INCREASING NUMBER OF TOYS: A CASE STUDY OF RESPONSE GENERALIZATION ACROSS NOVEL TOYS

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Children diagnosed with autism are often described as having limited or restricted activities that serve as reinforcers as compared to neurotypical peers. Many theories suggest that one of the many ways children develop is through participation in play. This results in children coming into contact with new environmental stimuli. The procedures used to enhance play skills for children diagnosed with autism typically involve training novel responses with novel stimuli (e.g., toys). This is often done using naturalistic procedures. Because multiple procedures are used, it is unclear what procedure or combination of procedures causes the increases in play repertoires. This study investigated an important component of the treatment package know as reciprocal imitation training. Specifically, the study examined whether increased opportunities, contingent imitation without the requirement to imitate, or contingent imitation with the requirement to imitate would increase the number of toys a child diagnosed with autism would play with. The results showed dramatic increases in the number of toys the child independently chose to play with and an increase in the spontaneous use of different response topographies across novel stimuli only when the student was required to imitate a model. The results are discussed in terms of mediated generalization, the use of common responses, stimulus class formation and stimulus class expansion.

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INTRODUCTION

Play has been described as having a powerful role in the overall development and social success of children. However, play has proven to be an extremely difficult area to define due to the various theoretical perspectives and the heterogeneous nature of play (Wolery & Bailey, 1989). Despite these challenges, some basic characteristics of play have been identified. One characteristic of play is that play is voluntary. The player chooses to play and chooses the different toys, characters, and scenes that will unfold. Play is also pleasurable. It involves an activity the player will enjoy taking part in. It is also intrinsically motivating. The performed actions that a player engages in are performed because the activity is in itself enjoyable. Play requires active engagement of all involved. Play is flexible. It is an activity that is always changing and evolving to the new encounters in a player's environment. (Sutton - Smith & Kelly - Bryne, 1984; Wolfberg, 1995; Wolfberg & Schuller, 1999; Prelock, 2006).

The development of play has been categorized and mapped in a variety of ways. In 1962, Piaget described three distinct stages of play. Smilansky proposed a sequence of play similar to that of Piaget in 1968. However, Smilansky (1968) indicated that although one stage of play would be dominant at any given time, overlap of stages was likely. Due to the complex nature of play, it is challenging to determine the exact sequence or stages of play that occur during a child's development. Nonetheless, various disciplines have come to a consensus that play is an important medium for the social, linguistic, and emotional development of children (Parten, 1932; Fewell & Kaminski, 1988; Wolfberg, 1999; Prelock, 2006). Play helps children recognize that objects have functions other than the functions originally intended, which in turn, helps facilitate the ability to problem solve, imagine, and create (Libby, Powell, Messer, & Jordan, 1988; Prelock, 2006).

Children with autism typically have limited or restricted interests or activities that serve as reinforcers as compared to neurotypical peers (American Psychiatric Association, 2009). The play of children diagnosed with autism is often described as being rigid when compared to their neurotypical peers (Prelock, 2006). When given the opportunity to play freely, children with autism will often isolate themselves socially and exhibit stereotypic actions on objects (Wing, Gould, Yeates, & Brierly, 1977; Prelock, 2006). Children with autism tend to play less, engage in fewer actions, and exhibit less diverse conventional play as compared to their neurotypical peers (Williams, Reddy, & Costall, 2001; Prelock, 2006). Because the continuous expansion of play activities are regarded as key factors in the overall development of a child (Novak & Pelaez, 2004), play is often a primary focus within autism treatment. A wide variety of methods such as discrete trial instruction of play components (e.g., Cameron, Shapiro, & Ainsleigh, 2005), pivotal response training (e.g., Stahmer, 1995), play scripts (e.g., Goldstein & Cisar, 1992), and integrated play groups (e.g., Wolfberg & Schuller, 1993) have been utilized to teach play skills to children diagnosed with autism.

Another procedure that has been utilized to enhance the play repertoires of children diagnosed with autism is Reciprocal Imitation Training (RIT). Ingersoll and Schreibman (2006) conducted a study to assess whether immediate object imitation could be successfully taught to five children with autism and whether increases in imitation led to collateral changes in the children's language, pretend play, and joint attention behaviors. Treatment of reciprocal imitation training (Ingersoll & Schreibman, 2006) consisted of five phases that lasted for two weeks each. The phases were designed to follow the developmental progression of imitation seen in typical children, beginning with doing what the child is doing (contingent imitation), followed by the imitation of familiar actions, and ending with imitation of novel actions. Each phase of

Reciprocal Imitation Training (RIT) built upon previous phases by gradually incorporating more difficult tasks while interspersing maintenance tasks. In Phase 1 of Reciprocal Imitation Training, no actions were modeled for the children to imitate. In Phase II, only familiar actions were modeled with the same toy the child engaged with. During Phase III, familiar and novel actions were modeled with the same toy. In Phase IV, familiar and novel actions were modeled with a different toy. Finally in Phase V, familiar and novel actions were modeled with the same and different toys (Ingersoll & Schreibman, 2006). Beginning in Phase II, the therapist began interspersing imitating what the child was doing (contingent imitation) with requests for the child to imitate the therapist's actions. Actions were modeled approximately once every minute during the 20-minute treatment sessions, totaling about 20 actions per session. If the child imitated a modeled action independently, the therapist praised the child and allowed continued access to the play materials. If after the third model, the child did not imitate the action, the therapist physically prompted the child to complete the action and then provided praise. The results of Reciprocal Imitation Training (Ingersoll & Schreibman, 2006) showed increases in the participant's overall spontaneous pretend play, imitation skills, joint attention and variable results on each participant's use of spontaneous language.

Due to the multiple procedures used by Ingersoll and Schreibman (2006), it is unclear what caused the behavior changes observed for each of the participants. This study investigated an important component of their treatment package. Specifically, the study examined whether increased opportunities, contingent imitation without the requirement to imitate, or contingent imitation with the requirement to imitate would increase the number of toys a child diagnosed with autism would play with.

