THE USE OF CONJUGATE REINFORCEMENT IN AUTISM TREATMENT PROGRAMS:
A DEMONSTRATION AND DISCUSSION

Stephany Kristina Reetz, B.S.

Thesis Prepared for the Degree of

MASTER OF SCIENCE

UNIVERSITY OF NORTH TEXAS

December 2012

APPROVED:

Shahla Ala’i-Rosales, Major Professor
Traci Cihon, Committee Member
Jesús Rosales-Ruiz, Committee Member
Richard G. Smith, Chair of the Department of Behavior Analysis
Thomas L. Evenson, Dean of the College of Public Affairs and Community Service
Mark Wardell, Dean of the Toulouse Graduate School
The effect of a reinforcer on behavior is largely determined by the schedule in which it is implemented. One type of reinforcement schedule that has not been explored extensively is conjugate reinforcement. Previous researchers have used conjugate schedules to evaluate a reinforcer’s effects on behavior and as an assessment tool. However, none have explored how to effectively engineer conjugate schedules in applied settings. The current study explores the effectiveness of conjugate reinforcement implemented by several interventionists across a variety of responses, reinforcers, and in a wide range of participants with autism. The results indicated that delivering social, audio/visual, and tangible stimuli in a conjugate schedule resulted in increased durations of various target responses (e.g. social skills, motor skills) and non-targeted measures (e.g., approach, social bids, speed) across participants. Considerations regarding reinforcer and response selection in implementing conjugate schedules in applied settings are provided.
Copyright 2012

by

Stephany Kristina Reetz
ACKNOWLEDGEMENTS

Thank you to all who have supported me through this part of my journey. Thank you to my family. You continued to encourage me to go to graduate school, even if it meant moving to Texas and putting many miles between us. Without your ongoing love and support, I would have never accomplished what I have thus far. Thank you to my fiancé, Kelsey. I am forever grateful that you chose to move to Texas with me so that I could follow my dreams. You have given me reassurance, encouragement to never give up, and have never been reluctant to give me your support. Thank you to my advisor, Dr. Shahla Ala’i-Rosales for motivating and inspiring me to be a better researcher and clinician. You have influenced the course and focus of my career in autism treatment and have contributed to my growth as a behavior analyst and more importantly as a person. Thank you to my graduate colleagues. You have all provided me with valuable feedback, motivation to continue during the most trying times, and have provided me with a sound support system. You have made my experiences at the University of North Texas invaluable. I am fortunate to have formed lifelong friendships. Thank you to my committee members, Dr. Jesús Rosales-Ruiz and Dr. Traci Cihon. I have appreciated your insight, feedback, and discussion. I have learned so much from each of you. Thank you, Celina Rocha for helping with data collection and Joe Cihon for assisting with data collection and providing valuable feedback throughout this process. Thank you to the children who participated in this study. I am so proud of the progress you make each day. You have all been inspirations.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vi</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>METHOD</td>
<td>8</td>
</tr>
<tr>
<td>RESULTS</td>
<td>20</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>22</td>
</tr>
<tr>
<td>APPENDIX A INFORMED CONSENT FORM</td>
<td>32</td>
</tr>
<tr>
<td>APPENDIX B THERAPIST INSTRUCTIONS</td>
<td>36</td>
</tr>
<tr>
<td>APPENDIX C CODING INSTRUCTIONS</td>
<td>45</td>
</tr>
<tr>
<td>APPENDIX D DATASHEETS</td>
<td>52</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>60</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Participant Information</td>
<td>29</td>
</tr>
<tr>
<td>Table 2</td>
<td>Percent of Interobserver Agreement</td>
<td>30</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.</td>
<td>Mechner (1959) notation of episodic reinforcement delivery.</td>
<td>30</td>
</tr>
<tr>
<td>Figure 2.</td>
<td>Duration of targeted response and non-targeted measures across participants.</td>
<td>31</td>
</tr>
</tbody>
</table>
INTRODUCTION

Although considerable attention has been given to reinforcer assessment (Dunlap & Robbins, 1991), quality interventions also rely on the effective and judicious use of those reinforcers (Eikseth, 2009). The effects that a reinforcer has on the future occurrence and further modification of behavior targeted in intervention is largely influenced by the schedule in which the stimulus is presented (Morse & Kelleher [1968], as cited in Schoenfeld, 1970). Ferster and Skinner (1957) suggested, “many significant features of behavior can be explained only by reference to the properties of schedules [of reinforcement]” (p. 2).

In behavioral interventions, the episodic delivery of reinforcers is the most frequently used schedule. Figure 1 illustrates an episodic sequence. Episodic schedules involve the programming of a stimulus (i.e., consequence) at a distinct time, after a specific time interval or number of responses has occurred (Schoenfeld, 1970). That is, a behavior occurs, then a reinforcer is delivered. In episodic schedules, the consequence delivery is not coincident with the frequency or duration of the response (Gilbert, 1959). Therefore, the stimulus is made contingent on the behavior, and both do not occur simultaneously in time. Moreover, episodic reinforcer delivery involves an “extra” behavior occurring after the reinforcer is delivered. For instance, in a typical laboratory preparation, after a consequence (e.g., food pellet) is delivered contingent on a target response (e.g., lever press), the organism must consume the reinforcer, which involves the organism walking to the feeder to eat the food pellet prior to engaging in the target response a second time. This same arrangement also commonly occurs in applied settings. For example, when targeting peer play in behavioral intervention, a therapist might require the child to play with a peer for a specific duration of time before the reinforcer is delivered. After the child successfully plays with a peer for the target time duration, the therapist leads the child away from
the peer to access a reinforcer. The child is given access to the reinforcer, then the item is removed, and the child is instructed to return to play with the peer. However, when teaching responses desired to be of sustained durations, such as peer play, this arrangement might not be ideal. Delivering reinforcers episodically requires an interruption in responding in order to deliver the reinforcer. When targeting behavior that is emitted continuously, it may be more practical to allow the individual access to the reinforcer as he or she is engaging in the target response. Nonetheless, many teaching methods adhere to this contingency arrangement.

Some teaching methods in applied practice that utilize the episodic delivery of reinforcers include discrete trial training (DTT) and the Premack principle. DTT, an individualized teaching method that breaks teaching opportunities into small units of instruction known as discrete trials, arranges reinforcers episodically (Smith, 2001). In this contingency arrangement, the child engages in a response, *then* a consequence is delivered. For example, the therapist delivers a cue, “Sit down.” After the child sits in the chair for a specific duration of time, the therapist gives the child a preferred item (e.g., book). The child is allowed to have access to the item, the item is removed, and the instruction is given again. Furthermore, the Premack principle, a procedure in which high probability behaviors are used to reinforce low probability behaviors, are often used to increase activity-based behavior in intervention (Premack, 1959). The Premack principle has been widely used to increase exercise behavior. Allen and Iwata (1980) used a group contingency in which subjects were required to complete various exercises before being allowed to participate in games. Thus, in order to participate in the preferred activity (e.g., games), the subject was required to complete a specific number of exercise activities first. In general, many teaching methods in behavioral interventions operate under similar contingencies that involve the child engaging in a response, *then* a reinforcer being delivered.
The aforementioned procedures rely on the episodic delivery of reinforcers; however a limited number of applied studies explore the conditions under which non-episodic delivery methods are effective in behavioral interventions. One schedule in particular that has received little attention is conjugate reinforcement. Conjugate schedules of reinforcement involve continuous, covarying response-reinforcer relations in which the intensity, magnitude, and/or amplitude of the response (e.g., increased bike pedal speed) is proportional to the reinforcer (e.g., increased television illumination) (Lindsley, 1962). Occurrence of the reinforcer is coincidental with the occurrence of the response in that each response continuously produces a different reinforcer (Gilbert, 1959). In other words, the response and reinforcer are synchronous, and the onset and offset of the reinforcer is directly correlated with the onset and offset of the individual’s response (Voltaire, Gewirtz, & Palaez, 2005). Unlike episodic delivery, an “extra” behavior (i.e., break in responding for reinforcer consumption) does not occur after the target response occurs. Rather, the individual is receiving access to the reinforcer as he or she is engaging in the target response. For example, a therapist delivers a cue, “Sit down.” While the child engages in the response, the therapist delivers continuous access to a preferred item (e.g., book). If the child is not sitting, reinforcer delivery is terminated. When targeting activity-based exercises, the therapist may instruct the child to bike. As long as the child is biking, the therapist allows the child to watch a favorite television show. When the child stops biking, the television show is turned off. Overall, results of previous literature indicate that high, sustained human response patterns can be maintained on a conjugate schedule.

Conjugate schedules were initially introduced in laboratory settings as a tool to evaluate reinforcement and its effects on behavior. In particular, high response rates were demonstrated across various response classes. Lindsley (1956) first evaluated conjugate reinforcement in the
laboratory as an operant conditioning method to analyze the behavior of patients with chronic schizophrenia. Results indicated that the patient’s rate of talking, listening, and looking increased when the patient’s simultaneous, rapid microswitch pressing produced increased illumination and volume of the television in which a therapist was viewed and heard. Lindsley (1962) and Morgan and Lindsley (1966) further explored the effects of conjugate reinforcement in increasing other human motor responses. To illustrate, Lindsley (1962) examined the effects of reinforcers (e.g., television) delivered conjugately on hand switches in which high rates of button presses produced greater illumination of the television. Results indicated that participants engaged in high rates of button presses during preferred television segments.

