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Response Interruption and Redirection Applied to Life Skills Tasks

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RESPONSE INTERRUPTION AND REDIRECTION APPLIED TO LIFE SKILLS TASKS

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RESPONSE INTERRUPTION AND REDIRECTION

APPLIED TO LIFE SKILLS TASKS

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An Abstract of the Dissertation Presented
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Response Interruption and Redirection (RIRD) has been demonstrated to be an effective treatment for stereotypic behavior exhibited by persons with autism spectrum disorder. The present study investigates the applicability of this intervention in the context of the classroom setting. Specifically, it investigates whether or not the intervention is as effective when it is used with a subject in the process of completing complex tasks. This research also investigates collateral effects of reduced stereotypic behavior on productivity and efficiency of task completion. While stereotypy was reduced and productivity increased across three experimental conditions, there were mixed results as to the relationship between RIRD and overall efficiency of task completion.

DEDICATION

This dissertation is dedicated to my mother who has always loved and supported me. Her encouragement and support throughout the graduate school journey have been instrumental in my achievements.

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Finally, I would like to acknowledge and thank "Mitch" and his family for being so great to work with and willing to lend themselves to this study. Mitch and his family are wonderful individuals, especially his mother who is inspiring to all.

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LIST OF ABBREVIATIONS

Autism Spectrum Disorder (ASD)

American Psychiatric Association (APA)

Center for Disease Control and Prevention (CDC)

Stereotypic Behaviors (Stereotypy, Stereotypies)

Response Interruption and Redirection (RIRD)

Minute (min)

Seconds (s)

Non-contingent Attention (NCA)

Differential Reinforcement of Incompatible Behavior (DRI)

Non-contingent Reinforcement (NCR)

University Institutional Review Board (IRB)

Interobserver Agreement (IOA)

Task Analysis Recording Procedure (TARP)

Preference Assessment (PA)

Functional Analysis (FA)

Yogurt with Pears (YP)

English Muffin with Butter (EM)

Grooming Routine (GR)

Baseline Phase (BL)

Intervention Phase (Int.)

Average (Avg.)

Trial (T)

Chapter 1: Introduction and Literature Review

Children, adolescents, and adults with developmental disabilities face a number of challenges in educational and vocational contexts. While research in the fields of behavior and learning has shown that individuals with developmental disabilities can acquire a number of skills, many of these individuals struggle to apply these skills with efficiency when compared to their peers (Binder, 1996). Autism spectrum disorder (ASD) is a neurodevelopmental disorder with symptoms that can range from mild to severe with regard to associated impairments. The key features of ASD include impairments in social interaction, language and communication, restricted interests, and stereotypic repetitive behaviors (American Psychiatric Association [APA], 2013).

Between the 1990s and today, the prevalence of the diagnosis of autism has increased exponentially due to several hypothesized factors: (a) increased awareness, (b) more refined diagnostic criteria, (c) comorbidity studies, (d) and a possible increase in the actual number of individuals with autism (Walker, 2008). U.S. Center for Disease Control and Prevention (CDC) current estimates, suggest that ASD has a prevalence rate of 1 in 68 children (Baio, 2014); this estimate is in contrast to the 1 in 10,000 case rate that was estimated in the 1980s. These estimates suggest that all schools are likely to have more students with ASD in the future and must be prepared to meet their needs. Repetitive, stereotypic behaviors in particular have been identified to interfere substantially with school-based activities such as new learning, efficiency, and task completion (Koegel & Covert, 1972; Sugai & White, 1986).

Stereotypy

Stereotypic behaviors (stereotypy) are considered operant behaviors which, like all other operant behaviors, are influenced by the antecedents preceding them and are maintained by the consequences following them. What distinguishes stereotypy from other behaviors is their repetitive nature, and that they do not appear to have obvious social significance (Rapp & Vollmer, 2005). Stereotypy has been observed in typically developing children, and individuals with intellectual disabilities, but is so common to individuals with autism that it is a diagnostic feature of the disorder (Ahearn, Clark, MacDonald, & Chung, 2007; Cunningham & Schriebman, 2008).

The most common forms of stereotypy include repetitive motor movements (e.g., rocking, finger waiving, hand flapping) and vocalizations (e.g., repeated words, phrases, sounds, and rhythmic breathing) (Ahearn et al., 2007). While stereotypy can be categorized broadly into two major forms, motor and vocal stereotypy, the actual presentation of behavior can be simple or complex, sometimes involves objects, and can vary in frequency and intensity. The topographical qualities of stereotypy are actually quite varied (Cunningham & Schriebman, 2008).

The functional nature of stereotypy is believed to vary from case to case (Cunningham & Schreibman, 2008; Rapp & Vollmer, 2005). Research using functional analysis of stereotypy evidences that in most cases the function of stereotypic behavior has been found to be a form of automatic reinforcement using sensory stimulation produced from the behavior. However, other maintaining consequences of stereotypy have been evidenced and include social variables such as attention, and antecedent variables such as task demands. Functional analysis is highly recommended prior to

treatment and study of stereotypic behaviors due to the idiosyncratic nature of individuals and the varied potential functions of stereotypy.

