A Modified Azrin and Foxx Rapid Toilet Training Protocol for Children With Autism Spectrum Disorder

Thesis

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By

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Abstract

Toilet training is an important milestone for children and parents for several reasons, including but not limited to, independence, safety concerns, and social acceptance (Cicero & Pfadt, 2002; Hyams, MaCoull, Smith, & Tyler, 1992; Lott & Kroeger, 2004; McCartney, 1990). Toilet training individuals with disabilities can be difficult for several reasons, and many children with developmental disabilities require systematic training to acquire independent toileting skills (Burgio & Burgio, 1989; McCartney, 1990). Although toilet training individuals with developmental disabilities is one of the most frequently researched self-help skills, limited studies have reported success in toilet training individuals with autism spectrum disorders (ASD; Keen, Brannigan, & Cuskelly, 2007; Konarski & Diorio, 1985). Kroeger and Sorensen (2010) suggest an additional need for research on toilet training given the increase of ASD diagnoses. This study examined the effects of an intensive 2-day potty training protocol with 3 children with ASD. The results suggest this protocol was not successful with 2 of the 3 participants.

Dedicated to my clients and clients' families. You are my passion to go to work everyday and inspiration through this study.

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Fields of Study

Major Field: Educational Studies

Area of Specialization: Special Education- Applied Behavior Analysis

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CHAPTER 1

Introduction

Toilet training is a critical skill that is associated with self-confidence, independence, hygiene, safety, lower risk of abuse, and access to inclusive day care and school settings. Individuals who are not competently toilet trained may lack of self-confidence and experience exclusion from daily activities, such as community outings and play dates (Cicero & Pfadt, 2002; Lott & Kroeger, 2004). For older children lack of potty training can be a barrier to inclusive school settings, regular daycare settings, etc. Teacher/ staff attitudes (e.g., resentment) when children are granted access to inclusive settings without being toilet training is a problem. Caregivers of children with developmental disabilities seek to have their child toilet trained for several reasons, including cost (Schonwald, 2009), safety concerns (e.g., a possibility of being abused) and practical concerns (Chung, 2007).

"The economic and environmental costs of incontinence are also substantial" (Brown & Peace, 2011; p. 321). Brown and Peace explain that pull-ups (which are often non-biodegradable) are worn, changed, and disposed of several times a day which adds thousands of dollars of expenses over the years. Additionally, child incontinence introduces several health and safety concerns, such as diarrhea and hepatitis (Luxem & Christophersen, 1994). Children who are not toilet trained also face more hygiene issues

(e.g., not being changed at an appropriate time). Further, when they are changed, they have the possibility of being abused (Chung, 2007). Additional practical concerns parents have included not being able to find staff to work with their child and helping to find them a job placement and place to live (Chung, 2007).

Children require systematic training to acquire independent toileting skills (Burgio & Burgio, 1989; McCartney, 1990), but children with developmental disabilities may require more structure and reinforcement to increase their intrinsic motivation. Individuals with developmental disabilities are capable of acquiring skills that typical children have, but at a much slower rate (Schonwald, 2009). For example, individuals with developmental disabilities require an average of 1.6 additional years of toilet training to achieve competence (Chung, 2007). The effect that this has on toilet training is that this skill develops later in life. Typically developing children have generally mastered daytime toilet training by age 4 (Keen, Branningan, & Cuskelly, 2007). When considering implementing a toilet training procedure, it is important to determine the cognitive and verbal skills of the child, as those can be associated with the length of toilet training individuals with autism spectrum disorder (ASD; Dalrymple & Ruble, 1992). In addition, children with developmental disabilities struggle with complex directions and may benefit from toilet training instruction broken into smaller parts (Schonwald, 2009).

Although toilet training is a challenge for many children with developmental disabilities, children with Autism Spectrum Disorder (ASD) may face some unique challenges that have not been well studied. Although toilet training individuals with developmental disabilities is a frequently researched self-help skill, limited studies have

reported success in toilet training individuals with ASD due to the lack of replication (Keen, Brannigan, & Cuskelly, 2007; Konarski & Diorio, 1985). Kroeger and Sorensen (2010) suggest an additional need for research on toilet training given the increase of ASD diagnoses Autism Speaks states the prevalence of ASD has risen to 1 in 68 births (Autism Speaks Inc., 2015). Researchers have found that once children with ASD are toilet trained, they may have a hard time generalizing these skills across settings and environments or transferring stimulus control (i.e., urinate only when they are wearing a diaper) due to fear and anxiety associated with voiding in the toilet (Luiselli, 1997).

Prerequisite skills are needed prior to implementing a toilet training protocol (Keen, Branningan, & Cuskelly, 2007). Smith (1979) states that an individual needs to practice bladder control in order to be independently toilet trained. Keen, Branningan, and Cuskelly (2007) defined bladder control as being able to recognize the need for toileting and holding your urine before eliminating. The rationale used was that normal toileting is not simply a matter of learning to respond to bladder and bowel pressures and sensations, but rather is a social learning process that has been hindered by being institutionalized and not learning to cope with those feelings (Azrin & Foxx, 1971). Two goals must be met in order to competently toilet train an individual: (a) continence, where an individual must be able to recognize the sensation for elimination and (b) mastery of the entire chain of behaviors accompanying a toilet visit (i.e., going to the bathroom, turning light on, pulling pants down, pulling underwear down, sitting on toilet, standing up, pulling underwear up, pulling pants up, and washing hands) (Kroeger & Sorenson-Burnworth, 2009).

Additionally, Schonwald (2009) suggests that a child must master several skills to be competently toilet trained including being aware of when urine and/or feces are coming, having the ability to hold the urine and/or feces in, communicating when they need to eliminate, relaxing while sitting on the toilet, being aware of how to empty the bladder or stool, wiping, and pulling pants down and then back up. Although children with disabilities have to learn all these skills, the protocols used to toilet train individuals with ASD and other developmental disabilities are inconsistent about when they introduce these skills. Toilet training children with ASD can be difficult because of the child not meeting developmental milestones and symptoms specific to autism (e.g., GI problems, communicating, transitions) (Schonwald, 2009). There isn't a clear order in which these skills should be taught.

Researches have used 6 different approaches, including video priming and modeling, graduate guidance, reinforcement-based training, scheduled sits, punishment procedures, and increased fluid intake. Bainbridge and Myles (1999) used priming to toilet train a 3-year-old boy with ASD. Kroeger and Sorenson-Burnworth (2009) defined priming as providing information to the participant before they are required to perform the activity to increase the likelihood the behavior will be completed successfully. Bainbridge and Myles (1999) used a toilet training video, which resulted in an increase of initiations and successful voids in the toilet, as well as a decrease in accidents. Keen, Branningan, and Cuskelly (2007) investigated if video modeling would be an effective tool to toilet train individuals with ASD across various settings. Results showed increased continence for the participants who watched the video as compared to those who did not.

Another method use in toilet training individuals with ASD is graduated guidance (e.g., Azrin & Foxx, 1971; LeBlanc, Carr, Crossett, Bennett, & Detweiler, 2005; Van Wagenen et al., 1969). Kroeger and Sorensen-Burnworth (2009) describe graduated guidance as one of the most commonly used components in toilet training protocols. Azrin and Foxx's (1971) most commonly used protocol, Rapid Toilet Training (RTT) consists of graduated guidance, in which prompts are increased and faded as necessary during training.

Reinforcement-based training is another component that several studies utilize during toilet training (e.g., Azrin & Foxx, 1971; Cicero & Pfadt, 2002). Chung (2007) used reinforcement-based training as one of the components in his protocol to toilet train a 12-year-old-boy with developmental disabilities, providing him with reinforcement contingent upon a successful void in the toilet. Results showed an increase of successful voids in the toilet that generalized across environments.

Another common procedure used when toilet training individuals with ASD is scheduled sits (Bainbridge & Myles, 1999; LeBlanc et al., 2005; Luiselli, 1997). Kroeger and Sorensen (2010) used scheduled sits with two boys diagnosed with ASD in which the boys were taken to the toilet on a schedule and reinforced when they successfully voided into the toilet. The protocol was implemented in the participant's homes using a parent training method. Results indicated that one of the participants was competently toilet trained by the end of day 10 and the other the end of day 5. Smith (1979) compared implementing a toilet training protocol with a predetermined elimination-likely schedule

finding to a non-predetermined time schedule and found predetermined times were easier to implement. However, one did not have success over the other.