METHOD

Participant

A 5-year-old child, Bentley (a pseudonym), who was diagnosed with autism, participated in this study. Bentley communicated through 1 to 2 word approximations (e.g., “tih” for tickles, “mmm” for more, “ase” for chase; etc.), gestures such as pointing, reaching, and leading staff members, functional signs such as the American Sign Language (ASL) signs for “help” and “more,” and a picture communication book that contained pictures of preferred items, activities, and locations within the clinic. He could follow 2- to 3-step instructions and could imitate a variety of gross motor responses, but showed limited oral motor imitation. Bentley enjoyed social interactions (e.g., playing chase, being tickled, etc.) with adults. Bentley had a history of choosing to interact with a limited variety of toys as well as interacting with chosen toys in repetitive ways. Bentley was chosen based on a documented history of limited toy selections and direct observation of limited toy interests throughout daily sessions by staff at the clinic. Bentley previously had a formal intervention program for toy selectivity prior to this investigation, however based on direct observation of the staff at the clinic; Bentley still chose to interact with a limited number of toys available at the clinic. For example, Bentley would typically tilt toys side-to-side, very similar to the motion of a seesaw; line up toys side by side or one behind the other; and would twirl toys by holding them in between his index finger and thumb. Additionally Bentley did not frequently switch to different toys and it was common for him to interact with toys using repetitive movements for long durations time. He typically chose to interact with cars, insert puzzles, and Sesame Street character figurines at the onset of the investigation. The intervention of increasing the number of toys independently chosen was apart of Bentley’s overall treatment program while at the center.

Settings and Materials

All sessions for Bentley occurred in a playroom (approximately 9.5 feet x 9.5 feet) located at the clinic. The room was equipped with a table, chairs, large window, an alphabet poster, and fish poster. Three collections of high, moderate, and low - preference play materials were used for this investigation. The collections are listed are in Table 1 and the actual images of all three - toy collections are displayed in Appendix D. The toy collections were composed of toy sets selected from daily probe data of independent toy initiations from the previous eight months (November 2014 to July 2015). Additionally, each toy collection was composed of two high (HP), moderate (MP), and low preference (LP) toy sets to provide exposure to a range of preference levels.

Measures and Data Collection

All sessions were videotaped and data were collected from the recorded sessions. Three response topographies and the number of independent toy selections per session were counted. The response topographies measured included tilting, twirling and lining up. Tilting was defined as moving one end of a toy down while raising the opposite end of the toy and moving the raised end down and the opposite end to the original starting position, similar to the movement cycle of a seesaw. Lining up was defined as arranging toys side by side or one behind the other in an intentional manner such as cars being arranged, as they would be at a red traffic signal. Twirling was defined as moving the toy in a back and forth motion between the thumb and index finger; with the index finger moving back while simultaneously moving the thumb forward and the index finger moving forward with the thumb returning to the starting position. Data for the three measured response topographies was collected as number or frequency of occurrence.

Toys chosen independently was defined as anytime the child touched, picked up, or manipulated a toy in the absence of an instruction or model. An independent toy selection was also scored if the child touched, picked up, or manipulated a toy five or more seconds after an instruction and model. Additionally, a toy was scored as being selected independently if the child engaged in a response other than the response modeled. For example, if the interventionist modeled tilting and the child engaged in twirling instead it was scored as a toy chosen independently.

Interobserver Agreement

The interventionist and a trained undergraduate student independently scored the video taped sessions for interobserver agreement (IOA). The undergraduate scored the video taped sessions for each response topography Bentley engaged in during the session, the frequency (number of occurrences) of each response topography, and each toy set Bentley independently initiated to during both baseline and intervention sessions. The number of independent and prompted modeled responses for each intervention session was also scored for interobserver agreement. The interventionist calculated interobserver agreement for each toy collection by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100. The mean percentage of agreement during baseline for Toy Collection 1 was 95.10% and 94% during intervention. The percent of agreement of toys independently chosen was 100% for Toy Collection 1. The mean percentage of agreement for Toy Collection 2 was 96% during baseline and 91.3% during probe sessions. The percentage of agreement for toys chosen independently was 100% for Toy Collection 2. The mean percentage of agreement during

baseline for Toy Collection 3 was 100% and 96% during probe sessions. The percentage of agreement for toys chosen independently was 100% for Toy Collection 3.

General Procedures

Prior to each 5 - minute session, the interventionist would lay the toy sets in a random order on the floor of the playroom. The interventionist would then walk with Bentley to the closed door of the playroom and ask Bentley if he wanted to go play with the toys in the playroom. If Bentley said yes, the interventionist would open the door to the playroom, he had free access to any of the toys in the playroom and the interventionist would start the 5-minute session. During the session, no programmed consequences were provided for engaging with the toys in the playroom. If at any point Bentley requested to leave the playroom, such as pointing to the door, his request was honored. For example, Bentley asked to leave the playroom with one of the toys as well as requesting the interventionist to come with him to go on a treasure hunt with toy around the center. At the end of each 5 - minute session, the interventionist asked Bentley if he wanted to go or if he wanted to keep playing. The times Bentley indicated that he wanted to keep playing, his request was honored, the interventionist remained in the playroom, and video recording continued. However, no data was collected on any play that occurred after the 5 - minute session had ended. . If Bentley stated that he did not want to play in the playroom, the interventionist asked Bentley what he wanted to play with and he was given access to the toys, activities, and/or location he requested. For example, if Bentley said no and that he wanted to go the ball gym, the interventionist took Bentley to play in the ball gym.

Baseline

Each baseline session consisted of a 5 - minute free play period with free access to any of the six toy sets in the given toy collection. The interventionist was present in the playroom during each baseline session, however, the interventionist did not interact with Bentley unless he made a social initiation (e.g., making eye contact with the interventionist, moving closer to the interventionist, reaching towards the interventionist, vocally requesting for help or the interventionist to play, and/or the use of a functional sign such as the American Sign Language (ASL) signs for ‘help’ and ‘more’. At the end of the session the interventionist followed the general procedures for each baseline session described above.

Intervention

Intervention was introduced in Toy Collection 1 using the dinosaur figurines with Toy Collections 2 and 3 remaining in baseline conditions. Intervention sessions consisted of three components.