Regardless of the functional nature of stereotypy, it is arguably one of the most limiting impairments common to individuals with ASD. Stereotypic behaviors can be socially stigmatizing because of their topography, intensity, or duration. They are often inappropriate for the individual's age, and the social context in which they are displayed. They can be socially alienating, making it difficult for parents to bring children with ASDs into the community, limiting the individual's involvement in social interactions and the community. Stereotypy has been shown to interfere directly with new learning and education (Cunningham & Schriebman, 2008; Koegel & Covert, 1972).

Instruction

Children with ASD have difficulty learning from traditional general education instruction. One of the reasons for this difficulty is because stereotypic behavior directly interferes with meaningful engagement in instruction (Koegel & Covert, 1972). The most effective methods of instruction for teaching both simple and complex behaviors to individuals with ASD have come from the field of behavioral psychology, specifically the science of behavior analysis (Koegel, Koegel, & Carter, 1999).

Behavior analysis is comprised of the philosophy of behaviorism, experimental analysis of behavior, and applied behavior analysis, which is the application of behavioral principles to socially meaningful problems (Baer, Wolf, & Risley, 1968; Fisher, Groff, & Roane, 2011). Specific methods, taken from behavior analytic research over the past 80 years, have been very successful in teaching a variety of discrete skills and complex behaviors to children with ASD, from using language and learning to read, to solving

math problems, and writing sentences. Adaptive functioning skills, such as brushing teeth, washing hands, and performing complex, multi-step life and vocational tasks also have been successfully taught using behavior analytic procedures. While the names and technical details of instructional procedures within the field of behavior analysis are varied, the vast majority of them are rooted in manipulation of antecedents, consequences, or both.

The present study is primarily concerned with the performance of community living skills. Cuvo and Davis (1983) categorized community living skills to include the subdomains of: (a) home living skills (e.g., cooking, cleaning), (b) use of community facilities (e.g., restaurants), (c) mobility in the community (e.g., bus riding), (d) personal appearance (e.g., laundry, grooming), (e) use of money, and (f) health care (e.g., taking medication, first aid).

Because living skills are considered complex tasks, comprised of multiple individual steps, they must be broken down into their component parts in order that each can be taught individually (Cuvo, 1978; Noell, Call, & Ardoin, 2011). Task analysis is the operation of breaking down a complex task into individual steps. It involves determining the validity of the individual steps that will need to be completed, the criteria for completion, including the sequence and which components are mandatory, and determining the general or specific nature of the task descriptions (Cuvo & Davis, 1983). Task analysis has been widely used in the teaching of complex tasks (Bauman & Iwata, 1977; Cavaiuolo & Gradel, 1990; Cronin & Cuvo, 1979; Cuvo, Davis, O'Reilly, Mooney, & Crowley, 1992; Cuvo, Jacobi, & Sipko, 1981; Noell, Call, & Ardoin, 2011).

Task analysis followed by instructional prompting has been used to teach complex tasks to individuals with developmental disabilities (Cuvo, Leaf, & Borakove, 1978; Steege, Wacker, & McMahon, 1987). Building on research suggesting that pictures of activities had the potential to function as prompts for behavior, many researchers have used pictures of individual tasks to facilitate skill acquisition and independent completion of the behavior chains (MacDuff, Krantz & McClannahan, 1993; McClannahan, MacDuff, & Krantz, 2002; Wacker & Berg, 1983). In the domain of food preparation, the use of picture recipes and picture prompts have been shown to increase independence and accuracy on steps within cooking tasks (Martin, Burger, Elias-Burger, & Mithaug, 1988; Mechling, Gast, & Seid, 2009; Steege et al., 1987). For example, Johnson and Cuvo (1981) trained individuals to complete a series of steps for cooking and were able to use pictures of the individual tasks to facilitate independent task completion. Even more germane to the present study, Mechling et al. (2009) incorporated personal electronic devices to depict picture activity schedules during food preparation tasks, which increased students' independence.

Children with ASD can exhibit a variety of stereotypic behaviors, which directly compete with adaptive goal-directed behavior (Walker, 2008). Because reinforcement maintaining interfering problem behaviors is often higher in value than the social or natural reinforcement associated with academic, life, and vocational tasks, children with ASD are often observed to be off-task, non-compliant, slow to start, and slow to complete these non-preferred tasks without frequent prompting and assistance from a parent, teacher, peer, or job coach. The lack of self-monitoring during task completion, and general lack of requisite executive functioning skills, interferes with both learning new

tasks, and with sustaining effort and persistence through previously learned tasks. While the term generalization has been conceptualized to include several technologies that have been shown to successfully combat these deficits (Stokes & Baer, 1997), vocational literature suggests that one of the many current barriers to employment for individuals with ASD directly involves a lack of efficiency, poor executive skills, and the need for costly supports, such as job coaches for prompting and help, or behavior specialist services to modify the environment and provide reinforcement contingencies on an ongoing basis (Hendricks, 2010; Morgan & Alexander, 2005).

