INCREASING ACTIVITIES AND INTERESTS IN A CHILD DUALLY DIAGNOSED WITH PDD-NOS AND DS

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Expanding interests may be a behavioral cusp, resulting in widespread changes across skills, and therefore is particularly relevant in intervention programs for children with autism. Little research has addressed directly increasing the diversity of activities and interests for this population. This study describes a program developed to increase activities and interests in a girl dually-diagnosed with pervasive developmental disorder (PDD-NOS) and Downs syndrome (DS). A multiple-baseline design across stimuli was employed to evaluate the program. The results show that the program increased number of total and different toy interactions. No effects were observed for overall duration of toy interactions. Results are discussed in relation to play skill instruction and preference assessment literature, the cusp, and autism intervention programs.

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TABLE OF CONTENTS

LIST OF TABLES AND ILLUSTRATIONS

Page

Tables

Figures

INTRODUCTION

Autism is defined by impairments in communication and social interactions, as well as restricted repetitive and stereotyped patterns of behavior, interests, and activities (American Psychiatric Association, 2000). Repetitive behaviors are described as an encompassing preoccupation with one or more stereotyped patterns of behavior with abnormal intensity or focus. This can include inflexible, specific, nonfunctional routines or rituals that sometimes involve repetitive motor mannerisms or persistent preoccupation with specific parts of objects (American Psychiatric Association, 2000). According to the dictionary, an **"**interest" is something that accompanies or causes special attention to an object or class of objects. Children with autism, when compared to typical peers have fewer objects or classes of objects that evoke this special attention (American Psychiatric Association, 2000).

Relative to social and communication deficits, little attention has been focused on the restricted, repetitive behaviors in children with autism (Ala'i-Rosales, Zeug, & Baynam, 2008). Ala'i-Rosales, et al. (2008) propose that expanding activities and interests should be a treatment priority within autism intervention programs. It is argued that expanding interests will benefit children by increasing opportunities for learning, by creating interests that can be shared with typically developing peers, and by increasing motivation during instructional activities. In fact, expanding activities and interests may be a behavioral cusp (Rosales-Ruiz & Baer, 1997). It is believed that behavioral cusps allow children to contact new stimuli in their environment that result in greater capacity for learning and repertoire development in a number of skill areas (Rosales-Ruiz & Baer, 1997).

For example, varied of interests can potentially increase opportunities for learning in children with autism. Children diagnosed with autism typically lack motivation in educational situations and this lack of motivation often interferes with teaching (e.g. Koegel & Egel, 1979; Dunlap, & Koegel, 1980). Behavioral interventions for children with autism rely on reinforcement to teach new skills. Items and events, from which access is typically limited, are utilized to potentially reinforce a child's behavior, resulting in behavior that is not otherwise likely (e.g. Anderson & Romanczyk, 1999). However, children with autism typically have a limited number of items and events that function as reinforcers, that is, items that will increase the probability of a response topography (Williams, Koegel, & Egel, 198l; Rogers, Cook, & Meryl, 2005). This makes teaching new skills more difficult. If the number and type of preferred events were to increase, interventions could be enhanced with more potential reinforcers.

Additionally, restricted activities and interests in children with autism may affect the development of relationships with peers. For example, increased proximity has the potential to strengthen a variety of skills for children with autism, especially social learning, that typically occurs through the imitation of same-age peers (e.g. Lee, Odom, & Loftin, 2007). It has been observed that children engage in more social behavior when participating in preferred activities (e.g. Koegel, Dryer, & Bell, 1987). By expanding the number of activities of interest, children may increase proximity to peers and this may facilitate social responding.

For young children, play activities can be a measurable set of interests to develop. Sampling and engaging in various play activities, especially with toys, provides interaction and awareness of a wide variety of play materials which is thought

to be necessary for the development of more complex play skills. Play and the continual expansion of play activities are considered key factors in a child's overall development (Novak & Pelaez, 2004).

For these reasons, play skill instruction is a highly developed and utilized area within autism treatment. Several methods are employed to teach play related behaviors: discrete trial instruction of play components (e.g. Cameron, Shapiro, & Ainsleigh, 2005), pivotal response training (e.g. Stahmer, 1995), video modeling (e.g. D'Ateno, Mangiapanello, & Taylor, 2003), social stories (e.g. Barry & Burlow, 2004), integrated play groups (e.g. Wolfberg & Schuler, 1993), play scripts (e.g. Goldstein & Cisar, 1992), choice offerings (Dicarlo, Reid, & Stricklin, 2003) and activity schedules (e.g. Morrison, Sainato, Benchaaban, & Endo, 2002). Because children with autism frequently engage in more manipulative play with fewer functional play sequences than their typically developing peers (e.g. Wolfberg & Schuler, 1999), play skill interventions are often aimed at increasing the duration and or complexity of play in order to approximate play that is more similar to typically developing children. The acquisition of longer and more complex play could potentially serve to expand a child's interests.

Preference for newly acquired play activities, however, is not commonly measured or reported within play skill instruction programs. It would be useful to understand the number and diversity of toys that a child will freely and sustain engagement over time. For example, Lifter, Cannon, and Anderson (2005) increased teaching upon child initiation ("following the child's lead"), prompting, modeling play activities, and providing social consequences for play. They did not, however, assess preference, approach, or engagement with toys. Several techniques have been

developed to assess preference (c.f. Hagopian, Long, & Rush, 2004). Of particular interest here are those studies that evaluate toy preference in young children. For example, Reid, Dicarlo, Schepis, Hawkins, and Stricklin (2003) evaluated children's independent selection of toys during an open choice play period. "Free play" preferences were assessed and ranked for each preschooler and toddler.

The purpose of the present study was to combine aspects of play skill instruction literature and the preference assessment literature. Specifically, the goal was to partially replicate Lifter et al. (2005) and Dicarlo et al. (2003) with regard to the training techniques and Reid et al. (2003) with regard to assessment of preference. In doing so, the hope was to evaluate the extent to which effective play skill instruction will expand a child's number of interests. In this case, the instruction was designed to increase the diversity of toy interactions in a 24-month-old girl dually diagnosed with autism spectrum disorder (PDD-NOS) and Down's syndrome (DS).

METHOD

Participant

A 24-month old girl, Sunny (a pseudonym), who was dually diagnosed with autism spectrum disorder (PDD-NOS) and Down's syndrome (DS), participated in this study. The participant was an only child of European and Asian descent. She engaged in some communicative eye contact, gestures (primarily for "up"), but had no vocal communication at any point during the study. Sunny displayed no imitation prior to the study but this improved throughout the course of the study as an intervention to teach object imitation was part of her general treatment program. Sunny also exhibited low frequencies of eye contact and joint attention and she had limited mobility (some crawling) throughout the course of the study. She typically did not respond to her name or when someone entered the room. Sunny rarely approached other people or initiated interactions with others (infrequently with her parents and very familiar and preferred adults). She was more likely to approach another person, or a peer, if it involved gaining access to a preferred item (e.g. beads or switch toys).