Minute 1: Observe. Once Bentley would enter the playroom, the interventionist would start a timer for 1 minute. During this 1 minute, the interventionist would observe, or watch, the toy(s) chosen by Bentley and how Bentley manipulated the toy(s) chosen (e.g., tilting, twirling, or lining up the toys). Additionally, during the 1-minute observation, the interventionist did not interact with Bentley unless he initiated (reached towards the interventionist, signed for ‘help’, etc.) toward the interventionist.

Minute 2: Model. After the 1-minute observation, the interventionist would start another 1-minute timing. During this 1-minute, the interventionist would use the dinosaurs to imitate, or copy, exactly how Bentley was manipulating the toy(s) he chose to interact with. For example, if

Bentley was tilting the cars and saying ‘ah’, the interventionist would tilt the dinosaurs and say ‘ah’. No instructions were given to interact with the dinosaurs during this 1-minute timing. The purpose of this 1-minute imitation period was to capture Bentley’s attention to model, or show, Bentley that he could manipulate other toys in the same way he manipulated high preference toys (e.g., cars, Sesame Street® character figurines, etc.). If Bentley did not look up when the interventionist was modeling, the interventionist would wait for Bentley’s eye gaze, head, and or body to orient toward the interventionist before providing another model.

Minutes 3 Through 5: Instruct. The last 3 minutes of each 5-minute intervention session consisted of the interventionist instructing Bentley to manipulate the dinosaurs in the same way he was manipulating the toy(s) he was currently engaged with. The interventionist instructed Bentley by modeling and inviting Bentley to follow the model. For example, If Bentley was twirling a Sesame Street® character figurine; the interventionist would gently restrict access from the Sesame Street® figurine (e.g., hovering hand over the figurine) and wait for Bentley to make eye contact. Once Bentley made eye contact, the interventionist would model twirling a dinosaur while providing an instruction similar to “Look! You can do that with the dinosaurs too! You try!” Social praise was given with access to the toy(s) Bentley selected for Bentley manipulating the dinosaurs (e.g., “Awesome! Thanks for playing dinosaurs with me!”) This was repeated approximately every 30 to 45 seconds during the last three minutes of the intervention session. If Bentley refused to imitate the modeled action with the dinosaurs, his refusal was honored and the interventionist would wait approximately 30 to 45 seconds before presenting another instruction to imitate. If Bentley manipulated the dinosaurs in a way other than modeled (e.g., Bentley twirled the dinosaurs instead of tilting the dinosaurs as modeled), the interventionist provided social praise for Bentley approaching and manipulating the dinosaurs. The interventionist would

immediately represent the original instruction and model following the social praise. After the second presentation of the original instruction, Bentley was given access to the toy(s) he had independently chosen regardless of if Bentley imitated the model or not.

Design

A multiple baseline design across toy collections was used to evaluate the relationship between the use of common responses and the number of novel toys chosen by a child.

RESULTS

Figure 1 shows the frequency of tilting across toy collections during baseline and intervention. The top panel shows Toy Collection 1, the middle panel shows the results for Toy Collection 2, and the bottom panel shows Toy Collection 3. During baseline for Toy Collection 1, the Sesame Street® toys and vehicles were tilted 320 and 270 times, respectively. During intervention in Toy Collection 1, the vehicles continued to be tilted at high rates, being tilted approximately 1280 times by the end of intervention. The Sesame Street® toys also continued to be tilted at a rate similar to the rate in baseline, being tilted 270 times by the end of intervention. Three additional toys were independently tilted with the onset of intervention, the Jungle toys were tilted 30 times and the dinosaurs were tilted 35 times. During baseline in Toy Collection 2, the farm toys and Veggie Tails® toys were tilted 50 and 36 times, respectively. During probe sessions in Toy Collection 2, Bentley began tilting all 6 toys in the collection immediately after intervention was introduced with the dinosaurs in Toy Collection 1. The farm toys continued to be tilted at a rate similar to baseline during probe sessions, being tilted 320 times. The trains were not tilted during baseline however, immediately following the introduction of intervention in Toy Collection 1, the rate of tilting the trains increased drastically, being tilted 720 times. Bentley did not tilt the Legos®, circus toys, and rolling telephone during baseline. During probe sessions, Bentley began tilting the Legos®, circus, and rolling telephone, 150, 290, and 50 times, respectively. In baseline for Toy Collection 3, the BatCave® toys were tilted 50 times and the insert puzzles were tilted 150 times. In Toy Collection 3, Bentley continued to tilt the insert puzzles at high rates, tilting the puzzles 460 times during probe sessions. The BatCave® toys also continued to be tilted during probe sessions, being tiled 150 times. Immediately following the

introduction of intervention with the dinosaurs in Toy Collection 1, the Play-Doh® toys and bowling toys were tilted 50 and 20 times, respectively.

Figure 2 shows the frequency of twirling and frequency of toys chosen independently across toys and toy collections during baseline and intervention. The top panel shows Toy Collection 1, the middle panel shows the results for Toy Collection 2, and the bottom panel shows Toy Collection 3. During baseline for Toy Collection 1, the Sesame Street® toys were twirled 50 times and the jungle toys were twirled 10 times. During intervention in Toy Collection 1, the Sesame Street® toys were twirled 80 times and the remaining toys in Toy Collection 1 were twirled 10 times each. Bentley did not twirl of the toys from Toy Collection 2 during baseline and during probe sessions in Toy Collection 2, the trains were twirled 15 times. In Toy Collection 3, the insert puzzles were twirled 90 times while in baseline. Finally, during probe sessions in Toy Collection 3, the insert puzzles were twirled 210 times with the remaining toys in Toy Collection 3 being twirled 10 to 12 times, respectively.