If it were possible to improve executive skills for individuals with ASD, then learning outcomes could improve, as could independent performance of previously learned behaviors; such outcomes have been observed with other populations (Dawson & Guare, 2009). While language and cognitive deficits might prevent some individuals with ASD from learning metacognitive strategies to improve efficiency and executive skills, if stereotypy could be reduced, certain topographies of behavior such as efficiency, and perseverance might at least approximate the outcomes of improved executive functioning. For example, if an individual values fluency of task performance, he or she is more likely to complete tasks efficiently. This can be observed in typical populations, when students are given timed reading probes. If they value doing well on the probe, they will read faster and pay careful attention to accuracy, resisting temptations to exhibit more immediately stimulating behavior such as tapping his/her pencil. Conversely, a child with ASD who possesses the same reading skills might not read the probe faster under the same conditions if he cannot resist the temptation to access more immediately

stimulating behavior such as waiving his fingers in front of his eyes repeatedly (e.g., motor stereotypy).

A promising approach to reducing stereotypy termed response interruption and redirection (RIRD) has received a high degree of attention and evaluation in recent years (Martinez & Betz, 2013). It is possible that applying RIRD to stereotypic behavior during the execution of complex life skills tasks could improve performance for individuals with ASD and reduce the need for frequent task orienting prompts.

Response Interruption and Redirection (RIRD)

Ahearn, Clark, and MacDonald (2007) used response interruption and redirection (RIRD) to reduce vocal stereotypy and increase appropriate vocalizations in four children with an ASD. Prior to the intervention, the researchers used functional analysis to determine that the vocal stereotypy was maintained by automatic reinforcement. Treatments were conducted in a small room with a table and two chairs. During the treatment sessions, when the subject exhibited vocal stereotypy, the individual administering the intervention said the subject's name to gain his/her attention and then made verbal task demands to the subject. The verbal demands were predetermined to be within the skillset of the subject and consisted of questions such as, "what's your name" or to repeat a word such as, "say ball." Once the subject responded appropriately to three verbal demands without exhibiting vocal stereotypy, no further demands were given until the subject exhibited vocal stereotypy again. If the subject exhibited vocal stereotypy during the vocal demands, additional demands were given, until the subject responded to three demands consecutively without stereotypy.

The researchers conducted their treatments using a withdrawal design (ABAB) first with no consequences for stereotypy, then with RIRD following each occurrence of stereotypy and so on. They timed the sessions but stopped the time when conducting RIRD interventions. Using 10 s momentary time sampling to calculate the rate of stereotypy, and frequency counts to document appropriate vocalizations, they found that the percentage of vocal stereotypy was reduced during treatments for all participants and appropriate vocalizations increased for three of four subjects. As a follow up procedure, the subject's teachers were trained to implement RIRD in the natural environments during academic and leisure times. The researchers collected 5 min video segments of the subjects in their natural environments prior to the treatments and one month following the treatment. Using the same 10 s interval observation techniques and frequency counts the treatment was observed to be effective in reducing stereotypy and increasing appropriate vocalizations in the natural environment.

RIRD was further validated as a successful treatment of automatically reinforced vocal stereotypy by Athens, Vollmer, Sloman, and St. Peter Pipkin (2008). Working with a child with Down syndrome, these researchers first implemented a treatment package involving non-contingent attention (NCA), response cost in the form of removing a preferred item in response to non-compliance, and RIRD in a similar procedure used by Ahearn et al. (2007). The researchers found success in reducing vocal stereotypy using the treatment package and continued success when the NCA component was removed.

They concluded that the NCA component was unnecessary to achieve their desired goals and noted that while the response cost component of the treatment package remained prescribed for non-compliance for the entire treatment protocol, it was needed

less than 1% of the time during the intervention phase and only 5% of the time during the fading phase. By incrementally increasing the time the child was in the room alone, the researchers showed that stereotypy could remain low while the therapist presence was gradually faded, until the subject maintained zero levels of stereotypy in an alone condition for three consecutive 5 min sessions. Athens et al. (2008) also reported anecdotally that the parents of the child were taught to use the procedure and were able to extend the low levels of stereotypy to even longer durations of the alone condition. They reported strong social validity. Specifically, that the RIRD interventions were acceptable to the parents, who learned to implement RIRD procedures in their own home without the presence of the therapists.