Punishment procedures have also been used in a number of studies for individuals with developmental disabilities (e.g., Azrin & Foxx, 1971; Lott & Kroeger, 2004). The most common punishment procedure used when toilet training is overcorrection. Overcorrection is defined as walking the individual from the spot of the accident to the toilet a predetermined set of times. Azrin & Foxx (1971) suggest overcorrection is aligned with rapid skill acquisition. Cicero and Pfadt (2002) questioned the use of using punishment procedures to toilet train individuals with ASD. Currently, the most common punishment procedures used in toilet training protocols are contingent on accidents (i.e., positive practice). LeBlanc et al. (2005) defined positive practice as repeatedly performing only the appropriate behaviors after an accident occurred.

Increasing fluid intake is another common procedure used in toilet training to increase the likelihood the individual will void (Azrin & Foxx, 1971; Cicero & Pfadt, 2002; Kroeger & Sorensen, 2010). "Providing free access to liquids and promoting hydration prior to the scheduled sitting increases the likelihood of urinary voiding, as well as contingent reinforcement for elimination," (pg. 613; Kroeger & Sorensen-Burnworth, 2009). Research suggests increasing fluids during toilet training, especially in conjunction with scheduled sits (Kroeger & Sorensen-Burnworth, 2009).

Although several features are common throughout various protocols used to toilet train individuals with ASD, little research has been done using more intensive, short-term protocols that combine several of these characteristics. Previous studies used a less-

intensive (e.g., school hours) protocol that was in place until the participants are toilet trained (between 4 days and 10 months). Studies suggested future researchers use a more rapid approach. If the amount of time to toilet train a child with ASD could be reduced, then the amount of time that child could be learning other important skills (e.g., academics) could be increased (Cocchiola et al., 2012). Cocchiola et al. went on to suggest that future research should attempt to determine the impact that toilet training has on the individual's academic and learning (Cocchiola et al., 2012).

Recently, toilet training individuals with ASD and other developmental disabilities has been a priority among researchers. Toilet training for individuals with ASD has been difficult due to effort and length of time needed to teach the skill (Keen, Branningan, & Cuskelly, 2007). Therefore, the purpose of this study was to determine if children with ASD could be toilet trained in 2 days using an intensive reinforcement-based protocol.

CHAPTER 2

Method

Participants

Three children participated in this study. To qualify, the children had to meet the following criteria: (a) be between 3 and 8 years old, (b) have a diagnosis of autism spectrum disorder, (c) have parental consent, (d) have medical clearance from a pediatrician, and (e) have not been successfully potty trained by parents. All three participants were recruited from a local clinical psychologist's office. Parents were selected from a list of those clients wishing to receive assistance toilet training their child and had expressed interest in using an intensive toilet training procedure.

Robert was a 7-year-old boy diagnosed with Autism Spectrum Disorder who was non-verbal and had significant developmental delays. He also had a co-morbid sleep disorder that required medication as needed for night awakening. Robert utilized an augmentative and alternative communication device (AAC) to help express his wants. At the time of the study, Robert had four preferred buttons on his device (i.e., eat, bubbles, iPad, and more), and bathroom was added to the device for use during this study. The results from the Autism Diagnostic Observation Schedule-2nd Edition (ADOS-2) (Lord et al., 2000) indicated an overall score of 24, which is above the autism cut-off score of 16 (for a child with few to no words). Finally, the results from the ADOS-2 Comparison

Score (using age and overall score) was 8, indicating a high level of autism spectrum-related symptoms. He demonstrated significant delays in cognitive skills, expressive and receptive language, play/leisure skills, and adaptive functioning. Prior to intervention, Robert wore diapers throughout the day and was only taken to the bathroom when he was soiled. Previous attempts using non-contingent scheduled sits to toilet train Robert were not successful.

Peter was a 7-year-old boy diagnosed with Autism Spectrum Disorder and cerebral palsy. He had severe deficits in receptive, expressive, and pragmatic language; and motor, communication, and academic skills. The Bayley Scales of Infant and Toddler Development (Bayley, 2005) results indicate that his cognitive skills were equal to 4 months, receptive communication was less than 16 days, expressive communication was 6 months, fine motor 6 months, and gross motor was 11 months. Given Autism-specific measurement tools, including observation and play-based assessment and parent and teacher rating scales, results were supportive of a high level of autism symptoms. At the time of the study, Peter utilized a speech-generating device (SGD), which was new to him. Professionals were using it to teach him to communicate his wants and needs independently. Parent-implemented toilet training was unsuccessful, so he continued wearing diapers every day. Prior to intervention, Peter did not go through a bathroom routine; when he was soiled, he was laid down and changed.

Jeffrey was a 3-year-old boy diagnosed with Autism Spectrum Disorder. He was considered age appropriate in regards to receptive and expressive language skills, but had deficits in pragmatic language. Jeffrey was verbal and independently expressed his wants

and needs. When given the Stanford-Binet Intelligence Scales-Fifth Edition (SB5) (Thorndike, Hagen, & Sattler, 1986), he was in the 58th percentile for Nonverbal IQ, 73rd percentile for Verbal IQ, and 66th percentile for Full Scale IQ. He rated very advanced—in the 98th percentile—when given the School Readiness Composite. Jeffrey was rated very elevated—in the 99th percentile—the Autism Spectrum Rating Scale (ASRS). Parent-implemented potty training was unsuccessful. Jeffrey wore diapers throughout his day—at school and home—and he would lie down to get changed.

Materials and Setting

Three timers were used to ensure the accuracy of sit schedules (scheduled sit, increased fluids, and pants checks). All timers were color-coded and labeled to ensure interventionists were using correct one. Additionally, data sheets, preferred fluids, a foot stool (if applicable) per participant, an adapted toilet seat (if applicable), preferred edibles per participant, and individually identified highly preferred, moderately preferred, and neutral reinforcers were used. Based on the results from the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD) (Fisher et al., 1996), varied levels of reinforcers were used to pair voiding in the toilet with the most preferred item. If a participant did not successfully void in the toilet, neutral items were used to ensure that this behavior was not reinforced.

Intervention took place in the home of each participant. Robert's intervention took place in the second floor hallway bathroom. The bathroom was average sized and included a sink, toilet, and bathtub. Robert used the regular toilet seat and had a small

stool to rest his feet when sitting on the toilet. Peter's intervention took place in the basement bathroom. The bathroom was large and included a sink, toilet, bathtub, and closet with a washer and dryer. Peter used a portable potty seat that went on the regular toilet seat and had a small stool to rest his feet when seated. Jeffrey's intervention took place in the second floor hallway bathroom. The bathroom was average sized and included a sink, toilet, and bathtub. Jeffrey used a portable potty seat that fit into the regular toilet seat and a small footstool. Generalization for Jeffrey took place in the master bathroom on the second floor in his parent's bedroom and in the first floor bathroom. The master bathroom had two sinks, a toilet, bathtub, shower, and door that went into a large walk-in closet. The first floor bathroom was small and included a sink and toilet. Jeffrey's portable potty seat and footstool were used across bathrooms at home and school.

Dependent Variables

The dependent variable was successfully voiding, which was defined as the release of urine or feces while seated on the toilet. Secondary measures included accidents and self-initiations. A self-initiation was indicated when the participant independently went to the bathroom and voided without verbal or physical prompts during any point of the behavioral sequence, and an accident was noted any time a void occurred away from/off of the toilet.

Independent Variable

The independent variable was the intensive potty training protocol, which is described in the procedures section below.

Data Collection

Data were collected using a frequency count during baseline, intervention, and maintenance phases. Intervention data were collected for two consecutive days from the time the child woke until they changed into their pull-up during their bedtime routine. In addition to successful voids, data were collected on accidents and self-initiations.