Conjugate schedules have also been used as an assessment tool. Specifically, developmental psychologists used conjugate reinforcement to evaluate cognitive function (e.g., memory, learning), and motor development in infants (Gross, Hayne, Herbert, & Sowerby, 2002; Rovee, & Rovee, 1969; Siqueland & Delucia, 1969). Psychologists have used conjugate schedules to increase infant motor activity in order to evaluate stimulus recognition and long-term memory in infants (Fagen & Ohr, 1990). Rovee and Rovee (1969) used a mobile conjugate reinforcement task in which the rate of infant foot kicks was proportional to the rate of movement in the overhead mobile. Infants learned that their foot kicks produced movement of the overhead mobile during the reinforcement condition compared to baseline sessions in which foot kicks did not produce reinforcement. Retention was then measured when the baseline period was reintroduced. A high rate of foot kicks during baseline demonstrated retention of the previous reinforcement contingency. Researchers have also used conjugate reinforcement as an operant conditioning method to study learning with infant sucking responses (Siqueland & DeLucia, 1969) and infant head turns (Siqueland & Lipsitt, 1966).
Moreover, conjugate schedules have been used to evaluate various reinforcers. Researchers have used conjugate reinforcement as an assessment for automatic reinforcement (Switzky & Haywood, 1973; Rapp, Dozier, Carr, Patel, & Enloe, 2004). Switzky and Haywood (1973) implemented a conjugate schedule of reinforcement to alter the rate of sensory motor activity exhibited by individuals with mental retardation. Results indicated that higher rates of motor activity were maintained when high rates were conjugately reinforced. Similarly, Rapp et al. (2004) suggested individuals engaged in high rates of erratic body movement when visual stimulation was proportional to body movement. Thus, researchers have indicated that stereotypic behavior patterns might be maintained by conjugate reinforcement, which he suggests provides additional information for effective extinction procedures (Rapp, 2008).

Furthermore, conjugate schedules have been used to evaluate the effects of auditory/visual stimuli (Lovitt, 1967; McKirdy & Rovee, 1978; Voltaire, Gewirtz, & Palaez, 2005). Voltaire et al. (2005) compared responding under conjugate schedules when using visual reinforcers, auditory reinforcers, and a combination of the two, concluding that the highest incidence of responding occurred when auditory/visual reinforcers were combined. McKirdy and Rovee (1978) produced similar results by demonstrating that a combination of auditory and visual reinforcers produced high response rates. Lovitt (1967) explored different topographies of auditory reinforcers (e.g., story, poem, journal article, sentences and words in reverse order) delivered on a conjugate schedule. Results showed that individuals engaged in high rates of microswitch presses to access various narrative forms. Lovitt (1968) manipulated intensity of auditory reinforcers delivered conjugately on microswitch presses in typically developing and developmentally disabled boys. Results indicated that the majority of participants responded at rates to access narrative forms read at normal speech rate (i.e., 180 words per minute).
The effects of social stimuli have also been evaluated in conjugate schedules (Lindsley, 1956; Lindsley, 1963; Lindsley, 1969). Lindsley (1963) explored the effects of social stimuli implemented conjugately, indicating that when high rates of infant footkicks resulted in greater illumination of images of a smiling woman, footkicks were sustained at a higher rate compared to images delivered episodically. Similarly, Lindsley (1956) used social stimuli in the laboratory as an operant conditioning method with individuals with chronic schizophrenia. Psychotherapy patients’ rate of talking and looking increased when reinforcing stimuli, such as the visibility of the therapist and the therapist’s speech, were continuously proportional to the patient’s rate of button presses. Lindsley (1963) suggested that social stimuli are often delivered conjugately in the natural environment, suggesting that stimuli are perceived on a gradient and increases and decreases in responding produce corresponding increases and decreases in reinforcement.

Previous researchers have demonstrated that conjugate reinforcement is effective in increasing behavior and is useful as an assessment tool in the applied and basic laboratory. However, few studies have demonstrated the effectiveness of conjugate schedules in applied practice. Lindsley (1963) suggested conjugate schedules simulate the contingencies in the natural environment, yet few studies have explored its usefulness in applied settings. Dozier, Iwata, Thomason, & Neidert (2007) conducted preliminary research demonstrating that conjugate reinforcement can effectively increase physical activity in individuals diagnosed with Prader Willi syndrome. Dozier et al. (2007) indicated that conjugate schedules were more effective in increasing and maintaining exercise behavior (e.g., walking on treadmill, stationary bicycle) than episodic schedules (i.e., access to reinforcer after exercise was complete) with 3 out of the 4 individuals diagnosed with Prader Willi syndrome. Notwithstanding, no studies have explored
the conditions under which conjugate reinforcement is effective in applied settings with socially significant behavior.

The results of the aforementioned studies have suggested that conjugate schedules are effective in both basic and applied settings. Nonetheless, careful considerations of response and reinforcer selection and delivery and an understanding of the conditions under which the schedule is effective is necessary when considering how to engineer this type of reinforcement in applied practice. In particular, it is critical to consider the topography of the response and reinforcer when evaluating the schedule’s effects on socially significant behavior. The purpose of the current study is to first provide a demonstration of the effectiveness of conjugate schedules of reinforcement to increase the duration of four target responses across four children diagnosed with autism with different reinforcing stimuli delivered by several different interventionists. Second, the current study aims to provide an analysis of the conditions under which conjugate reinforcement might be effective in behavior intervention.
METHOD

Participants and Setting

Four children diagnosed with autism spectrum disorders were selected to participate in the study. All children received services at a non-profit autism treatment center and were of varying functioning levels. Each child was selected based on behaviors currently targeted in his or her individual dynamic programming. An overview of each child’s pertinent participant information is displayed in Table 1.

Experimental sessions were conducted at various locations in the autism treatment center. Max’s sessions took place in the kitchen, which included two tables, chairs, kitchen appliances (e.g., refrigerator), and a shelf with various toys. Emily’s sessions were carried out in a treatment room that contained a table, chairs, a one-way window that adjoined an observation room, and toys selected for the purpose of the study. A circle 3.5 ft (1 m) in diameter was marked with gray tape in the corner of the therapy room. Carl’s sessions took place in the physical therapy (PT) gym, which contained various exercise equipment, bicycles, and toys secured in cabinets. One small bicycle attached to a CycleOps® bicycle trainer (Saris Cycling Group, Inc., Madison, WI) was used for the purpose of the study. Ulysses’ sessions were ran in the school room, which included other children, tables and chairs, a circle time area, various toys on shelves, a bookshelf, and program materials for each child receiving services at the center.

Observation

The experimenter or a second observer recorded all sessions on a Flip® video camera (Cisco Systems, Inc., San Jose, California) and data were collected from the recorded videos. The experimenter measured minutes engaged in the target behavior and non-targeted responses
during all sessions for each participant, and a second observer independently scored 48% of 
sessions for target behaviors and non-targeted responses. Refer to Table 1 for child specific 
responses. The experimenter and observer independently scored the target response by recording 
a start and stop time for each onset and offset of the response. An agreement or disagreement 
was calculated for each start and stop time. An agreement was recorded when the experimenter 
and observer recorded within 1 s of each other for each start or stop time. Interobserver 
agreement (IOA) was calculated by adding the total number of agreements, dividing by the 
agreements plus disagreements, and multiplying by 100.

Non-targeted responses were recorded separately. The experimenter and observer 
recorded the frequency of Emily’s approaches to the therapist and Max’s approaches to the table 
within each session. Similarly, Carl’s total bike revolutions were recorded for each session. 
Agreement was indicated when the experimenter and observer recorded the same frequency of 
approaches or revolutions within the session. For Ulysses, child and peer social bids were scored 
using 10 s whole interval recording. An agreement was recorded when the experimenter and 
observer scored the same number of social bids in the interval. IOA for the non-targeted 
responses was calculated the same as the targeted responses. See Table 2 for detailed IOA 
results.

Procedures

Experimental Design

A non-concurrent multiple baseline across participants design (Watson & Workman, 
1981) was used to examine the effects of a conjugate schedule of reinforcement on the duration 
each child engaged in the target responses. Target responses were selected and individualized
according to each child (i.e., Emily’s proximity of coach, Ulysses’ proximity of peer, Carl’s bike pedaling, Max’s sitting at the snack table). Due to staff and child availability, baseline lengths were predetermined and were assigned to children as they became available for the study.

Preference Assessment

Preference assessments were individualized for each child. Stimuli were selected based on staff familiarity with the child’s reinforcer history. Children who were able to vocalize his or her preferences (e.g., Carl) were asked what they wanted (e.g., “Do you want to tell ghost stories or watch Bubble Guppies?”) prior to each session in the conjugate condition. After the participant selected an item, the therapist delivered access to the preferred stimulus for 15 s. After 15 s, preferences were reassessed. If the child selected the same item after the initial 15 s, the stimulus was used in the conjugate condition.

Children with limited vocal verbal repertoires (i.e., Max, Emily, Ulysses) were presented with a free operant multiple stimulus without replacement (MSWO) preference assessment (DeLeon & Iwata, 1996). A MSWO was implemented immediately before each session in the conjugate condition in a treatment room with various stimuli that were likely to function as reinforcers based on therapist anecdotal reports (e.g., books, electronic toys).

Baseline

Each baseline session lasted 15 min or ended when the child engaged in an appropriate escape response (e.g., “all done”) from the task or location. No programmed consequences (e.g., praise, preferred item identified as identified in MSWO) were delivered contingent on the
participant’s target response during baseline sessions. Thus, the therapist did not give the child his or her most preferred item at any time during the session.