At the start of intervention Sunny's interaction with toys was primarily limited to repetitive movements with "cause and effect toys" (i.e., visual and auditory sensory stimulation appeared to be a reinforcing consequence of using these toys). She also had the tendency to spin parts of toys repetitively and had a limited number of toys she would play with and did not frequently switch to different toys. It was not uncommon for Sunny to interact with a toy in a repetitive fashion for a long period of time. Expansion of activities and interests was identified as one of her priority areas shortly following the

onset of her behavioral treatment program and the goal was increasing the diversity of toys, switching between toys, and increasing the complexity of toy play.

The expansion intervention was implemented as a part of her behavioral, in-home treatment program. The participant was enrolled in a full time preschool program for typically developing children and children with special needs; therefore the in-home behavioral intervention averaged approximately four hours per week. Additional occupational, feeding, speech, and physical therapy sessions were also provided during the course of the study. Behavioral teaching programs taught in conjunction included: communication training, object imitation, motor skills training, and social activities programs. All programs, including the expansion intervention, were implemented by the first author and supervised by the second author. Appendix D contains a copy of the participants' informed consent form for participation in the present study.

Setting and Materials

All sessions were conducted in the child's home in a common (approximately 10 x 12) carpeted, living area. Three sets of 12 developmentally appropriate play materials were used throughout the study. The sets for each experimental phase are listed in Table 2 and the actual images are displayed in Appendix E. Toys were chosen according to toy category (simple manipulation, imagination, sensory, and education) to vary in relation to the child's interest as well as to provide exposure to a range of levels of complexity.

Experimental Design and Procedure

A single-subject, multiple-baseline design across stimuli (toy sets) was conducted. Following the initial baseline period, stimuli were systematically staggered following the phase lengths. The participant had in-home therapy sessions two days a week. During therapy sessions, 10-minute expansion session was conducted once per day, totaling approximately eight sessions per month.

Measures

During 10-minute treatment sessions, data was collected on the number of initiations towards toys, defined as any time Sunny moved in the direction of a toy and manipulated it for at least two consecutive seconds. For the data sheet used to collect session data and reliability data, see Appendix C. The number of different toys contacted was also recorded. This was defined as the number of novel toys that Sunny initiated with during any given 10-minute session. Additional measures include the total duration of time that Sunny manipulated each toy contacted. For full observation code, see Appendix B.

Interobserver Agreement

Interobserver agreement (IOA) was calculated for all measures during 23% of both baseline and intervention sessions: total number of toys played with (95% agreement), different toys played with (90% agreement), and total duration of toy play (89% agreement). The primary investigator calculated agreement for event recording by dividing the smaller number of recorded instances by the larger number of recorded

instances and multiplying by 100 (Cooper et al., 1987/2007; Alberto & Troutman, 1990). A similar formula was used to calculate interobserver agreement of the total duration of toy manipulation (smaller duration divided by the larger duration, multiplied by 100).

Social Validity

Social validity was assessed using a nine-question survey. The answers were ranked on a four-point Likert scale (not at all, some, quite, very). The questions were answered by Sunny's parents following the completion of intervention and addressed issues of importance, invasiveness, effectiveness, and comfort of the intervention (See Appendix G).

Baseline

Baseline consisted of a free play period with free access to any of the 12 toys within the given toy set. The data collector was present, but did not interact with the participant, and no consequence was provided for engaging with the toys. The length of the baselines will be staggered across the three toy sets.

Treatment

The expansion program intervention consisted of three components: toys were presented to the participant, conventional uses were modeled, and any initiations to toys that were presented (or toys just available within the toy set) were reinforced with praise. Following an initiation with a toy, the experimenter interacted with the child and the toy, modeling conventional manipulations for approximately one minute before a

different toy was presented (see Appendix H for diagram of intervention procedures). No choices or initiations to toys were forced; Sunny always had the opportunity to not respond or switch to playing with a different toy.

RESULTS

Frequency of Toy Play

Figure 1 shows the number of total toys and the number of different toys that Sunny played with across three toy sets, spanning 35, 10-minute expansion intervention sessions. The top graph shows the total number of toy interactions during baseline averaged 5 per session and ranged between 4 and 6 toys. The number of different toys that she engaged with ranged between 3 and 5, averaging approximately 3 different toys per session. Immediately following the introduction of the expansion intervention, the total number of Sunny's toy interactions jumped up to 13 and remained almost triple baseline levels for the remainder of the phase averaging 15 total interactions with toys per session (ranging from 10 to 23). The number of different toys that Sunny manipulated following the implementation of the expansion intervention also immediately jumped up to 7. Sunny continued to engage in about double the number of different toys compared to baseline throughout the intervention sessions. The number of different toys Sunny engaged with ranged between 7 and 11 different toys (there were 12 different toys available in each toy set) and averaged approximately nine different toys per session.

Sunny averaged 4 total toy engagements with (range between 2 and 6 toys), manipulating an average of 3 different toys per session (range between 2 and 4 different toys) during baseline of Toy Set 2, following the implementation of training in Toy Set 1. Within Toy Set 2, again, following the implementation of the expansion intervention an immediate and substantial effect was seen with both total and total different toys, increasing approximately three to four times from baseline across 11

sessions implementing the intervention. The total number of times that Sunny played with toys averaged 13 and ranged between 8 and 16. She engaged with an average of 8 different toys per session (ranging between 7 and 10).

Untrained baseline sessions with Toy Set 3, following implementation of the expanding activities and interests intervention, showed a slightly higher number of total toy interactions averaging eight (ranging between 4 and 10). However, the number of different toys engaged with remained similar to the previous two baselines and averaged 3 toys (ranging between 3 and 4). Even with higher baseline totals for the number of toy interactions, the intervention proved to be significantly effective in increasing the total number of interactions with toys. During sessions where the expansion intervention was implemented, no values overlapped with baseline values and the number of toy interventions ranged between 11 and 15 (averaging 13 toy interactions). The effect of the expansion intervention on increasing the number of total toy interactions and the number of different toys is again immediately clear within Toy Set 3 as the number of different toys jumped up to 10 different toys during the first session employing the expansion intervention and averaged 9 toys (ranging between 9 and 10 toys).

