12-2014

Assessment and Treatment of Elopement in Young Children with Autism

Ivette Andrade
University of Texas-Pan American

ASSESSMENT AND TREATMENT OF ELOPEMENT

IN YOUNG CHILDREN WITH AUTISM

A Thesis

by

IVETTE ANDRADE

Submitted to the Graduate School of
The University of Texas-Pan American
In partial fulfillment of the requirements for the degree of

MASTER OF ARTS

December 2014

Major Subject: Experimental Psychology

ASSESSMENT AND TREATMENT OF ELOPEMENT

IN YOUNG CHILDREN WITH AUTISM

A Thesis
by
IVETTE ANDRADE

Dr. Zina Eluri
Chair of Committee

Dr. Valerie (Wendy) James-Aldridge
Committee Member

Dr. Frederick Ernst
Committee Member

Dr. Mark H. Winkel
Committee Member

December 2014

ABSTRACT

Andrade, Ivette, Assessment and Treatment of Elopement in Young Children with Autism. Master of Arts (MA), December, 2014, 51 pp., 1 table, 6 figures, 4 appendices, 70 references, 21 titles.

Elopement, leaving a caregivers side without permission or supervision, is a behavior that is more prevalent among children with autism as compared to their typically developing peers. With potentially fatal consequences (e.g., drowning, being run over, abducted), it is reported to cause high levels of stress for caregivers. In the present study, we evaluate the assessment and treatment of elopement using a multicomponent treatment package to address the multiple functions of elopement. The treatment consisted of an antecedent treatment procedure, blocking and differential reinforcement of other behaviors with extinction (DRO w/ EXT). An ABAB reversal design was utilized to assess treatment effectiveness. Results showed a significant reduction of elopement following the first phase of treatment for both participants. However, for one participant, previous reduction rates were not reached upon reimplementation. Results are discussed and limitations to the study are noted.

DEDICATION

This accomplishment would not have been possible without the love and support of many. To my beautiful mother who I love very much, thank you for all of your hard work and for helping me keep my family afloat during this process, I am forever grateful to you. To my kids, thank you for understanding that mommy had to study, as you would say, "all the time." Without your loving, supporting and considerate hearts this would not have been possible, love you to infinity. To my husband Eric who I love with all my heart, thank you for being incredibly supportive, for picking up on mommy duties, for endless words of encouragement and for always believing that I could accomplish anything I set my mind to. I love you bunches and bundles. Finally, to my family and friends, thanks for understanding my absence at many events and for your words of support, which always remained one quick phone call away.

ACKNOWLEDGEMENTS

During this journey I had the honor of meeting many knowledgeable and inspiring professionals. Individuals whose passion for what they do is obvious and admirable. Whose list of accomplishments is long, yet they choose to share their knowledge and wisdom with dreamers like myself. Among them Dr. Eluri, Dr. Aldridge, Dr. Ernst and Dr. Winkel, I could not have asked for a better committee, thank you. To my committee chair Dr. Eluri, I am forever grateful to you for allowing me to conduct this thesis project and for your guidance throughout the process. Thank you for your constant feedback, for your encouragement, for sharing your knowledge and for believing in me. Without you this thesis would not have been possible. Thank you, thank you, and thank you! We did it!

TABLE OF CONTENTS

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

Autism spectrum disorder (ASD) was first explored and described by Leo Kanner (1943) where he described a series of case studies of children who had behavioral characteristics that were different than other psychological or developmental disorders. He described children who seem perfectly content with themselves and who showed little to no interest in interacting with those around them, including their parents (Kanner, 1943). Children who demonstrated repetitive behaviors such as spinning objects, organizing things in particular ways, shaking of the head from side to side and repetitive verbal utterances were noted, among other behaviors (Kanner, 1943).

Some of the core behaviors identified by Kanner (1943), or lack thereof, by children with ASD were observed in the majority of cases. These core behaviors included social impairments and repetitive behaviors. In fact, in the most resent revisions of the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013), those core behaviors continue to be a critical aspect of diagnosis. According to the DSM-5, the two core criteria are social and communication impairment, and restrictive repetitive patterns of behavior. Additionally, the latter core deficits must be or have been present in early childhood,

even if they are not fully exhibited until environmental demands surpass the capabilities of that individual (Wing, Gould & Gillberg, 2011).

Social deficits include the following three sub-criteria: First, the individual currently manifests or has previously displayed deficits in social-emotional exchange, which can include a variety of behaviors such as the inability to initiate and/or maintain conversation, reduced expression of interest and emotions, or complete failure to respond to social interactions. Second, there are apparent deficits in nonverbal communicative behaviors used for social interactions that can include behaviors such as lack of eye contact, gestural language, and facial expressions. Lastly, deficits in developing, maintaining, and understanding relationships should also be evident and can include the inability to adjust behavior depending on context, difficulties with pretend play and/or demonstrating no interest in peers (American Psychiatric Association, 2013).

Restricted repetitive patterns of behavior, interest or activities, is the second criteria. Repetitive patterns of behavior must be currently observable or identified in the individual's history in at least two of the following sub-criteria. First, stereotyped or repetitive motor movements, objects, or speech are apparent (e.g., lining up toys, hand flapping, and repetitive phrases). Second, insistence of sameness and inflexible adherence to routine or ritualized patterns of behavior (e.g., need to take a specific route home, eat the same food daily, display extreme distress at small changes). Third, highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment or preoccupation with unusual objects, highly limited and persistent interests). Finally, the individual may display behaviors of over or under reacting to sensory input (e.g., high interest in sensory aspects of the environment, having adverse responses to sensory input) (APA, 2013).

Although these criteria provide a well-established broad description that encompasses much of the variability of behaviors exhibited by those with ASD, there have been numerous behaviors identified as maladaptive, which have demonstrated to be more prevalent in children with ASD (McClintock, Hall & Oliver, 2003). Behaviors that have been noted as maladaptive in the literature include, but are not limited to, disruptive behavior (Leon, Lazarchick, & Griffin, 2013; McDowell, Duffy & Kerr, 2007; White et al., 2010), aggression (Leon et al., 2013; McDowell et al., 2007; White et al., 2010) and self-injury (Leon et al., 2013; McDowell et al., 2010). The topography of each response class of behaviors varies for each child. Disruptive behaviors include topographies such as screaming, crying, out of seat behavior, making negative statements, snatching objects, destroying property, and banging on surfaces with force (Leon et al., 2013; McDowell et al., 2007; White et al., 2010). Varying topographies of aggression include behaviors such grabbing, biting, hitting, kicking, scratching, head butting, hair puling, pushing and throwing objects targeted at others (Leon et al., 2013; McDowell et al., 2007; White et al., 2010). Self- injury includes head banging, self pinching, body hitting, head hitting, and self scratching, among others (Leon et al. 2013; McDowell et al., 2007). Maladaptive behaviors have demonstrated to affect not only the individual engaging in these behaviors, limiting their learning opportunities and increasing the cause for potential physical harm, but also affect those around them such as family, peers and educators. Therefore, a large body of literature exists on the pervasiveness, assessment and treatment of such behaviors.

A behavior that has been noted in the past among children with ASD, but remains limited in research, is elopement. In general, elopement has been defined as any instance of an individual leaving an area or socially acceptable perimeter, without the permission and or supervision of caregivers (Call, Pabico, Findley & Valentino, 2011; Kodak, Grow & Northup,

2004; Lang et al., 2009; Lang et al., 2010; Lehardy, Lerman, Evans, O'Connor & LeSage, 2013; Perrin, Perrin, Hill, & DiNovi, 2008; Piazza et al., 1997; Tarbox, Wallace & Williams, 2003). Jacobson (1982) examined frequencies of occurrences of problematic behaviors among those with developmental disabilities, and identified elopement as a prevalent behavior within that population. Elopement from a classroom or instructional setting can lead to decreased opportunities for learning, distractions for non elopers, increased work for instructors and the need for more staff to accommodate and ensure the safety of the eloper and others (Chambers, Sanok & Striefel, 1980; Davis, et al., 2013; Perrin, et al., 2008). Additionally, eloping can be extremely dangerous exposing individuals to open water, traffic, and strangers, which can potentially lead to death (Davis et al., 2013; Garner, 1990; Lehardy, et al., 2013; Perrin et al., 2008).

In 2012, Anderson and colleagues published a study on the prevalence of elopement among children with ASD sampling data from an online national database that includes information on individuals with autism and their relatives (Anderson et al., 2012). Criteria for inclusion in the study included having a child between the ages of 4 and 17 with a professional ASD diagnosis and living in the United States. The Social Communication Questionnaire (SCQ), a brief screening measure, was used to confirm parental report of ASD diagnosis. Siblings of the sample of children with ASD were used as a normative comparison. Additionally, researchers were interested in looking at the stress that elopement produced for families. The final sample consisted of 1218 families, for a total of 901 children with ASD and 1076 unaffected siblings (Anderson et al., 2012). Data indicated that 49% of those sampled with ASD had engaged in elopement at least one time after their fourth birthday, in contrast to 13% of typically developing siblings. Of those within the age range of 4 to 7, 46% of children with ASD

engaged in elopement behavior, compared to 11% of typically developing siblings. Fifty three percent of children were missing for a long enough time period to trigger concern (41.5 minutes on average), and 65% and 24% of these children were exposed to dangers of being run over and drowning, respectively. Furthermore, at least half of the families that had experienced elopement reported that this behavior kept the family from being able to enjoy outdoor activities, elopement was the source of much stress for the family, and the family had not received any guidance for preventing or addressing elopement. Due to the potential for the most severe consequences of elopement and the lack of resources on the topic, research to further address this problem behavior is important and immediately necessary (Anderson, et al. 2012; Davis, et al., 2013; Lehardy, et al. 2013).