Though not directly targeted, data were also collected on task analysis steps for the bathroom routine around voiding. These 12-steps included pull pants down, pull underwear down, sit on toilet, stand up, pull underwear up, pull pants up, and washing hands (i.e., turn water on, wet hands, get soap, rub hands together, rinse hands, turn water off, and dry hands). These data were collected to determine if any self-help skills were gained in addition to toileting.

Interobserver Agreement

Interobserver agreement (IOA) data were collected by a second trained observer who independently collected data on an average of 33% of bathroom visits across all three participants during baseline and intervention phases. IOA was calculated at 100% across all participants during baseline and intervention. Data collectors for baseline, intervention, and IOA were required to attend a one-hour training session prior to the start of the study, which consisted of reviewing the procedures, data collection, background on participants, hypothetical situations, and the schedule for implementing baseline and intervention including: accidents, self-initiations, successful voids, and 12-steps of the bathroom routine.

Design

An AB single case design (Gast & Ledford, 2014) was used to analyze each participant's successful voids in the toilet to compare baseline data to intervention data and determine the efficacy of the intensive two-day toilet training procedure.

Procedures

Preference assessment. Prior to baseline data collection, parents were interviewed using the RAISD (Fisher et al., 1996) to identify potentially reinforcing items. Once this list was generated, a multiple stimulus without replacement (MSWO) (DeLeon and Iwata, 1996) procedure was carried out with each participant to determine a preference hierarchy. Determining highly-preferred items per participant was an important component of this protocol due to the lack of intrinsic motivation the participants had to successfully void in the toilet. The five items the parents thought were the most highly preferred were presented in a randomly-ordered straight line about 5 cm across the child. The experimenter instructed the child to take an item and immediately gave the child access to the selected item for 30 s. After 30 s, the experimenter removed the item from the child's hands and put it out of sight (i.e., leisure activity) or did not replace it (i.e., edible). The remaining items were randomly rotated and the child was given the same instruction to "take one." The session continued until no items remained or the child did not want a remaining item. This procedure was completed five times for each participant.

Each participant's HP items were leisure toys and edibles (e.g., m&m, skittle). Participants were given access to neutrally preferred (NP) items off the toilet, MP items

while sitting on the toilet, and HP items when they successfully voided in the toilet. Highly preferred item was defined as an item the child liked to have or use over any other item. Moderately preferred item were defined as an objects a child enjoyed, but that was not their favorite choice. Neutrally preferred items were defined as a neutral stimulus. Based on satiation findings (Gerwitz & Baer, 1958; Gottschalk, Libby, & Graff, 2000), parents were asked to restrict access to the strongest reinforcers for a minimum of 3 days prior to implementing the intensive toilet training protocol. It was important that parents restricted access to the HP items to increase effectiveness of the reinforcer.

Baseline. Baseline data for successful voids in the toilet were collected for 3 days prior to the start of each participant's first day of intervention. For all participants, baseline data were collected across settings (i.e., home, school, community). Participants wore diapers during baseline and parents were encouraged to continue with their routine. The caregiver with the participant during the time of the interval was called and asked, "Has *name of participant* successfully voided in the toilet between the hours of ____ and ____?" The data collector recorded if their answer was yes or no. This procedure was used at the end of each interval (4 hour intervals) across 3 days.

Intervention. After three stable days of baseline data were collected, day one of intervention began for participant 1. Participants did not wear pull-ups or diapers during hours of intervention. Participants were encouraged to drink preferred liquid every 5 min during the first hour, every 10 min during the second hour, every 15 min during the third hour, and every 30 min throughout the rest of days 1 and 2. Participants had scheduled

sits that gradually increased the length of time off the toilet and decreased the time on the toilet. The schedule for level changes is presented in Table 1.

Level	Scheduled Sits/Breaks	Location
1	10 min on; 5 min off	In bathroom
2	10 min on; 10 min off	Can be in hallway outside of bathroom
3	5 min on; 15 min off	Can be in room across the hall from bathroom
4	5 min on; 25 min off	Anywhere on same floor
5	5 min on; 35 min off	Anywhere on same floor
6	5 min on; 45 min off	Anywhere on same floor
7	5 min on; 60 min off	Any floor of house
8	5 min on; 90 min off	Any floor of house
9	5 min on; 120 min off	Generalize throughout different bathrooms in house

Table 1. Schedule for Level Changes.

Participants were allowed access to moderately preferred toys while seated on the toilet to prevent boredom and potential inappropriate behaviors, such as hitting, screaming, and crying. If the participant successfully voided in the toilet during a scheduled sit, they were immediately reinforced with a primary edible (which were determined using the MSWO) and a HP item. The remainder of the sit interval was added to the inter-sit (i.e., break time) interval. Following, the participant was given access to the HP item for 5 min and given a break from sitting on the toilet. For example, Robert sat on the toilet for 6 min, then successfully voided in the toilet. He immediately got a break from the toilet and was given a primary edible and access to his most preferred

item (iPad) for 5 min. Additionally, the remaining 4 min of the sitting interval was added to the break time interval off the toilet.

When participants reached level 8 they practiced initiating the request to use the bathroom. Participants 1 and 2 had the bathroom icon added to their SGD, and participant 3 was shown a visual that read, "I need to go to the bathroom" when the timer went off to signal time for bathroom.

When the scheduled sit timer signaled the end of a break, a verbal demand of "time for potty" was given to the participant, and he was directed to sit on potty. The timer was started once he was seated. If he did not void while sitting on the toilet, break time was started as soon as he stood up off the toilet. Each participant was prompted to pull up his underwear and wash his hands. No reinforcement was provided if he did not successfully void in toilet. Each participant was given access to neutral reinforcing items while on break.

A dry pants check was also used during intervention. Every 5 min during the first 2 hours, the participant was praised and given an edible reinforcer if his pants were dry. This interval gradually increased to once every 30 min for hours 3 to 5, every hour for the remainder of day 1, and every 2 hours for day 2. If their pants were wet, participants were redirected to sit on the toilet. If they had an accident while on break, the participant was given a neutral verbal redirection, "We go pee on the toilet" and physically redirected to the toilet. Participants were seated on the toilet for 30 s. If they finished voiding in the toilet after physical redirection, they were reinforced, and the void was treated as a successful void, immediately reinforcing the participant with a primary edible and an HP

item (Kroeger & Sorensen, 2010). Once off the toilet, the participant was given paper towels to clean up the mess and helped to change his clothes with minimal verbal attention.

Every hour and a half, participants moved to the next level, where time on the toilet was systematically reduced and time off was gradually increased. Modifications to the leveled system were made in order to ensure participant success. After an accident occurred, the participant remained on the same level until two consecutive dry intervals were observed. Additionally, the participant was moved down a level (e.g., level 5 to level 4) if they had two or more accidents during the hour and a half he was on a level with no successes. Robert and Peter did not wear pants during intervention due to the number of accidents they were having. Moreover, the researchers were able to intervene more quickly when they had an accident if they were not wearing pants.

If a participant self-initiated while on a break, he was immediately provided reinforcement and a new break time started if he had a successful break-time void.

Procedural Modifications. Although the procedures were effective for Jeffrey, the method was not effective for two of the participants, and several modifications were implemented. The intervention began with participants progressing through a level every 90 min. This progression did not account for the toileting success of two participants. Consequently, several changes were made once it was observed that Robert and Peter were having increased accidents. The procedure was modified to state that, after an accident, a participant must have two successful intervals with no accidents to be moved forward a level. Additionally, participants moved back a level if they had two accidents

in a row at the current level. This change was made to increase the likelihood of successful voids in the toilet.

An additional modification put in place for Peter and Robert included having them only wear underwear and a shirt throughout intervention. As Peter and Robert were having an increased rate of accidents, it was easier to identify an accident and immediately intervene.

Generalization. Once participants reached level 9, they were shown and required to use another toilet in the house. After Day 2 of intervention, if successful, participants were to generalize to other bathrooms throughout their routine and outside of their home.