Cassella, Sidener, Sidener, and Progar (2011) replicated the RIRD study by Ahearn et al. (2007) and sought to determine if the task demands requested during the RIRD intervention would be effective if they were not topographically matched to the stereotypic behavior. Specifically, they showed that the RIRD therapist could request motor demands of the subject, rather than vocal demands, and vocal stereotypy was still reduced significantly compared to no-treatment conditions. While Cassella et al. (2011) found the intervention to be successful during treatments, they did not observe a significant increase in appropriate vocalizations as was observed by Ahearn et al. (2007). They also noted that the treatment sessions were often very lengthy, the majority lasting 30 min. Other concerns noted were that reductions in vocal stereotypy were not maintained when the intervention was removed, and that one of the two participants exhibited aggression during one of the initial treatment phases. Finally, they noted that the intervention had to be applied at high rates during the treatment sessions, 50% for one

subject and 77% for the other, which resulted in poor social validity ratings by the caregivers of one of the subjects.

Ahrens, Lerman, Kodak, Worsdell, and Keegan (2011) extended applications of RIRD to address motor stereotypy in addition to vocal stereotypy. Similar to Cassella et al. (2011), Ahrens et al. (2011) found that the demands given to subjects effectively reduced stereotypy whether they were vocal (e.g., what's your name?) or motor (e.g., touch your head). Further, Ahrens et al. showed that vocal demands reduced vocal stereotypy as well as motor stereotypy, even though the demands were not matched topographically to the stereotypic behavior and vice versa. Motor demands reduced both vocal and motor stereotypies.

Finally, by fading the RIRD interventions systematically in one of the conditions, Ahrens et al. (2011) demonstrated that RIRD procedures function as punishment rather than extinction. The rationale for this conclusion was based on previous research by Lerman & Iwata (1996) and the principle that if the stereotypies identified were automatically reinforced, true extinction procedures would have resulted in steady or increased rates of stereotypy (i.e., response burst or extinction burst). Rather, the researchers found that even when the interventions were faded, the stereotypic vocal and motor behaviors were reduced, suggesting that RIRD functioned as a punishment procedure comparable to overcorrection procedures established by previous research (Epstein, Doke, Sajwaj, Sorrell, & Rimmer, 1974; Foxx & Azrin, 1973).

Colon, Ahearn, Clark and Masalsky (2012) also suggested that the RIRD task demands presented in response to stereotypy functioned as a punishment similar to overcorrection procedures. These researchers investigated RIRD in the context of verbal

operant training. Based on results of previous research, they speculated that verbal operant training alone would reduce vocal stereotypy and concluded that while this was the case, the combination of RIRD and verbal operant training was a more robust intervention than either RIRD or verbal operant training alone. The researchers found that RIRD, in addition to verbal operant training, was required in order to reduce vocal stereotypy to an acceptable level for two of the three participants. They also found that appropriate vocalizations increased as a result of the intervention and posited that using verbal operant training stimuli as the task demand in the RIRD procedure could have greater educational utility than using less meaningful verbal task demands.

Dickman, Bright, Montgomery, and Miguel (2012) further investigated the relationship between the increases in appropriate vocalizations and decreases in vocal stereotypy observed in previous RIRD research. Dickman et al. hypothesized that appropriate vocalizations result in social reinforcement (positive reinforcement) which competes with the automatic reinforcement produced by stereotypic behaviors; appropriate vocalizations are reinforced by avoidance of the punishing effects of the RIRD procedure in response to stereotypy (negative reinforcement), and that higher rates of appropriate vocalizations compete with rates of vocal stereotypy, which are members of the same response class and are incompatible with one another. By using differential reinforcement of incompatible behavior (DRI) and RIRD, their study showed that increases in rates of appropriate vocalizations and decreases in rates of vocal stereotypy were observed in response to RIRD procedures. Additionally, when RIRD was combined with DRI in the form of a token system where appropriate vocalizations were extrinsically reinforced, increases in rates of appropriate vocalizations and decreases in

rates of vocal stereotypy were larger than in the RIRD only conditions. These findings supported their hypotheses that despite being functionally unrelated to vocal stereotypy, reinforcement variables related to appropriate vocalizations are an important component of the relationship between increases in appropriate vocalizations and decreases in vocal stereotypy observed in previous RIRD research.

Love, Miguel, Fernand, and LaBrie (2012) compared the reductive effects of matched stimulation and RIRD on vocal stereotypy. They investigated the reinforcing qualities of auditory stimulation produced from vocalizations by providing the subjects with access to noise-producing toys. Results showed that the subjects' vocal stereotypy decreased in response to matched stimulation more than in baseline, which involved access to the same toys with batteries removed. While both participants had low levels of vocal stereotypy during both treatment conditions, one participant's level of vocal stereotypy was somewhat lower during the matched stimulation intervention alone compared to both treatments together. Both participants had larger increases in appropriate vocalizations during combined treatment conditions. The more successful treatment for both subjects was considered to be the combined RIRD and matched stimulation because of the increases in appropriate vocalizations. Additionally, for one participant, the combined treatment resulted in lower levels of vocal stereotypy and for the other, the combined treatment resulted in lower levels of stereotypy and less need for RIRD intervention, than the RIRD alone condition. Parents of the subjects also selected the combined treatments as the most socially valid because of the observed improvements in appropriate vocalizations and the opinion that the treatment would be realistic for them to implement in the home setting.