A variety of procedures have been identified to reduce or eliminate the occurrence of various forms of maladaptive behaviors. Among them are punishment (Foxx & Azrin, 1973; Kodak et al., 2004; Padgett, Garcia & Pernice, 1984), extinction (Forehand, 1973; Fester & Skinner, 1957; Lehardy et al., 2013), antecedent interventions (Carr & Duran, 1985; Lehardy et al., 2013; Mace & Belfiore, 1990; Mace et al., 1988; Piazza et al., 1997; Tarbox, Wallace & Williams, 2003; Vollmer, Iwata, Zarcone, Smith & Mazaleski, 1993) and differential reinforcement (Deitz, 1977; Deitz & Repp, 1983; Fester & Skinner, 1957; Piazza et al., 1997; Repp & Dietz, 1974).

The term punishment, in the general population, carries a lot of negative connotations. In applied behavior analysis, however, the word "punishment" identifies the reduction in the future probability of a behavior. Thus, the changes in the environment are structured in such a way that they immediately follow a response by either adding an aversive stimulus or removal of a reinforcing stimulus leading to a reduction in the future probability of that behavior. Time-out

(Bean & Roberts, 1981; Donaldson & Vollmer, 2011; Roberts, 1983; Kodak et al., 2004) and response cost (McLaughlin & Nay, 1975; Myers, 1975; Padgett et al., 1984; Rapport, Murphy & Baily, 1980; Solanto, 1990) are among some punishment procedures that have proven to be effective in the reduction of maladaptive behaviors. In general, time-out is defined as a process that involves the removal of an individual from a reinforcing environment to a less reinforcing environment contingent on problem behavior (Donaldson & Vollmer, 2011). Kodak and colleagues (2004) assessed and treated elopement of a 5-year old female with Attention Deficit Hyperactivity Disorder (ADHD) whose elopement behavior was maintained by attention. The intervention consisted of a combination of non-contingent attention and time-out as a consequence for elopement (Kodak et al., 2004). Results indicated that, during baseline, the child was engaging in this behavior for 90% of the time and upon initiation of treatment an immediate drop was observed to less than 5%. During the final sessions, complete suppression of the problem behavior was observed (Kodak et al., 2004).

Response cost (RC) is another form of punishment, which may be easily understood as paying a fine. With response cost, the "fine" becomes contingent on the problem behavior targeted for reduction. Padgett and colleagues (1984) reduced elopement of a 25-year old female with Down Syndrome, who engaged in elopement while walking from one building to another at an inpatient facility. Her elopement behavior was maintained by access to tangible food items. Treatment consisted of a token system, in which the individual was provided two tokens that could be traded for preferred food items and response cost in the form of removal of tokens contingent on elopement (Padgett et al., 1984). Prior to intervention, the time spent out of assigned area ranged from 37 to 51 minutes. Once the token system and response cost were

implemented, zero occurrences of elopement were quickly reached and continued at a six-month maintenance probe.

Although punishment-based procedures have demonstrated success in reducing behaviors, punishment may produce some negative side effects (Balsam & Bondy, 1983; Bandura, 1969; Capaldi, Sheffer, Viveiros, Davidson & Campbell, 1985; Lerman & Vorndran, 2002; Risley, 1968). Among them are emotional responses, aggression, escape or avoidance, and in some cases an increase in the behavior targeted for reduction in environments in which the behavior is not being targeted (Balsam & Bondy, 1983; Risley, 1968). Additionally, several studies have demonstrated that pre-exposure to punishment can decrease the effectiveness of punishment based interventions (Capaldi et al., 1985; Lerman & Vorndran, 2002). This is particularly an important point because in the natural environment individuals are likely to have encountered some kind of punishment intermittently, such as verbal reprimands, time out or overcorrection, delivered by caregivers in an attempt to quickly reduce a behavior (Lerman & Vorndran, 2002). This occurs usually prior to contingency-based treatments, which could reduce their effectiveness (Lerman & Vorndran, 2002) and lead to the need for increased intensity or denser schedules of punishment to successfully reduce maladaptive behaviors (Halevy, Feldon & Weiner, 1987; Sherman & Feldon, 1984). Thus, punishment may not always be the most suitable option.

Extinction is a behavior reduction procedure in which a previously reinforced behavior is no longer reinforced. This process results in a reduction in behavior because the individual is no longer gaining access to the reinforcers that have previously been presented immediately following the behavior (Bijou, 1958; Cote, Thompson & McKerchar, 2005; Forehand, 1973; Goh & Iwata, 1994; Iwata, Pace, Kalsher, Cowdery & Cataldo, 1990; Iwata, Vollmer & Zarcone,

1993; More, Fisher & Pennington, 2004; Reff, Felce, & Barron, 1988; Kazdin, 2001; Fester & Skinner, 1957). Skinner (1953) noted the following "in general when we engage in a behavior which no longer "pays off," we find ourselves less inclined to behave in that way again." Extinction as a procedure has come a long way since Skinner; however, the general principles of behavior he described that are responsible for its effect remain the same. Under ideal circumstances, there should be zero opportunities for reinforcement of the behavior targeted for reduction. Lehardy and colleagues (2013) used extinction to teach discrimination of availability of elopement to a six-year old male with ASD. The child had previously been exposed to treatment for reducing the occurrences of elopement that were ineffective. During the session, the experimenter would place a picture of the hallway within the therapy room to indicate to the child he would be allowed to leave the room if he asked (Lehardy et al., 2013). After two minutes of exposure to this condition, a picture of a stop sign would be placed on the door to indicate to the child that leaving the room would not be allowed. During this training, extinction was implemented when the picture of the stop sign was in place, reinforcing consequences were no longer provided for request to leave the room and all attempts were blocked (Lehardy et al., 2013).

Extinction, however, is not always possible or may not be the best option in some situations. For example, if self-injurious behavior (SIB) were found to be sensitive to multiple consequences, such as attention and escape, it would be difficult or impossible not to provide any form of attention while applying escape extinction (Iwata, Pace, Cowdery, & Miltenberger, 1994). The physical contact that may be required to run escape extinction could place the SIB on an intermittent schedule of reinforcement and produce an increase in behavior (Smith, Russo & Le, 1999). Additionally, extinction as a procedure may not always be practical when the

behavior is producing sensory or automatic reinforcement. For example, if a child is scratching his skin resulting in scabs and the child then persistently picks at his scabs, they could become infected and take a long time to heal. If the behavior is maintained by tactile sensory reinforcement, extinction could consist of placing gloves on his hands and fading them out. However, the latter could interfere with restroom use, writing, and other activities the child might need to engage in daily.

Extinction has also been found to produce some negative side effects (Lerman, Iwata, & Wallace, 1999), such as extinction bursts (Goh & Iwata, 1994; Iwata et al., 1990), extinction-induced aggression (Lerman & Iwata, 1995; Lerman et al., 1999) and emotional behaviors (Piazza, Patel, Gulotta, Sevin & Layer, 2003; Reed, et al., 2004). An extinction burst consists of an increase in the frequency, intensity or magnitude of a targeted behavior when a previous reinforcing consequence is no longer delivered (Lerman et al., 1999). Extinction-induced aggression refers to increased levels of aggression in comparison to baseline measures. Lerman and colleagues (1999) conducted an analysis on literature where extinction was used as treatment and found that 40% of the cases experienced an extinction burst, extinction-induced aggression, or both. Overall, an extinction burst was observed in 39% of the cases and aggression in 22%. Furthermore, they found that the effects were more prevalent when extinction was utilized as the sole intervention (62% of cases) versus a treatment package (15% of cases). Emotional behaviors that have been noted include crying, negative vocalizations, and other disruptive behaviors (Piazza et al., 2003; Reed et al., 2004). For these reasons, ethical considerations must be taken into account and measures used to reduce risks are important when identifying a treatment procedure, especially combining extinction with antecedent interventions or reinforcement-based procedures.

Antecedent interventions are those that attempt to prevent the behavior from occurring, by manipulating the environment and motivating operations. Motivating operations have a direct affect on the behavior(s) likeliness or its absence. These interventions have also been referred to as prevention focused interventions in the literature (Butler & Luiselli, 2007; Hanley, Piazza, Fisher, Contrucci & Maglieri, 1997; Luiselli, 2006). Non-contingent reinforcement (NCR; Butler & Luiselli, 2007; Kodak et al., 2004; Piazza et al., 1997; Tarbox et al., 2003; Vollmer, Iwata, Zarcone, Smith, & Mazalezki, 1993) and functional communication training (FCT; Falcomata, Roane, Feeney & Stephenson, 2010; Falcomata, Roane, Muething, Stephenson & Ing, 2012; Lehardy et al., 2013; Leon, et al, 2013; Tarbox et al., 2003) are two types of antecedent interventions that have been used in the reduction of problem behavior.

NCR is a type of antecedent intervention in which the individual is given access to a maintaining reinforcer regardless of their behavior. Procedurally, the reinforcer would be delivered on a fixed-time (FT) or variable-time (VT) schedule. Allowing the individual to access the reinforcer often and for free decreases the need and the probability of the individual engaging in the problem behavior to gain access to that specific reinforcer. The eventual goal is that the environment becomes enriched, and reinforcement will be available enough that it becomes an abolishing operation to the occurrence of problem behavior. It may be used to deliver positive, negative and automatically reinforcing stimuli. Piazza and colleagues (1997) used NCR to treat elopement by a ten-year-old boy, whose elopement exposed him to dangers, such as him touching electrical cords, climbing on furniture and climbing on windowsills. A functional analysis revealed that elopement was maintained by access to tangible items (Piazza et al., 1997). Treatment consisted of NCR by allowing access to a preferred tangible item (e.g., string) regardless of his behavior. A variety of strings were made available in the area in which he was

expected to remain at all times. A single string was available in the next room, systematically set up to make this area less enriched. During treatment he was allowed to elope; however, he was not allowed to take the string from one room to the other. During baseline, elopement occurred approximately at a rate of approximately 1.25 times per minute. After the introduction of an NCR procedure, the experimenters were able to achieve a 100% reduction of elopement. The procedure generalized to the home and school setting for this individual (Piazza et al., 1997). These results demonstrate the effectiveness of using antecedent interventions, such as NCR to reduce problem behavior.