Figure 3 shows the frequency of lining up across toys during baseline and intervention. The top panel shows Toy Collection 1, the middle panel shows the results for Toy Collection 2, and the bottom panel shows Toy Collection 3. During baseline for Toy Collection 1, the vehicles were lined up 30 times and the Sesame Street® toys were lined up 60 times. During intervention in Toy Collection 1, the vehicles were lined up 120 times and the Sesame Street® toys were not lined up during intervention. The remaining toys in Toy Collection 1 were lined up 10 to 20 times during intervention. None of the toys from Toy Collection 2 were lined up during baseline. The trains from Toy Collection 2 were lined up beginning in session 22 (seven sessions after the introduction of intervention in Toy Collection 1) and were lined up 170 times. The farm toys were lined up 90 times, the circus toys were lined up 50 times, the Veggie Tails® toys were

lined up 15 times, and the Legos® were lined up 30 times during probe sessions in Toy Collection 2. The insert puzzles from Toy Collection 3 were lined up 25 times during baseline. During probe sessions in Toy Collection 3, the insert puzzles continued to be lined up at a rate similar to baseline, being twirled 250 times and the Play - Doh® toys were lined up 20 times as well as the letter & number magnets and the bowling toys being lined up 8 times.

Figure 4 shows the number of toys independently chosen across toy collections during baseline and intervention. The top panel shows toys tilted independently across the three toy collections, the middle panel shows toys independently twirled across the three toy collections, and the bottom panel shows toys independently line up across the three toy collections. During baseline, the total number of toys tilted independently during baseline was 6. Once intervention was introduced in Toy Collection 1, the number of toys tilted independently increased to 9. The total number of toys twirled independently during baseline was 3 and during intervention the total number of toys twirled independently increased to 5. Finally, the total number of toys lined up independently during baseline was 3 and increased drastically to 11 of the 18 total toys being lined up independently once intervention was introduced in Toy Collection 1.

DISCUSSION

The results of this study suggest that a critical component for increasing the independent toy choice of a child diagnosed with autism was that the child engaged in the actions being modeled. For example, initially Bentley was independently tilting 6 toys, twirling 2 toys, and lining up 4 toys. Once the requirement for Bentley to imitate the action that was modeled was introduced, the number of toys tilted independently increased to 15, toys twirled independently increased to 8, and toys lined up independently increased to 15.

The treatment package utilized by Ingersoll and Schreibman (2006) has been termed Reciprocal Imitation Training (RIT). All of the components of reciprocal imitation training (e.g., contingent imitation, linguistic mapping, following the child's lead, etc.) may be necessary to enhance the play skills repertoire of a child. Still, the mechanism by which play increased was not clear. However, the results of the current study suggest that for a child diagnosed with autism, simply creating a rich environment was not enough because the child must come in contact with the reinforcing properties of novel items (toys). The results of the current investigation also suggest that imitating the child's actions (contingent imitation) alone was not sufficient to increase the toys chosen independently because simply imitating the child's actions does not necessarily bring the child into contact with the reinforcing properties of toys.

The results of this study may be explained in terms of stimulus class formation and expansion. Sidman (2000) discussed the possibility of stimulus classes being formed through a common response. More specifically, stimuli involved in separate contingencies, without having any conditional or discriminative stimuli in common, may enter into the same stimulus class when a common response is induced in those contingencies (see also Keller & Schoenfeld, 1950). For the current investigation, Bentley independently engaged in three responses (tilting,

twirling, and lining up) when playing with preferred items such as puzzles. These responses were utilized to add new members (new toys) to the stimulus class of toys.

In this study, one response (lining up) had much greater generalization. One explanation for this may be that it was easier to perform this response with a variety of objects as compared to the other responses. Virtually any object may be lined up, and this also required less effort when compared to tilting and twirling. For example, tilting and twirling large boxes may be more difficult than lining them up because of the size. An extension of this study could examine the effects on generalization when different child-led responses are systematically introduced. Future research may also investigate how a common response could be used to 1) increase play variation with a single toy and 2) increase generalization to novel toys.

The current study employed an AB design as opposed to more experimentally sound experimental designs such as a multiple baseline design. At the onset of the investigation, the use of a multiple baseline design across stimuli (toy collections) was intended. However, when intervention (modeling and the requirement to imitate modeled actions) was introduced in Toy Collection 1, the effects of the intervention procedures were also observed in Toy Collection 2, even though the intervention procedure had not yet been implemented for this set. The magnitude of the effects on Toy Collection 2 maintained through the remainder of the study. Therefore, it was determined that intervention sessions in Toy Collections 2 and 3 were not necessary and the remainder of sessions from Toy Collections 2 and 3 served to asses the generalization effects of intervention, as generalization probes. This suggests that a multiple baseline design across responses may have been a better choice for this study.

In conclusion, the results showed dramatic increases in the number of toys the child independently chose to play with and an increase in the spontaneous use of different response topographies across novel stimuli only when the student was required to imitate a model.

Table 1

List of Toys in Each Toy Collection

Toy Collection 1	Sesame Street Set®
	Vehicles
	Dinosaurs
	Jungle Set
	Wooden ABC Blocks
	Let's Go Fishing Game®
Toy Collection 2	Farm Set
	Train Set
	Circus Set
	Larry the Pirate - Potato Head Set®
	Legos®
	Rolling Telephone
Toy Collection 3	Bowling Set
	1,2,3 - Go Diego, Go Board Game
	Play - Doh Set®
	Insert Puzzles
	BatCave Set®
	Letter & Number Magnets

Note. The top panel lists the toys present in Toy Collection 1. The middle panel lists the toys present in Toy Collection 2 and the bottom panel lists the toys present in Toy Collection 3