Parent training. At the beginning of day 1, the protocol and details were verbally reviewed with the parents as an informal description and observation. The trainer modeled intervention on day 1 with the participant's provider and/or parent so they could implement intervention on Day 3 if the participant was not successful at the end of Day 2. Participant 1's provider was in the bathroom with the trainer for the first 6 hours of intervention. Participant 2 and 3's parents were in and out of the bathroom during the first 3 hours. Participant 1's provider and participant 3's father overlapped the first 3 hours of intervention. Participant 2's father was in and out of the bathroom for the first 3 hours of intervention due to him having other children home. All three sets of parents observed their child's time on and off the toilet and how the levels worked (e.g., how long per level, when to move up and/or down).

Follow-up data. Follow-up data were collected at 2 weeks, 2 months, and 4 months to assess maintenance of toilet use. The same toilet used during intervention was used during follow-up.

Social validity. Questionnaires were distributed to parents of the participants to determine if they believed the intervention was effective for their child. Additionally, they were asked how appropriate the steps used in the intervention were in aiding the toilet training of their child, their overall satisfaction, if they were able to continue with intervention if their child was not successful, and if they are interested in more information about why potty training is important for their child.

CHAPTER 3

RESULTS

Preference Assessments

Table 2 shows the selection ranking for Robert, Peter, and Jeffrey. Parents input from the RAISD was used to compile a variety of presumably highly preferred items for the formal preference assessment. To prevent satiation, Jeffrey was given a choice between his top four preferences before each session. Robert's HP item was the iPad, Peter's HP items were musical cause and effect toys, and Jeffrey's HP items were the iPad and the play-doh fun factory. The participants MP items were considered the remaining tangible items used during the MSWO. NP items per participant were not used during the formal preference assessment

Rank	Robert	% Selected	Peter	% Selected	Jeffrey	% Selected
1	Straw Candy	83%	Jungle	67%	Play-doh Factory	78%
2	iPad	56%	Piano	33%	Fruit Snacks	78%
3	Magic Moves	31%	Musical Apple	67%	iPhone	33%
4	Fruit Snacks	28%	Guitar	20%	iPad	31%
5	A Straw	24%	Tortilla Chips	0%	Mickey Book	21%

Table 2. Preference Assessment Result

Intervention

Robert. Results for Robert are shown in Figure 1. During the three days of baseline, Robert had no successful voids in the toilet. During intervention, the triangles showed successful voids increased to 8 and squares documented he had 20 accidents across two consecutive days. At the end of the 2-Day Intensive Potty Training (TDIPT) intervention, Robert ended on level 6. Prior to intervention, Robert independently completed 1 out of 12 steps of the bathroom routine. By the end of intervention, he completed 4 out of 12 steps of the bathroom routine independently.

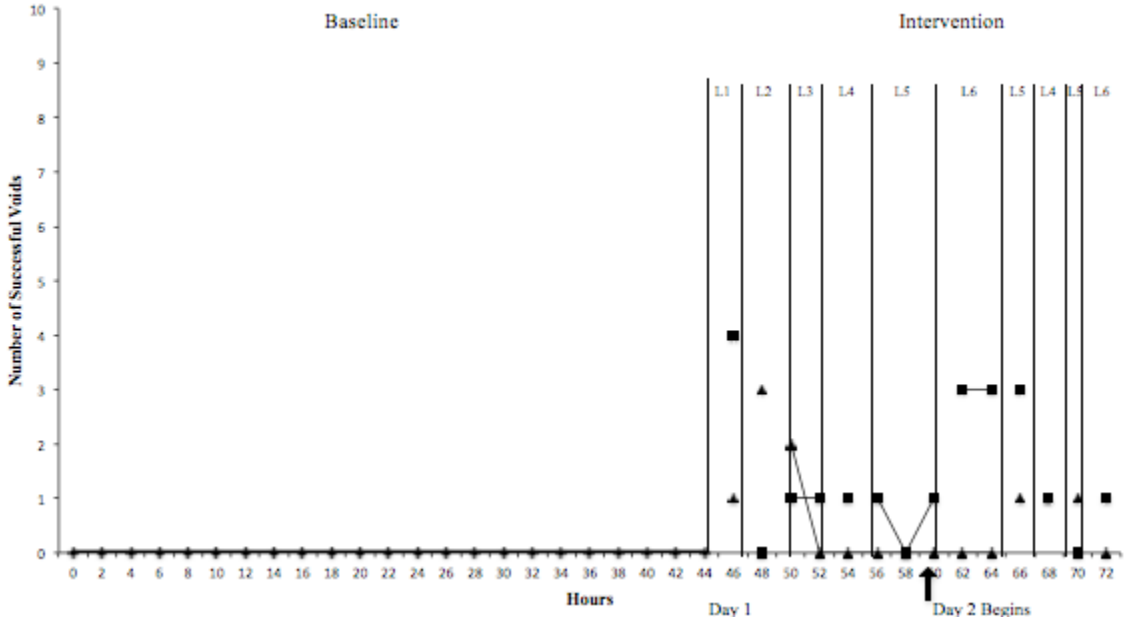

Figure 1. Robert's Results. Number of successful voids in toilet and accidents per hour of intervention for Robert. The triangles represent successful voids and the squares represent accidents.

Peter. Results for Peter are shown in Figure 2. During baseline, Peter had no successful voids in the toilet. When intervention was implemented, Peter had 9 successful voids in the toilet and ended on level 5 of the TDIPT intervention. Prior to intervention, Peter independently completed 0 out of 12 steps of the bathroom routine. At the end of day 2, Peter independently completed 1 step of the bathroom routine.

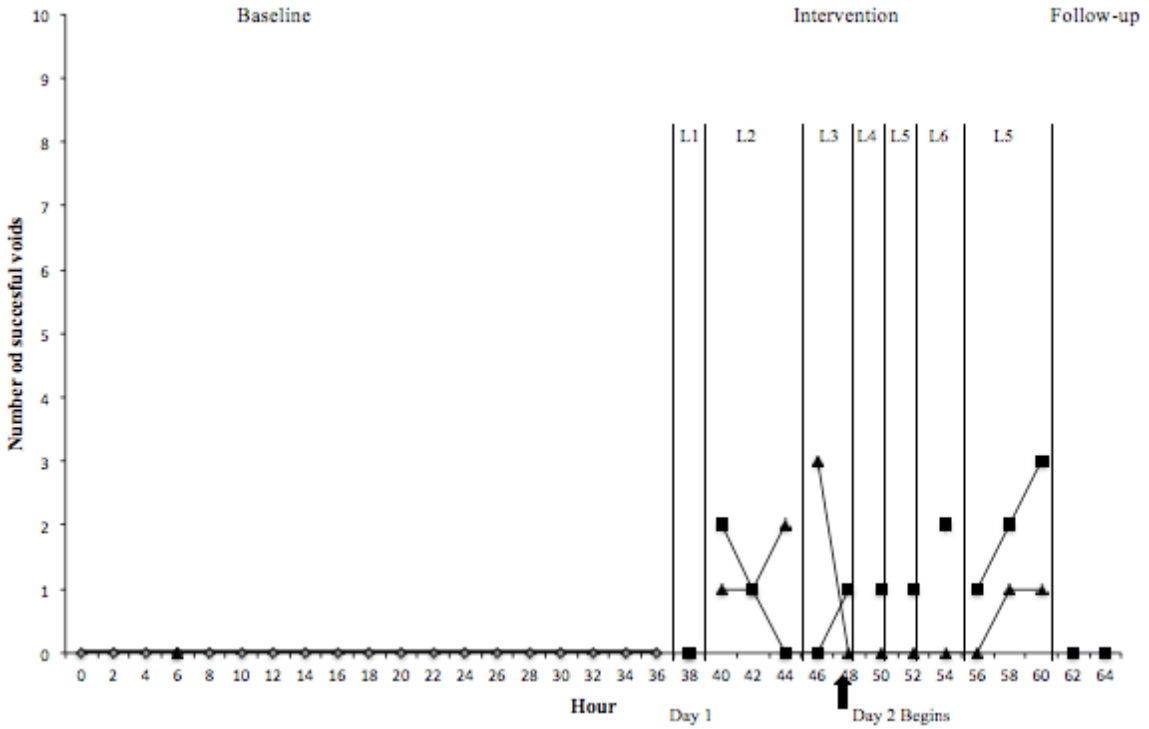

Figure 2. Peter's Results. Number of successful voids in toilet and accidents per hour of intervention for Peter. The triangles represent successful voids and the squares represent accidents.