Conjugate Condition

Each conjugate session lasted 15 min or concluded when the child engaged in an appropriate escape response from the task or location. Each conjugate session involved continuous response-reinforcer relations. For example, the child was given continuous access to the most preferred item or activity identified in the preference assessment as long as the child was engaged in the target response. Access to the item or activity was immediately discontinued when the participant stopped engaging in the target response.

Individual Procedures

Max. Max was selected as a participant due to infrequent approaches to the table during snack and failure to sit at the table with his peers during lunch and snack time. The child’s target response included sitting in a chair at the table during snack time. Sitting was defined as the child’s buttocks being in contact with the seat of the chair when the chair was positioned within 1 ft (.3 m) of the snack table without engaging in challenging behavior (e.g., crying) identified in the child’s individual programming. The child could sit in any chair that was positioned within 1 ft (.3 m) of the snack table. Approaches to the snack table were measured as a non-targeted response. An approach included the child walking directly toward or standing up from the chair and sitting down in any chair positioned next to the snack table. Each time the child retreated or stood up from the chair and sat back down was scored as one instance of approach. The child’s
preferred items included books and V-Tech® electronic toys (VTech Electronics North America, LLC, Hong Kong, China).

The general session set-up remained consistent across baseline and conjugate sessions. Prior to each session, the child’s most preferred items were removed from the kitchen, and the child’s snack was placed on the table with a chair positioned in front of the snack table. Each session began with the therapist walking with the child to the kitchen from the 1:1 treatment room. When the child arrived at the entrance of the kitchen, the therapist removed any items from the child’s hands and placed them outside the kitchen door. The therapist established eye contact with the child and instructed the child, “It’s time for snack. Go sit down in the chair,” and pointed toward the chair. After the therapist delivered the instruction, the child was able to walk around the room (e.g., look out the window, turn the lights on and off). The therapist walked around the kitchen or stood next to the chair and observed the child, but did not speak to the child throughout the session. If the child attempted to engage with kitchen appliances (e.g., press buttons on the microwave), engage in behavior that could be potentially dangerous (e.g., climbing on counter), or elope from the kitchen into the hallway or the adjacent adult physical therapy gym, the therapist stood in front of the location without making eye contact or delivering instructions (e.g., “Don’t do that.”) and gently guided the child’s shoulders away from the item or location. After the 15 min session elapsed, the therapist provided general praise (e.g., “Good job.”), told the child that it was time to leave the kitchen, and the therapist transitioned the child to the next scheduled activity. If the participant engaged in an appropriate escape response (e.g., “I’m all done.”) before 15 min elapsed, the therapist ended the session, led the child out of the kitchen, and transitioned to the next activity.
During baseline sessions, the therapist did not allow the child to hold or manipulate his most preferred item at any time during the session. If the child sat in any chair in the kitchen, the therapist remained standing next to the chair, but did not provide social praise (e.g., “Good job.”) or give the child his most preferred item (e.g., book) at any time. Thus, the most preferred item was not available at any time.

During each session in the conjugate condition, the therapist stood within 2 ft (.6 m) of the chair that was positioned in front of the child’s snack, with the exception of redirecting the child away from areas in which he could engage with kitchen appliances (e.g., pressing buttons on the microwave), engage with potentially dangerous items, or attempt to elope. The therapist held the child’s most preferred item and observed the child throughout the session. The therapist handed the child the most preferred tangible item (e.g., book) and turned the item on (when applicable) immediately as the child sat in any chair positioned next to the table. As long as the child was sitting, the child had complete control of the item. That is, while sitting in the chair, the child could set the item next to the chair, set the item in his lap, turn the item on or off, or manipulate the item in any way. If the child stood up from the chair, the therapist removed the item from the child’s hands and turned the item off (when applicable). If the child requested the item (e.g., looked at therapist and said “book”) but was not sitting in the chair, the therapist said, “You need to sit down” and pointed toward the chair.

*Emily*

Emily was selected as a participant for the study due to deficits in social skills and infrequent approaches and social interactions with therapists. The child’s target response was proximity of therapist. The target response was defined as the child sitting, standing, or laying in
the designated circle with over half of the individual’s body crossing the plane of the circle without engaging in challenging behavior (e.g., pinching, head hitting) identified in the child’s individual programming. A non-example includes, but is not limited to, lying on the floor with head and trunk of body positioned outside of the circle. Approaches to the therapist were included as a non-targeted response. An approach was recorded when the child entered the circle the therapist was positioned in. Each time the child left the circle and entered the circle again was scored as one instance of approach. Emily’s sessions took place in a 1:1 room. Emily’s preferred items used in conjugate sessions included electronic toys that could be turned on and off, such as musical keyboards, LeapFrog® phonics radio (LeapFrog Enterprises, Inc., Emeryville, CA), and various V-tech electronic toys.

The general set-up was similar throughout sessions in the baseline and conjugate conditions. A circle 3.5 ft (1 m) in diameter was marked with gray tape in the corner of the therapy room, which was used to ensure treatment fidelity across therapists. Prior to each session, low preferred stimuli (e.g., bead toy, puzzles, markers, books) were arranged around the room outside of the marked circle and the most preferred items were removed and placed in an alternative treatment room. Stimuli that were not used for the purpose of the study were secured in cabinets. At the beginning of each session, the therapist lead the child to the 1:1 treatment room and delivered the initial instruction, “Come sit next to me.” The child could freely move around the room (e.g., walk around the room, look in the mirror) and engage with low preference stimuli. The therapist sat in the back edge of the circle and observed the child but did not say anything to the child throughout the session. After 15 min elapsed or the child engaged in an appropriate escape response (e.g., led therapist to the door), the therapist provided general praise (e.g., “Good job.”) and lead the child out of the 1:1 room to the next scheduled activity.
During baseline sessions, the child’s most preferred electronic toy was not available at any time. The therapist remained seated in the back edge of the circle throughout the session and observed the child. If the child entered the marked circle, the therapist did not give the child the most preferred toy nor socially interact (e.g., provide eye contact, speak) with the child in any way.

Prior to each session in the conjugate condition, an MSWO was conducted to determine the highest preferred item. Throughout the session, the therapist remained in a fixed location, seated inside the edge of the circle holding the child’s most preferred electronic toy and observed the child. The therapist turned the electronic toy (e.g., Leap Frog phonics radio) on and gave the child the toy when she entered the marked circle. As long as the child was sitting or standing in the marked circle, the toy remained on, and the child could manipulate the toy in any way (e.g., press buttons, turn the toy on and off, set the toy down). If the child stepped or crawled outside of the marked circle, the therapist removed the toy from the child’s hand and turned the toy off. Throughout the session, the child could move freely around the room and engage with other low preference items in the room, but the therapist only gave the child the most preferred toy if she was positioned within the circle.

Ulysses

Ulysses was chosen as a participant in the study due to a low number of approaches to peers and infrequent social interactions with peers. The child’s target response involved the child directly approaching the peer and sitting, crouching, or laying within 2 ft (.6 m) of peer, with over half of the body positioned within a 2 ft (.6 m) radius of peer without engaging in challenging behavior identified in the child’s individual programming. Non-examples included,
but were not limited to, the individual lying on the floor with head positioned outside of a 2 ft (.6 m) radius. Non-targeted responses included child social bids and peer social bids. Child social bids included the child looking at the peer or engaging in a vocal request to obtain an item or access an activity (e.g., “I want the phone.”), orienting head and eyes toward peer’s eyes, initiating or responding to joint attention with a peer, or attending to the peer (e.g., looking at what peer is engaged with). Peer social bids were defined as a peer looking at participant or engaging in a vocal request to obtain an item or access an activity (e.g., “Let’s watch a different one!”), orienting head and eyes toward participant’s eyes, initiating or responding to joint attention with the participant, initiating comments regarding the item the participant is engaged with (e.g., “That’s cool!”), or attending to the participant (e.g., looking at what child). Ulysses’ preferred items included physical play (e.g., tickles, spinning), watching videos on a phone, sandboxes, and swinging.

Session set-up remained consistent during baseline and conjugate sessions. All items in the school room were left in their respective locations. The therapist approached the child in the school room, gained eye contact with the child, pointed toward a peer, and said, “Go sit next to your friend.” The individual was free to move around the school room (e.g., walk around the room, look out the window) and engage with any toys. The therapist moved around the school room and observed the child but did not say anything or socially interact with the child. If the child attempted to engage in dangerous behavior (e.g., climbing on counter) or attempt to leave the school room, the therapist redirected the child away from the area by standing in front of the location without making eye contact or delivering instructions. The therapist provided general praise (e.g., “Good job”) at the end of the 15 min session or contingent upon appropriate escape responses (e.g., gestures toward door, requests to transition to alternative locations).
During baseline sessions, the therapist removed the child’s most preferred item (e.g., phone) from the school room. Hence, the child was not allowed to manipulate the phone at any time during the session. The therapist moved around the school room and observed the child. The child was allowed to interact with any items or people in the school room, but the therapist did not interact with the child at any time during the session. If the child approached a peer or remained in close proximity to a peer, the therapist did not give the child the phone nor deliver social praise (e.g., “Good job.”).