Another commonly used antecedent intervention is functional communication training (FCT). FCT involves teaching the individual a communicative response to obtain the reinforcer that was maintaining the target behavior (Carr & Duran, 1985; Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998). Davis and colleagues (2013) used functional communication as a treatment for elopement of a child whose behavior was maintained by access to tangible items. The child was taught to emit an appropriate response, "play with me" by pressing a button for a pre-recorded request from a speech-generating device (SGD) due to difficulty with vocalizations. Latency from the removal of tangible items to elopement was recorded and used for analysis. A 200% increase on latency to elopement was obtained (Davis et al., 2013).

Although, the above-mentioned antecedent interventions for behavior reduction have demonstrated to be effective, they may not always be practical. Caution must be taken not to inadvertently reinforce problem behavior when incorporating an NCR schedule (Camp et al., 2000). Additionally, with FCT, it has been noted that the individual may engage in the communicative response at high rates and at times in situations where reinforcement is not

available to be delivered, making this procedure impractical and difficult to generalize to the natural environment (Hagopian et al., 1998).

Differential reinforcement is another set of procedures that have been used to reduce problem behaviors, and is perhaps among the most widely used behavior reduction techniques. When using this method, a behavior or response class of behaviors is reinforced while the target behavior(s), a particular behavior or behavior class, is not reinforced or reinforced at lower rates. There are several differential reinforcement procedures for reducing behavior in this category. Four of the most utilized differential reinforcement procedures include differential reinforcement of alternative behaviors (DRA), differential reinforcement of incompatible behavior (DRI), differential reinforcement of other behavior (DRO).

Differential reinforcement of alternative behaviors (DRA) is a procedure in which a more appropriate response is selected to produce reinforcement at higher rates than the problematic response (Athens & Vollmer, 2010). Classically, when a DRA procedure is implemented the alternative response (more appropriate behavior) is reinforced continuously and that schedule is slowly thinned, while the behavior that is being targeted for reduction is not reinforced (Vollmer, Roan, Ringdahl & Marcus, 1999). However, there are variations of the DRA procedure (Piazza et al., 1997; Worsdell, Iwata, Hanley, Thompson & Kahng, 2000). Because the alternative behavior will result in high rates of reinforcement, the probability of that behavior reoccurring increases. The behavior chosen to replace the maladaptive behavior should preferably already exist in the individuals' range of behaviors prior to the intervention and should ideally produce the same type of consequence as the problem behavior (Vollmer et al., 1999). For example Piazza and colleagues (1997) implemented a DRA with an individual who would elope from parents in open areas. Treatment consisted of the child being able to pick from either receiving

attention or having free access to running (a preferred activity) as reinforcement for the child when he did not engage in elopement. Upon walking appropriately for a predetermined amount of time, the child was offered the choice between the two available reinforcers. At the onset of intervention, the reinforcement schedule was dense; however, it was successfully thinned and treatment was generalized to the individual's natural environment, while maintaining near zero rates of elopement (Piazza et al., 1997).

When an alternative and or incompatible behavior is not readily available and cannot be easily taught, differential reinforcement of other behaviors (DRO) might be a more viable option. DRO is cited as one of the most commonly used behavior reduction procedures (Vollmer et al., 1993). Typically, a DRO involves the delivery of reinforcement contingent on the non-occurrence of the response targeted for reduction for a specified amount of time (whole-interval DRO) or at a predetermined moment in time (momentary DRO) (Hammond, Iwata, Fritz & Dempsey, 2011). Piazza and colleagues (1997) used DRO to decrease elopement of an 11-year-old boy who had a diagnosis of severe intellectual disability, autism, bipolar and ADHD and was admitted for the treatment of elopement. Functional analysis of elopement revealed that it was maintained by access to a tangible item and attention. Treatment consisted of differential reinforcement of other behavior, using attention and chips as reinforcement for the non-occurrence of elopement for a predetermined time, which was later extended and generalized to various settings. Elopement was not blocked due to the fact that mom would not be able to consistently block in the natural environment, however, upon elopement during treatment eating chips was blocked, no attention was provided, and the timer was reset once he independently returned to the treatment room (Piazza et al., 1997). Upon DRO implementation, an 80% reduction of elopement was immediately observed (Piazza et al., 1997).

With all behavioral interventions, the goal is to increase or decrease behaviors and many times intervention procedures require a combination of increasing behaviors, while simultaneously decreasing other behaviors. Thus, the procedures mentioned above are utilized as part of a multicomponent treatment package on most occasions. This means that while there may be an extinction procedure to reduce one behavior, there is simultaneously an antecedent intervention in place to prevent that behavior and a reinforcement based intervention to increase another behavior. For example, Matson, LoVullo, Boisjoli and Gonzalez (2008) utilized DRO, compliance training, extinction and FCT as an intervention package to reduce aggressive behaviors of an 11-year-old girl diagnosed with ASD. Because her aggressive behaviors served different functions in different contexts, different contingencies had to be placed to address her needs and successfully decrease her problem behavior, as well as provide her with the communicative tools to meet those needs in the future. Because of the fact that in the natural environment there is an enormous amount of stimuli present at any given time to which we are responding, multicomponent treatment packages almost seem necessary in order for an intervention to be successful across settings, people, and functions.

The purpose of the proposed study is to evaluate the assessment and treatment of elopement using a multicomponent treatment package to address the multiple functions of elopement in children with ASD. This study attempts to create a multicomponent treatment package to reduce rates of elopement that can eventually be applied to the general population, as opposed to focusing on individual differences.

CHAPTER II

GENERAL METHODS

This experiment consisted of implementation of similar methodologies to assess and treat elopement for two participants independently. A paired choice preference assessment was conducted initially with each child to obtain a hierarchy of preferred items that would be used in each child's functional analysis and during treatment. Next, an experimental functional analysis was conducted for each participant to assess the possible functions of their elopement behavior. The results of the above mentioned assessments were evaluated and used in the creation of a multicomponent treatment package. These procedures will be described in more detail below.

Participants and Setting

Participants were individuals diagnosed with autism spectrum disorder actively enrolled at the University of Texas Pan-American behavioral research clinic for a variety of behavioral concerns including elopement. Hector is an energetic four-year-old boy, who enjoys playing with blocks and trains, and frequently engages in imaginative, but repetitive, play. He often communicates with one-word utterances and or gestures to mand for preferred items and activities. Hector's caregivers reported that he would elope from settings such as parking lots, parks, beaches, street sidewalks and other open areas. Natalia is an active three-year-old girl who enjoys being held, playing Ring Around the Rosy, and observing herself in mirrors or glass. She has an extremely limited verbal repertoire and often resorts to disruptive behaviors in the form of tantrums to get things she wants. Natalia's caregivers reported that she engaged in elopement in public areas such as restrooms, stores, outdoor markets, sidewalks and parking lots.

For both participants, elopement had at some point resulted in increased risk of the dangers of drowning, being run over and/or getting lost. One participant had previously eloped and been missing in a high traffic public setting for approximately 15 to 20 minutes. Parents' constant and vigilant supervision was necessary, particularly in community settings, to ensure the child's safety.

Elopement trials were conducted in a long hallway within a university building. The hallway was approximately 120 feet long, however during sessions 50

feet were blocked off and utilized. Six undergraduate research assistants would block either side of the hallway to ensure the participant would not pass this perimeter. The hallway had floor to ceiling glass windows on one side that offered a view of an outside courtyard area and on the other was a concrete wall that had several large-scale paintings.

Response Measure and Interobserver Agreement

Elopement was defined as any instance of the participant moving at least two feet away from the caregiver or experimenter without consent by either walking or running. During treatment for both participants, attempts to elope were also counted. Attempts were defined as any instance of the participant lunging forward in an attempt to pick up pace. A primary observer and a secondary observer collected frequency data independently and simultaneously for the target response. Interobserver agreement was assessed for 75% of all functional analysis, baseline sessions and for 70% of treatment sessions for each participant. The mean agreement for frequency of elopement for Hector and Natalia, during the functional analysis, was 97% (range of 83% to 100%) and 98% (range of 86% to 100%), respectively. Hector and Natalia's mean agreement, during baseline, was 97% (range, 92% to 100%) and 100%, respectively.

Lastly, mean agreement, during treatment, for occurrences of elopement for Hector and Natalia was 100%.

Assessment Procedures

A paired choice preference assessment (Fisher et al., 1992) was conducted with each participant. The preference assessment began by identifying eight items the participant gravitated toward or played with at home. This information was gathered through informal observations and indirect assessments (interviews with parents/guardians). These eight items were then listed on the paired choice preference assessment data sheet in the allotted numbered spaces with no hierarchy (see appendix A), which provided a number identifier for each item. The experimenter walked the participant in to the session room and sat with the participant on the floor. The experimenter then shuffled notecards, which had two prewritten numbers, to pair each of the eight items with each other. These notecards were used to randomize the order in which the items were presented to the child. For example, if the notecard read 2 – 4, items 2 and 4 were presented. Next, the experimenter placed one item in each hand and presented both items to the participant while saying, "(name of the child), pick one." The data collectors then recorded on data sheets the item that the participant chose. The process was repeated until all items were paired with every other item. If the participant grabbed both of the items presented, the experimenter would retrieve them, place the matching notecard at the end of the stack and represented the items again later. If the participant reached for one item, the participant was given access to the item for 30 seconds. At the end of the 30 seconds, the item was retrieved and another set of items was immediately presented. The items identified as low, medium, and highly preferred were used accordingly in each of the participants' experimental functional

analysis and during treatment. The items used for each participant and their results are presented in appendix B.