Total Duration and Number of Toys Contacted

Figure 2 displays the total duration of toy engagement and individual toy play within each session (n = 35) for baseline and intervention across three similar sets of toys. Initially, Sunny manipulated toys for an average of 456 seconds, across an average of 5 toy interactions and 4 different toys per session, during baseline of Toy Set

1 (range between 353 and 553). Following the intervention the duration remained at an average of 455 seconds and had a similar range between 346 and 527 seconds. However, this duration was across an average of 15 total toy interactions with an average of 9 different toys per session.

In second baseline (Toy Set 2) following the first implementation of intervention in Toy Set 1, Sunny showed slightly a slightly higher average total duration of toy play averaging 513 seconds (range between 353 and 596). These sessions however had a lower average of both the total toy play interactions and different toys played with implying that she was manipulating a small number of toys for long durations. During sessions where intervention was implemented within Toy Set 2, the total duration of Sunny's toy play averaged 449 seconds (range between 266 and 574), slightly lower than during the baseline within that toy set. Again, similar to within Toy Set 1, the total duration of toy play during intervention (as compared to baseline) is across a significantly higher number of total toy interactions and number of different toys interacted with (averaging 13 toy play interactions with 8 different toys).

The final baseline within Toy Set 3 (following the previous two phases of intervention) had an extremely similar average total duration of toy play per session (466) and range (327-561) to baselines in the previous two baselines (particularly Toy Set 1). However, the average total number of toy interactions per session the duration of toy play is across is slightly higher than before, averaging 8 toy interactions per session (indicating more switching to play with a different toy than the toy she was currently playing with). The implementation of the expansion intervention again does not appear to have a significant effect on the total duration of toy play within Toy Set 3.

Sunny's total duration of toy play averaged 417 seconds and ranging between 393 and 484 seconds per session during intervention session. This is only slightly lower than during durations for baseline sessions within the same toy sets and quite similar to the durations of toy play found during intervention sessions of the previous two toy sets.

Social Validity

Following the completion of the expansion program Sunny's parents completed the social validity questionnaire (see Appendix G). There they reported that the intervention took a "fair about of time", but that it was "well worth the time." They did not feel that the intervention was intrusive and thought they could implement the intervention with "just a little assistance." They rated the effectiveness of the intervention as "very effective" and the importance, significance, and advantages as "very important," also stating that they would be "very willing" to do similar interventions in the future. Sunny's parents were very comfortable with the intervention and were given the opportunity to understand most of the procedures.

DISCUSSION

The current study was an attempt increase the diversity of toy play for a child diagnosed with autism spectrum disorder (PDD-NOS) and Down's syndrome (DS). The number of total toy interactions and the number of different toys that Sunny interacted with was higher across all three toy sets following intervention. The expansion program was successful in achieving its primary goal for Sunny, increasing the diversity of toys across three toy sets. This was particularly important for in Sunny's case due to her limited skills (mobility, language).

The current expansion of activities and interests intervention combines the play skill instruction literature and preference assessment literature to increase the diversity of activities and interests of children with autism. It systematically replicates the procedures used in play skill interventions by Dicarlo et al. (2003) and Lifter et al. (2005). The expansion intervention procedures consisted of child initiation ("following the child's lead"), prompting, modeling play, and providing social consequences for play (Lifter et al., 2005) and systematically presenting different toys approximately every minute (Dicarlo et al., 2003). A review of the play instruction literature suggests that preferences for newly acquired play activities are not commonly measured or reported. Dicarlo, et al. (2003) anecdotally reported small increases in the number of toys played with following their more-to-less, child-directed, classroom intervention. However, the intervention was aimed primarily at increasing nonprompted toy play. The current study presented a wide variety of high and low preference toys, like many preference assessments (e.g. Reid et al., 2003), but the intervention expanded the number of different toys contacted.

During intervention Sunny not only initiated toy interactions with the toys upon presentation, but also engaged in more independent initiations and increased switching from one toy to another. While the duration of each toy interaction varied, she typically engaged with each toy for an appropriate amount of time, while still engaging in switching among the different toys.

The total duration of toy play was measured to demonstrate any collateral effects and ensure that intervention did not interfere with the total duration of time Sunny would engage with toys. The current intervention did not appear to have an effect on the duration of time that Sunny interacted with toys following the expansion intervention. There tended to be, on average, only slightly lower durations of total toy play during sessions where Sunny switched to play with a different toy more often.

A number of factors could have affected these outcomes. The study was conducted under limited stimulus conditions (the living room of Sunny's home) with only one instructor. There were also no children present during the intervention. It should also be noted that there was a ceiling on the number of different toys that Sunny could engage with because the toy sets each included only 12 toys and Sunny contacted almost all of the toys (between 10 and 11) within all three toy sets.

The combination of the play skill instruction and the preference assessment literature is promising. Diversity of toy contact increased and the method allows inference of preference for the contacts. The current study sets the stage for further investigation on the prevailing effects of these outcomes. It is possible that the sampling of items in the environment is a behavioral cusp, resulting in increased capacity for learning (Rosales-Ruiz & Baer, 1997). Furthermore, increased diversity of

play also decreased the amount of time Sunny spent engaging in less desirable behavior (playing with one toy in a repetitive manner). The intervention facilitated contact of stimuli (toys) that were not contacted prior to the implementation of the experimental procedures. However, it is not known whether this also resulted in further repertoire development for Sunny. Future research is necessary to see if items that showed increased manipulation and approach would also come to function as reinforcers and then be used to teach other important skills, such as communication. The potential relationship between having expanded interests and proximity and interactions with peers also is left for further investigation. This is important as it my have the potential to increase opportunities to learn from typically developing peers and to develop friendships (e.g. Lee, Odom, & Loftin, 2007).

Whether expanding activities and interests through increased sampling of environmental stimuli is a behavioral cusp remains to be determined. The current intervention provides a promising approach to increase the diversity of preferred stimuli in children with autism. More research in the area of expanding activities and interests could benefit the lives of many children with autism. Future research conducted in this area could increase the understanding on how to expand the restricted patterns of behavior, interests, and activities, in children with autism (American Psychiatric Association, 2000).