During the conjugate condition one peer was selected as the confederate for the purpose of the study. Throughout the session, the peer’s therapist prompted the confederate to remain in one area of the school room and engage with items in that area. The peer’s therapist also prompted initiations toward the participant when appropriate (e.g., peer asks therapist that the child turn on a specific video on the phone) and delivered praise contingent on initiations toward the participant. Throughout sessions in the conjugate condition, the child’s therapist held the child’s most preferred item (e.g., phone). After the initial instruction was delivered, the therapist moved around the school room and observed the child but did not say anything or socially interact with the child. When the child entered within 2 ft (.6 m) of the confederate, the therapist turned the phone on and handed it to the child. As long as the child remained within 2 ft (.6 m) of the peer, the child could manipulate the phone in any way (e.g., select various videos, set the item down, turn the volume up), and the therapist sat directly behind the child but did not socially interact with him. If the stood up from and left the 2 ft (.6 m) radius in which the peer was positioned, the therapist turned the phone off and removed the item from the child’s hands. The child was free to move around the school room and engage with other items in the school room throughout each session, but the child could only manipulate the item if positioned within 2
ft (.6 m) of the confederate peer. If the child requested the phone but was not engaged in the target response, the therapist delivered the initial instruction again and pointed toward the peer. At the end of the 15 min session, the phone was removed, and the child was transitioned to his next scheduled activity.

**Carl**

Carl was chosen to participate in the study due to gross motor deficits and family desire to have him ride a bicycle. The child’s target response was bike pedaling, which was defined as both of the child’s feet making contact with both bike pedals, moving in a clockwise direction. A non-example included, but was not limited to, the child’s feet making contact with both bike pedals and failing to move in a clockwise direction for longer than 1 s. Speed (in revolutions per min) was calculated during each session as a non-targeted measure by dividing the total number of revolutions by the total duration biked. One revolution was defined as the child’s feet making contact with both bike pedals, moving clockwise completing one 360 degree rotation from the starting point. Carl’s sessions took place in the PT gym. Carl selected ghost stories as his most preferred item prior to each conjugate session.

The initial set-up was consistent across all experimental sessions. All items in the PT gym were left in their typical locations. Prior to each session, the therapist told the child that he was going to practice riding bike and transitioned the child to the PT gym. Once the child sat on the seat of the bike, the therapist said, “It’s time to ride bike. Bike as long as you can as fast as you can.” The participant was given the opportunity to bike throughout the 15 min session. The session ended when the participant engaged in an appropriate escape response (e.g., “I’m all
done now”). At the end of the session, the therapist provided general praise (e.g., “Good job”) and transitioned the child to the next scheduled activity.

During baseline sessions, the therapist stood within approximately 5 ft (1.5m) of the bike and observed the child ride the bicycle, but did not speak to the child at any time during the session. If the child attempted to speak to the therapist, the therapist did not respond. The therapist did not tell ghost stories at any time during the session, regardless of whether the child was or was not biking.

During sessions in the conjugate session the therapist stood in front of the bicycle the child was sitting on. Throughout the session, the therapist observed the child’s feet on the bike pedals. When the child began biking, the therapist looked at the child, displayed positive affect, and began telling ghost stories. Ghost stories involved the child’s selection of characters (e.g., Mr. Joe) and setting (e.g., the woods). The ghost stories involved a series of suspenseful incidents, sound effects, and various facial expressions. The therapist continued to tell ghost stories as long as the child was biking. If the child stopped biking, the therapist looked down at the bike pedals, displayed neutral affect, and stopped telling the ghost story. When the child began biking again, the therapist looked at the child, displayed positive affect, and began telling the story from where the story left off. The participant was free to stop at any time and engage with other items in the PT gym, but the therapist only told ghost stories and looked at the child when he was engaging in the target response. If the child requested ghost stories when he was not biking, the therapist gestured toward the bike and said, “It’s time to ride the bike.”
RESULTS

Figure 2 displays results for minutes engaged in both the target response and non-targeted responses (e.g., frequency of approach, frequency of social bids toward peers, speed) across experimental sessions for each participant. During the baseline condition, each participant’s engagement in the target response remained low, with Max engaged in the target response for less than 8 s, Emily less than 1 min, Ulysses less than 15 s, and Carl less than 20 s. When the conjugate condition was introduced, engagement in the target response increased across all participants. Specifically, Max’s duration engaged in the target response increased, ranging from approximately 6.5 min to 14.5 min. Emily exhibited a sustained duration of engagement in the targeted response at nearly 15 min across sessions in the conjugate condition. Ulysses duration of engagement in the targeted response remained above 12 min, and Carl’s target response increased up to 3.5 min compared to baseline levels.

Implementation of the conjugate condition resulted in changes in additional, non-programmed responses across participants. During the baseline condition, Max approached the table one time. When the conjugate condition was introduced, the frequency of Max’s approaches to the lunch table increased to 11 in Sessions 2 and 4 and remained at 5 approaches or greater for the remainder of sessions. Emily engaged in 4 or fewer approaches to the therapist during baseline. The conjugate condition produced a variable number of approaches, initially increasing to 8 approaches in Session 4 and ranging from 4 to 9 approaches in Session 5–Session 9. Frequency of participant social bids during Ulysses’ baseline sessions remained at 3 social bids or fewer, and peer social bids remained low. When the target response was conjugately reinforced, participant social bids initially increased to 9, 8, and 9 in Session 6, 7, and 8 respectively and decreased to 2 or fewer in Sessions 9 and 10. Peers social bids increased,
ranging from 58 to 85 in the conjugate condition. Carl’s bike pedaling speed was variable in baseline, with an increasing trend from Sessions 4 to 7. Carl’s speed of bike pedaling exhibited a decreasing trend in the conjugate condition.
DISCUSSION

The current study extended previous research (Lindsley, 1969; McKirdy & Rovee, 1978; Siqueland & Lipsitt, 1966) by demonstrating the effectiveness of conjugate reinforcement across children, behaviors, and reinforcers in behavioral intervention and identified an additional intervention strategy in autism treatment. To enumerate, first the results indicate that delivering reinforcers on a conjugate schedule produced increases in the duration of various target responses (e.g., social skills, motor skills). Specifically, Emily’s duration of sitting or standing next to the therapist and Ulysses’ duration of sitting next to peers increased significantly when reinforced on a conjugate schedule. Likewise, Max sat at the lunch table for a longer durations, and Carl’s duration of bike pedaling, a targeted motor response in his daily programming, increased in duration when social reinforcers were delivered conjugately.

Second, the present study examined the effects of conjugate reinforcement in increasing target responses utilizing various reinforcers. Previous research on the application of conjugate schedules indicated that audible, visual, and social reinforcers were effective in increasing infant foot kicks and human motor responses (e.g., button press, stereotypic body movements, gross motor activity) (Lindsley, 1963; McKirdy & Rovee, 1978; Rapp et al., 2004; Switzky & Haywood, 1973; Voltaire et al., 2005). The current study extended this previous literature by using audio/visual, social, and tangible reinforcers to increase responding in applied practice with children with autism.

Third, implementation of a conjugate schedule resulted in increases in behavior related to the target response that were not directly programmed. To illustrate, prior to the conjugate condition, Ulysses’ social bids toward peers remained relatively low. Delivering iPhone© videos on a conjugate schedule to increase duration of sitting in close proximity of peers resulted in an
initial increase in participant social bids. Similarly, peer social bids were three or fewer in baseline, and increased substantially in the conjugate condition (e.g., 44 to 85 social bids). Peer social bids began to decrease in Session 8; however, it should be noted that they were still substantially higher than baseline sessions. A number of factors may have contributed to this decrease. Because the participant chose the same videos during each session, a reduction in peer interest in the stimulus may have resulted due to lack of variability in videos. Novel therapists responsible for facilitating and reinforcing the peer’s interactions with the participant may have also had an effect on the frequency of social bids. In Sessions 6 through 8, a more experienced therapist directed the peer’s initiations toward the participant and provided a denser schedule of reinforcement for peer interactions.

Similar effects were observed with Max’s frequency of approaches to the snack table in the conjugate condition. The frequency of approaches to the snack table increased with the introduction of the conjugate condition and decreased in the final two sessions. While Max approached the table less frequently during the last two sessions, he remained seated at the snack table for longer durations of time during each approach. Furthermore, the frequency of Emily’s approaches to the therapist remained variable, ranging from 4 to 9 approaches during the conjugate condition, which was greater than frequency of approaches in baseline. In contrast, Carl’s bike pedaling speed decreased in the conjugate condition while the duration of engaging in the targeted response increased. Moreover, the speed in which he pedaled decreased when bike pedaling was maintained on a conjugate schedule, but remained at a steady rate. This result might indicate that Carl was maximizing reinforcers.

The current study not only demonstrated the effectiveness of conjugate schedules, but also indicated that the procedures produced meaningful change in the clients’ lives based on
parent anecdotal reports. Following the completion of the study, debriefing meetings were scheduled with the participants’ parents to explain the procedures and results. Overall, the participants’ parents were interested in the study’s results and satisfied with the skills taught to their children. Carl’s mother in particular was especially impressed with the results due to the difficulties she had experienced trying to get him to ride a bicycle. She also emphasized the value of using of a social stimulus to increase bike riding as social reinforcers were something she could use in alternative settings to get Carl to ride his bike.

Overall, the results of the study suggest that implementing conjugate schedules, while effective, require careful consideration of response and reinforcer selection and delivery and an understanding of the conditions under which the schedule might be effective in applied practice. Specifically, one must consider the topography of the stimulus functioning as the reinforcer and the manner in which the reinforcer can be delivered and consumed. Because reinforcer delivery is occurring at the same time as the response, reinforcers that do not inhibit the participant from engaging in the target response must be selected. For instance, a reinforcer that is incompatible with the response, such as using audio/visual reinforcers to increase attending to academic tasks, may be ineffective when implemented conjugately.