The experimental functional analysis was derived from the methodologies of Iwata and colleagues (1994). The experimenter guided the participant in to the hallway area, as described above, for elopement trials. Each session lasted 5 minutes. Attention, demand, tangible and play conditions were alternated at random in a multielement design. The attention condition was developed to match a situation in the natural environment in which a behavior is followed by a similar type of social disapproval and that consequence serves to maintain the behavior of concern through the delivery of socially mediated positive reinforcement. The demand condition was established to assess the possibility that an individual would engage in a particular behavior of interest in order to escape or avoid a situation in which they are being requested to do things, often termed negative reinforcement. The purpose of the tangible condition is to assess the possibility that the individual is engaging in the target behavior to gain access to a physical item that he/she wants. The unstructured play condition was developed to serve as a control for all other conditions, in which toys are present and attention is being provided noncontingently while target behaviors are being ignored. Additionally, the unstructured play condition was developed to simulate an environment that is enriched and, thus, lower levels of the target behavior should be observed. However, high rates of the target behaviors in this condition may be an indication of an automatic or sensory function of the response, particularly when higher rates are observed across conditions. These conditions will be described in detail below.

During the attention condition the participant was directed to the hallway area. The experimenter began the session by saying, "Come on, I need to make a phone call." The experimenter then turned away from the participant and walked along with the participant while

pretending to be on a phone call. Attention was made contingent on elopement. When the participant eloped, the experimenter immediately turned toward the participant and ran after the participant and said "(name of the child), please don't do that". Once the experimenter reached the participant, he/she retrieved the participant and repeated "Come on, I need to make a phone call". All responses other than the target behavior were ignored.

During the demand condition the participant was directed to the hallway and presented with various demands. The experimenter placed the demands to walk, sit, and stand with them in rotation by saying for example, "sit with me." When the participant complied, the experimenter praised the participant by saying things such as "good job" or "nice sitting" and immediately presented another demand. If the participant did not comply with the demand after three seconds, the experimenter would initiate three-step guided compliance procedures. Once the demand was complete, another demand was presented. Escape from demands was made contingent on elopement. If the participant engaged in elopement, the experimenter immediately stopped the demand and turned away from the participant saying, "Ok, you can take a break." The participant was then permitted to take a break (elope) for 30 seconds with team members blocking all relevant exits to ensure the child's safety at all times. After the 30 second break, the experimenter walked toward the participant and continued with the demands. All responses other than the target behavior were ignored.

During the tangible condition the participant was directed to the hallway. The experimenter then presented the participant a highly preferred item (as identified through the preference assessment) and provided uninterrupted access for two minutes. When the two minutes lapsed, the experimenter removed the item and the tangible condition in the functional analysis began. Access to the preferred item was made contingent on elopement. When the

participant engaged in elopement, the experimenter immediately presented the preferred item, and said "here is your (name of the item)." All other responses were ignored.

The play condition was used as a control condition by providing a non-contingently reinforcing environment. This condition involved ensuring that no demands were placed on the child, a variety of toys were made available (low to medium preferred as identified by preference assessment), and attention was freely available. The experimenter delivered attention at least once every 30 seconds either noncontingently or contingent on appropriate behaviors, such as "I love your hair," "nice shoes," or "I like the way you play." All target responses were ignored.

Treatment Procedures

An ABAB reversal design was used to assess the treatment. The first phase was a baseline (A), which served as a visual and quantifiable depiction of how often the target behavior was occurring prior to treatment. The next phase included the introduction of the treatment package (B). Following the implementation of the treatment package, the treatment was removed to determine if the effects observed during treatment were the direct result of the treatment or if another process was responsible for the changes. Lastly, treatment was reinstated (B) given the social significance of treating this specific target behavior.

Baseline

In most cases, the results of the functional analysis are used as the initial baseline. However, given that elopement appeared to have multiple functions for both participants, a synthesized baseline, as described by Hanley and colleagues (2013), was used. A synthesized assessment is one in which the consequences that were found to be maintaining elopement behavior were provided simultaneously during each baseline session with the understanding that there is a combination effect occurring and the target behavior is being maintained not only by

one function or another, but rather by the interaction between multiple functions. A detailed description for each child is provided below.

Baseline (Hector). The participant was directed to the hallway and presented with various demands. The experimenter placed demands on the participant to walk, sit and stand with them in rotation, for example by saying, "walk with me." When the participant complied, the experimenter praised the participant by saying "good job" or "nice sitting" and immediately presented another demand. If the participant did not comply, the experimenter began three step-guided compliance procedures. Once the demand was complete, another demand was presented. If the participant engaged in elopement, the experimenter immediately ran after the participant saying "Hector, please don't do that." Once the experimenter was within two feet of the participant another demand was presented and the process was repeated. All responses other than the target behavior were ignored, and thus did receive a break from demands or access to attention.

Baseline (Natalia). The participant was directed to the correct area. There were medium to low preferred toys available for the participant to play with, foam letters and Thomas the train (as identified by the preference assessment). The experimenter began by saying, "let's play." During play, the experimenter presented demands to the participant to walk, sit and stand with them in rotation. For example by saying, "walk with me," while simultaneously engaging in play with the available toys. When the participant complied, the experimenter praised the participant by saying "good job," "nice sitting" or "nice playing" and immediately presented another demand. If the participant did not comply, the experimenter followed three-step guided compliance procedures. Once the demand was complete, another demand was presented. If the participant engaged in elopement, the experimenter would immediately run after Natalia saying

"Natalia, please don't do that" and give her access to her highest preferred item, as determined through a paired-choice preference assessment, for 30 seconds. Once the thirty-second time elapsed, the experimenter would remove the items and say, "Let's play" and the process was repeated. All responses other than the target behavior were ignored, and thus would not receive a break from demands, attention from the experimenter, or access to her highly preferred item.

Treatment

The items identified in the preference assessment (mentioned above) as having reinforcing properties were integrated into the treatment components. Since the results of the functional analysis for both participants indicated that elopement was multiply controlled, it appeared that a multicomponent treatment package would be most effective in reducing elopement for both participants. The treatment package evaluated in this project involved a combination of antecedent procedures, blocking, and differential reinforcement of other behavior. The treatment package will be described in detail below.

Treatment package. The participant was directed to the hallway area. The session began by the experimenter providing a verbal instruction, which was an antecedent manipulation. The experimenter told the participant "(name of participant), if you want the (highly preferred item) you have to stay with me." This was included to indicate to the participant that the contingencies were now in place and to serve as an additional discriminative stimulus, which would, after repeated presentations, gain controlling properties for the behavior of staying within two feet. The experimenter then alternated demands to walk, sit or stand with them throughout the duration of the session. These demands were chosen because of three reasons. First, both families reported that the elopement behavior of the participants occurred when they needed their child to engage in one of the three behaviors mentioned above. Second, the topography of the

behaviors already existed in their repertoire; although, it was not emitted upon request. Finally, the verbal demand was expected to acquire stimulus control over appropriate behavior. Treatment also included differential reinforcement of other behaviors with extinction (DRO w/ EXT) to reinforce behaviors other than elopement or attempts to elope. Reinforcement was delivered after a predetermined amount of time, 10 seconds, which was calculated based on the interresponse time (IRT) of occurrences of elopement during baseline for each participant (Repp, Deitz, & Deitz, 1976). The reinforcer delivered was determined based on both the function of elopement (as determined by the functional analysis) and the highly preferred tangible item (as identified by the preference assessment). The experimenter began a 10 second timer when the participant began to comply with the demand. Three step-guided compliance was used as part of escape extinction for the behavior of elopement. For example, if the experimenter said, "let's walk," once the participant started to walk the ten-second timer was started, and contingent on the nonoccurrence of elopement for those ten seconds the experimenter delivered the preferred item while saying, "nice walking" and allowed the child access to a highly preferred item for ten seconds during which no demands were placed. At the end of the ten seconds, the experimenter retrieved the item and placed another demand such as "sit with me" and the process was repeated. Blocking, which has demonstrated to be an essential component in the treatment of elopement (Call et al., 2011), was included. Nevertheless, Call and colleagues acknowledge that, due to nature of the behavior, it may not always be possible to block, thus, retrieval procedures were also in place. Blocking consisted of the experimenter placing his or her hand/arm in front of the participant to physically guide the participant to stay within two feet of the experimenter, while providing the least amount of physical attention or eye contact. If the participant managed to elope, the experimenter immediately retrieved the participant, while also providing least

amount of physical attention and eye contact, while continuing to place the same demand. If the participant attempted to elope or eloped, the timer was reset for ten seconds and data collectors documented the response.

CHAPTER III

RESULTS

During the experimental functional analysis both participants had variable rates of responding in at least two of the four conditions. The results of Hector's experimental functional analyses are presented in Appendix C, top panel. Hector exhibited high levels of elopement in both the attention and demand conditions. During the attention conditions, Hector's average rate of responding was 2.2 instances of elopement per minute with his behavior at an upward trend. During demand conditions, it was an average of 1.4 instances per minute, with a steady rate in responding observed during the last two sessions. Hector eloped at a rate of 1.2 instances per minute during the first tangible condition session, however, the rate dropped and remained at zero instances of elopement for the remainder of the tangible conditions of the functional analysis. Hector never eloped during play conditions of the functional analysis. The results of Hector's functional analysis indicate that his elopement behavior was multiply controlled by attention and escape from demands. The results of Natalia's experimental functional analyses are presented in Appendix C, bottom panel. Rates of elopement were variable in all of the conditions of the functional analysis for Natalia. The highest rates of elopement were observed during the attention conditions, with an average rate of responding of 2.84 instances per minute. An upward trend in elopement was observed toward the end of the assessment. During tangible conditions, the average rate was 1.64 instances per minute. Rates during the demand conditions averaged 1.52 instances of elopement per minute. Lastly, the average rate of responding was 0.92 instances per minute during play conditions. It should be noted that throughout the play

conditions of the functional analysis Natalia would occasionally be carried by the experimenter, which may explain the lower average rates of responding throughout that condition. The variable rates of elopement that were observed throughout all of the conditions suggest that Natalia's elopement is maintained by automatic reinforcement.