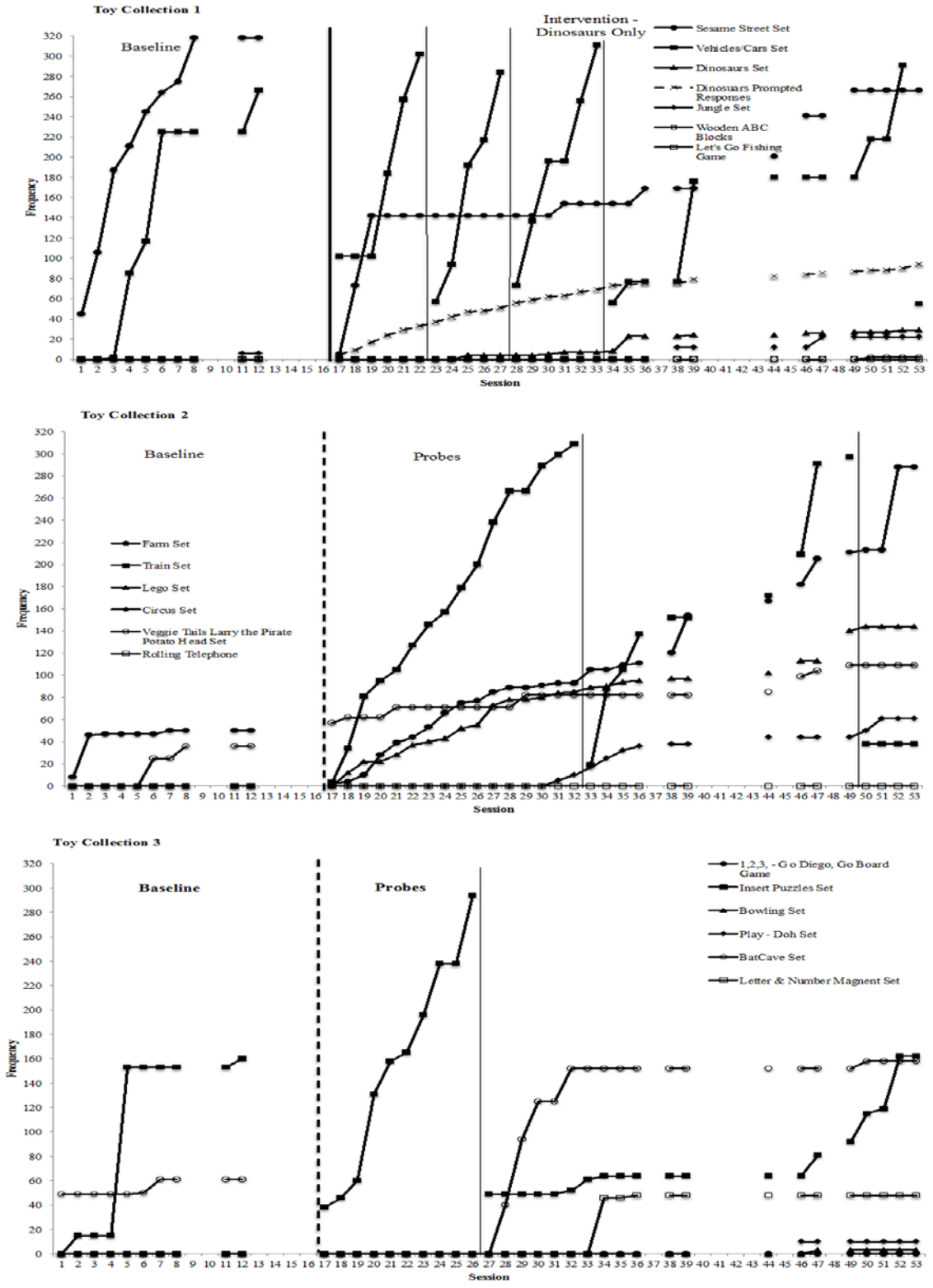

Figure 1. Cumulative frequencies of toys tilted independently across toy collections during baseline and intervention. The top panel shows the results for Toy Collection 1, the middle panel shows the results for Toy Collection 2, and the bottom panel shows the results for Toy Collection 3.