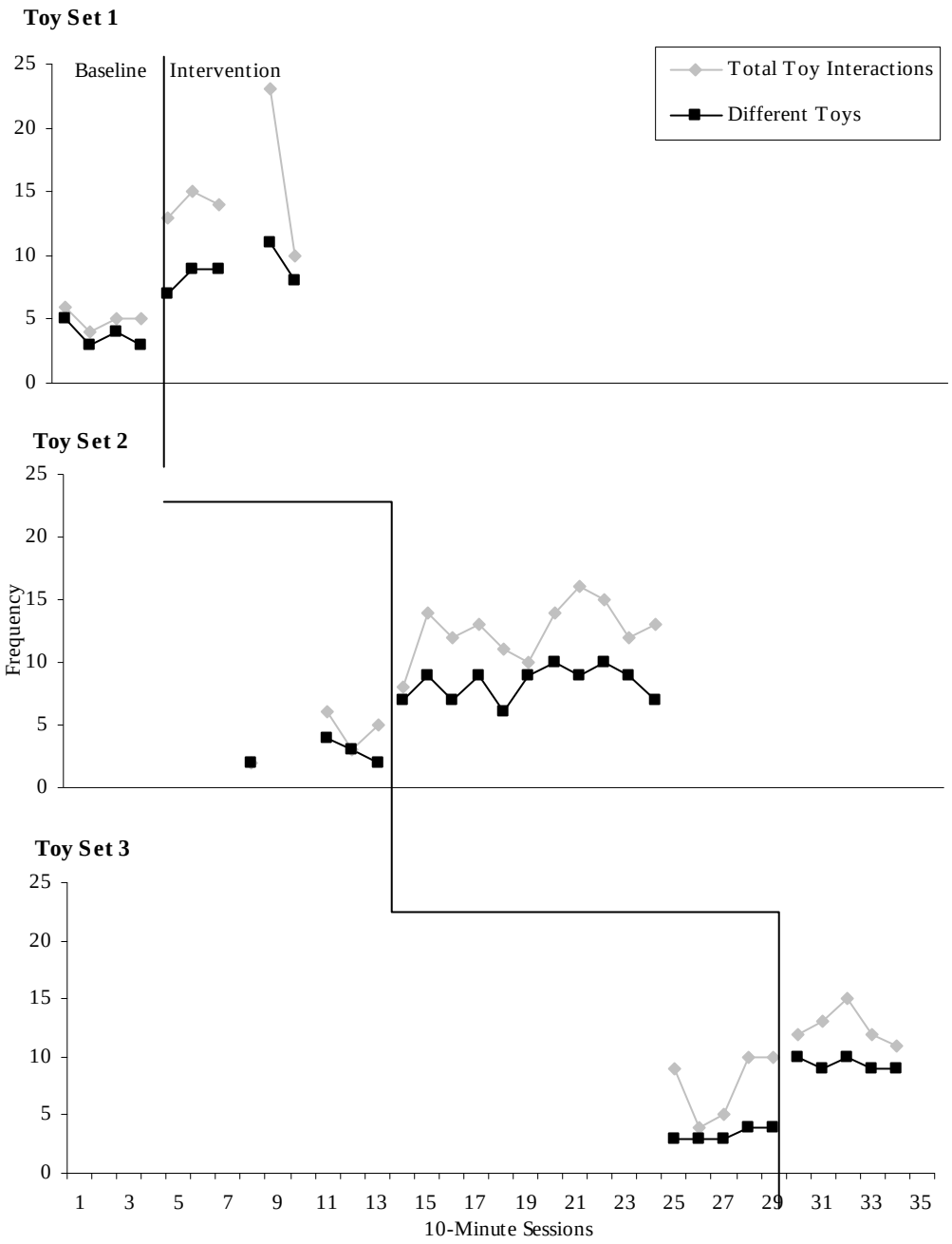

Figure 1. Frequency of toy play.

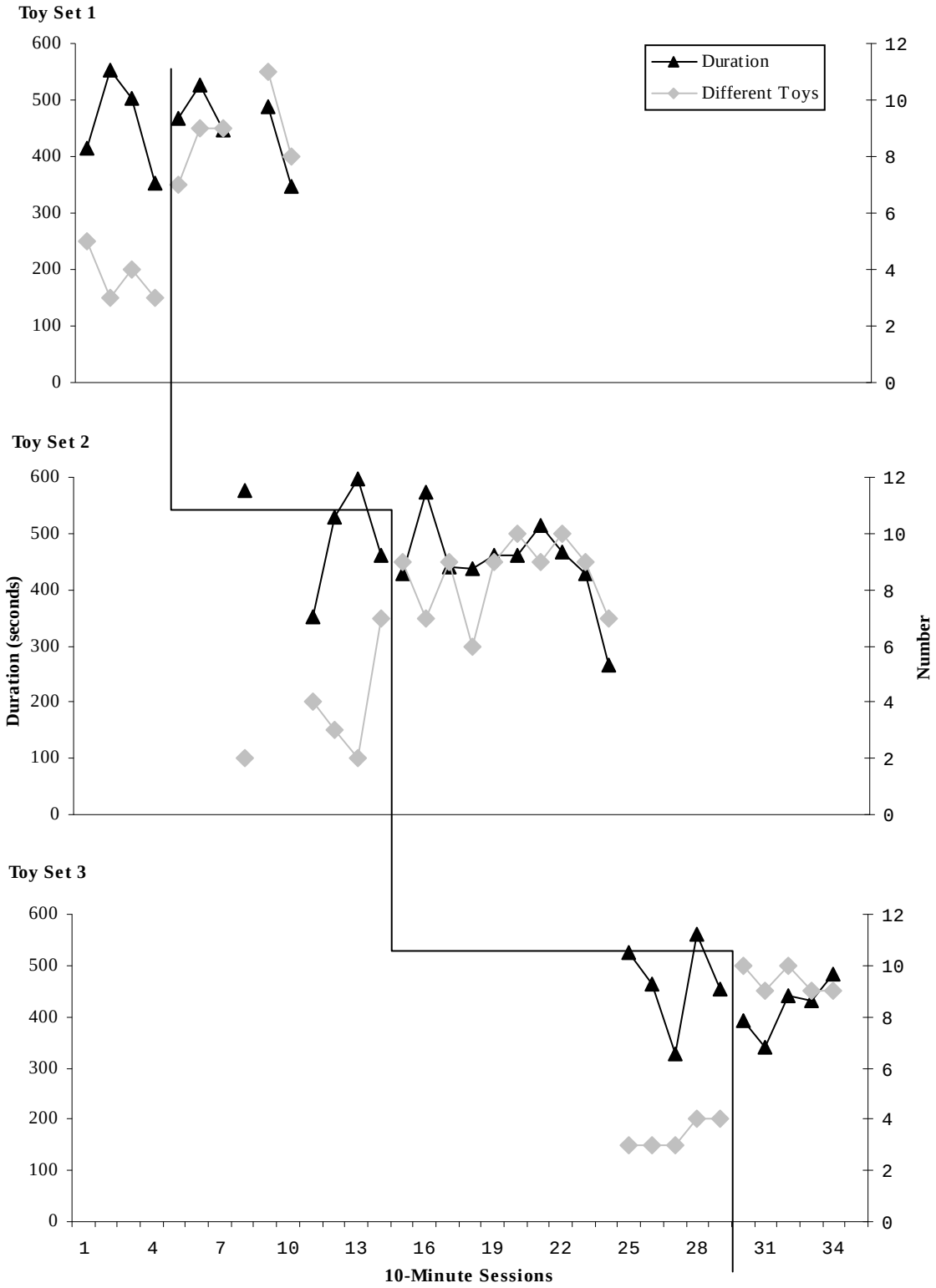

Figure 2. Total duration and number of toys contacted.