As previously described, Hector's baseline consisted of delivering attention in the form of a brief social reprimand and allowing a 30 second break from demands contingent on elopement. The combination of consequences was used because results of the functional analysis indicated that his elopement behavior was maintained by both attention and escape. During baseline for Hector, the average rate was 4.53 instances of elopement per minute and an upward trend in behavior was observed (see Appendix D, top panel). Results from Natalia's functional analysis revealed that her elopement behavior was sensitive to all of the consequences presented during the functional analysis, therefore, her baseline consisted of the delivery of attention, escape from demands, and access to a highly preferred tangible item contingent on elopement. Her average rate during baseline was 2.4 instances of elopement per minute (see Appendix D, bottom panel). When treatment was implemented Hector's rate of elopement decreased as expected to an average of .73 instances per minute, a greater than 80% reduction. Natalia's average rate of elopement also decreased as expected during the first phase of treatment to an average rate of 0.4, a reduction greater than 80%. When treatment was removed during the reversal phase, Hector's rate of elopement increased as anticipated to an average rate of 2.2 instances per minute. During Natalia's reversal, the average rate was .98 instances of elopement per minute, an increase from the fist treatment phase, however, not near initial baseline rates. Throughout the reinstatement of treatment the average rate of responding was .43 instances of elopement per minute for Hector, an 80% reduction from the return to baseline and a 90%

reduction from the original baseline. Natalia's average rate of responding during the reinstatement of treatment was 1.0 instance of elopement per minute, no reduction from reversal phase was observed.

CHAPTER IV

DISCUSSION

The purpose of this study was to evaluate the use of similar assessment procedures, as well as the use of a multicomponent treatment package for addressing the multiple potential functions of elopement in children with ASD. In this study, the functional analysis methodologies utilized were chosen because they closely resembled the conditions in which the behavior was occurring within the natural environment as compared to previous research in which the functional analysis were conducted inside one room or within a much smaller enclosed area. Although the rates of elopement for Hector were higher during most attention conditions of the functional analysis, it was not possible to rule out a functional relationship between elopement and escape from demands (see appendix C, top panel). The rates of elopement during the demand condition remained moderately high and stable throughout the analysis, while reaching and remaining at zero for the tangible condition and never occurring in the play condition (see appendix C, top panel). It is possible that the verbal attention and physical attention provided inherently by placing demands and the use of three step-guided compliance contributed to the difference in rates between the attention and demand conditions. This suggests that the amount of attention received during the demand condition was enough to decrease the rates of elopement but not eliminate its occurrence all together. Similar to Hector, Natalia emitted the highest levels of elopement during the attention condition, however, the varying but high rates of elopement throughout the functional analysis in all conditions was an

indication that some form of sensory/automatic reinforcement was maintaining her elopement behavior (see appendix C, bottom panel).

When the contingencies of the hypothesized functions, based on the functional analysis, were combined during baseline for Hector, his elopement behavior increased significantly (see appendix D, top panel). The results observed during baseline suggest that the combined effect of the two consequences was more influential than one single consequence for him. The multicomponent treatment package utilized was successful in reducing the rates of elopement for both participants after the first phase of treatment (see appendix D). Hector's behavior immediately decreased by 64% in the first treatment session and quickly dropped to more than an 80% reduction by the second session and maintained a steady rate for five consecutive sessions. When the treatment was removed during the return to baseline (see appendix D, top panel), his behavior increased and was at an upward trend reaching similar average rates per minute to the initial baseline phase. This indicated that the treatment package in phase two did account for the reductions observed in his elopement behavior. Finally, once the treatment was reinstated, the behavior decreased and remained at a stable low average rate of responding of .33 instances per minute during the last eight sessions (range 0 to .6) (see appendix D, top panel), suggesting that the multicomponent treatment package did successfully come to gain control of the nonoccurrence of elopement.

For Natalia, we were not as successful in demonstrating control of her elopement behavior because we could not reverse the effects of the treatment package in the reversal phase as quickly as with Hector (see appendix D, bottom panel). The latter could suggest that what she had learned could not as easily be unlearned. In fact, we saw higher rates of compliance during the second baseline phase compared to the initial baseline and first treatment phase. Natalia

would readily sit, stand or walk with the experimenter instead of trying to elope. Unfortunately, we did not collect data on compliance; therefore, this information is not reflected in the data. Eventually, elopement did increase to concerning rates after five reversal sessions (see appendix D, bottom panel). When treatment was reinstated, Natalia's behavior did decrease as anticipated, but remained at concerning rates, an average rate of 1 response per minute for seven sessions. Her behavior never reached the low rates that were observed in the first phase of treatment (see appendix D, bottom panel).

A few things could explain the inability to reach complete suppression of Natalia's elopement behavior. One, her behavior seemed to be maintained by automatic and or sensory reinforcement. As previously noted by Lehardy and colleagues (2013) there are inherent difficulties in identifying nonsocial reinforcers. This could be due to the inability to control for all of the variables that are functionally related to the target behavior. In fact, if running, in and of itself, was the source of reinforcement, our inability to block all attempts to elope could have kept her behavior on an intermittent schedule of reinforcement. This could potentially explain the reason that we were able to obtain greater decreases with Hector. Hector's behavior was maintained by escape and attention, which means that even if he managed to elope, but was not given a break from demands or attention and his reinforcers were delayed, we were successful with the integrity of procedural extinction. Second, it is possible that the reinforcement value of her preferred item could have changed. We may have been able to alter her elopement behavior during the first phase of treatment by delivering her preferred item, providing attention, and permitting a break from demands contingent on the nonoccurrence of elopement. This could have been sufficient or strong enough to compete with the automatic function of her elopement behavior during the first treatment phase but not during the second. A preference assessment

was not conducted at this time and thus it is unclear whether the item continued to be preferred and could effectively compete with the hypothesized automatic or sensory function.

Limitations and Future Research

This experiment was not without limitations. One limitation was that during implementation of treatment for both participants there were some unsuccessful attempts to block elopement. The unsuccessful attempts to block instances of elopement during treatment were followed by the experimenter running after the participant, while providing the least attention, however, attention inherently exists in retrieval and redirection. This could account for some of the fluctuation in the rates of elopement. Also, as mentioned above, the behavior of running could have potentially possessed automatic reinforcing properties for Natalia's elopement behavior. Documentation of instances in which the participants successfully eloped in data collection may have provided more information about its potential influence on Natalia's behavior and for future applications. Another limitation was the fact that the experiment was conducted in a public area within the university, which at times meant that random distractions would present themselves that could not be controlled. This may have influenced the amount of experimental control possible, however, this also made the assessment and treatment setting more naturalistic. The number of participants was also a limitation. Having additional participants with socially mediated functions and additional participants with automatic functions would have allowed for comparison in results due to function as an important variable that affected the efficiency of treatment.

A possible extension of this experiment could be to increase the number of participants, separate and compare the results of those with an automatic function versus a socially mediated function, and potentially isolate variables to determine how much of the differences in these and

future results are attributed to the differences in the functions. Additionally, future research could explore the use of synthesized assessments during functional analysis, as described by Hanley and colleagues (2013), for cases in which the target behavior is hypothesized to be multiply controlled. In this experiment, it was observed that for Hector, whose elopement was socially maintained, when the consequences that influenced his behavior combined, the response rates (4.53 mean responses per minute in baseline) more than doubled the highest rates obtained during the functional analysis (2.2 mean responses per minute in the attention conditions). This may indicate that, for multiply controlled problem behaviors, the estimates obtained during the functional analysis may be an underrepresentation of the estimates observed in the natural environment with the interaction of multiple functions being available simultaneously. This is an area for future research to explore.

REFERENCES

American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders (5th ed.) Arlington, VA: American Psychiatric Association

Anderson, C., Law, J. K., Daniels, A., Rice, C., Mandell, D. S., Hagopian, L., & Law, P. A. (2012). Occurrence and family impact of elopement in children with autism spectrum disorder. *Pediatrics, 130(5),* 870-877. doi: 10.1542/peds.2012-0762

Athens, E. S. & Vollmer, T. R. (2010). An investigation of differrential reinforcement of alternative behavior without extinction. *Journal of Applied Behavior Analysis, 43(4),* 569–589. doi: 10.1901/jaba.2010.43-569

Balsam, P. D., & Bondy, A. S. (1983). The negative side effects of reward. *Journal of Applied Behavior Analysis*, *16(3),* 283-296. doi: 10.1901/jaba.1983.16-283

Bandura, A. (1969). Principles of behavior modification.

Bean, A. W., & Roberts, M. W. (1981). The effect of time-out release contingencies on changes in noncompliance. *Journal of Abnormal Psychology*, *9(1),* 95-105. doi: 10.1007/BF00917860

Butler, L. R. & Luiselli, J.K. (2007). Escape maintained problem behavior in a child with autism: Antecedent funtional and intervention evaluation of nocontingent escape and instructional fading. *Journal of Positive Behavior Interventions,* 9: 195. doi: 10.1177/10983007070090040201

Call, N. A., Pabico, R. S., Findley, A. J., & Valentino, A. L. (2011). Differential reinforcement

with and without blocking as treatment for elopement. *Journal of Applied Behavior Analysis*, *44(4),* 903-907. dio: 10.1901/jaba.2011.44-903

Capaldi, E. D., Sheffer, J. D., Viveiros, D. M., Davidson, T. L., & Campbell, D. H. (1985). Shock preexposure and the reduced effectiveness of shock. *Learning and Motivation, 16*, 357–380. doi: 10.1016/0023-9690(85)90021-9

Camp, C. M. V., Lerman, D. C., Kelley, M. E., Roane, H. S., Contrucci, S. A., & Vorndran, C. M. (2000). Further analysis of idiosyncratic antecedent influences during the assessment and treatment of problem behavior. *Journal of Applied Behavior Analysis*, *33*(2), 207-221. doi: 10.1901/jaba.2000.33-545

Carr, E. G., & Duran, V. M. (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18,* 111-126. doi: 10.1901/jaba.1985.18-111

Chambers, J. H., Sanok, R. L., & Striefel, S. (1980). Using contingent decreased freedom-of-movement to eliminate classroom running away: A case study. *Education and Treatment of Children, 3,* 123-132.

