prompting effectively increased positive reciprocal interactions between siblings. In addition, James and Egel found similar results when the sibling’s training was incorporated into a play group with typically developing peers. Finally, Merker (2005) taught siblings how to set up opportunities for conversation and praise correct responding across 3 toy conditions. In addition to the siblings’ teaching behaviors, Merker measured interactions, proximity, social bids, and nonverbal affection between siblings. As a result, the sibling increased teaching behaviors, while interactions,
nonverbal affection, and proximity increased, especially with toys chosen by the child with autism.

The results supported siblings as effective change agents within social play interactions (Baker, 2000; James & Egel, 1986; Merker, 2005). The collateral measures in these studies extend ASD sibling research (e.g. Cash & Evans, 1975; Celiberti & Harris, 1993; Colletti & Harris, 1977; Schreibman, O’Neil, & Koegel, 1983) by providing information pertaining to the siblings’ interactions. For example, increases in nonverbal affection and reciprocal play may indicate an improvement in the quality of the “siblings’ relationship” or “bond” as described by Harris and Glasberg (2000). However, with the exception of Baker (2000), James and Egel (1986) and Merker (2005), ASD sibling research has exclusively measured the typically developing sibling’s teaching behaviors and the child with autism's targeted responses. Since the ASD sibling literature is divided as a result of different procedures and measures it is difficult to compare their outcomes. Conceivably, Colletti and Harris (1977) could have seen changes in the siblings’ relationship had they measured proximity, nonverbal affection, and reciprocal interactions while targeting bead stringing, simple addition, and writing letters. Unfortunately, proximity, nonverbal affection, and reciprocal interactions were not measured. As a result there is no way to assess whether the interventions that are directed primarily toward skill instruction affect the overall sibling’s relationship. ASD sibling research could benefit from experimental analyses that take into account both teaching and social dimensions of the sibling relationship. This would allow experimenters to evaluate teaching procedures that can effectively acquire skills and facilitate mutually reinforcing interactions between siblings.
The purpose of this study is to experimentally evaluate the direct and collateral effects of teaching a sibling of a child with autism to target two different skills, toy play and social play. The sibling training package was similar to that of previous ASD sibling research. The teaching targets, however, included skills trained in each group of ASD sibling research. Targeting toy play was similar to those studies emphasizing the sibling as a teacher (e.g., Cash & Evans, 1975; Colletti & Harris, 1977; Celiberti & Harris, 1993; Schreibman, O’Neil, & Koegel, 1983; Randall, 2000). Targeting social play was similar to those studies emphasizing the sibling as a companion (e.g., Baker, 2000; James & Egel, 1986; Merker, 2005). The collateral effects that the sibling training package and the skills targeted had on the siblings’ interactions were assessed throughout the experiment (engagement, proximity, cooperative play, smiles & affection, cries and retreats). The primary goal of the present study was to understand the effects of training on the sibling relationship.
METHOD

Participants

The participants in this study were two siblings, a 6.5 year-old typically developing boy and his 2.5 year-old sister with an autism spectrum disorder (ASD). The participants resided with their father, mother, and maternal grandmother. The family was Asian American. The brother was enrolled in a regular first grade class. The sister was enrolled in a campus affiliated in-home intervention program for 20 hours a week. She also attended a public preschool program for children with disabilities four mornings a week. She was diagnosed with autism at two years of age and described as having severe speech delays, poor eye contact, significant social impairment, lack of interest in people other than her mother, and stereotyped patterns of behavior.

The sibling project was initiated at request of the supervising behavior analyst affiliated with the University of North Texas and the parents who felt treatment generalization and the siblings’ relationship would be enhanced by an intervention. Prior to intervening the experimenter obtained the parents’ consent and assent from the brother (see Appendix B).

Prior to the baseline condition a questionnaire was administered with the brother (see questionnaire in Appendix B and treatment condition overview in Appendix C). As a conclusion of this questionnaire it was discovered that the siblings had very few interactions and their interests were incompatible. For example, the brother did not enjoy the television show his sister watched and sister did not play with toys. Instead, the participant’s parents described the interactions between their children as brief and that sister did not play with her brother at all.
Setting and Materials

This study was conducted in the family’s home. The study began in the living room which contained a couch, television, a large bookshelf, and age-appropriate toys for both children. After 17 sessions, the family requested that the sessions be moved to the family playroom, which was also where the therapy sessions took place. The playroom was equipped with child-size furniture (e.g., table with two chairs), toys, which were also present during in-home therapy sessions, a television, which remained off during all sessions, and a video camera on a tripod. During the second phase of treatment, a set of training materials was added to the playroom (e.g., tarp covering the floor, moon sand, art supplies, and a plastic container of beans and a plastic container of small toys).

Measurement

The present study measured a total of 27 behaviors, including measures unique to each of the siblings separately, and measures of their interactions. These responses are thoroughly defined in Appendix C. The recorded target behaviors for the brother were four teaching components across three skill domains: 1) setting up opportunities 2) modeling target response 3) praising target responses 4) and extending interactions. Frequency counts were taken on each teaching component separately. Setting up opportunities incorporated withholding access, entice approach by using physical or vocal labels of toys or activities, and introducing a new toy or activity.

Target behaviors for the sister include conventional and simple toy play, eye contact, participation in social activities, and turn-taking. Participation in a social activity
was defined as the sister manipulating a toy or an item associated with the same toy or activity that her brother simultaneously manipulated following an arranged opportunity. Eye contact was defined by facial orientation toward the other sibling. Conventional toy play was defined as manipulating a toy the way it was intended, this excluded holding, handing, or receiving the toy from brother. Simple toy play was defined by manipulations within the context of play not the way a toy was intended, this included sister pushing buttons with foot, or turning a toy in her hand as she looked at it. Simple play excluded any toy manipulations that could be considered conventional.

Nine collateral variables were measured during sibling interactions. These target behaviors include engagement, cooperative play, proximity, smiles and affection, crying, and retreats. Engagement was defined as manipulation of a toy or social activity material. Proximity was defined as siblings being within arms reach of each other, not necessarily playing together or with the same toy. Siblings were scored as playing cooperatively whenever an initiation from one child was returned by the other. An example of cooperative play included brother hands his sister a piece of toy food and she takes it and puts it to her mouth.

Data Collection Procedures

This study took place twice a week. All sibling sessions were video recorded and lasted 30 minutes. Each session included a 5 minute pre-assessment, 20 minute training, and 5 minute post-assessment. Video clips were scored for direct and collateral effects, as well as, interobserver agreement (see Appendix D for sample datasheet). The 5 minute assessment clips were scored outside the participants’ home.
in a confidential office. Within every teaching interaction the occurrence of each of brother’s teaching behaviors and sister’s targeted responses were recorded. All interval recorded data were collected in 10 second, continuous intervals, using partial interval recording. If an observer could not see brother or sister’s response, either because the child was off camera or had their back to the camera, they would not record the response. Instead that response was recorded as off camera or not applicable (NA).

Reliability

Inter observer agreement was calculated by the experimenter and three other observers (see Appendix D for training procedures for observers). The observers received a list of operational definitions of all target behaviors. All observers scored video clips independently. Interobserver agreement was assessed in 30% (2 of 6) of baseline sessions and 30% (3 of 10) of training sessions.

For interval recorded data, observer agreement was defined as at least 80% agreement on the occurrence and nonoccurrence of each response across all 10 second intervals. For occurrence data (i.e., teaching interactions see Figure 1), observer agreement was defined as at least 80% agreement on the total number of occurrence. Interobserver agreement was calculated by dividing the number of agreements, between both trainer and observer, by the sum of agreements and disagreements and multiplied by 100. Percentage of Interobserver agreement is represented for every measure in Tables 6 through 10.
Experimental Design and Data Analysis

A multiple baseline design of brother’s teaching behaviors targeting two different skills, Toy Play and Social Play, was used to evaluate the effects of a sibling training package. Collateral measures were also analyzed for treatment effects. Baseline 1 and Treatment 1 and Baseline 2 and Treatment 2 were conducted with the same siblings. An illustration of treatment conditions is provided in Appendix C.

Procedure

Baseline

Baseline 1 and 2 made up of 16, 5 minute assessments. Prior to every assessment the experimenter and the participants’ parents briefly talked about parent’s questions or concerns as well as, any interactions between the siblings since the last session was conducted. Following a brief interaction with the participants’ parents the experimenter would set up a camera on a tripod in the corner of the living room. During this prep time the participants’ parents would bring the children into the living room or play room. At this time the siblings were given the instruction to “do what you would usually do” as the experimenter started a 5 minute timer. During assessments the experimenter sat behind the camera and took notes on brother’s teaching behaviors, and sister’s responses. During pre and post- assessments the experimenter did not provide feedback or interact with either child. If sister retreated from the living room the participants’ parents would guide her back to the living room. During retreats the experimenter kept the camera on. If both siblings were off camera for longer than 10 seconds due to a retreat, then the experimenter would turn the camera in attempts to
record both of the children. If the siblings were too far apart to capture with the camera then the experimenter would keep the camera on sister. During some baseline assessments the participants’ parents were present. When a parent was present the experimenter did not deter the parent from telling the brother what to do. If the brother or parents asked the experimenter what the siblings should be doing while baseline observations were recorded, the experimenter simply reminded them that they should do whatever they typically do together.

**Treatment 1: Teaching Toy Play**

The brother was taught four teaching components: 1) set up toy play opportunity 2) model toy play 3) praise toy play and 4) extend toy play. The four teaching components were adapted from Greer (1994), Greenwood, Delquadri, and Hall (1984) and Besner (2008).

The set up toy play opportunity component involved the brother choosing the type of item of interest to his sister to promote a target toy play, introducing a new toy or play action and then pausing or giving the item to his sister, or drawing interest to a toy through vocal labels or physical actions. The model toy play component involved the brother performing either a conventional or simple play action actions. This could include rolling a car back and forth, pounding with a toy hammer, or popping bubbles. Following a model, the brother handed his sister the toy for which he had just modeled play. The Praise toy play component was to follow an incidence of the sister performing any form of play action and her brother was taught to praise (e.g. “good playing” or
“you’re so good at playing”). The Extend toy play component entailed the brother’s continuing manipulation of the items associated with the toy.