Jeffrey. Results for Jeffrey are shown in Figure 2. During three days of baseline, Jeffrey had no successful voids in the toilet. When intervention was implemented, Jeffrey

had 37 successful voids in the toilet. He ended the TDIPT intervention on level 9. On Day 1, Jeffrey self-initiated when the highly preferred item was removed and access was contingent on successful voids. To teach initiating on day 2, when the timer went off to signal it was time to go to the bathroom, Jeffrey was shown a visual that read, “I want bathroom” and asked what he needed to do. Once he said, “I want bathroom” he was immediately given praise for self-initiation and a highly preferred edible (m&m) and taken to the bathroom. Jacob ended with 10 self-initiations during level 9. Per level instructions, the self-initiation visual and preferred edibles were faded by the end of day 2. Jeffrey advanced a level every hour and a half until the final level was reached where he remained until intervention was complete. Figure 3 also shows Day 2, where Jeffrey generalized his toilet training to two other bathrooms in his home. Prior to intervention, Jeffrey independently completed 10 out of 12 steps of the bathroom routine. By the end of intervention, Jeffrey independently completed all 12 of the bathroom routine.

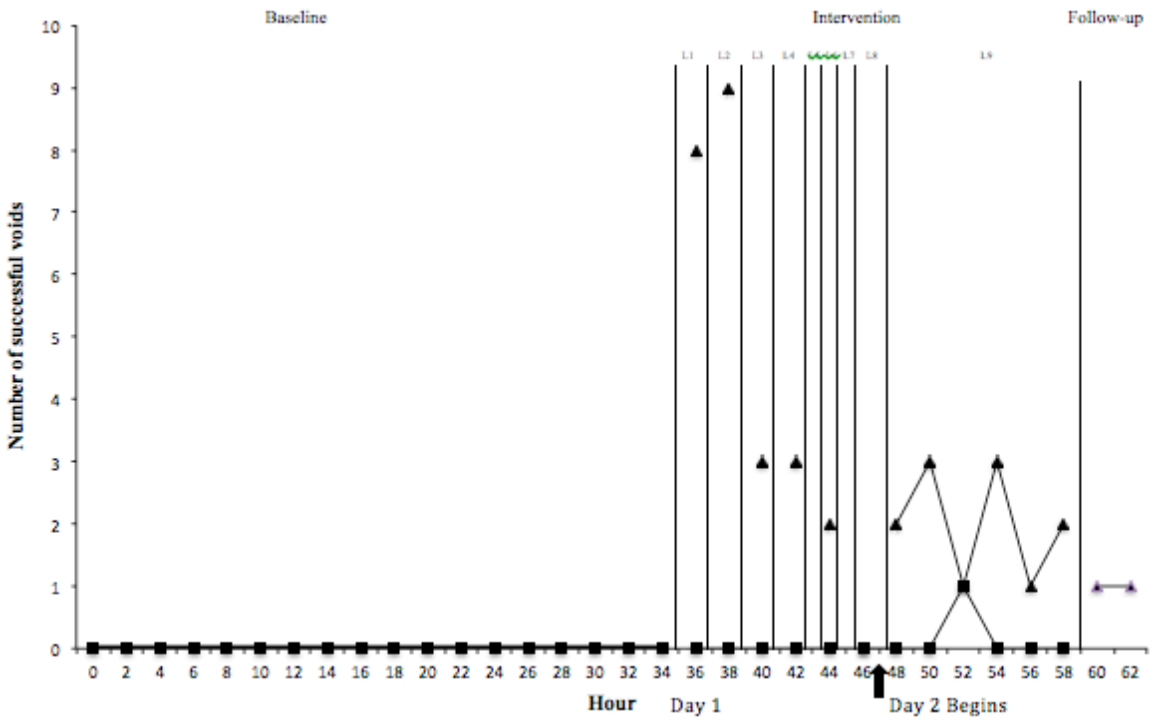

Figure 3. Jeffrey's Results. Number of successful voids in toilet and accidents per hour of intervention for Jeffrey. The triangles represent successful voids and the squares represent accidents.

Generalization and Maintenance

Robert. Robert's parents and provider attempted to continue the intensive potty training protocol, but they reported it was too time consuming. They ceased training prior to the 2-week maintenance check.

Peter. Peter's parents continued to implement a scheduled sit for Peter. His parents report that he currently sits for 5 min and is off the toilet for 25 min. At the 2-week follow-up, Peter did not successfully void in the toilet during scheduled sits or breaks.

Jeffrey. During day two of intervention, Jeffrey generalized using the bathroom to the other two bathrooms in the home. At the 2-week follow-up, Jeffrey successfully voided in the toilet and did not have any accidents. At the end of the study, Jeffrey could hold urine for 2 hours and successfully urinate in the toilet.

Social Validity

Robert. Robert's parents indicated that their feelings were neutral in regards to the potty training protocol procedures being an appropriate aide in potty training their son. They strongly disagreed that this was an effective intervention for their son, that they were able to continue implementing the intervention after the 2-day intensive intervention, and that they were interested in learning how potty training Robert has a positive impact on his future and independence. Robert's mother expressed that she does not think he made the connection of voiding in the toilet and receiving his most preferred item. She said that they as a family were not as ready as they thought to do ongoing potty training and that affected their ability to continue with the program on their own.

Peter. Peter's parents agreed that the intensive potty training intervention was appropriate in helping aide their son, and they were interested in learning how potty training Peter has had a positive impact on his future and independence. His parents indicated that their feelings were neutral in regards to being able to continue with the toilet training after the 2-day intensive intervention. They disagreed that the potty training intervention was an effective for Peter and that they were overall satisfied with the intervention process.

Jeffrey. Jeffrey's parents were pleased with the intensive potty training protocol They rated all five questions as "strongly agree." They expressed that this was an effective intervention for Jeffrey and that he had generalized toilet use to various places in the community and school.

CHAPTER 4

Discussion

There is an abundance of research relating to toilet training individuals with special needs, but there is limited research using an intensive short-term (i.e., less than a week) protocol. In this study, an intensive 2-day potty training protocol was implemented with three children with ASD. Components of this intervention included increased fluids, scheduled sits, dry pants checks, and reinforcement-based training. Data showed high variability throughout intervention, and the results indicate that two of the three participants did not acquire the skills to independently use the toilet in this short period of time. However, this protocol was successful with one participant, who learned to independently use the toilet, generalize his toilet use, and maintain the skill over time.

This study extends the current literature by investigating whether children diagnosed with ASD could be toilet trained in two days using an intensive reinforcement-based protocol and whether they could generalize those skills across settings and time. The results of this study were inconclusive, and indicate that further research needs to be conducted in order to determine if two days is an appropriate length of time to potty train children with ASD.

Peter

Peter showed high variability, indicating this 2-day protocol were not effective for him. There were potential sources that influenced this variability. Wetness did not appear to be a motivating factor to successfully void in the toilet.

Two-days of intense intervention was not enough time for Peter to pair successfully voiding in the toilet with gaining access to a highly preferred item. This may be due to the fact that Peter did not engage in enough successful voids in the toilet to contact reinforcement before the levels increased. Data suggest Peter was not ready for the next level when the intervention progressed, suggesting that a regimented intervention protocol may need to be tempered by data indicating a child may not be ready to proceed. Peter would require further intervention to be potty trained.

Peter engaged in self-stimulatory behavior on and off the toilet, which calls into question if he was receiving reinforcement with or without preferred toys. Two of Peter's accidents occurred during his reinforcement period, when he then immediately lost his highly preferred toy and was seated back on the toilet.