Pastrana, Rapp, and Frewining (2013) recognized that previous RIRD researchers have shown it consistently to decrease both motor and vocal stereotypy and to function as a punishment procedure. They questioned whether or not the effects were limited to immediate behavior or if they extend to subsequent behavior following the intervention. They also questioned whether or not the punishment effects of the treatment could result in increased probability of related problem behavior due to principles related to reallocation of responding. Specifically, were motor stereotypy to be restricted via punishment involving motor topography, would vocal stereotypy rates increase if left untreated as a result of reallocation of responding by the participant. Using a multielement design with an embedded three-component multiple schedule to evaluate the effects of RIRD, they found that vocal stereotypy rates increased mildly but subsequently did not reach higher levels than baseline sessions. They also found that RIRD treatments reduced immediate motor stereotypy but reductions were not maintained on subsequent stereotypic behaviors in the absence of the treatment.

Although RIRD has shown strong reductive effects on stereotypy in previous research, Carroll and Kodak (2014) questioned whether or not the data collection procedures commonly used in these studies played a role in treatment outcomes reported. Specifically, Caroll and Kodak highlighted that in the majority of the previous studies, researchers used discontinuous data collection procedures where target behaviors were measured for an interval of time but that the time interval and data collection were interrupted during the RIRD procedures. This effectively removes intervention procedures and any associated target behaviors from the data sample. The authors speculated that this could be potentially problematic to the validity of the outcomes for

three main reasons. One reason was that if the subject exhibited high rates of stereotypy during the RIRD intervention, it would not be recorded or reported, and increased rates of stereotypy during intervention could limit the practicality of the intervention in applied settings. A second concern the authors expressed was that there was no way of knowing how frequently researchers needed to implement the intervention during sessions, which could also jeopardize social validity if researchers had to implement the intervention frequently. A third concern they expressed was that by interrupting the data collection interval to implement the procedure and then resuming data collection following the procedure, there was no way to know if the data collected were an artifact of the intervention or the measurement procedure itself.

To answer these questions Carroll and Kodak (2014), conducted a two-part study where they examined RIRD using continuous and discontinuous data collection procedures. Their results suggested that discontinuous data collection over-estimated the effects of RIRD compared to the continuous data collection procedure. They also found that levels of stereotypy did not change from comparison conditions when stereotypy was measured during RIRD implementation. Finally, they did not observe a reduction in the frequency of, or duration of, RIRD intervention across sessions. When they compared RIRD to non-contingent reinforcement (NCR), they found that regardless of whether they used interrupted or uninterrupted data collection procedures, NCR data remained stable across conditions while RIRD data overestimated the effects of the procedure.

Summary of Literature Review

Response interruption and redirection was initially developed as a method of blocking vocal stereotypy, by requiring the subject to exhibit incompatible verbal

behaviors such as answering simple questions, effectively reducing rates of vocal stereotypy (Ahearn et al, 2007). These results have been replicated by a number of investigations (Ahrens et al., 2011; Athens et al., 2008; Cassella, et al., 2009; Colon et al., 2012; Dickman et al., 2012; Love et al., 2012; Miguel et al., 2009; Pastrana et al., 2013). In addition to reductions in vocal stereotypy, many researchers noted increases in appropriate vocalizations during treatment sessions (Ahearn et al., 2007; Athens et al., 2008; Colon et al., 2012; Dickman et al., 2012; Love et al., 2012). Several studies suggested that RIRD functioned as a punishment by blocking access to behavior and the associated automatic reinforcement. Ahrens et al. (2011) evaluated whether RIRD functioned as an extinction procedure or punishment and found that it was more likely to be a punishment procedure, having consistent effects on behavior similar to previously established punishment procedures such as overcorrection (Colon et al., 2012; Foxx & Azrin, 1973).

RIRD procedures were extended from using vocal task demands to using motor task demands to reduce vocal stereotypy, despite the unmatched topography of the intervention and the behavior. Researchers found that regardless of topography of the demands used in RIRD procedures, vocal stereotypy was reduced. Similarly, regardless of topography of the RIRD demands, motor stereotypy could also be significantly reduced (Ahrens et al., 2011; Cassella et al., 2011; Pastrana et al., 2013).