All four teaching components were taught by the experimenter, Table 2 of Appendix B provides treatment fidelity measures for brother’s training. During training the experimenter taught the brother all of the teaching components at the same time using modeling and instruction, role-play, and feedback. Modeling and instruction included three to 5 minutes of demonstration of the four teaching components by the experimenter along with a verbal explanation of each teaching component. In order to teach the brother how to set up toy play opportunities the experimenter demonstrated and explained how to entice his sister with a toy within close proximity to her while modeling conventional play actions. He was shown how to deliver praise for her attempts to manipulate toys. Following modeling the experimenter and the brother role-played the skill for at least 5 minutes. During this portion of training, the experimenter played the part of the sister, with responses typical to her observed behavior. During role-plays the experimenter also prompted the brother to use the appropriate teaching skills. Prompts included vocal cues such as, “How might you make this toy look really fun,” “What am I doing right now,” or “What else could you do with this toy.” For the remainder of the training session, the brother practiced the teaching components with his sister while the experimenter delivered feedback and praise. For example, while the brother practiced teaching toy play, the experimenter gave feedback on different forms of praise he could deliver. The participants’ parents were provided with a written description of the teaching components taught to the brother (see Appendix E).
Treatment 2: Teaching Social Play

Treatment 2 was developed to increase brother’s involvement during play and to increase reciprocity between the siblings when they played together. In order to increase brother’s involvement during play with his sister the experimenter wanted to assess brother’s preferences and incorporate them into activities he could engage in with his sister. Prior to introducing Phase 2, Teaching Social Play Skills, the parents were interviewed about both the brother’s and the sister’s interests. During this interview the participants’ parents discouraged the experimenter from assessing the brother’s interests. Instead, the participants’ parents emphasized their desire that the brother provide guardianship and aid in his sister’s treatment and their belief that his interests were not the priority in this context. In keeping with previous research on responsive behavioral support plans (Chen, Downing, and Peckham-Hardin, 2002), there was some discussion to help the therapists understand the family’s long term goals and perspectives, while describing to the family the role of motivation in maintaining responding. After discussion, it was agreed to incorporate both siblings’ interests into a treatment plan, but that the plan would continue to emphasize the brother’s teaching role.

In an attempt to change the siblings’ interactions from an overly directive teacher-student situation to a mutually enjoyable learning opportunity, the preferences of both the brother and of the sister were assessed. The participants’ parents gave the experimenter a list of preferred items and activities for each. At first the items and activities appeared incompatible (e.g. the brother liked art while the sister liked stickers and cold items). The experimenter used this list of highly preferred items and activities
for each child to develop a hybrid list of contrived activities which would incorporate a preferred aspect for both the brother and sister (see Appendix B). During these mutually-enjoyable activities brother was to taught how to use the four teaching components (i.e. set up opportunities, model, praise, and extend target responses) to increase social play responses in his sister.

Prior to training, brother was provided with a short story developed by the experimenter and illustrated with characters from his favorite television show, Arthur. The book described the different roles he fills, as a teacher and as a friend, and how Treatment Phase 2 of the experiment would help him interact with his sister like a friend.

All four teaching components were taught by the experimenter, table 3 of appendix B provides treatment fidelity measures for brother’s training. During training, the experimenter taught all teaching components at the same time, using modeling and instruction, role-play, and feedback. Modeling and instruction included three to 5 minutes of demonstration of a learn unit by the experimenter, with a verbal explanation of each teaching component. For the Set Up Social Play Opportunities component, the experimenter demonstrated and explained how to entice his sister with an activity while modeling social skills (i.e., participating in the social activity, making eye contact and turn-taking during social activities), and then deliver praise for her attempts to participate in the social activity or perform a target response. Following modeling the experimenter and the brother role-played the skill for at least 5 minutes. During this portion of training, the experimenter played the part of the sister based on her previously observed behavior. During role-plays the experimenter also prompted the brother to use the appropriate teaching skills. Prompts were similar to Treatment Phase
1 (e.g. “How might you make this activity look fun,” “What am I doing right now,” or “If you wanted this item, how would you ask your sister for a turn”). For the remainder of the training session the brother practiced the teaching components with his sister while the experimenter delivered feedback and praise. For example, the sibling might practice teaching toy play while the experimenter gave feedback on different forms of praise he could deliver.

During Treatment Phase 2 brother targeted social play skills during interactions with his sister. During this phase the siblings were engaged in the same activity (e.g. moon sand, painting, drawing on dry-erase boards with markers). Within the activity, the brother set up social opportunities, provided models for his sister to participate in the activity, make eye contact, and take turns with activity materials. When the sister engaged in a target response her brother provided praise and continued to engage in the social activity with her.
RESULTS

The results from the sibling training package will be presented in six figures. The figures include brother’s teaching behaviors, sister’s toy play types and social responses, and collateral effects of the teaching interactions on both brother and sister.

Teaching Interactions

Figure 1 shows the number of occurrence of teaching components (set up opportunities, model, praise, and extend) during teaching interactions across three skills (toy play, social play, and other). The sibling training package trained the brother to teach toy play and social play. Teaching other behaviors was not trained by the experimenter. The top portion of Figure 1 displays the number of occurrences of teaching components targeting toy play. During baseline, the number of toy play teaching components remained consistent and ranged between 0 to 2 occurrences.

After Treatment Phase 1 was implemented, the number of teaching components jumped from 0 in baseline to 6 opportunities, 11 models, 2 praise statements, and 3 extensions in a 5 minute observation. This is approximately 1 - 3 teaching opportunities per minute. During sessions dates 11/14/07 through 11/28/07, all teaching components show a declining trend. During sessions 12/12/07 through 1/9/08, all teaching components show an upward trend. During the return to baseline (Baseline 2), set up opportunities and models started at 6 and 5 occurrences and then became more variable after Session 24, with an average of 6.4 and 5.9 (range, 2 - 13). During return to baseline (Baseline 2), praise and extend started at 3 occurrences and showed an
increase during Session 24, praise averaged 2.6 and extend averaged 2 (range, 0 - 7 and 0 - 5).

The arrow indicates when sessions began to take place in a different playroom. The new playroom corresponded to an increase in two teaching components, Set Up and Model Toy Play, and a slight decrease in the other teaching components, Praise and Extend Toy Play. During Treatment Phase 2, Teaching Social Play, all four teaching components remained above initial baseline levels (range, 0 - 5).

The middle portion of Figure 1 displays the number of occurrences of teaching components targeting social play. All four teaching components were below 1 occurrence during the first baseline. During Treatment Phase 1, Social Play teaching components ranged between 0 and 6, with an average 1 social opportunity per 5 minute observation. During return to baseline (Baseline 2), teaching components for Social Play ranged between 0 and 5 occurrences, with an average of less than 1. After Treatment Phase 2 was implemented, the number of teaching components for Social Play jumped from 0 in baseline to 4 opportunities, 4 models, 2 praise statements, and 3 extensions in a 5 minute observation. During Treatment Phase 2, all four teaching components display an upward trend with little variability except for the post assessment on 5/14/08. The number of social opportunities set up ranged between 4 and 10, averaging 5 opportunities. The number of models for social responses ranged between 0 and 9, averaging 5 occurrences per 5 minute observation. The praises for social responses ranged between 0 and 7, averaging 2 occurrences. The number of extensions following social responses ranged between 0 and 6, averaging 3 occurrences.
The bottom portion of Figure 1 depicts the number of occurrences of teaching components for teaching other behaviors. During the initial baseline, the brother set up between 2 - 8 opportunities for other behavior, with an average of 2. Throughout the remainder of the study, the brother set up only 1 - 2 opportunities for other behavior.

Engagement

Figure 2 presents the percentage of 10 second intervals during which sister and brother were engaged or non-engaged in toys or social activity materials. The top portion of Figure 2 displays the sister’s engagement. During baseline, she was engaged between 35 and 7% of the intervals, with a declining trend. She was non-engaged between 65 and 100% of intervals, with an upward trend. During Treatment Phase 1, the sister was engaged between 0 and 65% of intervals (average 41%), and non-engaged between 0 and 35% of intervals (average 14%) with some variability. During return to baseline (Baseline 2), engagement values ranged between 21 and 55% of intervals, and non-engagement values ranged between 41 and 87% of intervals. During Baseline 2, in a different playroom, engagement values increased from 16 to 56% and non-engagement decreased from 83 to 48% of intervals. After Treatment Phase 2 was implemented, there was a drastic change. Engagement increased to 100% of intervals and non-engagement dropped to 0% of intervals. During Treatment Phase 2, there was less variability between sessions (engagement averaged 80%, non-engagement averaged 20% of intervals) except for the session on 5/7/08 when the engagement and non-engagement returned to baseline levels.

The bottom portion of Figure 2 displays the percentage of intervals the brother
was engaged and non-engaged. During baseline, the brother was non-engaged for 100% of intervals. After Treatment Phase 1 was implemented, values of engagement jumped from 0 to 71% of intervals. During Treatment Phase 1, there was some variability in occurrences of both behaviors, but a general upward trend in engagement and downward trend in non-engagement. Values of engagement ranged between 35 and 98% of the measured intervals, with an average value of 73%. Values of non-engagement ranged between 7 and 43% of intervals, with an average of 26%. Similar response patterns were observed for both engagement and non-engagement during the return to baseline (Baseline 2). During Treatment Phase 2, engagement values ranged between 80 and 100%, and non-engagement ranged between 0 and 18%. There was no overlap between engagement and non-engagement values.

Play and Proximity

Figure 3 displays the percentage of 10 second intervals the siblings played either cooperatively or were in physical proximity of one another. During Baseline 1, the siblings did not engage in cooperative play, but were in proximity of each other between 10 to 45% of intervals (averaging 14%). During Baseline 1 there was a declining trend in percentage of proximity. After Treatment Phase 1 was introduced, the percentage of proximity jumped from 11 to 55% and cooperative play jumped from 0 to 12% of intervals. During Treatment Phase 1, there was some variability. Cooperative play values ranged between 0 and 35% of intervals (averaging 13%) and proximity values ranged between 26 and 85% of intervals (averaging 57% of intervals). During a return to baseline (Baseline 2), cooperative play ranged between 23 and 80%, with some
variability and a gradual declining trend until 4/16/08 when the siblings moved to a
different playroom where there was an upward trend in cooperative play values.

During a return to baseline (Baseline 2), proximity jumped up to 50% with a
range in values between 0 and 55% (averaging 60%). When the siblings moved to a
different setting, the playroom, there was a declining trend in proximity. During
Treatment Phase 2, cooperative play ranged between 0 and 26% of intervals (average
16% of intervals) and proximity ranged between 10 and 100% of intervals (average 78%
of intervals). During Treatment Phase 2 during the post assessment on 5/14/08, the
percentage of cooperative play and proximity both dropped compared to the pre
assessment on 5/14/08, cooperative play dropped from 90 to 0% and proximity dropped
from 23 to 10% of intervals.