Another potential source of variability in Peter's data surrounded his dual diagnosis of autism and cerebral palsy. Although his pediatrician cleared the potty training procedures, it is unknown if his conditions had any influence on the success of the intense intervention. Given Peter's physical limitations, he was not able to step on and off the footstool or sit on and off the toilet independently. Peter may need physical assistance to complete the toileting routine (i.e., sit on toilet, get off toilet), but he can still learn to self-initiate, successfully void in the toilet, and have no accidents. It may be

questioned if Peter will ever be independently toilet trained and not need some kind of assistance to complete all of the steps.

Robert

Robert's data showed high variability throughout intervention, which may have been influenced by a number of factors. Observational data suggested that wetness might not have been a motivating factor to successfully void in the toilet given his apparent unawareness of being wet.

Another potential source of variability was the levels changing too quickly. There were not enough successes per level for Robert to pair successfully voiding in the toilet with receiving a highly preferred reinforcer. By the time Robert started to have a few successes, it was time to move onto the next level although data suggested he was not ready.

Observational data also suggested Robert was content on and off the toilet without toys to keep him engaged. He engaged in self-stimulatory behavior on and off the toilet and it was questioned whether these behaviors provided more preferred reinforcement over the toys. A first-then visual was implemented with Robert to show him when he successfully voided in toilet he would receive iPad (most preferred item).

Jeffery

Jeffrey showed an immediate increase of successful voids when intervention began. It is possible that successful voids increased following the pairing of 5 min of access to a HP item given any successful void on the toilet. The latency between the end of the 5-min access and the next successful void was short through the first three levels. It

appears the procedures successfully paired voiding in the toilet with receiving a highly reinforcing item during level 1. Observational data question whether the levels were at too low a rate for Jeffrey as he caught on so fast.

When initially teaching self-initiation, Jeffrey received a primary edible (m&m) immediately after requesting the bathroom. His asking for bathroom behavior increased after the presentation of this reinforcer. Gradually, changes were made to include providing intermittent reinforcement when requesting bathroom. At the 2-week follow-up, Jeffrey continued to ask and use the toilet in the absence of edible and tangible reinforcement.

Maintenance

Robert's parents reported they did not realize the amount of time needed to continue implementing scheduled sits and opted out of continuing the study. Although this study sounded promising to parents because their child may be potty trained in 2 days, Robert's parents were not prepared to dedicate the amount of time and effort necessary if the protocol was not effective for their child. If the participant was not potty trained at the end of day 2, parents were asked to continue with scheduled sits at the level their child ended the intervention until they were demonstrating success.

When implementing a parent training in the future, parents should be included in the same training interventionists went through including the time commitment it may take to successfully teach the child if the 2-day intervention was unsuccessful. Additionally, a Behavior Skills Training (BST) package should be used. Interventionists

should provide a description and the rationale of the protocol to the parents, then model the protocol, role play it with parents, and provide feedback using a fidelity checklist.

Generalization

Jeffrey was the only participant who generalized toilet training across bathroom settings and locations. On day 2, Jeffrey used all of the bathrooms throughout the house. Jeffrey's intervention ended on Friday and parents reported that by Saturday and Sunday he was using public restrooms on a road trip and did not have any accidents. Jeffery's preschool teacher reported that he initiated when he had to go the bathroom and has not reported any accidents since the completion of the intervention.

Intervention Effectiveness

This study suggests individuals with high-functioning autism (HFA) paired successfully voiding in the toilet and receiving a HP item at a faster rate than the participants who were more severe. HFA is a term applied to students with have less severe symptoms of ASD and have an IQ greater than 70, where individuals with more severe autism have an IQ lower than 70 (Carpenter et al., 2009). These results suggest that the levels progressed too rapidly of a rate for Peter or Robert to pair successfully voiding in the toilet with receiving a highly preferred item.

Implications for Practice

This two-day intensive toilet training protocol may be appealing to parents given the short time frame. However, parents should exercise caution when selecting this protocol due to the intensity and the likely need for help when implementing the intervention.

Time restraints contributed to the challenges when implementing this intensive protocol. Parents should be aware that this protocol might work faster with children with HFA, but it is likely that it will take children with more profound autism longer to advance levels based on performance.

Limitations and Future Research

There were a number of limitations that should be considered when evaluating the present study. First, all three case studies involved children under 8 years of age diagnosed with ASD. It is unknown whether a study similar to this would be effective with a more diverse group of individuals. Future researchers should consider using a more diverse group of students and ages to identify participant characteristics that may result in better outcomes. This study targeted children with ASD between the ages of 3 and 7 years of age. Researchers should explore how young to begin potty training and how cognitively low is trainable. If an individual has more profound cognitive disabilities, future research should question approximately how long it takes to potty train them.

Additionally, there were several limitations related to study design. Multiple case studies—rather than an experimental design—were used to evaluate the efficacy of this intervention. The use of an A-B design did not allow for the components necessary for experimental control: replication, verification, and prediction.

If a multiple baseline across participants design had been used, interventionists would not have been able to wait for the data path to be stable to move on. Two of the three participants were not independently toilet trained at the end of the two days. This

protocol would have had to eliminate the number of days it said initially for it to have any experimental control.

Moreover, the intensive protocol ended on day two even if the participant was not successfully toilet trained. For two of the three participants, two days of intense intervention did not allow enough time for the participants to be successfully trained. The 2-day protocol's length should also be modified. For future researchers, it is recommended a protocol be used until the participants are successfully toilet trained. Modifications should be made to this protocol based on participant performance versus time.

Additionally, the protocol stated that parents were to implement scheduled sits with their child if they were not potty trained by the end of day two. However, if parent training is implemented, the intensity should be increased, as only Peter's parents implemented scheduled sits after the two-day intensive intervention was finished and Peter was not potty trained. It is recommended that parents who are implementing the intervention at the end of day two should go through the same training the interventionists go through prior to the start of the study and be trained using a BST package. This will allow for them to know the amount of time and effort that is needed for this intervention to be effective.

An additional limitation relates to the pace of the intervention. For two of the three participants, the pace was too quick. This was a limitation because it did not allow them to have the amount of successful voids they needed to pair successfully voiding in the toilet with receiving a highly preferred item. Having participants wait until they are

'ready' to move up a level may cause extra days of intensive intervention. 'Ready' in this context would be have no accidents for an hour and a half with at least 2 successful voids in the toilet. This protocol requires participants to be potty trained from the moment they awake until their bedtime routine. Using this protocol across multiple days may cause burn out for the interventions and boredom for the participant.

If this protocol is used, changes should be made at the beginning when implementing the levels. Participants should stay at a level for an hour and a half with no accidents. If they have an accident, then the time should be started over. This will allow the participants to have a higher success rate and learn to pair successfully voiding in the toilet with receiving edibles and high- preferred item. This study suggests Peter and Robert did not have enough successful voids to pair successfully voiding in the toilet with receiving preferred edibles and a high-preferred tangible.

Another limitation is prerequisites were not taken into account in this study. All participants had medical clearance saying they were 'okay' to be potty trained, but readiness skills were not assessed. Future studies should research if prerequisites are necessary to begin toilet training. Researchers should ask if a set of skills present before attempting toilet training have any impact on that individual being toilet trained. It could be likely that certain skills are needed before individual can be potty trained.

A final limitation was that all three participants had differing functioning levels. One participant had HFA, one had severe autism, and the third had severe autism and cerebral palsy. This did not allow for this study to determine if it would be effective with a certain functioning level of children. Studies teaching children with ASD have lacked

information regarding cognitive and receptive language skills (Keen, Branningan, & Cuskelly, 2007). Future researchers might use this two-day intensive protocol with children with higher-functioning autism (HFA) who are not yet potty trained to see if they receive the same outcomes as this study found. It is like this protocol is only effective for children with HFA.

Another limitation suggests that Peter and Robert had a history of reinforcement from previous attempts of being potty trained. Peter and Robert's parent had both attempted potty training their sons and with no success, they may lack self-confidence.

Conclusion

The results of this study suggest that this two-day intensive protocol was not successful in training children with ASD. However, it is imperative more research be done with individuals diagnosed with ASD to determine if this protocol is effective in toilet training them in two days. Future research would need to investigate the efficacy of pre-requisite skills in toilet training individuals with ASD. It is recommended that this reinforcement-based protocol be completed again with Robert and Peter, but modifications be made to levels. Level changes should be contingent on success not time.