Table 1

Examples List of Toys within All 3 Sets, Separated by Categories

Play Category	Toy Sets		
	1	2	3
Sensory	Peek-a-boo mouse Wand Wire shapes	Wand 2 Shaker worm Pegs	Rolling bumble bee Massage bee Cloth blocks
Simple Manipulation	Octopus piano Elephant/blocks Phone	Beach ball Sesame spaceship Baseball	Sesame pop-up Steering where Alien
Educational	Alphabet Pal Circle stacker Shape sorter	Puzzle Connectable shapes ABC Car	Shape sorter puzzle Table toy Instruments
Imagination	Stuffed bunny Baby doll Tractor & animals	Farm & animals Mr. Potato Head Cat puppet	Doll Elephant Cat

APPENDIX A

MATRIX OF LITERATURE RELATED TO EXPANDING INTERESTS OF CHILDREN WITH AUTISM

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Ardoin, S. P., Martens, B. K., Wolfe, L. A., Hilt, A. M., & Rosenthal, B. D. (2004). A method for conditioning reinforcer preferences in students with moderate mental retardation. *Journal of Developmental and Physical Disabilities, 16*(1), 33-51.	3 children with mental retardation; 12 years	Reversal design	None	Pairing low preference with high or moderate preference may condition reinforcers
Baker, M. J. (2000). Incorporating the thematic ritualistic behaviors of children with autism into games: Increasing social play interactions with siblings. *Journal of Positive Behavioral Interventions, 2*(2), 66-84.	3 children with autism, 5-7 years	Multiple-baseline design across participants	None - assessment of percentage of intervals with social play at 1 and 3 months	None- increasing social game play
Barry, L. M., & Burlew, S. B. (2004). Using social stories to teach choice and play skills to children with autism. *Focus on Autism and Other Developmental Disabilities, 19*(1), 45-51.	2 children with autism; 7-8 years	ABCD multiple-baseline design across two participants	None	None- increased appropriate play skills
Cameron, M. J., Shapiro, R. L., & Ainsleigh, S. A. (2005). Bicycle riding: Pedaling made possible through positive behavioral interventions. *Journal of Positive Behavioral Interventions, 7*(3), 153-158.	1 child with autism; 9 years	Changing criterion design	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Cohen-Almeida, D., Graff, R. B., & Ahearn, W. H. (2000). A comparison of verbal and tangible stimulus preference assessments. *Journal of Applied Behavior Analysis, 33,* 329-334.	6 adults with variety of diagnoses; 15-20 years	Reversal design; comparing verbal and tangible preference assessments	None	None
Charlop-Christy, M. H., & Haymes, L. K. (1998). Using objects of obsession as token reinforcers for children with autism. *Journal of Autism and Developmental Disorders, 23*(3), 189-198.	3 children with autism; 7.9-9.2 years	Multiple-baseline design across children, additional within-child reversal	None	None
D'Ateno, P., Mangiapanello, K., Taylor, B. A. (2003). Using video modeling to teach complex play sequences to a preschooler with autism. *Journal of Positive Behavioral Interventions, 5*(1), 5-11.	1 child with autism; 3.8 years	Multiple-baseline design across response categories; during intervention she viewed a video depicting one play sequence	None	None- expansion of verbal statements and motor responses within 3 given play activities
DeLeon, I. G., Iwata, B. A., Roscoe, E. M. (1997). Displacement of leisure reinforcers by food during preference assessments. *Journal of Applied Behavior Analysis, 30,* 475-484.	14 people with mental retardation; living at facility for people with developmental disabilities; SIB clinic	ABAB reversal design; responses per minute during baseline and R+ conditions	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
DiCarlo, C. F., Reid, D. H., & Stricklin, S. B. (2003). Increasing toy play among toddlers with multiple disabilities in an inclusive classroom: A more-to-less, child-directed intervention continuum. *Research in Developmental Disabilities, 24,* 195-209.	6 children with disabilities & 6 typically developing children; 18-36 months	Multiple probe across children	None	None
Dorrow, L. G. (1980). Generalization effects of newly conditioned reinforcers. *Education and Training of the Mentally Retarded, 15*(1), 8-14.	1 girl with mental retardation; living at residential facility	Variation of a multiple-baseline design across conditions with a incomplete reversal design	10-week maintenance phase assessing continued reinforcing effect of newly conditioned stimuli	Attempting to condition new reinforcers
Goldstein, H., & Cisar, C. L. (1992). Prompting interaction during sociodramatic play: Teaching scripts to typical preschoolers and classmates with disabilities. *Journal of Applied Behavior Analysis, 25,* 265-280.	6 typically developing children & 3 children with autistic characteristics, 3.7-5 years	Multiple-probe design across scripts, replicated across three triads	None	None
Gottschalk, J. M., Libby, M. E., Graff, R. B. (2000). The effects of establishing operations on preference assessment outcomes. *Journal of Applied Behavior Analysis, 33,* 85-88.	4 children with autism; 6-11 years	Parametric design	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Hall, S., Thorns, T., & Oliver, C. (2003). Structural and environmental characteristics of stereotyped behaviors. *American Journal on Mental Retardation, 108*(6), 391-402.	8 people with mental retardation	Within-groups design; component analysis	None	None
Hanley, G. P., Iwata, B. A., & Lindberg, J. S. (1999). Analysis of activity preferences as a function of differential consequences. *Journal of Applied Behavior Analysis, 32,* 419-435.	4 people with mental retardation; 25-41 yrs	Multiple-baseline design across activities; reversal	None	Modification of preference with superimposed reinforcement contingencies
Hanley, G. P., Iwata, B. A., Lindberg, J. S., & Conners, J. (2003). Response-restriction analysis: Assessment of activity preferences. *Journal of Applied Behavior Analysis, 36,* 47-58.	3 people with developmental disabilities; 34-66 years	Random presentation, multiple stimulus without replacement preference assessment	None	None
Higbee, T. S., Carr, J. E., Harrison, C. D. (2000). Further evaluation of the multiple-stimulus preference assessment. *Research in Developmental Disabilities, 21,* 61-73.	9 people with mental retardation; recruited from an intermediate care facility for people with mental retardation	Multi-element design; reversal design	None	None- reinforcer functionality of highest preferred from preference assessment
Hine, J. F., & Wolery, M. (2006). Using point-of-view video modeling to teach play and preschoolers with autism. *Topics in Early Childhood Special Education, 26*(2), 83-93.	2 children with autism; 30-42 months	MPD across two behaviors and across two participants	None? Number of gardening and cooking actions across 63 days	Increase number of cooking and gardening play actions using video modeling