Sister's Toy Play Types and Social Responding

Figure 4 displays the number of occurrences of different types of toy play and
social responding. The top portion of Figure 4 displays the number of conventional and
simple toy play responses the sister engaged in. During baseline conventional toy play
was occurring an average of 3 times and simple play was occurring less than 2 times
during the 5 minute observation. After Treatment Phase 1 Teaching Toy Play was
implemented, there was an increase in both conventional and simple toy play. During
Treatment Phase 1 both forms of toy play occurred with some variability. Conventional
toy play ranged from 0 to 7 and simple toy play ranged between 0 and 4. During a
return to baseline (Baseline 2), conventional toy play ranged between 0 and 4
occurrences, and simple toy play ranged between 0 and 5 occurrences. After Treatment
Phase 2 Teaching Social Play was implemented, conventional toy play initially increased from 1 to 6, but then both forms of toy play returned to baseline, with values ranging between 0 and 2.

The bottom portion of Figure 4 depicts social responding, including the number of occurrences of eye contact, participation, and turn-taking in social activities. During Baseline 1, turn-taking and participation in social activities did not occur, but eye contact values ranged between 2 and 4. During Treatment Phase 1, Teaching Toy Play, all social responses occurred less than 2 times during a 5 minute observation. During a return to baseline (Baseline 2), all three social responses occurred less than 1 time, except for eye contact. Eye contact during social opportunities did occur 4 times on 2/17/08 and 5 times on 3/14/08. When the siblings moved to a different playroom (indicated by the arrow on the graph) there was an increase in turn-taking, with 3 occurrences on 4/16/08.

Treatment Phase 2, Teaching Social Responses targeted eye contact, participation, and turn-taking. After Treatment Phase 2 was implemented, there was a jump in participation from 0 to 3. During Treatment Phase 2 there was some variability in responses, turn-taking occurrences ranged between 0 and 3 (averaging 1), participation occurrences ranged between 0 and 6 (averaging 3), and eye contact occurrences ranged between 0 and 4 (averaging 2). On 5/14/08 all three social responses dropped to 0 occurrences.

Cry and Retreat

Figure 5 displays when the sister engaged in behaviors indicative of
dissatisfaction. The two indicators measured were retreats and crying. The top portion of Figure 5 displays the number of occurrences of retreats during a 5 minute observation. During Baseline 1, the occurrence of retreats ranged between 0 and 4 with an upward trend. After Treatment Phase 1 was implemented, the occurrence of retreats ranged between 0 and 4 (averaging 2) with some variability. During a return to baseline (Baseline 2), the occurrence of retreats ranged between 0 and 3, with a declining trend. During Treatment Phase 2, Teaching Social Play, there were no occurrences of retreats.

The bottom portion of Figure 5 displays the percent of 10 second intervals that crying occurred. During Baseline 1, the percentage of intervals with crying ranged between 0 and 10, with some variability. During Treatment Phase 1, crying occurred between 0 and 40% of intervals, with an average of 15%. During a return to baseline (Baseline 2), crying occurred between 0 and 28% of intervals, with an average of 12%. After Treatment Phase 2, Teaching Social Play, was implemented, the percentage of intervals with crying stabilized at zero percent of intervals.

Smiles and Affection

Figure 6 displays the percentage of intervals in which the brother and sister engaged in smiles and behaviors related to affection. During Baseline 1, the percent of these intervals for both brother and sister were low. The brother expressed affection less than 10% of intervals and the sister expressed less than 5% of intervals. During Treatment Phase 1 there was a peak in smiles and affection from both siblings around the 12/12/07. Intervals in which affection was shown by the brother ranged between 0
and 35% of intervals, with an average of 8% of intervals. Intervals in which affection was shown by the sister ranged between 0 and 25% of intervals, with an average of 3% of intervals. During the return to baseline (Baseline 2), affection remained higher than the first baseline levels for both brother and sister. When the new playroom was introduced there was an increase in sister’s affectionate actions but eventually both siblings affection decreased to none. During Treatment Phase 2, there was an increase in the sister’s affection, values range from 23 to 3% of intervals, while her brother’s affection remained stable around 5% of intervals.

Reliability

Observer agreement was calculated for each participant and for each behavior observed. A complete table showing a mean and range of observer agreement for each behavior for both participants across all treatment conditions is provided in Appendix D. All means for each behavior were above 80%.

Interobserver agreement for teaching interactions is represented across three skill domains (e.g. toy play, social play, and other) and divided into the 4 teaching components: setting-up opportunities, modeling target response, praising a target response, and extending on a target response (see Table 6). The total mean reliability was 96% for setting-up toy play opportunities (ranging from 86 -100), 98% for modeling toy play (ranging 90 -100), 98% for praising (ranging 90-100), and 100% for extending toy play. The total mean reliability was 94% for setting-up social play opportunities, 94% for modeling social play, and 100% for praising and extending social play. The
mean reliability was 100% for setting-up, modeling, and extending other opportunities, and 94% for praising other responses.

Interobserver agreement for the occurrence and non-occurrence of engagement, cooperative play, and proximity is represented across each participant in table 7. The total mean reliability was 96% for brother’s engagement (ranging from 87 – 100), 96% for brother non-engagement (ranging 80 -100), 98 for sister’s engagement (ranging from 93 - 100), 98%for sister’s non-engagement (ranging from 91-100). The mean reliability was 90% for the occurrence of cooperative play (ranging from 80-100), 99% for the non-occurrence of cooperative play (ranging 96 -100), 93% for the occurrence of proximity (ranging 87 -100), and 100% for the non-occurrence of proximity.

Interobserver agreement for sister’s target responses includes conventional toy play, simple toy play, approach, participation, eye contact, vocals, and turn taking (see Table 8). The total mean reliability for all target responses was 100% agreement.

Interobserver agreement for the occurrence and non-occurrence of cries, retreats, and nonverbal affection is represented in table 9. The total mean reliability was 98.5% for the occurrence of crying (ranging from 91-100), 100% for the non-occurrence of crying, 100% for the number of retreats, 97% for the occurrence of brother’s nonverbal affection (ranging 83 -100), 100% for the non-occurrence of brother’s nonverbal affection, 100% for the occurrence of sister’s nonverbal affection, and 98.6% for the non-occurrence of sister’s nonverbal affection (ranging 92-100). A complete table showing percentage of observer agreement for each behavior across all conditions is provided in Appendix D.
DISCUSSION

The purpose of this study was to experimentally examine the direct and collateral effects of different teaching targets on a child with autism and her brother. The results of this study showed an increase in the number of teaching components the typically developing brother performed across two different targeted skills, toy play and social play (see Figure 1) and the behaviors taught by the brother to his sister increased conventional and simple toy play, eye contact, participation, and turn-taking (see Figure 4). As well as, increases in the amount of engagement, cooperative play, and proximity between the siblings (Figures 2 and 3).

This study supports literature that siblings of children with autism spectrum disorders (ASD) can be trained to teach, but they also may need to be taught how to interact with their brother or sister as a companion (Harris & Glasberg, 2003). Unfortunately, an emphasis on reciprocity and friendship between siblings is not well addressed in previous sibling research. This study, along with previous research by Baker (2000), James and Egel (1986), and Merker (2005), extends sibling research by identifying teaching techniques and defining collateral measures which allow an experimenter to monitor and improve the siblings’ relationship. In the present study, targeting social play during Treatment Phase 2, lead to mutually reinforcing interactions between the siblings. Mutually reinforcing interactions included high rates of engagement, turn taking, and close proximity as well as decreases in sister’s crying and retreats during sibling interactions. These qualitative changes in the siblings’ interactions could potentially facilitate a stronger and life-long friendship (Harris & Glasberg, 2003).
With this in mind, several implications are noted for measuring and teaching procedures for behavior assessment significant of a relationship between siblings. First, this study recommends that participants’ affect be a critical variable for assessing treatment progression. In this study, satisfaction indicators were measured in the form of smiles and preferred physical touch to one another. Throughout the experiment, both brother and sister engaged in steady, low rates of smiling and physical touch during their interactions. Additional measure of “satisfaction” for the participants in this study included proximity, engagement, and cooperative play. All changed in favorable ways during the second phase of intervention.

Dissatisfaction indicators were measured in the form of crying and retreating. As treatment progressed, behaviors associated with satisfaction and dissatisfaction became very relevant as a source of information and treatment adjustment. Specifically, the data of the sister’s crying set the occasion for revision of the intervention package and led to the development of Treatment Phase 2. In general, it is important to individualize the definition of satisfaction and dissatisfaction indicators based on observations for individual participants. Measuring both satisfaction and dissatisfaction indicators can facilitate person-centered programming, which could aid the selection of future treatment programs for our clients that are based on direct observation of their behavior (Broome, 2008; Baker, 2000; Green & Reid, 1999; Koegel, Dyer, & Bell, 1987).

Second, in order to evaluate the effects of the present study, the experimenters monitored a wide range of collateral measures. These measures include the brother’s and the sister’s engagement and non-engagement, cooperative play, proximity, smiles, affection, cries, and retreats. Analyzing these collateral measures across two
participants assisted the experimenter in making data-based decisions. For example, during Treatment Phase 1: Targeting Toy Play, the experimenter observed an increase in the number of opportunities, models, and praise statements delivered by the brother to his sister. There was also an increase in the sister’s simple toy play. However, the sister cried and retreated more often than previously observed, and the brother was overly-directive, with very few extensions on the sister’s toy play. Instead the brother would model a toy play action, and once his sister engaged in that action, he would deliver praise but stop playing with her and the toy. Instead, he would either watch her play with the toy while looking for approval from the experimenter or parents, or he would seek out the next teaching opportunity. Based on these observations it was clear that the siblings’ interactions were not mutually reinforcing. Instead, their interactions were that of a teacher and student. At this point it was important that the treatment package be altered. One alteration involved the inclusion of the brother’s preferred toys during social play. This was similar to Merker (2005) and appeared to contribute to the similar results.

Finally, this study discovered the importance of attentively selecting teaching targets, because, in essence, what you train is what you will get. For example, during the implementation of Treatment Phase 2: Targeting Social Play, there were observable increases in the number of teaching components within this skill domain. Correspondingly, there were observed decreases in the number of teaching components targeting toy play. As a result, the occurrence of the sister’s social responses (i.e., eye contact, participation, and turn-taking) increased, while she engaged in less toy play types (i.e., conventional and simple toy play).
Future Research Directions

With these outcomes in mind, there are several aspects of this study that suggest additional investigation. Particularly, the sibling training package in this study was only implemented by the experimenter. Unfortunately, there was no data taken in the home when the experimenter was not present. In other words, when the brother was not being directly supervised by the experimenter, it is unknown if he set up learning opportunities or the number and duration of interactions between siblings. This information is critical for measuring the generality and maintenance of this study’s results.