While the reductive effects of RIRD on vocal and motor stereotypy are consistent across studies that report the immediate effects, several studies suggest that RIRD procedures do not have significant impact on behavior over time, when the treatment conditions are removed (Carol & Kodak, 2014; Cassella et al., 2009; Martinez & Betz,

2013; Pastrana et al., 2013; Schumacher & Rapp, 2011). However, there is evidence that with fading and programming for generalization procedures included as part of the intervention, reductions in stereotypy are stable over time (Ahearn et al., 2007; Ahrens et al., 2011; Athens et al, 2008)

Problem and Research Hypotheses

Individuals with ASD often exhibit high rates of stereotypic behaviors, which interfere with skill acquisition but also with efficiency when completing tasks that have been previously learned. Response interruption and redirection (RIRD) is a promising intervention that has been shown to reduce stereotypy effectively. Some of these studies have shown response covariation where appropriate vocalizations increased as verbal stereotypy decreased. However, all of the research studies to date have examined the procedure in either tightly controlled conditions with no tasks, or in conditions where few tasks were required. As many of the studies have suggested, while RIRD procedures reduce stereotypy, the procedures themselves require a significant amount of time to implement. Also, RIRD, as a procedure, is incompatible with efficiency or progress toward accomplishing tasks. Further, there have been no studies that have evaluated the validity or applicability of RIRD procedures when implemented during complex multi-step life skills tasks in a realistic setting. The research questions are:

1. Will an RIRD intervention reduce stereotypic behavior that a subject exhibits during completion of complex life skills tasks?
2. Will the subject be able to complete complex tasks more efficiently if stereotypy is reduced (i.e., will there be covariation showing an increase in task steps completed as stereotypy is reduced)?

3. Will the need to implement an RIRD intervention decrease over time, such that the frequency is low enough to allow for increased independent task completion by the subject?

Chapter 2: Method

Setting

The setting for this study was a life skills classroom at a public high school in the Northeast region of the United States. The school had 274 students enrolled during the 2013-2014 academic year, of which, 27% were eligible for free and reduced school lunch. The classroom was equipped with 4 kitchen stations, each containing a sink, a conventional oven, countertop space, drawers and cabinets. There was one refrigerator in the room and one pantry where all food items were kept. The classroom was used for both general and special education classes. Most trials of the study were conducted during special education life skills class sessions. Such classes included 5-8 students with moderate to severe developmental disabilities who required one-to-one support. Additional trials were conducted in the same setting outside of the scheduled class time but within the parameters of the school day. During these times, the researchers and the subjects were the only individuals in the room.

Participants

The participant for this study, “Mitch,” was a 15 year-old male with a diagnosis of ASD, in the severe range of functioning. Mitch had communication impairments such that he sometimes used single-word and phrased speech, while other times he augmented unintelligible speech with his device when prompted by a teacher or other communicative partner. In addition, Mitch was accustomed to using a manipulative picture activity schedule on an iPad, detailing assigned tasks throughout the day. Despite showing mastery of independent task completion using the picture activity schedule, Mitch’s independent task completion was limited due to excessive vocal and motor stereotypy.

One of Mitch's individualized educational goals was to become more independent when completing functional life-skill tasks. Even though prior to the study Mitch had shown the ability to complete each of the tasks, physical, gestural, verbal, and pictorial prompts were used often to keep him oriented to the task, mainly when he exhibited stereotypy. However, with the exception of pictures representing steps of the complex task to remind him which step he was working on, prompts were generally not needed to assist Mitch with completing tasks correctly.

All study procedures and personnel were reviewed and approved by a university Institutional Review Board (IRB) before research activities began. Mitch's parents were contacted by the researcher via telephone to ask whether they were interested in learning about the study and willing to consider granting permission for their child to participate. After agreeing to learn more about the study, Mitch's parents were then given a parent permission form and the researcher reviewed it with them in person. His parents provided written permission for Mitch to participate. In lieu of written student assent, Mitch was asked at the start of each research session if he was willing to work with the researcher. An observer was present at each session to confirm student assent and the observer signed a form documenting each assent given.

Materials

Intervention materials. Intervention materials included materials necessary to complete the functional analysis of stereotypy and the tasks that were selected for the study. Most of the materials for the study were readily available within the setting, but certain food items were provided by the researcher, as needed. For the functional analysis the materials included sorting shapes for the demand condition and Mitch's iPad with

familiar games for the attention condition. The alone condition was conducted in a classroom, which was equipped with several tables and chairs.

For the first phase of the experiment Mitch was required to prepare food from a recipe of yogurt with pears. The materials required for this phase of the experiment included the kitchen station with a sink, counter space, cabinets, cutting board, a fork, a knife, a bowl, a refrigerator, strawberry yogurt, sliced pears, and napkins.

In the second phase of the experiment Mitch used a recipe to prepare English muffins with butter. For this phase of the experiment the materials included the same kitchen station described above, a plate, a knife, a cutting board, partially separated English muffins, sprayable butter (e.g., *I Can't Believe It's Not Butter*), a toaster preset to preferred darkness, and napkins.

In the third phase of the experiment, Mitch completed a routine of four life skills tasks: wash hands, brush teeth, wash face, comb hair. For this phase of the experiment the routine was completed in a one-person bathroom attached to the life skills classroom. The bathroom was equipped with a toilet, a sink, two mirrors, and storage drawers. Materials used in this portion of the experiment were a sink, liquid soap dispensed from a unit mounted on the wall next to the sink, rolled paper towels dispensed from a unit mounted next to the sink, a trash can, a toothbrush, toothpaste with a screw cap, a face-cloth, a receptacle for used face-cloths, and a hair brush. Picture prompts also were mounted on the walls of the bathroom depicting steps of each of the tasks. This was the only task where Mitch did not use an iPad for picture prompts.