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Klatt, K. K., Sherman, J. A., & Sheldon, J. B. (2000). Effects of deprivation on engagement in preferred activities by persons with developmental disabilities. *Journal of Applied Behavior Analysis, 33,* 495-506.	3 men with mental retardation; 30-49 yrs	Alternating treatments design; evaluate effects of deprivation on engagement	None	Deprivation from stimuli up to 4 days, increase engagement
Koegel, L. K., Koegel, R. L., Frea, W., Green-Hopkins, I. (2003). Priming as a method of coordinating educational services for students with autism. *Language, Speech, and Hearing Services in Schools, 34*, 228-235.	2 children with autism, 5.6-15 years	Reversal design	None	None
Lalli, J. S., Zanolli, K., & Wohn, T. (1994). Using extinction to promote response variability in toy play. *Journal of Applied Behavior Analysis, 27, 735-736.*	2 children with developmental delays; 4-5 years	Multiple-baseline across participants	None-measurement of untrained topographies in play	Increased variability in play with extinction procedure
Lee, S., Odom, S. L., & Loftin, R. (2007). Social engagement with peers and stereotypic behavior of children with autism. *Journal of Positive Behavioral Interventions, 9*(2), 67-79.	3 children with autism; 7-9 years old; & 13 typically developing children; 8-10 years old	Multiple-baseline design across settings and participants	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Lerman, D. C., Iwata, B. A., Rainville, B., Adelineis, J. D., Crosland, K., & Kogan, J. (1997). Effects of reinforcement choice on task responding in individuals with developmental disabilities. *Journal of Applied Behavior Analysis, 30,* 411-422.	6 people with mental retardation referred for assessment and treatment of behavior disorders	Multiple-baseline design across participants comparing baseline, reinforcement choice, and no reinforcement choice	None	None- "choice" given between 2 items
Lifter, K., Ellis, J., Cannon, B., & Anderson, S. R. (2005). Developmental specificity in targeting and teaching play activities to children with pervasive developmental disorders. *Journal of Early Intervention, 27*(4), 247-267.	3 children with pervasive developmental disorders; preschool ages	Modified multiple-baseline across play targets	None	None
Mason, S. A., McGee, G. G., Farmer-Dougan, V., & Risley, T. R. (1989). A Practical strategy for ongoing reinforcer assessment. *Journal of Applied Behavior Analysis, 22*, 171-179.	3 children with autism characteristics; 4-5.1 years	Multiple-baseline design across participants	None	None- looking to better IDENTIFY not EXPAND reinforcers
Militerni, R., Bravaccio, C., Falco, C., Fico, C., & Palermo, M. T. (2002). Repetitive behaviors in autistic disorders. *European Child & Adolescent Psychiatry, 11,* 210-218.	121 children with autism; toddlers 2.4-4.1 years (n = 75), children 7.2-11.4 years (n = 46)	Between groups design; repetitive behaviors	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Morrison, R. S., Sainato, D. M., Benchaaban, D., & Endo, S. (2002). Increasing play skills of children with autism using activity schedules and correspondence training. *Journal of Early Intervention, 25*(1), 58-72.	4 children with autism & 8 typically developing children; 42-70 months	Multiple-baseline across participants	None	None
Newman, B., Reinecke, D. R., Meinberg, D. L. (2000). Self-management of varied responding in three students with autism. *Behavioral Interventions, 15,* 145-151.	3 children with autism; 4-6 years	Multiple-baseline design across participants comparing percent of variable responses in baseline, self-management, and follow-up	None - 1 month follow-up assessing variability in responding	Expansion of variable responses with play materials
Nuzzolo-Gomez, R., Leonard, M. A., Ortiz, E. (2002). Teaching children with autism to prefer books or toys over stereotypy or passivity. *Journal of Positive Behavioral Interventions, 4*(2), 80-87.	1 child with autism; 3 years	ABCA reversal design, with follow-up probes	Looking at books during 5-second intervals to 90-day probe	Conditioning of looking at books by pairing with established reinforcers
Patterson, C. R., & Lucius, A. (2007). Using video modeling for generalizing toy play in children with autism. *Behavior Modification, 31*(5), 660-681.	4 boys with autism; 6-9 years	Multiple-baseline design across play behaviors with withdrawal and continuous-generalization probes	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Piazza, C. C., Fisher, W. W., Hagopian, L. P., Bowman, L. G., & Toole, L. (1996). Using a choice assessment to predict reinforcer effectiveness. *Journal of Applied Behavior Analysis, 29*, 1-9.	4 people with mental retardation & severe destructive behavior; 7-19 years	Comparison design	None	None
Reid, D. H., DiCarlo, C. F., Schepis, M. M., Hawkins, J., & Stricklin, S. B. (2003). Observational assessment of toy preferences among young children with disabilities in inclusive settings. *Behavior Modification, 27*(2), 233-250.	7 children with developmental disabilities; 27-45 months	Parametric design	None	None
Rekers, G. A., & Lovaas, O. I. (1974). Behavioral treatments of deviant sex-role behaviors in a male child. *Journal of Applied Behavior Analysis, 7*, 173-190.	Male child, "childhood cross-gender identity"	Multiple-baseline design across behaviors and situations	None	None
Reinhartsen, D. B., Garfinkle, A. N., Wolery, M. (2002). Engagement with toys in two-year-old children with autism: Teacher selection versus child choice. *Research and Practice for Persons with Severe Disabilities, 27*(3), 175-187.	3 children with autism; 2 years	Alternating treatments design: teacher selection of toys & child choice	None	None; percentage of intervals engaged