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APPENDIX A

SOCIAL VALIDITY SURVEY

Parent Questionnaire on Social Validity of Intensive Potty Training Protocol

Please circle the number that most closely reflects your personal opinion on whether you agree or disagree with the following statements. Your input is valued.

Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	**2**	**3**	**4**	**5**

1. Overall, I believe that the intensive potty training protocol was an effective intervention in helping potty train my child.

   1 2 3 4 5

2. I believe the procedures used in the intensive potty training protocol were appropriate in helping aide the potty training of my child.

   1 2 3 4 5

3. I feel that the intervention aided in potty training my child.

   1 2 3 4 5

4. Overall, I am satisfied with the intervention process.

   1 2 3 4 5

5. I feel that I was able to continue with the toilet training after the 2-day intensive protocol.

   1 2 3 4 5

6. I am interested in learning how potty training my child has a positive impact on my child's future and independence.

   1 2 3 4 5

APPENDIX B

MULTIPLE STIMULUS WITHOUT REPLACEMENT (MSWO)

MSWO Protocol

Before Assessment:

- Identify 5 to 7 stimuli to present simultaneously. This can be accomplished by interviewing staff persons who are familiar with the client. The Reinforcer Assessment for Individuals with Severe Disabilities (RAISD) is a useful tool in helping to select stimuli.
- To ensure familiarity, provide the client with brief (30 s) access to each stimulus prior to beginning the assessment. If necessary, prompt the client to hold the item or model appropriate manipulation of the item.

During Sessions:

- Present 5-7 items in a straight line on the table in a random sequence. The items will be about 5 cm apart and the participant will be seated about 0.3 m from the stimulus array.
- Tangible and edible items will not be presented together in the same session.
- The participant will be asked to select one item and will be allowed to interact with the chosen stimulus for 30 s before beginning the next trial. If using food, the trial will end when the item is consumed. Once an item is chosen, it will be removed from the array.
- At the end of a trial, do not replace the selected item in the array. Also, rotate the remaining items by taking the item at the left end of the line and moving it to the right end. Make sure the remaining items are equally spaced.
- If the client does not make a selection within 30 s, the trial and the session will be terminated. All remaining items will be scored as "not selected."
- The assessment will be repeated across five sessions.

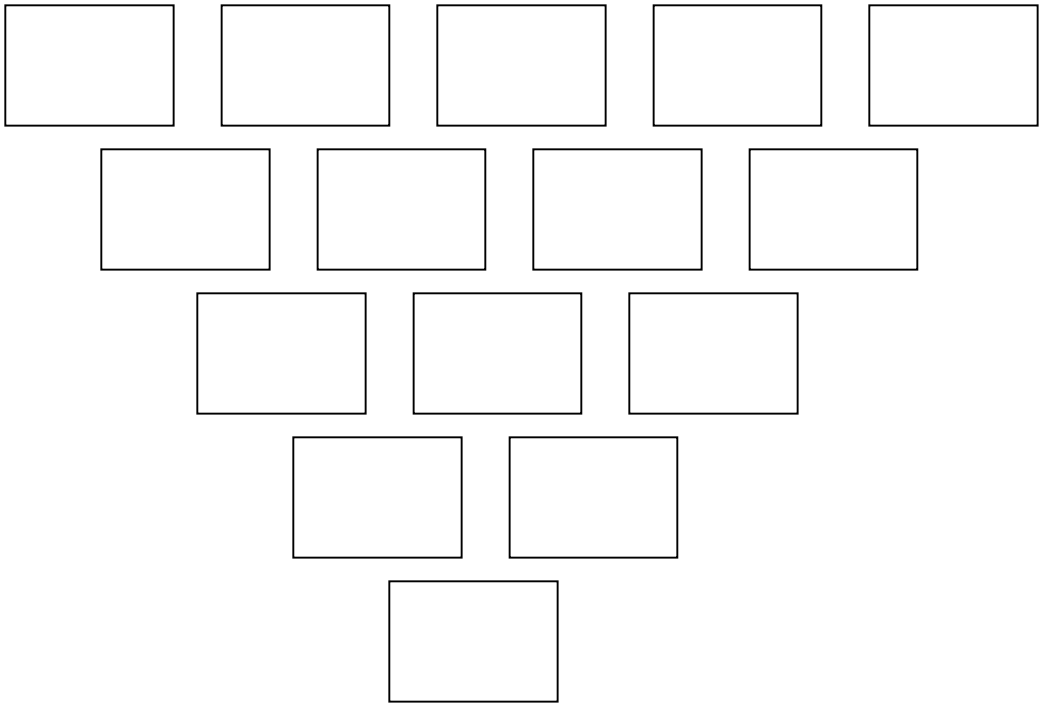
Data Collection:

- Record item selection during each trial.
- Item selection is defined as physical contact with one of the presented items.
- Calculate the number of times an item was selected divided by the number of trials during which the item was presented (percentage of trials selected).

Student: _____ Date: _____
Time: _____

Multiple Stimulus Without Replacement Data Sheet

Session #



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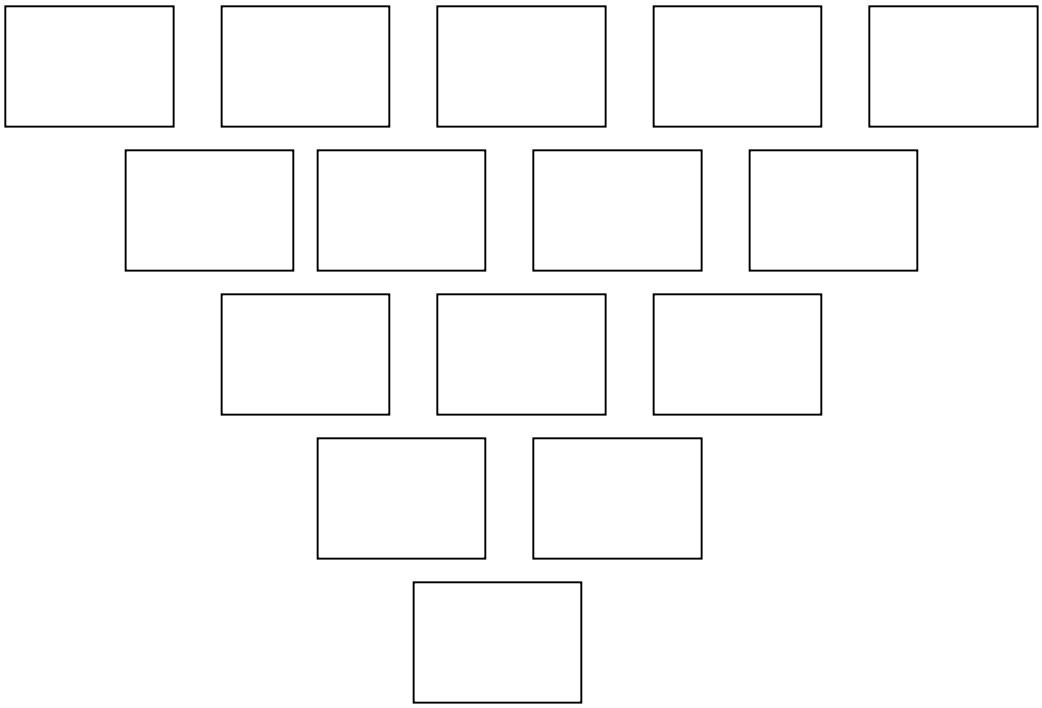