Davis, T.N., Duran, S. Bankhead, J., Strickland, E., Blenden, K., Dacus. S., … & Machalicek, W. (2013). Brief report: Latency functional analysis of elopement. *Behavioral Interventions, 28,* 251-259. doi: 10.1002/bin.1363

Deitz, S. M. (1977). An analysis of programming DRL schedules in educational settings. *Behaviour Research and Therapy*, 15(1), 103-111. doi: 10.1016/0005-7967(77)90093-6

Deitz, D. E. D., & Repp, A. C. (1983). Reducing behavior through reinforcement. *Exceptional Education Quarterly, 3, 34-46.*

Donaldson, J. M., & Vollmer, T. R. (2011). An evaluation and comparison of time-out procedures with and without release contingencies. *Journal of Applied Behavior Analysis*, *44*(4), 693-705. doi: 10.1901/jaba.2011.44-693

Falcomata, T. S., Roane, H. S., Feeney, B. J., & Stephenson, K. M., (2010). Assessment and treatment of elopement maintained by access to stereotypy. *Journal of Applied Behavior Analysis, 43,* 513–517. doi: 10.1901/jaba.2010.43-513

Falcomata, T. S., Roane, H. S., Muething, C. S., Stephenson, K. M., & Ing, A. D. (2012). Functional communication training and chained schedules of reinforcement to treat challenging behavior maintained by terminations of activity interruptions. *Behavior modification*, *36(5),* 630-649. doi: 10.1177/0145445511433821

Fester, C. B., & Skinner, B. F. Schedules of Reinforcement. N.-Y.,-1957. *Gendlin ET*.

Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis, 25,* 491-498. doi: 10.1901/ jaba.1992.25-491

Forehand, R. (1973). Teacher recording of deviant behavior: A stimulus for behavior change. *Journal of Behavior Therapy and Experimental Psychiatry*, *4(1),* 39-40. doi: 10.1016/0005-7916(73)90036-0

Foxx, R. M., & Azrin, N. H. (1973). The elimination of autistic self-stimulatory behavior by overcorrection1. *Journal of Applied Behavior Analysis*, *6(1),* 1-14. doi: 10.1901/jaba.1973.6-1

Garner, M.M. (1990). The treatment of elopement behavior in a retarded using a graduated levels program. *Journal of Behavior Therapy and Experimental Psychiatry, 21,* 277- 280. doi:

10.1016/0005-7916(90)90029-K

Goh, H., & Iwata, B.A. (1994). Behavioral persistence and variability during extinction of self-injury maintained be escape. *Journal of Applied Behavior Analysis, 27,* 175-176. doi: 10.1901/jaba.1994.27-173

Hagopian, L. P., Fisher, W. W., Sullivan, M. T., Acquisto, J., & LeBlanc, L. A., (1998). Effectiveness of functional communication training with and without extinction and punishment: a summary of 21 inpatient cases. *Journal of Applied Behavioral Analysis, 31,* 211-231. doi: 10.1901/jaba.1998.31-211

Halevy, G., Feldon, J., & Weiner, I. (1987). Resistance to extinction and punishment following training with shock and non-reinforcement: Failure to obtain cross-tolerance. *The Quarterly Journal of Experimental Psychology*, *39(2),* 147-160. doi: 10.1080/14640748708402259

Hanley, G. P., Piazza, C. C., Fisher, W. W., Contrucci, S. A., & Maglieri, K. (1997). Evaluation of client preference for function-based treatment packages. *Journal of Applied Behavior Analysis*, *30(3),* 459-473. Doi: 10.1901/jaba.1997.30-459

Hammond, J. L., Iwata, B. A., Fritz, J. N. & Dempsey, C. M. (2011). Evaluation of fixed momentary DRO schedules under signaled and undignaled arraingements. *Journal of Applied Behavior Analysis, 44(1),* 69–81. doi: 10.1901/jaba.2011.44-69

Hanley, G.P., Jin, C.S., Vanselow, N.R, & Hanratty, L.A. (2014). Producing meaningful Improvements in problem behavior of children with autism via synthesized analyses and treatments. *Journal of Applied Behavior Analysis, 47,* 16-36. doi: 10.1002/jaba.106

Iwata, B.A., Dorsey, B.A., Dorsey, M.F., Slifer, K.J., Bauman, K.E. & Richman, G.S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Beahvior Analysis, 27,* 1

*97-209*10.1901/jaba.1994.27-197 (Reprinted from *Analysis and Intervention in Developmental Disabilities, 2*, 3-20. 1982)

Iwata, B. A., Pace, G. M., Cowdery, G. E. & Miltenberger, R.G. (1994). What makes extinction work: An analysis of procedural form and function. *Journal of Applied Behavior Analysis, 27,* 131-134. doi: 10.1901/jaba.1994.27-131

Iwata, B. A., Pace, G. M., Kalsher, M. K., Cowdery, G. E., & Cataldo, M. F. (1990). Experimental analysis and extinction of self-injurious escape behavior. *Journal of Applied Behavior Analysis, 23,* 11-27. doi: 10.1901/jaba.1990.23-11

Jacobson, J.W. (1982). Problem behavior and psychiatric impairment within a developmentally disabled population: I. Behavior Frequency. *Applied Research in Mental Retardation, 3,* 121-139. doi: 10.1016/0270-3092(82)90002-9

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous child*, *2(3),* 217-250.

Kodak, T., Grow, L., & Northup, J. (2004). Functional analysis and treatment of elopement for a child with attention deficit hyperactivity disorder. *Journal of Applied Behavioral Analysis, 37,* 229-232. doi:10.1901/jaba.2004.37-229

Lang, R., Davis, T., O'Reilly, M., Machalicek, W., Rispoli, M., Sigafoos, J., … & Regester, A. (2010). Functional analysis and treatment of elopement across two school settings. *Journal of Applied Behavior Analysis, 43,* 113-118. doi: 10.1901/jaba.2010.43-113

Lang, R., Rispoli, M., Machalicek, W., White, P.J., Kang, S Pierce, N., … & Lancioni, G. (2009). Treatment of elopement in individuals with developmental disabilities: A

systematic review. *Research in Developmental Disabilities, 30(4)*. 670-681 doi: 10.1016/j.ridd.2008.11.00

Lehardy, R.K., Lerman, D.C., Evans, L.M., O'Connor, A., & LeSage, D.L. (2013). A simplified methodology for identifying the function of elopement. *Journal of Applied Behavior Analysis, 43,* 256-270. doi: 10.1002/jaba.22

Leon, Y., Lazarchick, W. N., Rooker, G. W., & DeLeon, I. G. (2013). Assessment of problem behavior evoked by disruption of ritualistic toy arrangement in a child with autism. *Journal of applied behavior analysis, 46(2),* 507-511. doi: 10 .1002.jaba.41

Lerman, D.C., & Iwata, B.A. (1995). Prevalence of the extinction burst and its attenuation during treatment. *Journal of Applied Behavior Analysis, 28(1),* 93-94. doi: 10.1901/jaba. 1995.28-93

Lerman, D. C., Iwata, B. A., & Wallace, M. D. (1999). Side effects of extinction: Prevalence of bursting and aggression during the treatment of self-injurious behavior. *Journal of Applied Behavior Analysis*, *32(1),* 1-8. doi: 10.1901/jaba.1999.32-1

Lerman, D. C., & Vorndran, C. M. (2002). On the status of knowledge for using punishment: Implications for treating behavior disorders. *Journal of Applied Behavior Analysis*, *35*(4), 431-464. Doi: 10.1901/jaba.2002.35-431

Luiselli, J.K. (Ed.). (2006). *Antecedent assessment & intervention: Supporting children & adults With developmental disabilities in community settings.* Paul H. Brookes Pub

Mace, F.C., & Belfiore, P. (1990). Behavioral momentum in the treatment of escape motivated Stereotypy. *Journal of Applied Behavior Analysis, 23(4),* 507-514. doi: 10.1901/jaba.1990.23-507

Mace, F. C., Hock, M. L., Lalli, J. S., West, B. J., Belfiore, P., Pinter, E., & Brown, D. K. (1988). Behavioral momentum in the treatment of noncompliance. *Journal of Applied Behavior Analysis*, *21*(2), 123-141. doi: 10.1901/jaba.1988.21-123

Matson, J.L., LoVullo, S.V., Boisjoli, J.A. & Gonzalo, M.L. (2008). The behavioral treatment of an 11-year-old girl with autism and aggressive behaviors. *Clinical Case Studies,* 7(4), 313-326. doi: 10.1177/1534650107312243

McDowell, C., Duffy, K. & Kerr, K.P. (2007). Increasing food acceptance and reducing challenging behavior in a four-year-old girl with autism. *European Journal of Applied Behavior Analysis, 8(2),* 267-276.