One should also consider selecting reinforcers that will sustain performance and resist satiation for longer durations. That is, stimuli that can be implemented for longer durations of time continuously that are powerful enough to prevent the child from satiating quickly are imperative. Auditory and visual stimuli, such as music and light toys, are good possibilities, given that they function as reinforcers (McKirdy & Rovee, 1978; Morgan & Lindsley, 1966). For instance, Morgan and Lindsley (1966) indicated no satiation effects when delivering music conjugately for seven experimental hours.
The reinforcer that is selected should also be one that the therapist can easily manipulate. To ensure a conjugate schedule is implemented correctly, the therapist must turn the reinforcer “on” and “off” immediately as the child starts and stops responding. Hence, electronic stimuli and social reinforcers are highly amenable to precise control of onset and offset of reinforcer delivery.

Lindsley (1963) found that conjugate social reinforcers (e.g., favorable facial expressions) were effective in increasing responding. Lindsley (1956) also pointed out that conjugate social stimuli are more likely to resemble consequences found in the natural environment. Incorporating social reinforcers in intervention is critical due to social skill deficits and lack of social stimuli functioning as reinforcers being a marked characteristic in children diagnosed with autism. The result of the present study showed that utilizing social reinforcers in a conjugate schedule not only results in increases in the target response, but may also strengthen the reinforcing properties of social stimuli. This is a key component that warrants much attention when developing intervention strategies for children with autism.

An analysis of the types of responses that are more amenable to conjugate schedules is also necessary. Target responses that involve a collection of behaviors emitted continuously may be most applicable to conjugate schedules due to continuous response-reinforcer relations. Therefore, conjugate reinforcement may not be effective in increasing behavior that involves discrete responses (e.g., responding to math flashcards). Thus, responding measured in duration rather than frequency is expedient. Furthermore, conjugate reinforcement is beneficial for developing response classes without interrupting responding for reinforcer delivery. When teaching individuals to engage in a response for longer durations of time, delivering
reinforcement as the individual is engaging in the response may be more appropriate than disrupting the response to deliver the reinforcer.

The current study includes some limitations and suggestions for future research. First, reinforcer intensity and magnitude was not manipulated in the current study. Voltaire et al. (2005) indicated that a higher incidence of peak responding occurred under conjugate reinforcement (e.g., intensity was manipulated) compared to responding reinforced regardless of intensity (e.g., continuous reinforcement). Moreover, reinforcer intensity manipulations corresponding to intensity of response would have prevented reinforcer interruption altogether. The value of audible reinforcers, such as music, may increase when not interrupted. Had the volume of the audio/visual and social stimuli increased, higher rates of responding may have emerged. For example, increasing the volume or speed of the ghost stories contingent on higher speeds of bike pedaling and decreasing volume or speed with lower speeds of bike pedaling may have resulted in higher speed of bike pedaling.

Future research might also explore the effects of reinforcer variation on response rate. McKirdy and Rovee (1978) compared rate of infant footkicks when conjugately reinforced to non-contingent reinforcement involving the same duration of reinforcement, showing that conjugate reinforcement produced a higher rate of footkicks. Therefore, the authors suggested that reinforcer variation, specifically with respect to auditory-visual stimuli, might be a critical property of effective reinforcers and addresses individual differences in “optimal reinforcer value.” For instance, if the child had received a more intense stimulus (e.g., louder volume) when seated within 1 ft of the peer and a less intense stimulus (e.g., lower volume) when seated within 2 ft of the peer, the child may have remained in closer proximity to the peer for longer durations.
Third, while the study demonstrated that a conjugate schedule was effective in increasing all target responses, a comparison was not made between conjugate schedules and other forms of delivery, such as episodic schedules. However, because no previous investigation of conjugate reinforcement exists in relation to applied behavior analysis in autism treatment, a demonstration of the effectiveness of this particular type of reinforcer delivery was necessary before making comparisons to others methods. Future research should explore the relative effects and the conditions under which various reinforcer delivery methods are effective in increasing specific response topographies. This analysis would provide clinicians with additional information regarding the most efficient strategies to teach children with autism.

Similarly, the dimensions of behavior in the current study were limited to duration of engagement as the target measure, as well as frequency of approaches, social bids, and revolutions. Future research might include other response topographies as the target response.

Overall, the results of the study contribute to an understanding of reinforcement in application. Conjugate reinforcement was shown to be an effective tool in an ongoing autism treatment program. Conjugate reinforcement involves continuous response-reinforcer relations, continuously pairing the reinforcer with the response in a positive reinforcement framework. Implementing conjugate schedules may be a more natural teaching method when considering how it may map onto the environment (Lindsley, 1956, Lindsley, 1963). Lindsley (1956) indicated that conjugate schedules of reinforcement are the most prominent schedule in the natural environment, speculating that stimuli are continuously perceived on a gradient, resulting in gradual increases and decreases in stimulation that is directly related to the organism’s response patterns. For example, when two individuals engage in a conversation, the rate of one person’s talking may be directly proportional to the rate in which the other person makes eye
contact or displays certain facial expressions.

The current study provides a clear demonstration of the effects and utility of conjugate schedules of reinforcement in applied settings with children with autism. The study illustrates some of the conditions in which conjugate reinforcement is effective. It is important to recognize the generality of these findings across children, various reinforcing stimuli, and settings with several different interventionists implementing the procedures. While the present study provided a demonstration of a conjugate schedule in increasing behavior, the results indicate additional information regarding the engineering of this particular type of reinforcement schedule in applied experimental analysis. Notwithstanding, because reinforcement is one of our strongest tools in autism treatment, future research regarding the conditions in which specific reinforcer delivery methods are effective is warranted. An analysis of the contingencies in which it is most powerful and an understanding of the parameters of usefulness are worthy of further study.
### Table 1

**Participant Information**

<table>
<thead>
<tr>
<th>Child</th>
<th>Age &amp; Ethnicity</th>
<th>Diagnosis</th>
<th>Setting</th>
<th>Target Responses</th>
<th>Non-targeted measures</th>
<th>Reinforcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>5.8 years old, Ethiopian</td>
<td>Autism</td>
<td>Kitchen</td>
<td>Duration sitting at lunch table</td>
<td>Frequency of approaches to table</td>
<td>Books, V-tech toys</td>
</tr>
<tr>
<td>Emily</td>
<td>7.8-years old, Asian Caucasian</td>
<td>Autism, down syndrome, epilepsy</td>
<td>1:1 therapy room</td>
<td>Proximity to therapist</td>
<td>Frequency of approaches to therapist</td>
<td>Leap Frog phonics radio, electronic shape computer toy</td>
</tr>
<tr>
<td>Ulysses</td>
<td>5.5-years old, Middle Eastern</td>
<td>Autism, mixed receptive language disorder</td>
<td>School room</td>
<td>Proximity to peers</td>
<td>Child social bids; Peer social bids</td>
<td>Videos on phone (e.g., Tom &amp; Jerry, Mickey Mouse Clubhouse, Teletubbies)</td>
</tr>
<tr>
<td>Carl</td>
<td>5.7-years old, Caucasian</td>
<td>Presumptive PDD-NOS; chromosomal deletion</td>
<td>Physical therapy gym</td>
<td>Bike pedaling</td>
<td>Speed (revolutions per minute)</td>
<td>Ghost stories told by therapist</td>
</tr>
</tbody>
</table>

*Note. All participants were selected based on targeted programs in their individual programming.*
Table 2

Percent of Interobserver Agreement

<table>
<thead>
<tr>
<th>Child</th>
<th>Measure</th>
<th>Baseline</th>
<th>Conjugate</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max</td>
<td>Duration</td>
<td>-</td>
<td>82%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>-</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Emily</td>
<td>Duration</td>
<td>100%</td>
<td>100%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Ulysses</td>
<td>Duration</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Child Social Bids</td>
<td>100%</td>
<td>100%</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td>Peer Social Bids</td>
<td>100%</td>
<td>100%</td>
<td>88%</td>
</tr>
<tr>
<td>Carl</td>
<td>Duration</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>Speed</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>100%</td>
<td></td>
<td>95%</td>
</tr>
</tbody>
</table>

Figure 1. Mechner (1959) notation of episodic reinforcement delivery.
Figure 2. Duration of targeted response and non-targeted measures across participants.
APPENDIX A

INFORMED CONSENT FORM
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 a University and Community Treatment Program Designed to Address Disparities and Increase Quality Interventions in Autism

Investigator: Shahla Alai-Rosales, University of North Texas (UNT) Department of Behavior Analysis.

Purpose of the Study: You are being asked to give permission for information from your participation in the Easter Seals-North Texas Autism Treatment Program (ESATP) to be confidentially reported for educational and research purposes.

The purpose of this research study is report a series of case studies describing the ESATP program outcomes. Specifically, we will describe the social and political climate surrounding autism services that led to the creation of the ESATP. We will describe the implementation process (how interventions are developed within an scientific framework, how staff are trained to implement scientifically sound practices). We will also describe the program features (recruitment and intake procedures, family and staff demographics, the number of children and families served, and number and type of services offered) and the outcomes achieved to date (progress on treatment goals and standardized testing, staff performance, and parent and staff satisfaction with program procedures and results).

In the series of case studies, we will provide examples of staff, parent and child process and outcomes to illustrate the program design and success.

Study Procedures: We would like to review and analyze your data that were already collected as part of your involvement in the ESATP program. Your only time commitment for this new research project is the time it will take to go through the consent process that we are doing right now.