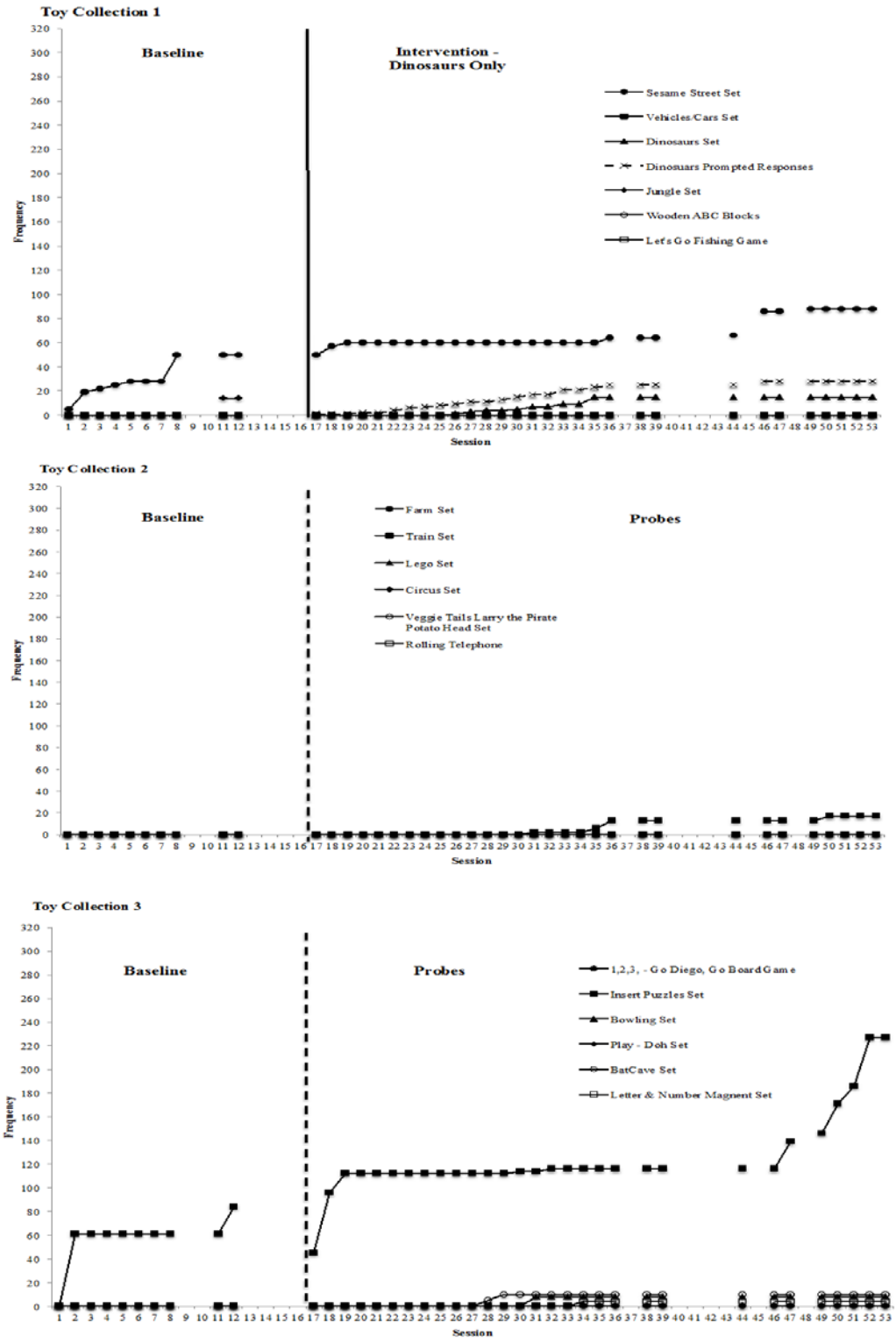

Figure 2. Cumulative frequencies of toys twirled independently across toy collections during baseline and intervention. The top panel shows the results for Toy Collection1, the middle panel shows the results for Toy Collection 2, and the bottom panel shows the results for Toy Collection 3.

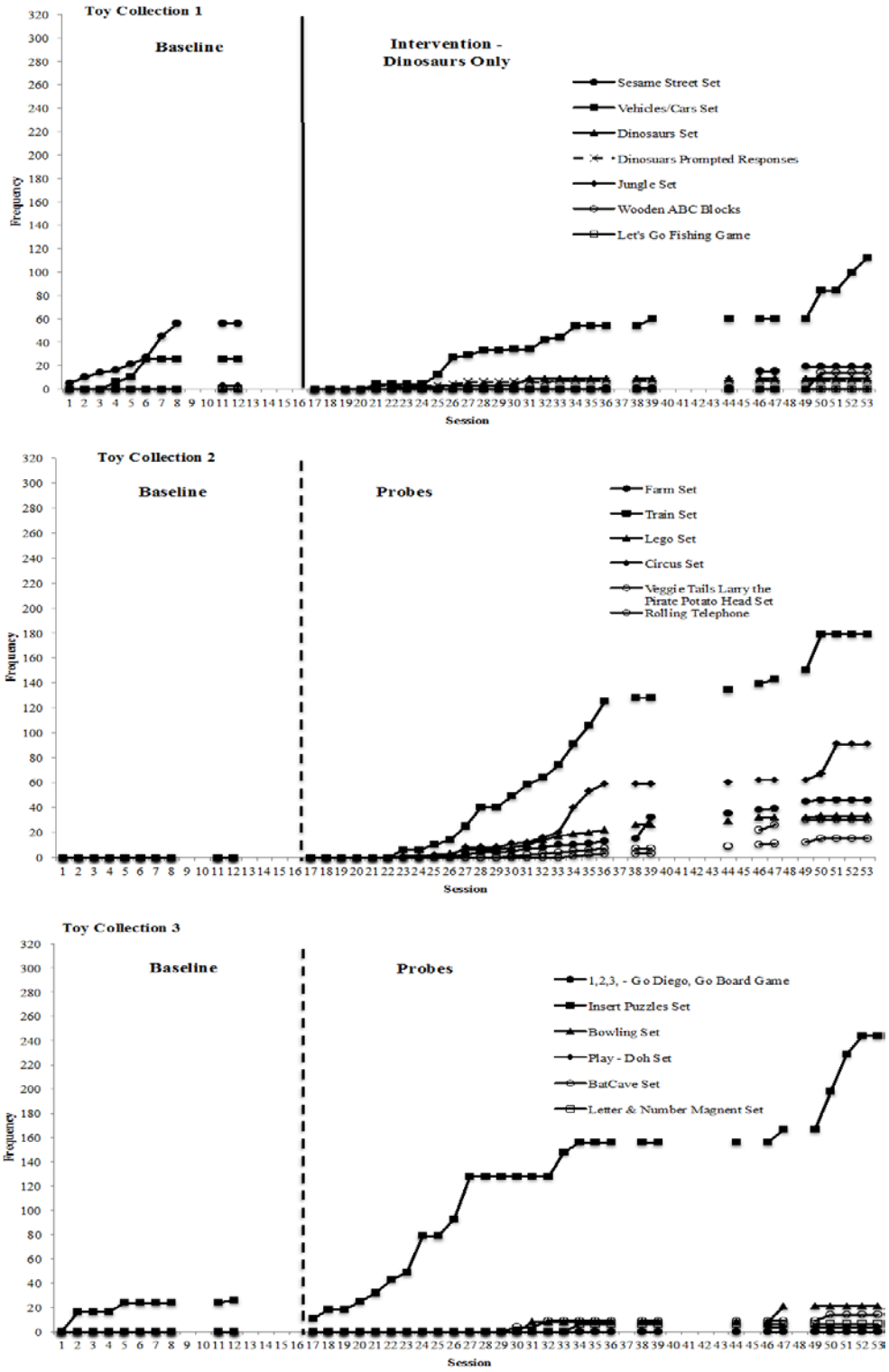

Figure 3. Cumulative frequencies toys lined up independently across toy collections during baseline and intervention. The top panel shows the results for Toy Collection 1, the middle panel shows the results for Toy Collection 2, and the bottom panel shows the results for Toy Collection 3.

Table 2

Toys Independently Tilted across Toy Collections

Toy Collection 1	
Baseline	Intervention
Sesame Street® Toys	Sesame Street® Toys
Vehicles	Vehicles
	Dinosaurs
	Jungle Toys
	Wooden ABC Blocks

Toy Collection 2	
Baseline	Intervention
Farm Toys	Farm Toys
VeggieTales® Toys	VeggieTales® Toys
	Trains
	Legos®
	Circus Toys

Toy Collection 3	
Baseline	Intervention
Insert Puzzles	Insert Puzzles
BatCave® Toys	BatCave® Toys
	Bowling Toys
	Play - Doh® Toys
	Letter & Number Magnets

Note. The top panel shows the results for Toy Collection 1 during baseline and intervention. The middle panel shows the results for Toy Collection 2 during baseline and intervention, and the bottom panel shows the results for Toy Collection 3 during baseline and intervention.