McLaughlin, J. G., & Nay, W. R. (1975). Treatment of trichotillomania using positive coverants and response cost: A case report. *Behavior Therapy*, *6(1),* 87-91. doi: 10.1016/50005-7894(75)80067-0

McClintock, K., Hall, S., & Oliver, C. (2003). Risk markers associated with challenging behaviours in people with intellectual disabilities: A meta‐analytic study. *Journal of Intellectual Disability Research*, *47(6),* 405-416. doi: 10.1046/j.1365-2788.2003.00517.x

Myers, D. V. (1975). Extinction, DRO, and response cost procedures for eliminating self-injurious behavior: a case study. *Behavior research and therapy, 13(2),* 189-191. doi: 10.1016/005-7967(75)90016-9

Padgett, W.L., Garcia, H.D., & Pernice, M.B. (1984). A Travel Training Program Reducing Wandering in a Residential Center for Developmentally Disabled Persons. *Behavior modification*, *8(3),* 317-330. doi:10.1177/0145 4455840083002

Perrin, C.J., Perrin, S.H., Hill, E.A. & DiNovi, K. (2008). Brief functional analysis and treatment of elopement in preschoolers with autism. *Behavioral Intervention, 23,* 87-95. doi: 10.1002/bin.256

Piazza, C.C., Hanley, G.P., Bowman, L.G., Ruyter, J.M., Nataliauer, S.E. & Saiontz, D,M. (1997). Functional analysis and treatment of elopement. *Journal of Applied Behavioral Analysis, 30,* 653-672. doi: 10.1901/jaba.1997.30-653

Piazza, C. C., Patel, M. R., Gulotta, C. S., Sevin, B. M., & Layer, S. A. (2003). On the relative contributions of positive reinforcement and escape extinction in the treatment of food refusal. *Journal of Applied Behavior Analysis*, *36(3),* 309-324. doi: 10.1901/jaba.2003.36-309

Rapport, M. D., Murphy, A., & Bailey, J. S. (1980). The effects of a response cost treatment tactic on hyperactive children. *Journal of School Psychology*, *18(2),* 98-111. doi: 10/1016/0022.4405(80)90025-4

Reed, G. K., Piazza, C. C., Patel, M. R., Layer, S. A., Bachmeyer, M. H., Bethke, S. D., & Gutshall, K. A. (2004). On the relative contributions of noncontingent reinforcement and escape extinction in the treatment of food refusal. *Journal of Applied Behavior Analysis*, *37(1),* 27-42. doi: 10.1901/jaba.2004.37-27

Repp, A. C., & Deitz, S. M. (1974). Reducing aggressive and self-injurious behavior of institutionalized retarded children through reinforcement of other behaviors1. *Journal of Applied Behavior Analysis*, *7(2),* 313-325. doi: 10.1901/jaba.1974.7-313.

Repp, A.C., Deitz, S.M., & Deitz, D.E.D. (1976). Reducing inappropriate behavior in classrooms

and in individual sessions through DRO schedules of reinforcement. *Mental Retardation, 14 (1)*, 11-15.

Risley, T. R. (1968). The effects and side effects of punishing the autistic behaviors of a deviant child1. *Journal of Applied Behavior Analysis*, *1(1),* 21-34. doi: 10.1901/jaba.1968.1-21

Roberts, M. W. (1983). The effects of warned versus unwarned time-out procedures on child noncompliance. *Child & Family Behavior Therapy*, *4(1),* 37-53. doi: 10.1300/J019v04n01_04

Skinner, B. F. (1953). *Science and human behavior*. Simon and Schuster.

Smith, R. G., Iwata, B. A., Vollmer, T. R., & Zarcone, J. R. (1993). Experimental analysis and treatment of multiply controlled self-injury. *Journal of Applied Behavior Analysis*, *26(2),* 183-196. doi: 10.1901/jaba.1993.26-183

Smith, R. G., Russo, L., & Le, D. D. (1999). Distinguishing between extinction and punishment effects of response blocking: A replication. *Journal of Applied Behavior Analysis*, *32(3),* 367-370. doi: 10.1901/jaba.1999.32-367

Solanto, M. V. (1990). The Effects of Reinforcement and Response–Cost on a Delayed Response Task in Children with Attention Deficit Hyperactivity Disorder: A Research Note. *Journal of Child Psychology and Psychiatry*, *31(5),* 803-808. doi: 10.1111/j.1469-7610.1990.tb00819.x

Tarbox, R.S.E., Wallace, M.D., & Williams, L. (2003). Assessment and treatment of elopement: A replication and extension. *Journal of Applied Behavior Analysis, 36,* 239-244. doi: 10.1901/jaba.2003.36-239

Vollmer, T. R., Iwata, B. A., Zarcone, J. R., Smith, R. G., & Mazaleski, J. L. (1993). The role of attention in the treatment of attention‐maintained self‐injurious behavior: Noncontingent

reinforcement and differential reinforcement of other behavior. *Journal of Applied Behavior Analysis*, *26(1),* 9-21. doi: 10.1901/jaba.1993.26-9

Vollmer, T. R., Roane, H. S., Ringdahl, J. E., & Marcus, B. A. (1999). Evaluating treatment challenges with differential reinforcement of alternative behavior. *Journal of Applied Behavior Analysis*, *32(1),* 9-23. 10.1901/jaba.1999.32-9

White, P., O'Reilly, M., Fragale, C., Kang, S., Muhich, K., Falcomata, T., … & Lancioni, G. (2011). An extended functional analysis protocol assesses the role of stereotypy in aggression in two young children with autism spectrum disorder. *Research in Autism Spectrum Disorder, 5,* 784-789. doi: 10.1016/j.rasd.201.09.006

Wing, L., Gould, J., & Gillberg, C. (2011). Autism spectrum disorders in th-V: better or worse than the DSM-IV? *Research in developmental disabilities*, *32(2),* 768-773. doi:10.1016/j.ridd.2010.11.003

Worsdell, A. S., Iwata, B. A., Hanley, G. P., Thompson, R. H., & Kahng, S. (2000). Effects of continuous and intermittent reinforcement for problem behavior during functional communication training. *Journal of Applied Behavior Analysis*, *33(2),* 167-179. doi: 10.1901/j

APPENDIX A

Appendix A

Paired-Choice Preference Assessment Data Sheet

Participant_____ Session_____

Date_____ Observer_____

	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

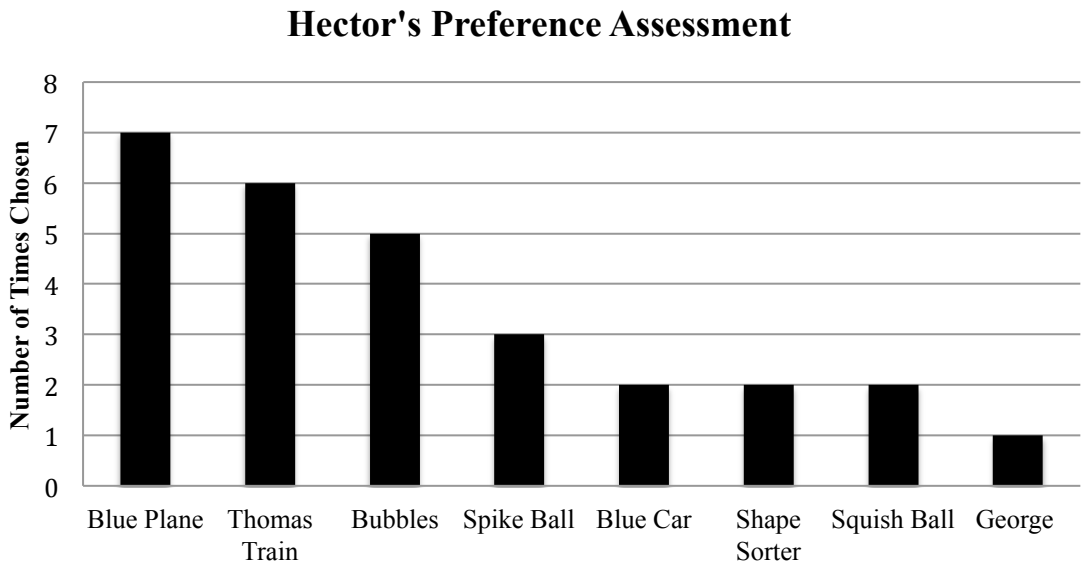
Items

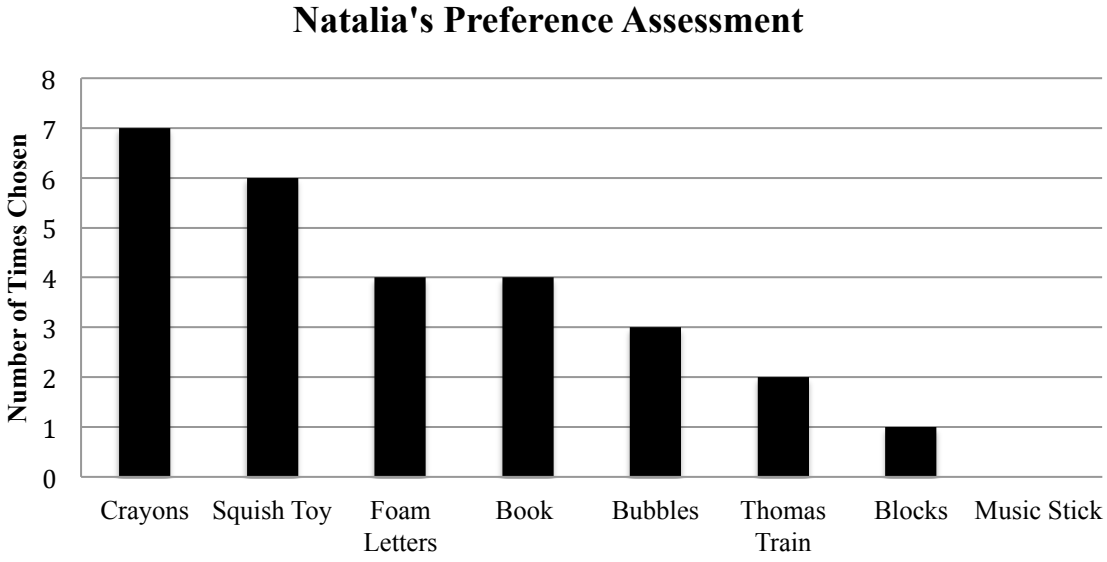
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