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Rekers, G. A., Yates, C. E., Willis, T. J., Rosen, A. C., Taubman, M. (1976). Childhood gender identity change: Operant control over sex-typed play and mannerisms. *Journal of Behavior Therapy and Experimental Psychiatry, 7*, 51-57.	1 typically developing child; 5 years	Reversal design	None	None
Reinhartsen, D. B., Garfinkle, A. N., Wolery, M. (2002). Engagement with toys in two-year-old children with autism: Teacher selection versus child choice. *Research and Practice for Persons with Severe Disabilities, 27*(3), 175-187.	3 children with autism; 2 years	Alternating treatments design: teacher selection of toys & child choice	None	None; percentage of intervals engaged
Russo, L. A., Ala'i-Rosales, S., & Rosales-Ruiz, J. (1993) Effects of a tactile prompting device on the requesting behavior of children with autism. Unpublished Master's Thesis, University of North Texas.	1 child with autism; 6 years	Multiple-baseline and reversal design across stimuli	Frequency of different play theme topographies and different play action topographies	Remote control tactile prompting device to request models and suggestions for play to expand play themes and actions
Rutherford, M. D., & Rogers, S. J. (2003). Cognitive underpinnings of pretend play in autism. *Journal of Autism and Developmental Disabilities, 33*(3), 289-302.	28 children with autism; 24 children with developmental disabilities; 26 typically developing children	Between groups design	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Stahmer, A. C. (1995). Teaching symbolic play skills to children with autism using pivotal response training. *Journal of Autism and Developmental Disorders, 25*(2), 123-141.	7 children with autism; 4- 7 years	Multiple-baseline across participants	None	None
Stahmer, A. C., & L. Schreibman. (1995). Teaching children with autism appropriate play in unsupervised environments using a self-management treatment package. *Journal of Applied Behavior Analysis, 25,* 447-459.	3 children with autism; 7-13 years	Multiple-baseline design across participants: effects of self-management treatment package	1 month follow-up (percent of engagement)	Generalization of appropriate play across settings and *new toys*
Stone, W. L., Lemanek, K. L., Fishel, P. T., Fernandez, M. C., & Altemeir, W. A. (1990). Play and imitation skills in the diagnosis of autism in young children. *Pediatrics, 86*(2), 267-272.	91 preschool children; 22 children with autism; 15 children with mental retardation; 15 hearing impaired children; 19 language impaired children; 20 typically developing children	Between groups design	None	None
Williams, E., Reddy, V., & Costall, A. (2001). Response-reinforcer relationships and improved learning in autistic children. *Journal of Autism and Developmental Disorders, 31*(1), 67-77.	15 typically developing children; 15 children with autism; 15 children with Down syndrome; 11 months-5.5 years	Between groups design; functional play across groups	None	None

Citation	Participants	Methodology	Measurement of Preferences/R+'s Across Time	Expansion of Preferences/ Reinforcers
Wolfberg, P. J., & Schuler, A. L. (1999). Fostering peer interaction, imaginative play and spontaneous language in children with autism. *Child Language Teaching and Therapy, 15*(1)*,* 41-52.	1 child with autism; 7 years	Case study	None	None
Wolfberg, P. J., & Schuler, A. L. (1993). Integrated playgroups: A model for prompting social and cognitive dimensions of play in children with autism. *Journal of Autism and Developmental Disorders, 23*, 467-489.	3 children with autism; 7 years	Multiple-probe design across stimuli	None	None- increased functional object play

APPENDIX B

COMPLETE RESPONSE DEFINITIONS FOR ALL MEASURES

Expanding Interests Observation Code

10 minute sampling period- record each toy, duration of engagement, and occurrence conventional manipulation within each engagement

Toy interaction Two or more seconds of manipulation with a toy

- *Examples*: Child presses buttons on the piano for 15 seconds; Child grabs a block puts it in the shape sorter, immediately grabs another block to put in the shape sorter; The child spins the rolling ball around and around for 1 minute at 21 seconds.
- *Non-Examples:* The child touches doll for a second before grabbing farm animal; Child is next to farm set playing with blocks.

Duration: Total number of seconds a given toy is manipulated before switching to play with a different toy

- *Examples*: A child manipulates the puzzle for 10 seconds, stops for 6 seconds, and then continues again for 4 seconds = 14 seconds (puzzle); A child manipulates a car for 4 seconds, then switches to a doll for 54 seconds, and then again returns to the car for 15 seconds = 3 toy interactions: 4 seconds (car), 54 seconds (doll), 15 seconds (car)

APPENDIX C

COMPLETE DATA SHEET USED FOR EXPANSION

INTERVENTION DATA COLLECTION

10 minute sampling period--- record each toy and/or activity, duration of engagement, and type of manipulation

Toy interaction Two or more seconds of manipulation with a toy

Duration: Total number of seconds a given toy is manipulated before switching to play with a different toy

Materials Set #: _____

	TOY		DURATION
1			sec.
2			sec.
3			sec.
4			sec.
5			sec.
6			sec.
7			sec.
8			sec.
9			sec.
10			sec.
11			sec.
12			sec.
13			sec.
14			sec.

Total toys/activities:_____ Conventional_____ Total time: _____sec

Total *different* toys/activities:_____

APPENDIX D

PARTICIPANT INFORMED CONSENT FORM

University of North Texas Institutional Review Board

Informed Consent Form

Before agreeing to you and your child'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 Study:

A Program Description and the Outcomes of a Parent Training Program for Toddlers with ASD

Principal Investigator:

Shahla Alai-Rosales, University of North Texas, Department of Behavior Analysis

Purpose of the Study:

Professionals are able to detect and diagnosis autism spectrum disorders (ASD) at earlier and earlier ages. There are very few descriptions of interventions, however, that specifically address the needs of toddlers. Furthermore, waiting lists and costs of EIBI (Early and Intensive Behavioral Interventions) present many barriers to families. The Family Connections Project (FCP), a service-learning project in the Department of Behavior Analysis at the University of North Texas, was created to specifically meet the needs of toddlers and their families in the region.

The purpose of this study is to provide a description of FCP procedures, outcomes and evaluations. The outcomes we would like to report will include the teaching skills you learned to increase your child's social, communication, motor, and/or play skills, your child's progress that resulted from that teaching, and additional benefits that were not originally anticipated when we started the projects. Additional beneficial outcomes includes increases in everyone smiling more during training, increases in attention to objects and people and overall increases in the amount that parents and children played together. We would like you to provide us with your evaluation of FCP for two reasons. First, you are no longer part of FCP and we would like your opinion of the experience (benefits, difficulties, suggestions) and how you view as time has passed. Second, there is a paucity of research in autism that includes children from non-Anglo families or from English as a second language families. FCP has typically had families from varied and diverse backgrounds and we would like to share that information in our published documents.

Study Procedures:

1) We are asking you to fill out a questionnaire that describes your education, age, ethnicity, income level, and your child's specific diagnostic labels (e.g., PDD, PDD-NOS, Autism,

Asperger's, Tourette's, etc.). You will also be asked to evaluate your experience with FCP: what did you think was beneficial for you and your child, what was difficult and what would you suggest we continue or change? If you consent to participate, the one page questionnaire will be given to you at that time. You will mail it back in a self addressed stamped envelope at your convenience. Your names will in no way be linked to this information. You and your child will be referred to by pseudonyms.