Additional materials. Other materials included an iPad to be used for the picture activity schedule, the *Video Scheduler* iPad application (MDR, 2013), a stopwatch for the

experimenter, and a digital video camera from an additional iPad. Preferred reinforcement was used during the preference assessment and functional analysis portions of the experiment as well as following the completion of experimental tasks. Mitch's preferred reinforcement included an indoor swing in a room designated for Occupational Therapy, listening to music, taking a brief walk around the school, and an iPad game called Starfall. Starfall is an educational interactive game which uses videos, music, and cartoon animation for educational activities targeting basic reading and mathematics skills (Starfall Education, LLC., 2015).

Data collection forms. Several data collection sheets were created for experimental and reliability procedures.

Preference assessment record form. The preference assessment record form (see Appendix A) was designed to document choices made during preference assessment procedures and to calculate the percentage of selections of preferred and non-preferred stimuli. It included step-by-step directions to conduct the preference assessment.

Dependent variable record form. The dependent variable record form (see Appendix B) included operational definitions of motor and vocal stereotypy, an interval recording table to document the occurrence of stereotypy, a frequency recording table to document the number of RIRD interventions used, and sections for duration recording and recording of tasks completed. In addition to being used during the study for primary data collection and interobserver agreement (IOA), this form was used to collect data prior to the study during the functional assessment and functional assessment IOA procedures.

RIRD demand record form. The RIRD demand record form (see Appendix C) was designed to assist researchers in compiling a list of vocal and motor tasks that the student could already perform with 100% accuracy. This form allowed for descriptive interview data collection, experimental data, and IOA calculations.

Task Analysis Recording Procedure (TARP). The task analysis recording procedure as described by Steege and Watson (2009) was adapted for this study and was used to monitor fidelity of two procedures. The TARP: PA (See Appendix D) was used during the preference assessment procedures. The TARP: RIRD (See Appendix E) was used during the RIRD intervention procedures.

RIRD demand list. A list of 20 randomized vocal and motor task demands (see Appendix F) to use during RIRD interventions was provided to the researcher and research assistant implementing RIRD interventions directly with the subject to ensure that demands requested were within the skillset of the subject and that the demands remained novel in the event of high rates of stereotypy.

Design and Procedure

This single-case study used three experiments. In the first experiment, an analogue ABAB withdrawal design, similar to those described in previous RIRD studies (Ahearn et al., 2007; Athens et al., 2008; Casella et al., 2011) was used to investigate the relationship between the dependent variables and the intervention. Once the relationship was demonstrated in the analogue experiment, two additional experiments using a multiple baseline across tasks design with an AB only format were used to demonstrate generality of the intervention within classroom settings for two additional life skills tasks.

In the analogue experiment, the “A” phases represented the baseline conditions and the “B” phases represented the treatment conditions when RIRD was implemented. The advantage to using an ABAB withdrawal design was that changes in the dependent variables replicated across phases provided strong evidence of the relationship between the intervention and the dependent variable. One potential drawback of this design was the possibility that the behavior would not return to baseline levels following intervention. As noted in prior research, RIRD is conceptualized as a punishment, so it is conceivable that the subject could have come to associate the researcher delivering the intervention as a discriminative stimulus for punishment of stereotypy, and avoid the stereotypic behaviors in the presence of the researcher. This drawback was possible but not expected considering the results of previous research using similar designs for RIRD interventions (Ahearn et al., 2007; Ahrens et al., 2011; Athens et al., 2008). Finally, the researchers were mindful that aggression or self-injurious behavior were possible as a result of extinction bursts, when the subject’s stereotypic behaviors were interrupted with RIRD procedures. The researchers were trained in crisis intervention prior to the study and the experimental protocol included instructions to immediately end the session if aggression occurred.

Ethically, ABAB withdrawal designs can pose concerns because they require the intervention to be withdrawn, even when it is showing positive effects on behavior. Nonetheless, due to the punitive function of the RIRD intervention, it was appropriate to remove the intervention even when positive effects had been observed. Additionally, removal or fading will eventually be required for any RIRD intervention if generalization of positive effects is the long-term goal (Athens et al., 2008).

The generality experiments, involving multiple baseline across tasks design in AB only format, followed the analogue ABAB experiment. The tasks used for this extension of the study were also selected from the life skills curriculum. Baseline and intervention procedures followed the same protocols of the ABAB sessions except, following the implementation of the intervention (B) phase, it was not removed until dependent variables became stable, all trials were completed, and the study was completed.