APPENDIX B

Appendix B

Preference Assessments

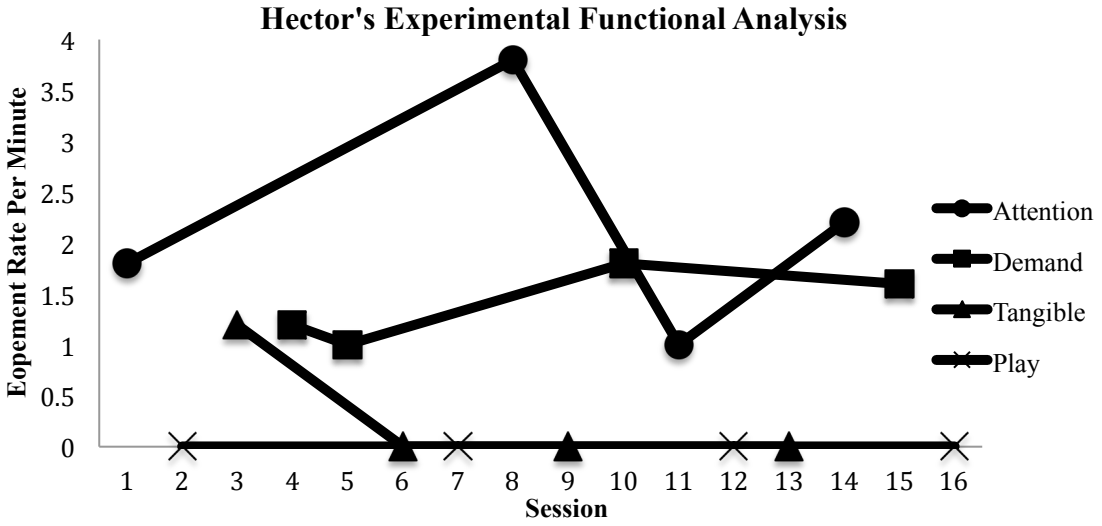




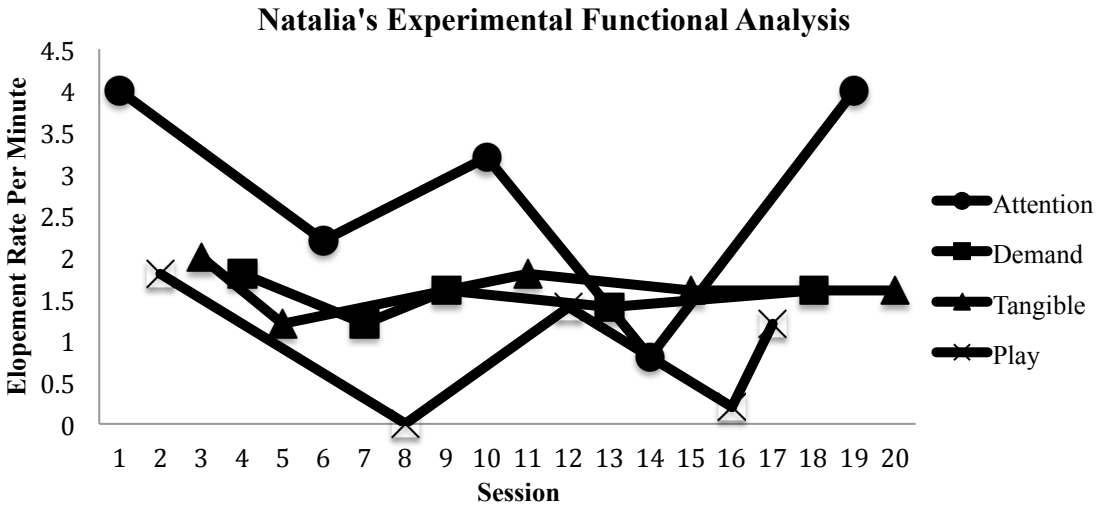
APPENDIX C

Appendix C

Experimental Functional Analysis



Experimental Functional Analysis results for Hector. Rate of responding per minute during each 5-minute session.

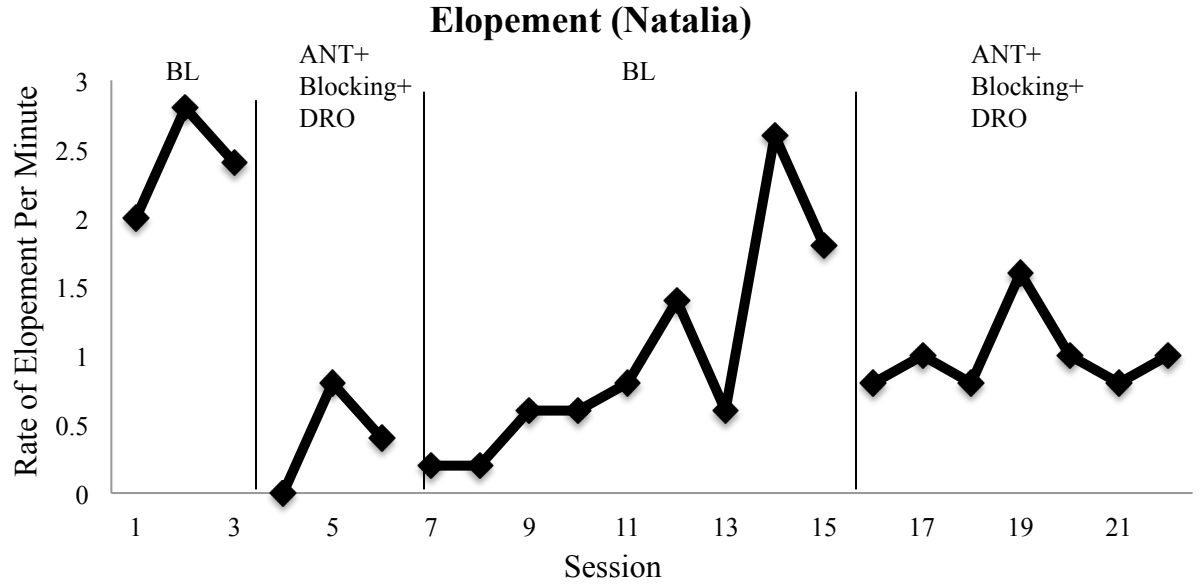


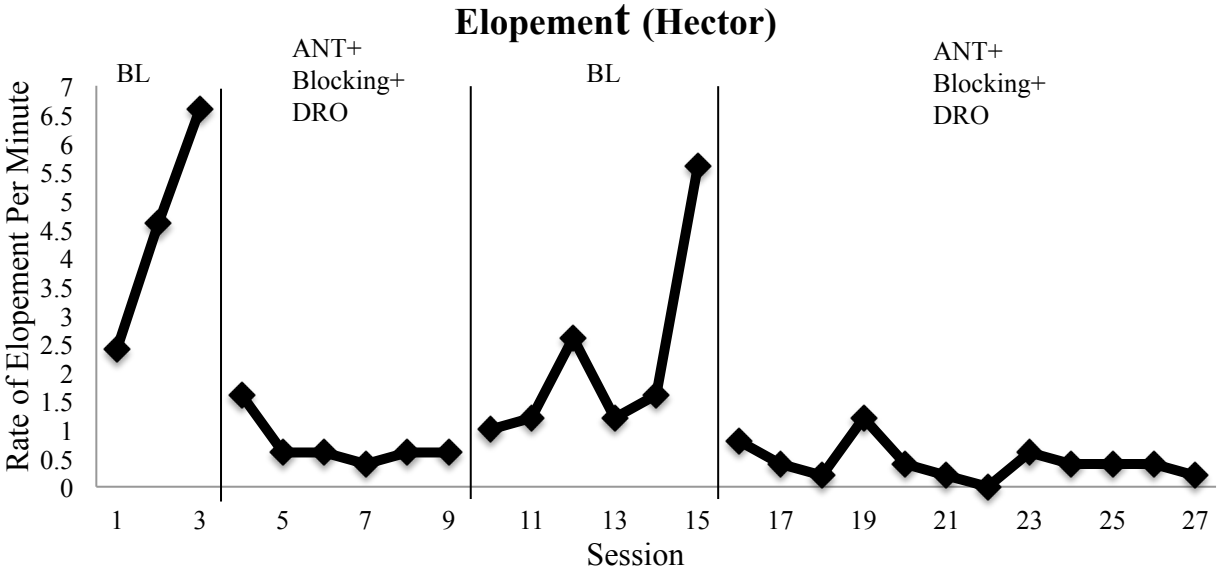
Experimental Functional Analysis results for Natalia. Rate of responding per minute during each 5-minute session.

APPENDIX D

Appendix D

ABAB Reversal Design





BIOGRAPHICAL SKETCH

Ivette Andrade earned her Bachelor's degree in Psychology from The University of Texas- Pan American in 2012. She joined the Master's program in Experimental Psychology in 2013. In 2014 she received her Master of Arts degree in Experimental Psychology, with a concentration in Behavior Analysis. Mrs. Andrade is part of the Psi-Chi national honor society in psychology.

While pursuing her Master's degree, Mrs. Andrade served as a research assistant at a university research center that focuses on behavioral interventions for children with Autism Spectrum Disorder (ASD) and other developmental disabilities. As part of her hours of experience and as a volunteer Mrs. Andrade worked in in-home programs focused on skill acquisition with children with ASD. Additionally, in a government state center, were she was able to gain experience working with adults who have a wide range of psychological disorders.

Throughout her educational career at the University of Texas Pan-American, Mrs. Andrade has resided in McAllen, Texas. She resides currently with her husband and two children. She could be contacted via email at andrade.ivette@gmail.com.

Mrs. Andrade's thesis, *Assessment and Treatment of Elopement in Young Children With Autism,* was supervised by Dr. Zina A. Eluri.