Foreseeable Risks: There are no foreseeable risks involved with participation in this study. No identifiable descriptions 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.

APPROVED BY THE UNT IRB
FROM 5/11/12 TO 5/20/13
Benefits to the Subjects or Others: There are no immediate benefits to you as the participants. It is possible that reporting the favorable outcomes of this program will 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 may provide other providers and universities resources for initiating similar programs designed to train students and contribute to the overall well-being of home communities.

Compensation for Participants: None

Procedures for Maintaining Confidentiality of Research Records:
No identifiable data will leave the ESATP site. ESATP staff will mask all ESATP records to maintain the confidentiality of the clients and staff. The investigators will only enter study data by groups and pseudonyms rather than by identifiable individual information. 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) 565-3940 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, 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 employment or enrollment at Easter Seals Autism Treatment Program.
- You understand why the study is being conducted and how it will be performed.

APPROVED BY THE UNT IRB
FROM 5/21/12 TO 5/30/13

Office of Research Services
University of North Texas
Last Updated: July 11, 2011

Page 2 of 3
• 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 Investigator or Designee:

I certify that I have reviewed the contents of this form with the subject 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  Date

APPROVED BY THE UNT IRB
FROM 5/21/12  TO 5/20/13

Office of Research Services
University of North Texas
Last Updated: July 11, 2011
APPENDIX B

THERAPIST INSTRUCTIONS
Conjugate Snack Time Sitting Protocol: Therapist Instructions for Max
(All sessions will take place in kitchen)

Target Response
Sitting: participant's buttocks are in contact with the seat of the chair when chair is positioned within 1 ft of the snack table without engaging in challenging behavior (e.g., crying, whining). The child can sit in any chair positioned within 1 ft of the snack table.

Baseline Condition
1. Place the child’s snack on the table and position a chair in front of the table.
2. Turn the camera on, and press record.
3. Place the paper indicating the session number and date in front of the camera for approximately 5 seconds.
4. Remove any stimuli from the participant’s hands upon entering the kitchen.
5. Gain eye contact with the participant and instruct the child, “It’s snack time. Go sit down in the chair.”
6. Stand in close proximity to the chair.
7. Throughout the 15 min probe, do not deliver tangible items or social praise at any time during the baseline condition, regardless of whether the participant is engaging in the target response or is not engaging in the target response.
8. Allow the child to move around the room.
9. If the child attempts to engage with the microwave or other appliances in the kitchen, redirect the child without making eye contact or engaging in vocal verbal behavior.
10. If the child engages in dangerous behavior (e.g., climbing on cabinets, eloping into adult physical therapy gym), block the child from engaging in the response, but do not provide social consequences (e.g., vocal feedback, eye contact).
11. If the child attempts to leave the lunch room, redirect the child inside without making eye contact with the child or engaging in vocal verbal behavior (e.g., “You need to go back inside and sit down.”)
12. Provide general praise (e.g., “Good job.”) and escape from the task at the end of the 15 min probe.
13. If the participant engages in any problem behavior identified in the child’s challenging behavior protocol or engages in an appropriate escape response (e.g., “I’m all done) before the 15 min probe elapses, end the session.

Conjugate Condition
1. Place the child’s snack on the table and position a chair in front of the table.
2. Turn on the camera located in the kitchen, and press record.
3. Place the paper indicating the session number and date in front of the camera for approximately 5 seconds.
4. Remove any stimuli from the participant’s hands upon entering the kitchen.

5. Gain eye contact with the participant, and instruct the child, “It’s lunch time. Go sit in the chair.”

6. Stand in close proximity to the chair.

7. Throughout the 15 min probe, deliver access to the most preferred tangible item (identified in the preference assessment) continuously (e.g., participant is able to hold item, look at item) as long as the participant is engaging in the target response.

8. When the participant is not engaging in the target response, do not deliver access to the tangible item (e.g., item is removed from participants hand and is turned off.)

9. Allow the child to move around the room.

10. If the child attempts to engage with the microwave or other appliances in the kitchen, redirect the child without making eye contact or engaging in vocal verbal behavior.

11. If the child engages in dangerous behavior (e.g., climbing on cabinets, eloping into adult physical therapy gym), block the child from engaging in the response, but do not provide social consequences.

12. If the child attempts to leave the lunch room, redirect the child inside without making eye contact with the child or engaging in vocal verbal behavior (e.g. “You need to go back inside and sit down.”)

13. If the child requests the item but is not sitting in the chair, say, “You can have this, but you have to sit in the chair” and gesture toward the chair.

14. Provide general praise (e.g., “Good job.”) and escape from the task at the end of the 15 min probe.

15. If the participant engages in any problem behavior identified in the child’s challenging behavior protocol or engages in an appropriate escape response (e.g., “I’m all done) before the 15 min probe elapses, end the session.
**Conjugate Proximity of Therapist Protocol: Therapist Instructions for Emily**
(All sessions will take place in 1:1 therapy room)

**Target Response**

*Proximity to Coach:* participant is sitting, standing, or laying in the designated circle. Over half of the individual's body must cross the plane of the circle. The individual is not engaging in challenging behavior (e.g., pinching, head-hitting). Non-examples include, but are not limited to lying on the floor with head and trunk of body positioned outside of the circle.

**Baseline Condition**
1. Arrange low preference stimuli (e.g., bead toy, flip toy, puzzle, markers/paper, and books) around the therapy room.
2. Remove any other stimuli that are not used for the purpose of the study, and lock the stimuli in the cabinets in the therapy room.
3. Tape a circle with a 3’6” diameter in the corner of the room near the bookshelf. Sit on the back edge of the circle with your back toward the wall.
4. Remain seated in the fixed location for the duration of the session.
5. Instruct the child, “Come sit next to me.”
6. Do not attend to the participant nor deliver tangible items at any time during the baseline condition, regardless of whether the participant is engaging or not engaging in the target task.
7. Provide general praise (e.g., “Good job.”) and escape from the task at the end of the 15 min probe.
8. If the participant engages in any problem behavior identified in the child’s challenging behavior protocol before the 15 min probe elapses, end the session.

**Conjugate Condition**
1. Arrange low preference stimuli (e.g., bead toy, flip toy, puzzle, markers/paper, and books) around the therapy room.
2. Remove any other stimuli that are not used for the purpose of the study, and lock the stimuli in the cabinets in the therapy room.
3. Tape a circle with a 3’6” diameter in the corner of the room near the bookshelf.
4. Sit on the back edge of the circle with your back toward the wall.
5. Place the most preferred item identified in the preference assessment in front of you. Keep the item close enough to you so that you are able to control turning it on and off.
6. Instruct the child, “Come sit next to me.”
7. Give the participant access to the tangible item (i.e., participant is allowed to hold/touch the tangible item) and keep the tangible item turned on as long as the participant engages in the target response (see definition).
8. If the participant stops engaging in the target response, immediately turn the tangible toy off and remove the item.

9. When the participant is not engaging in the target response, he or she is allowed to engage with the other low and medium preference items in the room, but do not grant access to the high preferred item if he or she is not engaging in the target response.

10. Provide general praise (e.g., “Good job.”) and escape from the task at the end of the 15 min probe.

11. If the participant engages in any challenging behavior identified in the child’s challenging behavior protocol before the 15 min probe elapses, end the session.
Conjugate Proximity to Peers Protocol: Therapist Instructions for Ulysses
(All sessions will take place in 1:1 therapy room)

**Target Response**
*Proximity to Peer:* participant directly approaches peer and remains within 2 ft of peer. Proximity of peer includes the participant sitting, crouching, or laying with over half of the body positioned within a 2 ft radius of peer without engaging in problem behavior.

**Baseline Condition**
1. Leave all items in the school room in their respective locations.
2. Take the child to the schoolroom.
3. Once the child is in the schoolroom, gain eye contact with the child and instruct the child, “Go sit next to your friend” and gesture toward a peer.
4. Do not deliver social praise nor deliver tangible items at any time during the baseline condition, regardless of whether the child is engaging or not engaging in the target task.
5. Allow the child to move around the school room and engage with any toys.
6. Provide general praise (e.g., “Good job.”) and escape from the task at the end of the 15 min probe.
7. If the child engages in any problem behavior identified in the child’s challenging behavior protocol before the 15 min probe elapses, prompt an appropriate escape response and end the session.
8. If the child attempts to engage in dangerous behavior (e.g., climbing on counter) or attempts to leave the school room, redirect the child without making eye contact or engaging in vocal verbal behavior.
9. If the child engages in an appropriate escape response (e.g., “I want to go to the ball gym) prior to 15 min elapsing, end the session.

**Conjugate Condition**
1. Conduct a short preference assessment prior to each session in the conjugate condition (see MSWO instructions for detailed procedures).
2. Leave all items in the school room in their respective locations and instruct the peer’s therapist to prompt the peer to remain in one location in the school room.
3. Locate the confederate peer used for all sessions in the conjugate condition.
4. Gain eye contact with the child and instruct the child, “Go sit next to your friend” and gesture toward a peer.
5. Give the child access to his most preferred item (identified in the MSWO) as long as the child engages in the target response (see definition above).
6. If the child retreats from peer and fails to remain within 2 ft of peer, remove the preferred item and turn it off.
7. If the child requests the preferred item but is not sitting, crouching, or laying within 2 ft of peer, gesture toward the peer and deliver the initial instruction, “Go sit by your friend” again.