Table 3

Toys Independently Twirled Independently across Toy Collections

Toys Twirled Independently	
Toy Collection 1	
Baseline	Intervention
Sesame Street® Toys	Sesame Street® Toys
Jungle Toys	Dinosaurs
Toy Collection 2	
Baseline	Intervention
	Trains
Toy Collection 3	
Baseline	Intervention
Insert Puzzles	Insert Puzzles
	BatCave® Toys
	Bowling Toys
	Letter & Number Magnets

Note. The top panel shows the results for Toy Collection 1 during baseline and intervention. The middle panel shows the results for Toy Collection 2 during baseline and intervention. The bottom panel shows the results for Toy Collection 3 during baseline and intervention.

Table 4

Toys Independently Lined Up across Toy Collections

Toy Collection 1	
Baseline	Intervention
Sesame Street® Toys	Sesame Street® Toys
Vehicles	Vehicles
Jungle Toys	Dinosaurs
	Wooden ABC Blocks

Toy Collection 2	
Baseline	Intervention
	Farm Toys
	VeggieTales® Toys
	Trains
	Legos®
	Circus Toys
	Rolling Telephone

Toy Collection 3	
Baseline	Intervention
Insert Puzzles	Insert Puzzles
	BatCave® Toys
	Bowling Toys
	Play - Doh® Toys
	Letter & Number Magnets

Note. The top panel shows the results for Toy Collection 1 during baseline and intervention. The middle panel shows the results for Toy Collection 2 during baseline and intervention, and the bottom panel shows the results for Toy Collection 3 during baseline and intervention.

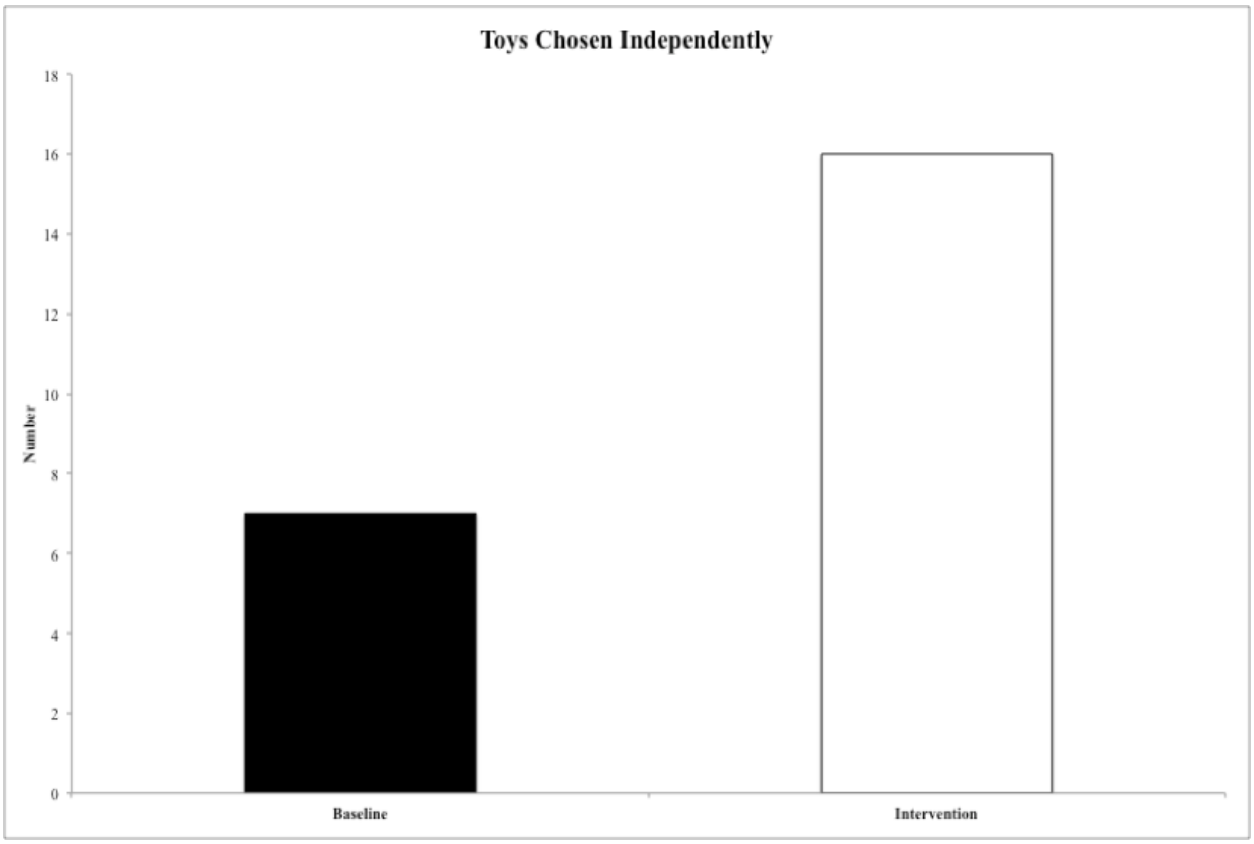

Figure 4. Toys chosen independently during baseline and intervention. The solid bar shows the number of toys chosen independently during baseline for all three-toy collections combined. The white bar shows the results for the number of toys chosen independently during intervention for all three-toy collections combined

APPENDIX A

COMPLETE DATASHEET USED FOR TOYS CHOSEN INDEPENDENTLY BASELINE DATA COLLECTION

Participant:_____ Toy Collection:_____ Date:_____
Session Date/Number:_____ Video Scored by: _____