Additionally, due to the brother’s previous exposure to teaching models, observed during his sister’s in-home treatment program, the generality of this study’s results are limited. It remains to be seen if this intervention would be effective as a training program with other families whose children are not a part of in-home intervention programs. If the training package was effective with other families, it could prove to be a component in the training of not only toy play skills but also applied to a number of different skill domains for children with autism. This information would strengthen the validity for the procedures adapted in this sibling training package.

With consideration of its limitations, the findings of the present study in combination with previous research (Baker, 2000; Cash & Evans, 1975; Celiberti & Harris, 1993; Colletti & Harris, 1977; James and Egel, 1986; Merker, 2005; Randall, 2000; Schreibman, O’Neil, & Koegel, 1983) contribute to the research and treatment of children with autism and their siblings. Findings of the present study identified teaching procedures that can be applied to two skill domains: toy play and social skills. It
demonstrated the effects that altering teaching materials and altering the goal of an intervention can have on a sibling relationship.

Table 1

*Treatment Fidelity (Teaching Toy Play)*

<table>
<thead>
<tr>
<th>TREATMENT 1 FIDELITY</th>
<th>Y / N / Na</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Preferred toys are accessible throughout the play environment</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>2. (if presenting toy for first time in session) teacher places toy in front of child; and models conventional play with the item.</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>3. (if child approaches toy) teacher gives immediate access to the toy</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>4. (If child not playing or looking at toy) teacher removes that toy and presents a new toy.</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>5. (if child touches toy but doesn't engage in conventional play) teacher models conventional play with toy.</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>6. (if child plays conventionally) teacher provides praise and continue with item or activity.</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>7. (if child cries or retreats) teacher plays with toy in attempts to entice continued play.</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>8. (if highly preferred toy) teacher plays with toy just out of the child's close proximity to entice her to approach teacher.</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>9. Experimenter models with child</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>10. Experimenter role plays with sibling</td>
<td>Y / N / Na</td>
</tr>
<tr>
<td>11. Experimenter provides feedback during sibling-child play interaction</td>
<td>Y / N / Na</td>
</tr>
</tbody>
</table>
Table 2

*Treatment Fidelity (Teaching Social Play)*

<table>
<thead>
<tr>
<th>TREATMENT 2 FIDELITY</th>
<th>Y / N / Na</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Activity materials are accessible throughout the play environment</td>
<td></td>
</tr>
<tr>
<td>2. (if modeling activity for first time during session) teacher models</td>
<td></td>
</tr>
<tr>
<td>a range of actions associated with activity</td>
<td></td>
</tr>
<tr>
<td>3. (if child manipulates any materials associated with social activity)</td>
<td></td>
</tr>
<tr>
<td>teacher provides a preferred consequence and continues with activity</td>
<td></td>
</tr>
<tr>
<td>4. (If child does not participate in activity) teacher models a different activity.</td>
<td></td>
</tr>
<tr>
<td>5. (if child watches but doesn't participate) teacher modifies model</td>
<td></td>
</tr>
<tr>
<td>6. (if child plays conventionally) teacher provides praise and continue</td>
<td></td>
</tr>
<tr>
<td>with item or activity.</td>
<td></td>
</tr>
<tr>
<td>7. (if child cries or retreats) teacher plays with toy in attempts to entice</td>
<td></td>
</tr>
<tr>
<td>child to approach.</td>
<td></td>
</tr>
<tr>
<td>8. (if highly preferred activity) teacher models activity out of the child's</td>
<td></td>
</tr>
<tr>
<td>close proximity to entice her to approach teacher.</td>
<td></td>
</tr>
<tr>
<td>9. Experimenter models with child steps 1 - 8</td>
<td></td>
</tr>
<tr>
<td>11. Experimenter provides feedback during sibling-child play interaction</td>
<td></td>
</tr>
<tr>
<td>on steps 1 - 8 when they apply</td>
<td></td>
</tr>
</tbody>
</table>
Table 3

**Interobserver Agreement (Teaching Interactions)**

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Baseline</th>
<th>Treatment 1</th>
<th>Baseline</th>
<th>Treatment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set up Toy Play Opportunity</td>
<td>100</td>
<td>83 -100</td>
<td>100</td>
<td>90 -100</td>
</tr>
<tr>
<td>Model toy play</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Praise Toy Play</td>
<td>100</td>
<td>90 -100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Extended Toy Play</td>
<td>100</td>
<td>80-100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Set up Social Opportunity</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Model Social Response</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Praise Social Response</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Extend Social Interaction</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Set up Other opportunity</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Model Other opportunity</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Praise Other</td>
<td>66</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Extend other</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4

**Interobserver Agreement (Engagement, Play, Proximity)**

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Baseline</th>
<th>Treatment 1</th>
<th>Baseline</th>
<th>Treatment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>agree/agree+disagree *100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occurrence of Brother Engagement</td>
<td>100</td>
<td>87-93</td>
<td>97</td>
<td>98-100</td>
</tr>
<tr>
<td>Non-occurrence of Brother Engagement</td>
<td>100</td>
<td>97</td>
<td>100</td>
<td>80-100</td>
</tr>
<tr>
<td>Occurrence of Sister Engagement</td>
<td>93</td>
<td>100</td>
<td>97</td>
<td>98</td>
</tr>
<tr>
<td>Non-occurrence of Sister Engagement</td>
<td>100</td>
<td>98-100</td>
<td>100</td>
<td>91-100</td>
</tr>
<tr>
<td>Occurrence of Cooperative Play</td>
<td>100</td>
<td>100</td>
<td>86</td>
<td>80</td>
</tr>
<tr>
<td>Non-occurrence of Cooperative Play</td>
<td>100</td>
<td>100</td>
<td>96</td>
<td>98-100</td>
</tr>
<tr>
<td>Occurrence of Proximity</td>
<td>87</td>
<td>80-100</td>
<td>96</td>
<td>100</td>
</tr>
<tr>
<td>Non-occurrence of Proximity</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 5

*Interobserver Agreement (Sister’s Toy Play Types & Social Responding)*

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Baseline</th>
<th>Treatment 1</th>
<th>Baseline</th>
<th>Treatment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Play</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Simple Play</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Approach</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Participate</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Eye Contact</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Vocal</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Turn Taking</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6

*Interobserver Agreement (Retreats, Crying & Nonverbal Affection)*

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Baseline</th>
<th>Treatment 1</th>
<th>Baseline</th>
<th>Treatment 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>agree/agree+disagree *100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occurrence of Cry</td>
<td>100</td>
<td>91-100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Non-occurrence of Cry</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Number of Retreats</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Brother Nonverbal Affection</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>83-100</td>
</tr>
<tr>
<td>Non-occurrence of Brother's NA</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Sister Nonverbal Affection</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Non-occurrence of Sister’s NA</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>92 - 100</td>
</tr>
</tbody>
</table>
Figure 1. Brother’s teaching components.
Figure 2. Sibling engagement.

Figure 3. Sibling’s play and proximity.
Figure 4. Sister’s toy play types and social responses.
Figure 5. Sister’s retreats and crying.
Smiles and Affection

Figure 6. Sibling’s smiles and affection.
APPENDIX A

REVIEW OF SIBLING RESEARCH
<table>
<thead>
<tr>
<th>Reference</th>
<th>What was taught</th>
<th>What measured</th>
<th>Targeted skills</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Baker (2000)</td>
<td>How to incorporate thematic ritualistic activities into games to be played with sibling</td>
<td>Collateral- Percentage of social play Sibling- affect Child- joint attention, nonengagement, ritualistic behaviors, positive and negative affect</td>
<td>Joint attention and social interactions</td>
<td>Collateral- Increased social interactions and joint attention Child- increased positive affect, decrease ritualistic behaviors, Generalized- new games and settings</td>
</tr>
<tr>
<td>Cash &amp; Evans (1975)</td>
<td>NT Sibling taught prompting, instructions, calling attention, and reinforcement, punishment</td>
<td>Sibling- prompting, instructions, positive reinforcement, calling attention, and punishment</td>
<td>Sibling 6 teaching skills</td>
<td>Sibling- teaching skills increased</td>
</tr>
<tr>
<td>Celiberti &amp; Harris (1993)</td>
<td>NT Sibling taught to elicit play, play-related speech, praise, and prompt</td>
<td>Sibling- percentage of elicitations, prompts, and praise that met criteria Child- targeted behaviors</td>
<td>Sibling teaching skills</td>
<td>Siblings- increased proficiency in teaching skills, and maintained for 3,6,16 weeks Generalized- novel toy</td>
</tr>
<tr>
<td>Colletti &amp; Harris (1977)</td>
<td>NT Sibling taught to instruct and reinforce target responses</td>
<td>Sibling- reinforcement Child- stringing beads, answer addition problems, out of seat</td>
<td>Child- string beads, write letter, simple addition</td>
<td>Siblings- proficient reinforcement. Parents- reliable data collectors Child- improved skills</td>
</tr>
<tr>
<td>* James &amp; Egel (1986)</td>
<td>NT Sibling taught how to prompt, model, and reinforce reciprocal interactions</td>
<td>Positive reciprocal interactions btw. siblings</td>
<td>Child- Initiate or reciprocate siblings initiations during play</td>
<td>Training increased initiations and responsiveness to initiations. Generalized- to play groups and different settings</td>
</tr>
<tr>
<td>* Merker, Stephanie (2005) Thesis</td>
<td>NT siblings taught how to set-up opportunities for conversation and praise correct responses across three toy conditions</td>
<td>Collateral- Interactions &amp; proximity Siblings- setting up opportunities for conversation, compliments, social bids, nonverbal affection, and imitation</td>
<td>Increase siblings proximity and interaction during play</td>
<td>Sibling increased teaching behaviors. Collateral measures: interactions, nonverbal affection &amp; proximity increased especially with toys chosen by child with autism</td>
</tr>
<tr>
<td>Randall, Domonique (2000) Thesis</td>
<td>NT Sibling taught how to instruct, model, and praise sibling play</td>
<td>Sibling- instructing play, wait for eye contact, prompting &amp; praising, Child-compliance, noncompliance, imitate sibling, physical or verbal initiation to sibling Collateral-proximity, interaction</td>
<td>Child- complied to instructions to play with a toy with sibling</td>
<td>Siblings- correctly implemented all trained interaction components Generalization-untrained material and setting</td>
</tr>
</tbody>
</table>
APPENDIX B

CONSENT AND ASSENT FORMS
Informed Consent Form

Before agreeing to you and your children’s participation in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Title of the Study:

Sibling-implemented training package:

An analysis of the effects on the behavior of a child with autism and her sibling

Principal Investigator:

Sara L. Czekalski, B.A.