2) We are asking you to give consent for the data from you and your child's training assessments to be summarized for a publication that describes the outcomes and effects of FCP. Your name and your child's name will never be associated with the data. We will use pseudonyms to describe you and your child in any publications. For example, "Shahla" and "Emiliano" would be changed to "Mina" and "Tomas".

Voluntary Participation:

Participation in this research study is voluntary. You have completed your participation in FCP and refusal to participate or a decision to discontinue participation will not involve a penalty or loss of benefits.

Foreseeable Risks:

No foreseeable risks are involved in this study. Pervious clinical and research reports have identified no harm and substantial benefit from participation in the training that was associated with this study.

Benefits to the Subjects or Others:

This study is not expected to be of any direct benefit to you; however, the results of the study may benefit future caregiver-child pairs receiving parent training services. In addition to the expected benefit of other parent\child groups the results of the study may also add directly to the knowledge of other service providers delivering parent training services to families with toddlers with autism and other populations.

Procedures for Maintaining Confidentiality of Research Records:

All records including signed consent forms and video tapes will be kept in a locked filing cabinet in the FCP office in Chilton Hall Rm. 361E. No documents will be posted on the internet and any electronic copies are kept for three years following FCP training and then destroyed. Parents may request video assessment at anytime. All research participants will be given a pseudonym that will be used when referring to that participant's data and will be maintained throughout the course of research. Following the research study, all personally identifiable data will be marked with the participant's pseudonym and will remain in The Family Connections Project records for up to 3 calendar years. Because of the extensive data collection involved in the study, a team of graduate student may at any time during study view the participants' records. All of these graduate students are staff of The Family Connections Project. Personally identifiable data will not be disclosed to anyone outside of The Family Connections Project Research Team. The

confidentially of the participants' personal information will be 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 Dr. Shahla Ala'i Rosales at srosales@unt.edu or (940) 369-7454.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

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:

- Shahla Alai-Rosales has explained the study to you and answered all of your questions. You have been told the possible benefits 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. The study personnel may choose to stop your participation at any time.
- 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

_____ _____

Signature of Participant Date

For the Principal Investigator or Designee: I certify that I have reviewed the contents of this form with the participant signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

_____ _____

Signature of Principal Investigator or Designee Date

APPENDIX E

PHOTOGRAPHS OF COMPLETE TOY SETS

Toy Set 1

Toy Set 2

Toy Set 3

APPENDIX F

RAW DATA TABLE

TOY SET 1

	Total Toys	Different Toys	Duration	Conventional	% Conventional
10.14.06	6	5	415	3	50
10.17.06	4	3	553	3	75
10.21.06	5	4	502	0	0
10.24.06	5	3	353	4	75
11.4.06	13	7	467	4	31
11.7.06	15	9	527	5	33
11.11.06	14	9	447	2	14
11.14.06					
11.14.06	23	11	488	6	25
11.18.06	10	8	346	3	30
11.18.06					
11.21.06					
11.25.06					
11.28.06					
12.9.06					
12.12.06					
12.16.06					
12.18.06					
1.6.07					
1.6.07					
1.9.07					
1.21.07					
1.30.07					
2.3.07					
2.6.07					
2.10.07					
2.13.07					
2.17.07					
2.20.07					
2.24.07					
2.27.07					
3.4.07					
3.10.07					
3.31.07					

TOY SET 2

	Total Activities	Different Activities	Duration	Conventional	% Conventional
10.14.06					
10.17.06					
10.21.06					
10.24.06					
11.4.06					
11.7.06					
11.11.06					
11.14.06	2	2	577	2	100
11.14.06					
11.18.06					
11.18.06	6	4	353	1	17
11.21.06	3	3	529	1	33
11.25.06	5	2	596	5	100
11.28.06	8	7	460	3	38
12.9.06	14	9	428	7	50
12.12.06	12	7	574	8	67
12.16.06	13	9	440	6	46
12.18.06	11	6	436	5	45
1.6.07	10	9	460	2	20
1.6.07	14	10	462	6	48
1.9.07	16	9	515	6	38
1.21.07	15	10	466	8	53
1.30.07	12	9	429	6	50
2.3.07	13	7	266	2	15
2.6.07					
2.10.07					
2.13.07					
2.17.07					
2.20.07					
2.24.07					
2.27.07					
3.4.07					
3.10.07					
3.31.07					

TOY SET 3

	Total Activities	Different Activities	Duration	Conventional	% Conventional
10.14.06					
10.17.06					
10.21.06					
10.24.06					
11.4.06					
11.7.06					
11.11.06					
11.14.06					
11.14.06					
11.18.06					
11.18.06					
11.21.06					
11.25.06					
11.28.06					
12.9.06					
12.12.06					
12.16.06					
12.18.06					
1.6.07					
1.6.07					
1.9.07					
1.21.07					
1.30.07					
2.3.07					
2.6.07	9	3	527	1	11
2.10.07	4	3	463	1	25
2.13.07	5	3	327	2	40
2.17.07	10	4	561	8	80
2.20.07	10	4	454	5	50
2.24.07	12	10	393	6	50
2.27.07	13	9	341	4	31
3.4.07	15	10	441	6	40
3.10.07	12	9	430	3	23
3.31.07	11	9	484	2	18

APPENDIX G

SOCIAL VALIDITY QUESTIONNAIRE

Social Validity Questionnaire

Directions: Circle the best answer

1. How much time was taken per week for the intervention?
(Circle one: *hardly any time, a fair bit of time, a lot of time, too much time*)

2. Was the time taken to implement worthwhile?
(Circle one: *not worth the time, a little worth the time, worth the time, well worth the time*)

3. How intrusive was the intervention?
(Circle one: *not intrusive, a little intrusive, somewhat intrusive, very intrusive*)

4. How much opportunity were you given to learn about the intervention?
(Circle one: *not at all, understood some, understood most, understood easily*)

5. Do you think you could implement the intervention on your own?
(Circle one: *not at all, with a lot of assistance, with a little assistance, easily*)

6. How willing are you to do similar interventions in the future?
(Circle one: *not at all, a little willing, quite willing, very willing*)

7. How would you rate the effectiveness of the intervention for this case?
(Circle one: *ineffective, a little effective, quite effective, very effective*)

8. How would you rate the importance, significance, and advantages, of the intervention?
(Circle one: *not important, a little important, quite important, very important*)

9. How comfortable were you with the intervention?
(Circle one: *not comfortable, a little comfortable, quite comfortable, very comfortable*)

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