Item/Toy Selected: _____

	Reponse Topography(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

Item/Toy Selected: _____

	Reponse Topography(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

Item/Toy Selected: _____

	Reponse Topography(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

Item/Toy Selected: _____

	Reponse Topography(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

Item/Toy Selected: _____

	Reponse Topography(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

APPENDIX B

COMPLETE DATASHEET USED FOR TOYS CHOSEN INDEPENDENTLY

INTERVENTION DATA COLLECTION

Child's Initials:_____
Session Date/Number:_____

Toy Collection:_____

Date Scored:_____
Data Collector Initials_____

1st Minute Observe

Item/Toy Selected:_____

[redacted]	Repunse Topuyaphy(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

Item/Toy Selected:_____

[redacted]	Repunse Topuyaphy(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

2nd Minute Initiate Coach Selection:_____

Item/Toy Selected:_____

[redacted]	Repunse Topuyaphy(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

Item/Toy Selected:_____

[redacted]	Repunse Topuyaphy(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

3rd - 5th Minutes Common Responses

Item/Toy Selected:_____

[redacted]	Repunse Topuyaphy(ies)	Frequency of Response	Total Duration of Response	Number of Social Initiations
Total Duration of Engagement:_____				

Instructed Common Response Imitations using Dinosaurs

Repunse Topuyaphy(ies) Instructed to Imitate	Independent	Prompted	Independent Initiations to Dinosaurs	Social Initiations

APPENDIX C

PARTICIPANT INFORMED CONSENT FORM

UNT

A green light to greatness.

THE OFFICE OF RESEARCH INTEGRITY AND COMPLIANCE

June 9, 2015

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

RE: Human Subjects Application No. 14208– R15

Dear Dr. Alai-Rosales,

The UNT Institutional Review Board has reviewed and approved the extension you requested to your project titled "Service-learning in Action: A Description of Community Based Interventions for Children with Autism." Your extension period is for one year, May 15, 2015 **through May 14, 2016**. **Federal policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only.**

Enclosed is the consent document with stamped IRB approval. Please copy and **use this form only** for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. The IRB must also review this project prior to any modifications. If continuing review is not granted before May 14, 2016, IRB approval of this research expires on that date

Please contact Shelia Bourns, Research Compliance Analyst, 940-565-4643, if you wish to make changes or need additional information.

Sincerely,

Chad Trulson, Ph.D.
Professor
Department of Criminal Justice
Chair, Institutional Review Board

CT:sb

UNIVERSITY OF NORTH TEXAS
1155 Union Circle #310979 Denton, Texas 76203-5017
940.369.4643 940.369.7486 fax www.research.unt.edu

University of North Texas Institutional Review Board
Informed Consent Form

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

Title of Study: Service-learning in action: A description of community based interventions for children with autism

Investigators: Dr. Shahla Alai-Rosales & Dr. Jesus Rosales-Ruiz, University of North Texas (UNT) Department of Behavior Analysis.

Purpose of the Study: The purpose of this research study is to present information about the ***Easter Seals North Texas - Autism Treatment Program*** (ESNT-ATP). The program is unique in that the agency has a commitment to non-punitive procedures. Treatment progress and parent satisfaction will be researched and discussed. Parents are asked to give permission for information from their child's participation in the ***Easter Seals North Texas - Autism Treatment Program*** (ESNT-ATP). Parents will also be asked to give about the program. The information will be confidentially reported for educational purposes. Specifically, we will describe how the interventions were developed, what happened during intervention, how staff was trained, and how satisfied parents were with the results.

Study Procedures: We would like to review and analyze the data that were already collected as part of your child's involvement in the ESNT-ATP program. Your only time commitment for this project is the time it will take to go through the consent process that we are doing right now and to fill out a confidential satisfaction survey. Most parents have taken between 10 to 20 minutes to complete the survey.

Foreseeable Risks: There are no foreseeable risks involved with participation in this study. No identifiable descriptions (i.e. names, client account numbers or addresses) will be given in manuscripts or presentations. In the event that vignettes are included, they will involve pseudonyms and composite characteristics and behaviors of several staff/child/parents so that they illustrate a concept rather than describe an individual. In the event actual outcomes are reported, pseudonyms will be used to refer to the person.

Benefits to the Subjects or Others: There are no immediate benefits to you as the participants. Although it is possible that reporting the favorable outcomes of this program could increase the likelihood of sustained funding of the program and increased overall support of programs for traditionally underserved populations. Furthermore, the reporting of this information could provide other programs and universities resources for initiating similar programs designed to train students and contribute to the overall well-being of home communities.

APPROVED BY THE UNT IRB
FROM 5/15/15 TO 5/14/16

Procedures for Maintaining Confidentiality of Research Records: No identifiable data will leave the ESNT-ATP site. ESNT-ATP staff will maintain the confidentiality of the clients and staff will mask all ESNT-ATP records. The investigators will only enter study data by groups and pseudonyms rather than by identifiable individual information (i.e. first and or last name, client account numbers, or addresses). The confidentiality of your participant information will be maintained in any publications or presentations regarding this study.

Questions about the Study: If you have any questions about the study, you may contact *Shahla Alai-Rosales* at *940-565-2274.*

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) 565-4643 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, or a designee,* 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.
- *Your decision whether to participate or to withdraw from the study will have no effect on your enrollment at Easter Seals North Texas - Autism Treatment Program.*
- 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.

Christina Ibanez
Printed Name of Participant

Signature of Participant — 5/10/16 Date

For the 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 Investigator or Designee — 5/10/16 Date

APPROVED BY THE UNT IRB
FROM 5/15/15 TO 5/14/16

APPENDIX D

PHOTOGRAPHS OF COMPLETE TOY COLLECTIONS

Toy Collection 1

Toy Collection 2

Toy Collection 3

APPENDIX E

RAW DATA TABLES

Toy Collection 1

Toy Collection 1: Cumulative Number of Independent Initiations & Cumulative Tilting Responses

| | Session Number | | |

Toy Collection 2

Toy Collection 2: Cumulative Number of Independent Initiations & Cumulative Tilting Responses

| | Session Number | | |

Toy Collection 3

Toy Collection 3: Cumulative Number of Independent Initiations & Cumulative Tilting Responses

| | Session Number | | |

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