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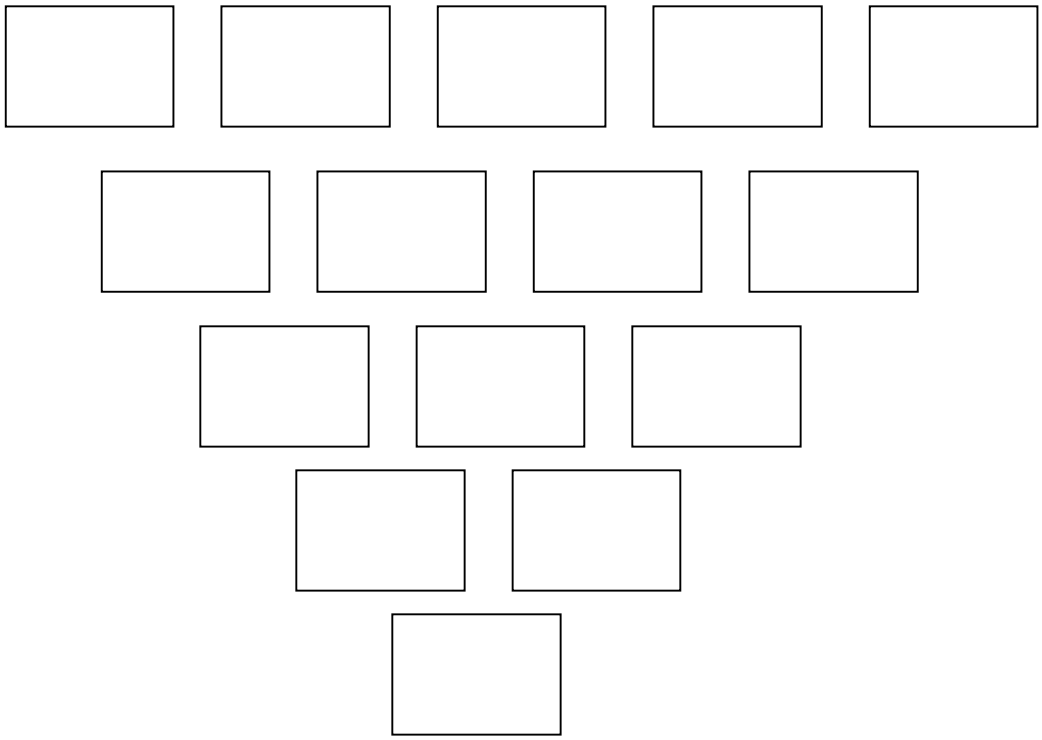

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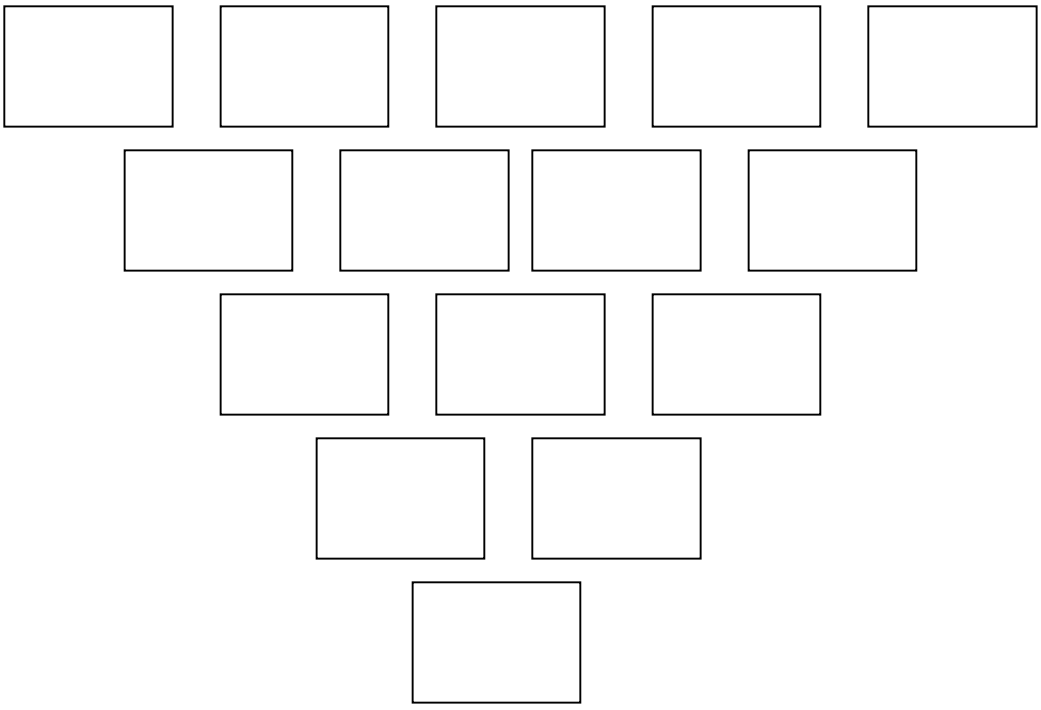

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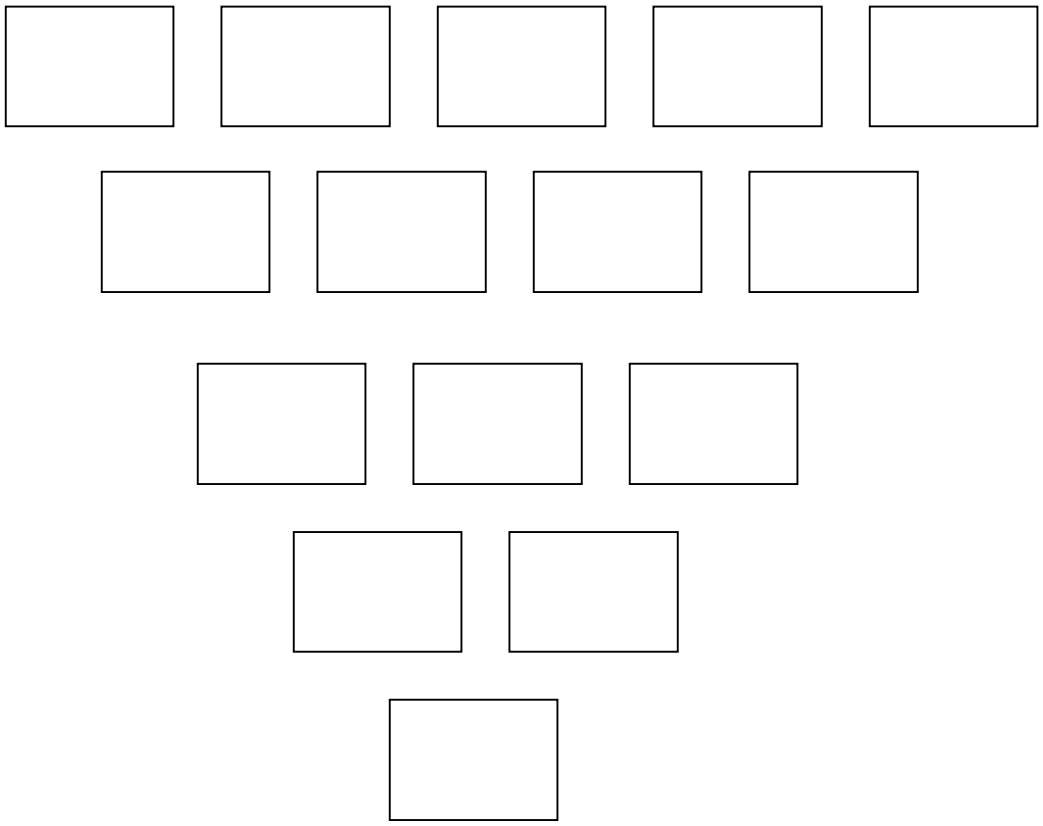

Items

1.

2.

3.

4.

5.

Data Summary

1. Record item selection each trial.
2. Item selection is defined as physical contact with one of the presented items.
3. Calculate the number of times an item was selected by the number of trials during which the item was presented (percentage of trials selected).

Item 1 _____
Number of trials selected / number of trials presented X 100 =
_____ / _____ X 100 = _____% of trials selected

Item 2 _____
Number of trials selected / number of trials presented X 100 =
_____ / _____ X 100 = _____% of trials selected

Item 3 _____
Number of trials selected / number of trials presented X 100 =
_____ / _____ X 100 = _____% of trials selected

Item 4 _____
Number of trials selected / number of trials presented X 100 =
_____ / _____ X 100 = _____% of trials selected

Item 5 _____
Number of trials selected / number of trials presented X 100 =
_____ / _____ X 100 = _____% of trials selected