8. Allow the child to move around the school room and engage with any toys.

9. Provide general praise (e.g., “Good job.”) and escape from the task at the end of the 15 min probe.

10. If the child engages in any problem behavior identified in the child’s challenging behavior protocol before the 15 min probe elapses, prompt an appropriate escape response and end the session.

11. If the child attempts to engage in dangerous behavior (e.g., climbing on counter) or attempts to leave the school room, redirect the child without making eye contact or engaging in vocal verbal behavior.

12. If the child engages in an appropriate escape response (e.g., “I want to go to the ball gym) prior to 15 min elapsing, end the session.
**Conjugate Bike Protocol: Therapist Instructions for Carl**
(All sessions will take place in the PT gym)

**Target Response**
*Bike pedaling*: both of the individual’s feet are making contact with both bike pedals, moving in a clockwise direction.

**Baseline Condition**
1. Remove any reinforcers that the participant has in his or her hands.
2. Tell him/her that it’s time to ride the bike.
3. Instruct the participant, “Bike as long as you can as fast as you can.”
4. Start the timer after you deliver the instruction. The timer will keep track of the duration of the probe (i.e., 15 minutes or to termination criteria).
5. Give the participant an opportunity to bike throughout the 15 min probe, stopping and starting as many times as the participant wants.
6. Provide general praise (e.g., “Good.”) and escape from the task at the end of the 15 min probe.
7. If the participant appropriately requests to be done (e.g., “I’m all done.”) before the 15 min probe elapses or if the participant engages in any problem behavior identified in the child’s challenging behavior protocol, prompt an appropriate escape response and end the session.

**Conjugate Condition**
1. Remove any reinforcers that the participant has in his or her hands.
2. Tell him/her that it’s time to ride the bike.
3. Instruct the participant, “Bike as long as you can as fast as you can.”
4. Start the timer after you deliver the instruction. The timer will keep track of the duration of the probe (i.e., 15 minutes or to termination criteria).
5. When the participant engages in the target response (i.e., bike pedaling), start telling the ghost story.
6. Continue to tell the ghost story as long as the participant continues to engage in the target response.
7. If the participant stops engaging in the target response, stop telling the ghost story.
8. Start telling the ghost story once the participant begins engaging in the target response again.
9. Continue this procedure for the entire duration of the 15 min probe.
10. Give the participant the opportunity to start and stop as many times as he likes throughout the 15 min.
11. At the end of the 15 min probe, provide general praise (e.g., “Good.”) and allow escape from the task.

12. If the participant requests ghost stories but is not engaging in the target response, gesture toward the bicycle or instruct the participant one time that he or she must engage in the target response to access the reinforcer.

13. If the participant appropriately requests to be done (e.g., I’m all done.”) before the 15 min probe elapses or if the participant engages in any problem behavior identified in his or her challenging behavior protocol, prompt an appropriate escape response and end the session.

Multiple Stimulus Preference Assessment: Therapist Instructions

**All preference assessments will take place in the child’s assigned individual therapy room that day or school room, if assigned.

**A preference assessment will be conducted prior to each session in the conjugate condition.

** The stimulus with the highest duration of engagement and rank will be used as in the conjugate condition.

Procedure

1. Place the child’s preferred items (identified by coaches on his team that day) around the room or on the table in the school room.

2. Keep all toys currently in the room in their respective locations.

3. Deliver the instruction, “Pick a toy to play with.”

4. After the child selects a toy, give the participant 15 sec access to the selected toy (e.g., books).

5. Give the child the option to choose any stimulus in the room.

6. If the child fails to respond, requests an extraneous reinforcer, or requests a toy that is not available, repeat the instruction.

7. If the child fails to respond, requests an extraneous reinforcer, or requests a toy that is not available a second consecutive time, terminate the assessment.

8. If the child walks away from the toy he chooses before the 15 sec access has elapsed, record the duration of engagement with the stimulus on the data sheet, place the toy outside of the room, and deliver the initial instruction, “pick a toy to play with,” again.

9. Allow the child to engage with the toy she/he selects until the 15 sec elapses.

10. After 15 sec elapses, place the toy outside of the room, and repeat the initial instruction, “Pick a toy to play with.”

11. The stimulus with the highest rank AND engagement duration will be used in the conjugate session. For example, if the child chooses the book first and engages with the book for 3 s and chooses the v-tech computer second and engages with the computer for 15 s, the v-tech computer is used in the conjugate session.

12. If the child does not choose any toy in the room, gather alternative toys, and conduct the preference assessment again.
Application of Conjugate Schedules of Reinforcement Scoring Instructions

Data Sheet Overview

- **Primary Measure: Minutes Engaged**
  - Duration of Bike Pedaling
  - Duration of Proximity of Therapist
  - Duration of Sitting at Snack Table
  - Duration of Proximity of Peer

- **Non-targeted Measures**
  - Speed of Bike Pedaling (revolutions per minute)
  - Frequency of Approaches to Coach
  - Frequency of Approaches to Lunch Table
  - Frequency of Participant Social Bids
  - Frequency of Child Social Bids

**General Scoring Instructions:**
1. Turn to the section of the binder that you will be scoring (e.g., engagement, rate, affect).
2. Read the detailed set of instructions located before each section of data sheets. Read the definition for the target response closely before coding any videos.
3. Find the video located on the Mac Computer in the autism lab.
4. Click on “fcplab” → documents → Steph. Select the participant and session number you are going to score.
5. Videos are categorized by participant initials and session number.
6. Find the specific data sheet required to score, and fill in the data sheet with your name, date, session number, and participant.
7. After scoring, record your initials and date in the video tracking form located in the front of the binder.
8. Contact the primary investigator of the study with any questions.

THANK YOU!
Scoring Instructions-Conjugate Snack Time Sitting Protocol: Max

**Targeted Response**

*Sitting at lunch table (target response in duration)*: participant's buttocks are in contact with the seat of the chair when chair is positioned within 1 ft of the snack table without engaging in challenging behavior (e.g., crying, whining). The child can sit in any chair positioned within 1 ft of the snack table.

**Instructions for Sitting at Lunch Table**

1. Gather data sheets and necessary materials to code sessions (e.g., data sheet, timer, pencil).
2. Select the video located on the lab computer.
3. After the therapist delivers the initial instruction, “It’s time for snack. Go sit down,” record duration of proximity to coach until 15 min elapses or the participant engages in an appropriate escape response (e.g., “I’m all done.”)
4. Record start and stop times throughout the 15 min session when the participant begins engagement in the target response and ends engagement in the target response.
5. When the participant begins engaging in the target response, record the start time (e.g., 1:06; 5:01)
6. When the participant stops engaging in the target response, record the end time (e.g., 1:20; 5:20)
7. Several start/stop times may occur within the 15 min session
8. At the end of the 15 min session, calculate the duration of responding for each start/stop time (e.g., 14s; 19s)
9. After calculating the duration of responding for each start/stop time, calculate the total duration of responding across the session.
10. Record the total duration of engagement in the corresponding blank at the bottom of the data sheet.

**Non-targeted Measure**

*Approach (frequency)*: participant walks directly toward or stands up from chair and sits down in any chair positioned next to the lunch table. Each time the child retreats or stands up from the chair and sits back down is scored as one instance of approach.

**Instructions for Approach**

1. Gather data sheets and necessary materials to code sessions (e.g., data sheet, pencil).
2. Select the video on the lab computer.
3. After the therapist delivers the initial instruction, “It’s time for snack. Go sit down,” record the frequency of approaches until 15 min elapses or the participant engages in an appropriate escape response (e.g., “I’m all done.”)
4. Each time the participant engages in an approach, score one tally on the data sheet.
5. At the end of the 15 min session, calculate the total number of approaches throughout the 15 min.
6. Record the total number of approaches in the corresponding blank at the bottom of the data sheet.

Scoring Instructions-Proximity of Coach Protocol: Emily

Targeted Response

Proximity of Coach (target response in duration): participant is sitting, standing, or laying in the designated circle. Over half of the individual's body must cross the plane of the circle. The individual is not engaging in challenging behavior (e.g., pinching, head-hitting). Non-examples include, but are not limited to lying on the floor with head and body trunk positioned outside of the circle.

Instructions for Proximity of Coach

1. Gather data sheets and necessary materials to code probes (e.g., data sheet, timer, pencil)
2. Select the video located on the lab computer
3. After the therapist delivers the initial instruction, “Come sit next to me,” record duration of proximity to coach until 15 min elapses or the participant engages in an appropriate escape response (e.g., “I’m all done.”)
4. Record start and stop times throughout the 15 min session when the participant begins engagement in the target response and ends engagement in the target response.
5. When the participant begins engaging in the target response, record the start time (e.g., 1:06; 5:01)
6. When the participant stops engaging in the target response, record the end time (e.g., 1:20; 5:20)
7. Several start/stop times may occur within the 15 min session
8. At the end of the 15 min session, calculate the duration of responding for each start/stop time (e.g., 14s; 19s)
9. After calculating the duration of responding for each start/stop time, calculate the total duration of responding across the session.
10. Record the total duration of engagement in the corresponding blank at the bottom of the data sheet.

Non-targeted Measure

Approach (frequency): the participant enters the circle the coach is positioned in. Each time the child leaves the circle and enters again is scored as one instance of approach.
Instructions for Approach
1. Gather data sheets and necessary materials to code sessions (e.g., data sheet, pencil).
2. Select the video on the lab computer.
3. After the therapist delivers the initial instruction, “Come sit next to me,” record the frequency of approaches until 15 min elapses or the participant engages in an appropriate escape response (e.g., “I’m all done.”)
4. Each time the participant engages in an approach, score one tally on the data sheet.
5. At the end of the 15 min session, calculate the total number of approaches throughout the 15 min.
6. Record the total number of approaches in the corresponding blank at the bottom of the data sheet.