University of North Texas, Department of Behavior analysis

Purpose of the Study:

Training siblings as teachers of children diagnosed autism spectrum disorders (ASD) has been shown to be beneficial for children with autism and their typically developing siblings. There are very few descriptions of interventions, however, that teach siblings in their homes, with their own toys, and using their interests to design the training. This approach is called “naturalistic instruction.”

The purpose of this study is to provide a description of the sibling training package your children received as part of the North Texas Autism Program (NTAP) early intervention program. The procedures, outcomes, and participant satisfaction will be documented so that other interventionists working with children diagnosed with ASD can replicate these procedures in their programs.
The study will include a description of the client’s prior to the study, the training the siblings received, and the principle investigator’s evaluation of the training package implemented in this study. We will do this so that interventionists working with siblings can replicate these procedures in their programs.

The outcomes we would like to report include the teaching skills your son learned, your daughter’s progress that resulted from sibling’s teaching, and any additional benefits that were observed. Additional beneficial outcomes might include: your daughter’s increased play with toys and with her brother. Also the overall increase in the amount of time your children will be able to play together, and increases in their proximity and cooperative play with each other. We will report outcomes so that other interventionists understand the types of changes that sibling training packages can produce.

We would also like you to provide us with your evaluation of the sibling training. We would like your opinion throughout and following the training process. Let us know if there are any problems or difficulties and suggestions for how the training process could have been more efficient. We will report this information to help others benefit from your perspectives on this type of intervention.

Study Procedures:

1) We are asking you to participate in an interview about the training your children received, the effects, and your satisfaction with the program. The interview should take about 20 minutes to complete. Your name will in no way be linked to the information. You and your children will always be referred to by pseudonyms.

2) We are asking you to give consent for the assessment of sibling and child interactions to be reanalyzed and summarized in order to report the degree to primary and collateral changes occurred. Your name and your children’s names will never be associated with any of the data. We will use pseudonyms to describe you and your child in any publications.
3) All study activities will be supervised by Dr. Shahla Ala-Rosales, through the Department of Behavior analysis at the University of North Texas (UNT): (940) 565-2274

Voluntary Participation:

Participation in this research study is voluntary. If you decline participation or decide to discontinue participation there will not be a penalty or loss of benefits or jeopardize access to any services that you may qualify for through the North Texas Autism Project (NTAP).

Foreseeable Risks:

No foreseeable risks are involved in this study. Previous clinical and research reports have identified no harm from the participation in the interviews associated with this study.

Benefit to the Subjects or Others:

This study is not expected to be any direct benefit to you, the parent; however, the results of the study may add directly to the knowledge of other service providers delivering early intensive behavioral intervention to families with siblings of children with autism and other populations. This, in turn, may benefit future children and parents receiving similar services.

Procedures for Maintaining Confidentiality of Research Records:

As part of standard NTAP procedures, all intervention records (signed consent forms, reports, home helpers, and assessment video tapes) are kept for three years in a locked filing cabinet in the NTAP office in Chilton Hall Rm. 361E. No document will be posted on the internet and any electronic copies are kept for three years following NTAP training and then destroyed. Parents may request additional copies of NTAP files or video assessments at anytime.

For families consenting to participate in this study, pseudonyms will be assigned to each parent and child. Those pseudonyms will be used when referring to that participant’s data. These pseudonyms will be maintained throughout the course of research. Following the completion of the research study, the files will remain in the NTAP records for 3 calendar years. Because of the extensive data collection involved in the study, a team of graduate students may at any time during study view the participants’ records. All of these graduate students are staff of the North Texas Autism Project (NTAP). Personally identified data will not be disclosed to anyone outside of the NTAP team. The confidentiality of the participants’ personal information will be maintained in any public dissemination, such as appearance in academic journals and/or academic conferences.
Questions about the Study

If you have any questions about the study, you may contact Sara Czekalski.

Research Participants' Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Sara Czekalski has explained the study to you and answered all of your questions. You have been told the possible benefit and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits.
- You understand why the study is being conducted and how it will be performed
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive a copy of this form.

__________________________________
Printed Name of Participant’s Guardian

__________________________________

_________________________
Signature of Participant’s Guardian                      Date

For investigator use only:

I certify that I have reviewed the content of this form with the subject signing above. I have explained the known benefits and risks of the research. It is my opinion that the project is fully understood by all involved.
Assent Form

Purpose of Study:

I would like to tell people about what you and your sister learned during sibling training. The training of brothers and sisters of children with autism is something that other people have done before. When other sibling projects were done they found that both the child with autism and the brother or sister had fun and learned how to play together. However, the sibling project that we did in your home with your sister was a little different. The special thing about our project together was that I taught you to work with your sister in your home, with your own toys, and using you and your sister's interests to make up the sibling project. This is called "naturalistic teaching."

I think you were a great teacher and your sister and you learned to play together. Now I want to share what happened with other people. By sharing this information with other people we might be able to change how other teachers of children with autism think about siblings as teachers.

I want to show the numbers and tell the story of the sibling project. I also would like to know what you liked and did not like about the sibling project. Was it fun? What did you learn? Are you and your sister playing together more because of the sibling project? With your help I will know what was good and helpful about the sibling project, and if there are any problems with the sibling project. I will write the information you share with me in my paper. This paper will help other teachers work with children similar to your sister that also have a brother or sister that would like to work and play with them.
Assent Form

Study Procedures:

1) Dr. Shahla helped with all of the writing, data, graphs, and teaching during the sibling project.

2) Dr. Shahla and I are asking you to talk with me about the training you and your sister received, the effects, and what you liked and didn’t like about the sibling project. The interview should take about 20 minutes to complete. Your name and your sister’s will in no way be linked to the information. You and your sister will always be referred to by nicknames. So your privacy is protected.

3) We are also asking you to give us permission to make the data, graphs, and written description of the sibling project. Again, your name and your sister’s name will never be on any of the data. We will use nicknames to describe you and your sister in any written descriptions.

Voluntary Participation: You do not have to give us permission to write, or create graphs for the sibling project. If you do not wish to participate or decide you want to stop at any point during the interview you will not get in trouble or lose any other benefits, and your sister’s therapy will continue as usual.

Foreseeable Risks: You will not get hurt or do anything that you don’t want to do. If at any point you don’t feel like sharing your opinion with me just let your parents or I know.

Confidentiality: The videotapes of you and your sister will be watched by me so that I don’t forget what happened when I leave your home. If other teachers and students watch the videotape it is only so they can learn more about sibling training. I will not tell others your names, instead we can think of a nickname for you!
CHILD ASSENT
I _________________________, have read the information provided above, and Sara has explained what it means and answered my questions. I understand I do not have to do this if I don’t want to. I also understand that this study will help other siblings just like my sister and I. I agree to participate in the study mentioned above.

_____________________________________    ______________
Printed Name of Child      Date

_____________________________________    ______________
Printed Name of Child      Date

WAIVER OF ASSENT
The child named _____________________________________ has been waived from signing an assent for the following reasons:
   ____ Age
   ____ Maturity
   ____ Psychological State of the Child

____________________________________________
________________
Signature of Participant’s Parent or Guardian    Date
APPENDIX C

TREATMENT CONDITIONS OVERVIEW
*Sibling questionnaire

*Brother data collection

** Brother taught sister toy play types

*Meeting with Parents: Assess siblings preferences

*Parents request move: new play room

*Sibling book on roles of big brothers

**Brother taught sister social play

Twice Weekly Sessions

Baseline 1  Treatment 1: toy play  Baseline 2  Treatment 2: social play

1  6  |  14  |  18  |  21  |  24
APPENDIX D

SIBLING PREFERENCES AND SOCIAL ACTIVITIES
Preferences Incorporated into Social Activities

Brother’s preferences (activity possibilities):

1. Read (sibling read picture book together)
2. Music: rock and rap (Freeze dance with half “Jack” and Arjun songs)
3. Wii
4. Draw & Art
5. Running/exercise (chase, pillow fight, crash with her wagon)
6. Board games (Trouble or Battle ship)
7. Playdoh & Moon sand
8. Helps sister with her bath
9. “learning and discovering” (building a blanket forth/castle)
10. Pretend camping (blanket tent in living room; flashlight stars on the ceiling)

Sister’s preferences (activity possibilities):

1. Books; Elmo & picture books
2. Jack CD
3. Plays with pegs at school
4. Stickers
5. Chase
6. Holding Tylenol bottles, red items
7. Bubbles
8. Water & bath time
9. Rides in her car/wagon
10. Giving high 5’s

Sibling Social Activities

1. Freeze Dance (need burn CD of his/her music)
   a. Activity reinforcer for him: his music #2
   b. For her: Jack music #2

2. Toys in container of water or beans
   a. Activity reinforcer for him: #8
   b. For her: water being poured #8
3. Capitalize a game of chase around the living room
   a. Reinforcer for him: #5
   b. Reinforcer for her: #5 & #6

4. Reading 6 year old appropriate books with pictures
   a. Reinforcer for him: #1 & #9 learning/discovering new topic
   b. Reinforcer for her: #1 pop-up pictures, Elmo or characters, Velcro attached pictures

5. Paint wood figurines, paint paper plate masks, paint picture with finger paint
   a. Reinforcer for him: #4 & her handing him crayons
   b. Reinforcer for her: #4 stickers or paint on her hands

6. Lite Brite:
   a. For him: she could give him pegs being in the dark or pretending they’re camping
   b. For her: #3

7. Moon Sand
   a. Him: #7
   b. Her: may like the texture on her hands

8. Leap frog books
   a. Him: #1
   b. Her: music & pictures

9. Toy Science kit
   a. Him: #9
   b. Her: #6
APPENDIX E

SIBLING QUESTIONNAIRE
Sibling Questionnaire

Sibling _______________________ Teacher _____________________ Date/Time:

1. What do you like to play?
2. Does your sister know how to play those things?
3. What do you like to watch on TV?
4. Does your sister like to watch those same shows?
5. Does your sister play with you very much?
6. Does she play with you when you ask?
7. When do you usually play with her?
8. What do you two play/do together?
9. Do you enjoy playing with your sister?
10. What would you like her to be able to do after this project?
APPENDIX F

SIBLING BOOK
Arthur, Big Brother Extraordinaire

By: Sara Czekalski
Sibling Project
For the Big Brother

Table of Contents: What's it mean to be a Big Brother?

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</table>
Big Brothers are so IMPORTANT

Friends for life
Sibling is another word for
Brother & Sister. Siblings
are so important
because you and your
Sister love each other and
are friends forever.
Just like Arthur and DW!

Parts of BIG BROTHER

There are many different parts of being a Big
Brother. Some parts are fun while others are not.
You and Arthur have a lot of these parts in
common.
One part of being a big brother is teaching your little sister.
Just like Arthur is teaching DW to read, you are teaching your sister to play!
Big Brothers also show their sister what is right by being a good model. That means you show your sister how to act.

Just like Arthur shows DW to whisper, you show your sister how to listen to your parents when you listen to them.
For the Big Brother

Big Brothers also just hang out with their little Sisters. Just like Arthur and DW wrestle, you and your sister will doing fun things together during the sibling project.

Siblings that are friends have some things that they both like to do or watch.

Arthur and DW both like playing in the leaves. During the sibling project we are going to find things that you and your sister both like.
These are great things a brother can do when he is TEACHING:

**Introducing new toys:**
This means showing your sister toys she may not play with very often or showing her different ways to play with a toy.

**Modeling:**
This means showing her how to play with the toy. For example, you push a car and show her how to blow bubbles.

**Praising:**
When your sister plays you get excited and do things that make her smile, like tickles or noises and play with her and the toy. All these things let her know you like what she did.

**Keep Playing:**
Have fun and keep playing with the toy. Your sister learns how to play by watching you play!
For the Big Brother

These are the things a brother can do when he is a FRIEND:

**Doing things you like together:**
Do things you like to do with your sister, and figure out which silly noises, songs, games, and toys make your sister smile and laugh and do those things with her. She will also learn to find things you like.

**Modeling**
Show your sister ways to play. She might show you ways to play too.

**Giving your little sister things she likes:**
You and your sister both have things you like. When friends hangout together they give gifts of things they like to each other, like attention, candy, stickers, and smiles.

**Saying nice things to your little sister:**
When you give someone a compliment it makes them happy. When playing with your sister you could tell her, "I have fun playing with you" or "good job." If she smiles at you that is a way of giving you a compliment.

**Friendly touches:**
You can both give hugs, give high 5's, pats on the head and holding hands. These are ways of saying “it's fun to be with you.”

**Have Fun and Keep playing with her:**
If you and your sister are both having fun keep going.
Have a good time!
If your sister is in trouble and needs help, a big brother is there to save the day!

You can help your sister by turning her toys on and making her bath time fun!

As your sister gets older she will learn to help you by getting you things, and help you with chores.
For the Big Brother

The most important part of being a big brother is that you and your little sister have a lot of love and you keep trying to learn to be friends and to help each other.
APPENDIX G

OBSERVATION CODE
Learn Unit

The learn unit is a chain of four teaching behaviors and a target response from the learner. For the purposes of the present sibling research study the teacher is the brother and the learner is the sister (see excerpt of data sheet below).

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>Model</th>
<th>response</th>
<th>Praise</th>
<th>Extend</th>
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<tbody>
<tr>
<td>Social Toy</td>
<td></td>
<td>M+ M-</td>
<td>C S A V Ec P T other</td>
<td>E+ E- na</td>
</tr>
<tr>
<td>Other</td>
<td>M+ M-</td>
<td>C S A V Ec P T other</td>
<td>C+ C-</td>
<td></td>
</tr>
</tbody>
</table>

The teaching behaviors occur in a sequence. A learn unit begins when the teacher sets-up an opportunity (opp.). For the purposes of the present sibling research study the opportunities are divided into three types. The teacher can set up toy, social or other opportunities. Then the teacher models the target response (M). Following a response from the learner the teacher provides a consequence (C). The learn unit ends with the teacher extending the toy or social play (E).

When collecting data on the learn unit one must assess whether each teaching behavior occurred or did not occur, according to the definitions provided below. In order to further aid data collection there are examples and exclusions provided for each teaching behavior as well as general scoring rules.

Teaching Behaviors-----------------------------------------------

Set up Opportunities
General Scoring Rules for Opportunities

1. Do not record teaching behaviors or target responses that you can not see or hear (i.e. can’t see sister’s face but you hear “good looking”).
2. If the video ends before a learn unit is completed mark each of the teaching behaviors you observed and cross out the remainder of the row.
3. When an opportunity is arranged but no target response is emitted then mark the opportunity as a toy opportunity (response: other). There is no opportunity for both children to play together therefore it is not social.
4. Brother calling his sister by name is not sufficient form of drawing attention thus, not considered an opportunity.

Set up Opportunities

Brother arranges the environment in a way that increases the likelihood of a response from his sister. General methods of arranging the environment include withholding access, drawing attention, and helping/assisting to gain access. This includes making an item of interest to his sister contingent in order to promote a target response; or introducing a new toy or play action then pausing or giving the item to his sister to promote a target response; or drawing interest to a toy through vocal labels or physical actions to promote a target response, such as approach or eye contact.

3 Types of Opportunities

1. Toy Play Opportunity
   Brother arranges the environment to promote a response from his sister that results in her receiving access, manipulating, or approaching a toy. If a target response occurs and brother does not simultaneously manipulate the toy with his sister than the opportunity is considered a toy play opportunity. Toy play opportunities also include attempts that do not result in a target response. Also includes each new play action within the same toy. Each new play action is a
new opportunity for toy play. Excludes any attempts to turn taking, for this skill is considered social opportunity.

Examples include but are not limited to:

- Brother pushes buttons on a toy car (1st opportunity & model) but his sister does not respond, then brother rolls the toy car to his sister (2nd opportunity & model) no response from his sister. Ten seconds later brother rolls the jeep back and forth between his own legs and looks at his sister (3rd opportunity & model).
- Brother says “sticker” and waits for eye contact, once she has received the sticker sister plays alone with the sticker.
- Brother pushes sister in a wagon, stops the wagon and waits till she looks at him then starts pushing her again.
- Brother takes out a sticker and waits for eye contact from his sister then gives it to her then they play separate from each other.
- Brother scribbles with a marker then holds the marker up and says “marker?” when his sister looks he gives the marker to her and briefly (less than 10 seconds) watches her scribble with the marker.

Exclusions include but are not limited to:

- Brother says “whoo” as he swings a toy around his sister’s head;
- Brother gives his sister a sticker non-contingently;
- Sister has a sticker in her hand and brother says “Priya, put the sticker right her, please” and points to a piece of paper (no access withheld);
- All parts of a toy are in sister’s possession while her brother plays with the toy; brother takes a book away from his sister and says “it’s not time to play book” but does not require an alternative response.
- Brother reads a book to his sister, while she sits in mom’s lap. Brother does not give her possession of the book.

2. **Social Play Opportunity**
   Brother arranges the environment to promote a target response. When the target response occurs both brother and sister simultaneously manipulate some aspect of the same event during or following the target response. If a target
response does not occur the opportunity is considered a toy play opportunity.

Also includes any attempts to practice turn taking.

Examples include but are not limited to:

- Brother is playing with beans but sister is drawing with markers, so brother moves beans closer and makes fun noises while playing with the beans (opportunity for social approach), when sister does not approach brother pours beans near her and says “beans?” then they both start picking the beans up together;
- Brother says “can I have it” and puts out his hand for his sister to hand over the toy microphone;
- Brother pretends to eat plastic food then hands it to his sister, then pretends to eat another piece of plastic food and hands a different food item to her (score as separate social opportunities bc/ siblings both manipulating the same toy items);
- Brother and sister are both manipulating beans when brother pours beans from a cup and hands his sister the cup then she pours beans (target responses: turn taking & participation);
- Brother and sister are both playing with beans when brother shakes an egg full of beans around his sister’s head then hands the egg to her and they both manipulate beans.

Exclusions include but are not limited to:

- Sister is pushing cards on the ground when brother approaches her and says “cards, good playing”
- Brother blows bubbles without requiring any response from his sister
- Brother turns a rain stick upside down then puts it in his sister’s hand while she turns it around he watches her and says “good playing” (toy opportunity)
- Brother says “Priya, look” without waiting for a response from her he drops fuzzy balls over her head;
- Brother is playing with beans but sister is drawing and brother says “Priya come play with the beans”
- Sister is bouncing back and forth on the couch, brother approaches her and says “good playing” and tickles her

3. Other
Brother arranges the environment to promote communication outside of the context of toy or social play.

Examples include but are not limited to:

- Brother withholds access the television (or any non-toy related activity) until his sister makes a vocal request;
- Brother stops pushing his sister in a cart and says “Jack” when she makes a vocalization he continues to push her
- Brother holds up a sticker and says “sticker” when his sister looks at him he gives her the sticker

Exclusions include but are not limited to:

- Brother says “look at me, look at me”;
- Brother blows bubbles for his sister then says “more?” when she looks in his direction he blows more bubbles (score as social opportunity)
- Brother says “oh, see-n-say” and pulls the lever on a toy
- Brother stops pushing his sister in a cart and says “says Dora.” This opportunity is unrelated to toy or social play.
- Brother says “do this” and pats his head,

Model Target Toy & Social Responses

General Scoring Rules

1. Mark similar repeated models with more than 3 seconds between them as separate models. Mark each separate model on a new line under the initial opportunity arranged. If no target response occurs mark other in the response column and C – if brother continues with the same or similar model.
2. Mark statements repeated with less than 3 seconds between them as one model
3. Mark statements repeated more than 3 times with less than 3 seconds in between as an M- (i.e. “more” “more” “more bubbles” “do you want more bubbles?” “more”)
4. Mark verbal instructions and physical prompts that demand one to engage or stop engaging in a specified behavior as M -
5. Questions and labeling items or actions are not included as instructions
6. Excludes toy play following, within 5 seconds, of a target response by the sister (score as consequence)
7. Verbal labels, such as “oh, puzzle,” are only considered a sufficient model when the label can be considered an attempt to draw attention and entice approach to a toy. In order for this to be appropriate sister must not be within close proximity of brother when he delivers the model.

Model Target Toy & Social Responses

Material manipulation, a vocal label, conventional or simple play action performed by brother which correspond with a toy or social response within an arranged opportunity. Models are followed by at least a 3 second pause, unless a response is provoked sooner than 3 seconds.