Scoring Instructions-Proximity of Peer Protocol: Ulysses

Target Response

Proximity of Peer (target response in duration): participant directly approaches a peer and remains within 2 ft of peer. The individual is sitting, standing, or laying, and over half of the individual's body is positioned within a 2 ft radius. The individual is not engaging in problem behavior.

Instructions for Proximity of Peer
1. Gather data sheets and necessary materials to code sessions (e.g., data sheet, timer, pencil)
2. Select the video located on the lab computer
3. After the therapist delivers the initial instruction, “Go sit by your friends,” record duration of proximity to coach until 15 min elapses or the participant engages in an appropriate escape response (e.g., “I’m all done.”)
4. Record start and stop times throughout the 15 min session when the participant begins engagement in the target response and ends engagement in the target response.
5. When the participant begins engaging in the target response, record the start time (e.g. 1:06; 5:01)
6. When the participant stops engaging in the target response, record the end time (e.g., 1:20; 5:20)
7. Several start/stop times may occur within the 15 min session
8. At the end of the 15 min session, calculate the duration of responding for each start/stop time (e.g., 14s; 19s)
9. After calculating the duration of responding for each start/stop time, calculate the total duration of responding across the session.
10. Record the total duration of engagement in the corresponding blank at the bottom of the data sheet.

**Non-targeted Measure**

**Peer social bids (toward participant) (in frequency):** peer looks at participant or engages in a vocal request to obtain an item or access an activity (e.g., "Let's watch a different one!"), peer orients head and eyes toward participant's eyes, initiates/responds to joint attention with participant (e.g., looks at item and looks back at participant), or initiates comments regarding item participant is engaged with (e.g., "That's cool!"), or attending to participant (e.g., looks at them or looks at what they are engaged with).

**Child Social Bids (toward peer) (in frequency):** participant looks at peer or engages in a vocal request to obtain an item/activity, participant orients head/eyes toward peer's eyes, initiates/responds to joint attention with peer, or initiates comments regarding item peer is engaged with (e.g., "That's cool!"), or attends to peer.

**Instructions for Peer and Child Social Bids**

1. Gather data sheets and necessary materials to code sessions (e.g., data sheet, pencil).
2. Select the video on the lab computer.
3. After the therapist delivers the initial instruction, “Go sit by your friends,” record the frequency of initiations to peers until 15 min elapses or the participant engages in an appropriate escape response (e.g., “I’m all done.”)
4. Record the number of peer and child social bids in the corresponding blanks during each 10 s interval.
5. At the end of the 15 min session, calculate the total number of social bids throughout the 15 min.
6. Record the total number of social bids in the at the bottom of the data sheet.

Scoring Instructions-Conjugate Bike Protocol: Carl

**Targeted Response**

**Bike pedaling (target response in duration):** both of participant’s feet are making contact with both bike pedals, moving in a clockwise direction. Non-example includes the participant’s feet making contact with both bike pedals and failing to move in a clockwise direction for longer than 1 s.

**Instructions for Measuring Bike Pedaling**

1. Gather data sheets and necessary materials to code probes (e.g., data sheet, timer, pencil)
2. Select the video located on the lab computer
3. After the therapist delivers the initial instruction, “It’s time to ride the bike. Bike as long as you can as fast as you can,” record duration of bike pedaling until 15 min elapses or the participant engages in an appropriate escape response (e.g., “I’m all done.”)

4. Record start and stop times throughout the 15 min session when the participant begins engagement in the target response and ends engagement in the target response.

5. When the participant begins engaging in the target response, record the start time (e.g., 1:06; 5:01)

6. When the participant stops engaging in the target response, record the end time (e.g., 1:20; 5:20)

7. Several start/stop times may occur within the 15 min session

8. At the end of the 15 min session, calculate the duration of responding for each start/stop time (e.g., 14s; 19s)

9. After calculating the duration of responding for each start/stop time, calculate the total duration of responding across the session.

10. Record the total duration of engagement in the corresponding blank at the bottom of the data sheet.

**Non-targeted Measure**

*Bike Revolution:* participant’s feet are making contact with both bike pedals, moving clockwise completing one 360 degree rotation from the starting position.

**Instructions for Measuring Rate (Revolutions per Minute-frequency)**

1. Gather data sheets and necessary materials to code sessions (e.g., data sheet, counter, pencil, timer).

2. Start the timer immediately after the therapist delivers the initial instruction, “It’s time to ride bike. Bike as long as you can as fast as you can.”

3. The timer will remain running for the entire duration of the session (i.e., 15 min) or until the participant engages in an appropriate escape response.

4. After the initial instruction is delivered, count each bike revolution on the counter (e.g., the counter advances for each bike revolution) based on the participant’s starting position.

5. At the end of the session (i.e., 15 min or when participant emits an appropriate escape response), record the total number of revolutions throughout the session in the corresponding blank on the data sheet.

6. Calculate revolutions per minute by diving the total number of revolutions by the total duration of engagement in the target response.

7. Record the revolutions per minute in on the corresponding blank on the bottom of the data sheet.
APPENDIX D

DATASHEETS
Name: ____________________________
Participant: Max
Circle: Primary or Reliability

Measures

**Sitting at snack table:** participant’s buttocks are in contact with the seat of the chair when chair is positioned within 1 ft of the snack table without engaging in challenging behavior (e.g., crying, whining). The child can sit in any chair positioned within 1 ft of the snack table.

**Approach:** participant walks directly toward or stands up from chair and sits down in any chair positioned next to the snack table. Each time the child retreats or stands up from the chair and sits back down is scored as one instance of approach.

<table>
<thead>
<tr>
<th>Date/Session</th>
<th>Start Time</th>
<th>Stop Time</th>
<th>Duration</th>
<th>Frequency of Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTALS:**
Name: 
Participant: Emily
Circle: Primary or Reliability

Measures
Proximity of Therapist: participant is sitting, standing, or laying in the designated circle. Over half of the individual’s body must cross the plane of the circle. The individual is not engaging in challenging behavior (e.g., pinching, head-hitting). Non-examples include, but are not limited to lying on the floor with head and trunk of body positioned outside of the circle.

Approach: the child enters the circle the therapist is positioned in. Each time the child leaves the circle and enters the circle again is scored as one instance of approach.

<table>
<thead>
<tr>
<th>Date/Session</th>
<th>Start Time</th>
<th>Stop Time</th>
<th>Duration</th>
<th>Frequency of Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTALS:
Name: 
Participant: Ulysses
Circle: Primary or Reliability

Measures
Proximity of Peer: participant directly approaches peer and remains within 2 ft of peer. Proximity of peer includes the participant sitting, crouching, or laying with over half of the body positioned within a 2 ft radius of peer without engaging in problem behavior.

Peer social bids (toward participant): peer looks at participant or engages in a vocal request to obtain an item or access an activity (e.g., "Let’s watch a different one!"). peer orients head and eyes toward participant’s eyes, initiates/responds to joint attention with participant (e.g., looks at item and looks back at participant), or initiates comments regarding item participant is engaged with (e.g., "That’s cool!"), or attending to participant (e.g., looks at them or looks at what they are engaged with)

Child Social Bids (toward peer): participant looks at peer or engages in a vocal request to obtain an item/activity, participant orients head/eyes toward peer’s eyes, initiates/responds to joint attention with peer, or initiates comments regarding item peer is engaged with (e.g., "That’s cool!"), or attends to peer.

<table>
<thead>
<tr>
<th>Date/Session</th>
<th>Start Time</th>
<th>Stop Time</th>
<th>Duration</th>
<th>Social Bid toward peer</th>
<th>Social Bid toward participant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTALS:
Name: _______________    Participant/Session #: __________________

Participant:  Carl

Circle: Primary or Reliability

**Measures**

*Bike Pedaling*: both of participant’s feet are making contact with both bike pedals, moving in a clockwise direction. Nonexample: participant’s feet are making contact with both bike pedals and failing to move in a clockwise direction for longer than 1 s.

*Revolution*: participant’s feet are making contact with both bike pedals, moving clockwise completing one 360 degree rotation from the starting point.

<table>
<thead>
<tr>
<th>Date/Session</th>
<th>Start Time</th>
<th>Stop Time</th>
<th>Duration</th>
<th>Revolutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTALS:**

**RPM:**

Name: _______________    Participant/Session #:  Ulysses
<table>
<thead>
<tr>
<th>Min</th>
<th>Social Initiation</th>
<th>0-15 sec</th>
<th>16-30 sec</th>
<th>31-45 sec</th>
<th>46-59 sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00-1:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:00-2:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00-3:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00-4:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00-5:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00-6:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:00-7:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7:00-8:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00-9:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00-10:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min</td>
<td>Social Initiation</td>
<td>0-15 sec</td>
<td>16:30 sec</td>
<td>31-45 sec</td>
<td>46-59 sec</td>
</tr>
<tr>
<td>-----------</td>
<td>-------------------</td>
<td>----------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>11:00-12:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:00-13:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:00-14:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:00-15:00</td>
<td>Social Bid to Peer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social Bid to Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Multiple Stimulus Without Replacement Preference Assessment**

Child: ________________
Coach: ________________
Date: ________________

<table>
<thead>
<tr>
<th>Name of Stimulus</th>
<th>Stimulus Rank</th>
<th>Duration engaged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
REFERENCES