Examples M+ include but are not limited to:

- Brother blows bubbles non-contingently, then says “pop, pop bubbles” and walks around popping bubbles
- Before giving his sister a paint brush brother paints with a paint brush
- Brother says “do this” then shows sister to pull a lever on her tool bench toy (M+) immediately brother hand over hand prompts his sister to pull the lever (M-). No need to score M- since M+ occurred.
- Brother says “where does this go” while handing a part of a toy to his sister;
- Brother rolls a car back and forth before he hands the car to his sister
- Brother says “book, let’s look at the book” then pauses for his sister to respond;
- Before blowing bubbles brother says “bubbles” then waits for sister to look in his direction
- Brother is pushing his sister in a cart, stops the cart and says “Dora” when she vocalizes he begins pushing the cart again (model for other opportunity)

Examples M- include but are not limited to:

- Brother says “Priya, put the sticker right here please” and points to the plate;
- Brother puts a toy in front of his sister that is off and repeats with less then 3 seconds in between “On? do you want? Say on. On. On”
- Brother hands his sister a balloon and says “play with the balloon” but does not perform any actions
- Brother takes a piece out of a toy, hands it to his sister and says “where does this go?”
- Brother says “lemon” then hands the toy food to his sister. When she does not take it from him he continues to attempt to place it in her grasp;
• Brother attempts to turn sister’s head in his direction in order to get her attention;
• Brother puts music on but does not move with the music;
• Brother puts blocks within close proximity of sister but does not show her how to stack the blocks;
• Brother is blowing on his sister’s tummy then stops and waits but does not say anything (score as a social opportunity and M-)

Instructions (not scored, just for clarification) Directions, either vocally or physically, to engage or to stop engaging in a specified behavior. Statements that would be considered questions are not scored as instructions. In addition, labeling actions that the sister is already engaged in is not scored as an instruction

Examples include but are not limited

• Brother tells his sister to “stop crying” or “say jack;”
• Brother says sister’s name when she retreats or he wants to get her attention; brother says “no” “no don’t lick your hands” “Priya stop;”
• Brother physically guides his sister toward a toy or social activity;
• Brother physically guides his sister back to the living room.

Exclusions include but are not limited to

• Brother rolls the car on the ground and say “vroom”
• Brother withholds access to bubbles and asks his sister “do you want more?”
• Brother says “mmm, want a cookie?” as he hands his sister a plastic piece of food;
• Brother complains “all she wants to do is run back and forth”

Consequence for Target Toy & Social Response

General Scoring Rules:
1. Do not score a target response if you do not see it. In a few video clips brother has said “good looking” when his sister did not look.
2. Whatever the type of opportunity arranged (i.e. social, toy, other) the model, consequence and extend are also that type
3. Correct consequence for when sister does not approach or manipulate a toy is for brother to model a new action or introduce a new toy within 10 seconds of his original model. If this does not occur write too long above C- in the consequence portion of the datasheet.

Consequence for Target Toy & Social Response

Following 5 seconds from the beginning of a target response, the sibling delivers a vocalization of approval, preferred tangible items, or physical touch while or following a target response. Also includes if a target response does not occur within 10 seconds of the model and brother moves on to a different play action with the same toy or a different toy all together. Excludes whenever sister retreats and brother follows her rather than enticing her with a different toy.

Examples C+ include but are not limited to

- Brother hands his sister another part of a toy when she put the last piece in the correct spot;
- Brother switches to painting when his sister does not approach the moon sand;
- Brother says “stove” and turns the knobs on the toy stove, when his sister does not approach him he puts a pan on the stove top;
- Sister does not pretend to eat plastic food with her brother so he shows her how to pour from the pitcher;
- Brother blows bubbles when his sister looks in his direction;
- Brother says “good playing” following his sister pushing a car;
- Brother provides paint brush when his sister looks at him for the paint brush;
- Brother hands his sister the jeep when she approaches him playing with it
- Brother says “thanks” when his sister shares the dry erase marker;

Examples C- include but are not limited to:

- Brother is playing with the light up stage in his lap and his sister looks in his direction but he does not notice or give her the toy;
• Brother blows bubbles but his sister does not approach, then he blows bubbles again;
• Brother says “good looking” but sister did not look in his direction or at the toy;
• Brother gives a preferred item to his sister when she attempts to retreat;
• Brother says “good job playing” when his sister is only holding a toy;
• Brother blows bubbles into his sister’s back as she walks away from him;
• Brother is painting but when his sister does not approach painting he does not change activity he keeps painting

Extend Play/Social Interaction
For 10 seconds following a target response, brother continues to manipulate items associated with the activity, provide a vocal label, or a modeled play action with the same toy or activity. Exclude when brother arranges a new opportunity within the 10 seconds following a target response. Extending play is not applicable (score NA) if no target response occurred and when brother is playing with a separate toy from his sister (score as E-).

Examples of E+ include but are not limited to:
• Following an approach sister is looking at a book and brother continues to look and comment on the pictures
• Brother pauses Jack, when his sister looks he turns jack back on and they both watch the television
• Sister pushes toy jeep and her brother continues to make jeep noises and says “jeep”
• Following sister’s approach to a block tower brother continues to stack blocks while his sister watches
• Sister is playing with at a puzzle box and brother stands next to her and says “box” then walks away and fills the box with smaller toys and says “dump”

Examples of E- include but are not limited to:
• Sister saying “mmm” in the presence of the Jack, sibling turns her show back on but does not watch it with her. Instead he looks at his data
• Brother pauses Jack, when his sister looks he turns jack back on but does not watch the television, instead he writes in his data book
• Sister pushes toy jeep and her brother watches her
• Sister does not approach toy so sibling stops playing with it (mark na)
• Brother says “paint with me” and his sister does not but he keeps painting anyway;
• Brother says “where does this go?” When sister moves the toy, brother says “where does this go?” rather than playing with the toy

SISTER TOY PLAY TYPES

Simple Play (S)
Child physically manipulates the toy or activity material within the context of play. Simple play does not include handing or receiving a toy or item and holding a toy or item in her hand.

General Scoring Rule
1. Simple play does not include manipulations that could be considered conventional play or pretend play.
2. Consider touching and turning simple play only if sister is looking in the direction of the item or toy.
3. Simple play is a target response for toy play opportunities. If social opportunity (both brother and sister simultaneously manipulate some aspect of the same event during the target response) then score sister’s manipulations as participation.

Examples include but are not limited to
• Sister throws her body against the couch while smiling and laughing, brother says “good playing” as he watches her
• Child pushes buttons on a toy with her toes;
• Sister turns a toy in her hands as she inspects it;
• Sister bangs a toy against another toy;
• Sister puts out her hands as bubbles fall on her;
• Sister pushes cards around after her brother threw them on the ground;
• Sister holds and turns a card while looking at the pictures on it
• Sister puts puzzle pieces in a box and dumps them into her lap;

Exclusions include but are not limited to
• Sister puts individual piece of a toy where they belong (conventional play);
• Brother hands plastic food to sister she grabs it and holds on to it;
• Brother hands a toy to his sister but she uses her mom’s hands to grab and manipulate the toy;
• Sister puts out her hands and watches as bubbles fall on her hands
• Sister places hand on toy but doesn’t manipulate item any further;
• Sister tosses toys over shoulder repetitively;
- Sister is crying and trying to retreat from the living room. Mom says “play with brother” so sister hands her brother a toy she was holding.
- Sister flips the pages as she looks at a book (conventional play);
- Sister carries a rain stick across the room;
- Sister carries a tootsie roll around

**Conventional Play (Conv)** Child makes contact with materials according to conventional use or engages in an activity according to conventional actions related to the activity.

**General Scoring Rule**
1. Conventional play is a target response for toy play opportunities. If social opportunity (both brother and sister simultaneously manipulate some aspect of the same event during the target response) then score sister’s manipulations as participation.

Examples include but are not limited to:

- Pushing a toy truck;
- Brother hands a plastic food to his sister and she turns it in her hands and puts it up to her mouth;
- Stirring with a spoon in a play pot;
- Drawing on a dry erase board with a marker;
- Sister puts pretend food up to her mouth;
- Sister pulls a lever on a toy and swings a hammer at pop-up heads
- Sister grabs a toy plane and rolls it back and forth on the ground and over her lead;
- Brother loads up the a toy dump-truck with beans and says “dump” repeatedly sister puts more beans in the back of the dump truck;

**Exclusions include but are not limited to**
- Sister pushes a toy truck with her feet while she looks at the truck (simple play)
- Sister shaking a spoon with no other pretend food toys in her possession
- Sister drawing on her foot with a marker;
- Sister handing a toy to her brother or rejecting a toy over her shoulder;
- Holding and turning a toy while looking at it;
- Sister watches as her brother hits a toy hammer

**SISTER SOCIAL PLAY RESPONDING**

**Turn Taking** Sister exchange possession of an item or toy with her brother. Excludes when brother hands a toy to his sister.

Examples include but are not limited to
• Brother pours beans from a cup then sister takes the cup and pours out the rest of the beans;
• Brother and sister take turns filling a cup with beans;
• Brother is hitting with a hammer and his sister takes the hammer and shakes it;

Exclusions include but are not limited to

• Brother says “my turn” but does not take the toy or item from his sister’s possession;
• Brother dumps a toy over his sister’s head;
• Brother hands a toy to his sister which she holds onto

Child Approach  Anytime the sister moves toward close proximity of her brother or a toy.
Examples include but are not limited to:
• Sister is sitting on mom’s lap when brother blows bubbles. When brother says “pop” she moves towards him and the bubbles
• Sister was sitting near her brother, when he turns a toy on she leans closer toward him with her hand out reached.

Exclusions include but are not limited to:
• Sister is laying on the couch and brother walks towards her to tickle her belly
• Sister passes by her brother on her way out of the room
• Brother follows his sister as she leaves the room
• Sister walks toward mom and sits in her lap, then brother comes near his mom and sister

Eye Contact  Sister’s face orientates in the direction of her brother’s face.

General Scoring Rules
1. Eye contact can occur as a target for all three types of opportunities (Toy play, social, and other). Eye contact that results in access to a toy that brother does not simultaneously play with is considered Toy Play Opportunity. Eye contact that is unrelated to a toy or activity theme is considered other opportunity. Eye contact that results in brother and sister simultaneously manipulating an item or toy is considered Social Opportunity.
2. Do not score if you can not see sister’s face

Examples include but are not limited to:
• Brother is pushing buttons on a light up stage and sister looks in the direction of his face

Exclusions include but are not limited to:
• Brother says "good looking" but his sister was looking at a book & when you can not see sisters face
Participation

Sister manipulates a toy or item that is associated with the same toy or activity that her brother is simultaneously manipulating following an arranged opportunity.

Examples include but are not limited to:

- Sister is scribbling with a marker while her brother is drawing;
- Brother and sister are playing with toys in a container of beans when brother pours beans and hands his sister a cup then she pours from the cup;
- Brother fills the back of a dump truck with beans and says to his sister “dump” then sister puts more beans in the back of the dump truck

Exclusions include but are not limited to:

- Sister is looking at a sticker and moving it between her hands but her brother is painting;
- Brother says “Priya come paint” and she continues to color with markers;
- Sister is looking at a book or playing with a toy without her brother;
- Sister is pushing cards around on the ground and brother comes over and says “cards, good playing”
- Brother and sister are both watching television then brother pauses the show and says “jack” when she looks in his direction he turns the show back on

PLAY TOGETHER

General Scoring Rules:

Do not record teaching behaviors or target responses that you can not see or hear (i.e. can’t see sister’s face but you hear “good looking”).

Cooperative Play (Coop)

An interaction (initiations from one child are returned by the other child) between brother and sister while manipulating the same toy or activity materials. Cooperative play
begins with an initiation (draw attention, handing or approaching with a toy, simple or conventional play actions) from one child is returned with a response from the other child.

Examples include but are not limited to

- Brother hands his sister a piece of toy which she takes it and puts on the toy;
- Brother and sister each pushing buttons on a toy;
- Brother hands his sister pretend food and she takes the food from him, then he pretends to eat the plastic food;
- Brother initiates a toy by saying “look cards” and the sister approaches or touches the cards;
- Sister approaches a book, her brother follows and says “oh, a sesame street book;”
- Brother stops pushing his sister in a wagon and says “should I keep going?” when she looks at him he starts moving again;
- Brother stops pushing his sister in a car and shows her how to turn the wheel and honk the horn then she pushes the horn too;
- Brother hands his sister a toy and she reaches but they are not within close proximity;

Exclusions include but are not limited to

- Brother says nothing to his sister as he pushes her in a wagon;
- Brother stands next to a gate and tells his sister to stop crying and go play;
- Sister walks out of the room (retreat) and brother follows her;
- Brother is playing with moon sand as his sister watches him;
- Brother and sister are painting together but there is no interaction between the two of them;
- Brother hands sister a toy and she lifts mom’s hands to grab for it;

Proximity (P)

Brother and sister are within arms reach of each other; not necessarily engaged in the same activity

Examples include but are not limited to
- Sister is on mom’s lap within close proximity of brother;
- Sister and brother are within arms reach of each other brother is painting and sister is watching him

Exclusions include but are not limited to

- Sister walks past brother to leave the room
- Brother and sister are within 2 feet of each other but sister is on the other side of the couch from her brother;

ENGAGEMENT

Engaged (E)

Child or sibling manipulates a toy in a simple or conventional manipulation or moving body during an activity. If you cannot see the child or child’s back is to the camera for the entire interval mark O for off camera.

Examples of E+ include but are not limited to

- Sister moves her hands through the beans as her brother pours beans;
- Sister draws with a marker and brother is painting;
- Brother is tickling his sister’s belly while she is flapping a toy above her head
- Brother pushes his sister in a wagon (ENG) while his sister sits and enjoys the ride (NE)
- Sister moves her hands and looks in the direction of her brother as bubbles fall on her
- Brother beeps the horn on a toy car and sister imitates him
- Brother hands his sister parts of the musical stage toy as she puts where they belong

Exclusions include but are not limited to

- Brother pauses television and says “jack” and sister makes sounds
- Brother watching television;
- Brother pausing television while his sister watches television;
- Brother “taking data” while child watches television
- Brother and sister are sitting next to a music box “listening” to the music;
• Brother is playing with toy cars (score as E) but sister is watching (NE);
• Brother is holding out a piece of plastic food waiting for his sister to grab it, when his sister moves her mom’s hands to grab the plastic food
• Brother is holding a toy and trying to place it in his sister’s hand

**Non-Engaged (NE)** The child or sibling sits and observes toy play or social activities rather than moving body or materials/toys. 
*Examples include but are not limited to;*
  • Sister grabs a puzzle piece and carries it across the room;
  • Brother and sister watch as bubbles float in the air
  • Both children watch television;
  • Brother watches as his sister is engaged with a toy

**DISSATISFACTION INDICATORS**

**Cry (C)**

Corners of the child’s mouth turn down accompanied by yelling or screaming noise, and/or tears.

**Retreat (R)**

Each retreat attempt begins when the child has facial orientation accompanied by movement in the direction of the adjacent room or her mother.

**Satisfaction Indicators**

**Smiles & Affection**

Preferred physical touch delivered by sibling or child, such as hugs, high 5s, pats, tickles. Accidental touches and forced physical prompts are not included. Smiles and noises associated with happiness (e.g., laughs or squeals).

*Examples include but are not limited to*
  • Brother rubs a toy on his sister’s body
• Brother manipulates a toy to kiss his sister
• Sister smiles with her face toward her brother
• Brother smiles while he pushes his sister in a wagon.
• Sister squeals when her show is turned back on

Exclusions include but are not limited to
• Brother smiles in the direction of the camera;
• Brother tells child “good playing” and does not touch or smile at her
APPENDIX H

OBSERVER TRAINING AND DATASHEET
## Outline for Training Observers

**Observer:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Initial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Principal Investigator provides observation protocol
Observer reads code

______  ____
Principal Investigator answers any questions observer may have about the code

### Oral Quiz

Principal Investigator shows video clips of siblings playing

______  ____
Observer provides a description of how each action would be scored

______  ____
Feedback is provided to observer

### Practice Scoring

Principal Investigator and trainee watch a 5-minute observation segment and score as stated in the observation protocol

______  ____
Trainee will be in control of time, scoring own datasheet, and video

______  ____
Principal Investigator will compare scores and calculate inter-observer agreement

______  ____
Feedback is provided to observer

______  ____
Trainee scores datasheet accurately (less than 80% IOA between trainee and PI will result in repeating this section)

**Comments:**
**Scoring Instructions:** For each opportunity write a description of the event and the corresponding minute in the first 2 columns. Circle the type of opportunity arranged. Either toy, social or other. Mark whether M+ or M- whether model was delivered. Next record the sister’s response circling all target responses that apply, or other. Then record C+ or C- for consequence delivered following response. Then mark E+ or E- whether the brother kept playing within the opportunity. Once you come to the end of the line move down to the line below it. Continue this sequence until the end of the clip. Total the number of each behavior at the bottom of the data sheet. The type of model, consequence, and extend correspond with the type of opportunity arranged (i.e. social opp., social M, social C, and social E+). Record the totals on the first data sheet and staple multiple sheets together.

<table>
<thead>
<tr>
<th>Description</th>
<th>min</th>
<th>opp.</th>
<th>M response</th>
<th>C</th>
<th>E</th>
<th>Description</th>
<th>min</th>
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<th>M response</th>
<th>C</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Toy</td>
<td>na</td>
<td>M+</td>
<td>M</td>
<td>C S A V Ec P T other</td>
<td>C+</td>
<td>E</td>
<td>Social Toy</td>
<td>na</td>
<td>M+</td>
<td>M</td>
<td>C S A V Ec P T other</td>
</tr>
<tr>
<td>Other</td>
<td>na</td>
<td>M+</td>
<td>M</td>
<td>C S A V Ec P T other</td>
<td>C+</td>
<td>E</td>
<td>Social Toy</td>
<td>na</td>
<td>M+</td>
<td>M</td>
<td>C S A V Ec P T other</td>
</tr>
<tr>
<td>Social Toy</td>
<td>na</td>
<td>M+</td>
<td>M</td>
<td>C S A V Ec P T other</td>
<td>C+</td>
<td>E</td>
<td>Social Toy</td>
<td>na</td>
<td>M+</td>
<td>M</td>
<td>C S A V Ec P T other</td>
</tr>
<tr>
<td>Other</td>
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<td>M+</td>
<td>M</td>
<td>C S A V Ec P T other</td>
<td>C+</td>
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<td>Social Toy</td>
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<td>M</td>
<td>C S A V Ec P T other</td>
</tr>
</tbody>
</table>

**Set-up social play:** M+ social: C+ social: E+ social: **Conventional toy play:** M+ toy: C+ toy: E+ toy: **Participation:** M+ other: C+ other: E+ other: **Eye Contact:** M+ toy: C+ toy: E+ toy: **Approach:** M+ other: C+ other: E+ other: **Turn Taking:** M+ toy: C+ toy: E+ toy: **Vocals:** M+ other: C+ other: E+ other: **Eye Contact:** M+ toy: C+ toy: E+ toy: **Approach:** M+ other: C+ other: E+ other: **Turn Taking:** M+ toy: C+ toy: E+ toy: **Vocals:**
APPENDIX I

TEACHING PROCEDURES FOR PARENTS
How to Teach Play

- **Most important**: Play should appear natural and enjoyable for both children. If it isn’t let me know and we can make the necessary changes.

- Make many different toys available around the room (on the couch and floor). Try to select a combination of toys you know she likes and different toys that she may enjoy.

- If sister is already playing, holding, or looking at a book or a toy then talk to her about that item and try different things (make funny noises talk about the book, tickle or dance with her) to play with her and make the play and item more interesting/fun/exciting for her. We call this **Following her lead**.

- When sister doesn’t have an interest in any toy in particular show her a new toy and show her how to play with it. We call this **Setting-up an opportunity & Modeling**.
  - When you think she is not interested in the toy, because she isn’t looking at it or touching it anymore, than introduce a different toy and model how to play with it.

- It is okay to play with some toys a couple feet away from sister without calling her attention to you, to see if she will be enticed enough to approach you and the toy you’re playing with. We would call this an **Approach**.

- Once sister starts playing with a new toy, even if she is just holding it, praise and celebrate her playing, while you keep playing with her. We call this **Positive Reinforcement** when it does in fact increase her playing.
• Finally, model more complex or conventional play actions that will not only potentially make the play interaction more fun for the siblings, but could also make increase the likelihood that sister will engage in more complex forms of play. We call this Expanding.

Parent Meeting Agenda

Topic: Sibling Project
Date: April 12, 2008

➢ Sibling Project Update
  o Initial Goals (teaching play)
  o Measures of Success
    ▪ Teaching components
    ▪ Sister’s play progress
    ▪ Discuss siblings’ affection toward each other
  o Outcome data
    ▪ Video of baseline & during treatment
    ▪ Graphs
  o Success and Concerns
    ▪ Generalization, amount of crying and retreats
    ▪ Parents satisfaction/dissatisfaction with sibling’s progress

➢ Phase II
  o Primary purpose of this meeting
  o Need parents’ input
    ▪ Discuss the goals for siblings: separately & together
      • Discuss next steps to be taken
        o Stay
        o Introduce a new phase
        o Stop altogether

➢ Set up a follow up meeting
REFERENCES