Preference assessment. Prior to the functional analysis (FA) and study procedures, a forced-choice stimulus preference assessment (PA) (e.g., Fisher et al., 1992) was conducted using four activities commonly offered to the subject as reinforcement during his regular school day. The preferences, as reported by the teacher and the subject's one-to-one assistant, included: (a) go for a walk in the hallway, (b) use the swing for 2 minutes in the OT room, (c) listen to music for two minutes on the iPad, and (d) play Starfall, a game on the iPad. Pictures of the activities were created and were numbered one through four on the back of the photo cards. Number combinations were randomized prior to each preference assessment session. The items were presented two at a time ensuring all items were presented together two times in a counterbalanced order such that each of the three preference assessments consisted of 12 picture presentations total. Once the subject made a selection, he was allowed to complete the activity each time. The most selected items were used as reinforcers during the functional analysis. The subject also was allowed to choose one of the activities following completion of each of the baseline and experimental sessions. Data from the preference assessment procedures were collected on the preference assessment record form (see Appendix A).

Functional Analysis. A synthesized functional Analysis (FA) adapted from procedures established by Iwata, Dorsey, Slifer, Bauman, & Richman (1982/1994) and expanded upon by Hanley (2012) was conducted to determine the function of the subject's stereotypy. Hanley's synthesized functional analysis is more streamlined and targeted than traditional FA procedures (e.g., Iwata et al., 1982/1984). It involves a synthesis of descriptive assessment such as interviews and observations, as well as experimental analysis to determine which of the four traditional FA conditions (e.g., alone, demand, attention, and play) are most needed to demonstrate a functional relationship between the subject's behavior and the environment. First, interviews were conducted with the subject's teachers and one-to-one assistant. Then, based on the interview data, three of four conditions typically used in FA (e.g., alone, demand, and attention), were chosen to demonstrate the function of Mitch's stereotypic behaviors. The subject was exposed to each condition three times for 5 minutes each day. A video recording of roughly 30% of the sessions was used for assessment reliability purposes. The order of conditions was randomly selected each day. FA and IOA data were collected on the dependent variable record form (see Appendix B). Descriptions of the three FA conditions follow below.

***Alone condition*.** Similar to Athens et al. (2008), a modified alone condition was used for the purposes of this study because it would have been highly unusual for the subject to be left completely alone in a classroom for an extended period of time. During the alone condition, the subject was seated at a table in a classroom with no materials in front of him, except his voice output device. The classroom used was separated into two rooms with an observation window and two doors between them, such that when the

doors were closed, the subject was essentially alone in a room but could be observed through the windows. One of the doors closest to the researchers was left slightly ajar in order for the researchers to be able to hear vocalizations. Also, the subject could see the researcher and research assistant through the window but this did not appear to interfere with his attention. The research assistant sat the subject at the table and said, “I’ll be right back.” She then left the room closing the door behind her. The subject was observed through the window. He was left alone for five minutes. No programmed consequences were provided for any type of stereotypy or appropriate vocalizations during the alone condition but researchers were instructed to terminate the session were the subject to exhibit behaviors that could have been potentially dangerous.

Demand condition. During the demand condition, the subject was seated at a table in the same classroom. The subject was asked to complete a shape- and color-sorting task for five minutes. Specifically, various small colored foam shapes were emptied onto the table in front of the subject and he was asked to sort them by putting them into empty egg containers with receptacles marked with corresponding shapes or colors. The task was familiar to the subject as it had been used in his educational program in the past, but his teacher reported that he only completed the task independently (without any task-orienting prompting) about 75% of the time on average. When the subject completed the task, he was given verbal praise and asked to do it again if the five minutes had not expired. When the subject exhibited vocal or motor stereotypy, the experimenter said, “okay, you don’t have to,” and removed the task for 15 s after which the task was reintroduced.

Attention condition. During the attention condition, the subject was seated at a desk in the same classroom and was given an iPad on which he could access a game application called Starfall (Starfall Education, LLC, 2015). Starfall is a mobile application involving reading- and mathematics-based interactive educational games, incorporating animated videos and music. The Subject's teacher reported that he often requested to use Starfall following academic tasks and during free time but when it was compared to other reinforcers in the forced choice preference assessment, it ranked as only mildly reinforcing (chosen only 27% of the time that it was offered). At the start of the attention condition, the subject was given the iPad and asked to put on his headphones and to play Starfall. When Mitch engaged in vocal or motor stereotypy during the attention condition, the experimenter would tap Mitch to gain his attention and then would say, "quiet voice please," or "calm hands please."

RIRD probes. To ensure that the demands requested during RIRD interventions were within the skillset of the subject, prior to the intervention, teachers provided a list of vocal requests and motor task demands that were believed to be in Mitch's skill repertoire. A list of 10 vocal and 10 motor task demands was then created based on data showing that the subject could easily complete each task demand to be used later in RIRD interventions. To collect these data, two different researchers asked Mitch to complete the 20 demands in separate sessions and document the subject's accuracy on each of the items. Demands that the subject could complete accurately for both experimenters were kept, and requests that were not completed correctly for both experimenters were discarded. Additional demands were to be developed to replace any that needed to be discarded until a list of 10 vocal and 10 motor demands was

established, but this was not necessary. Data were recorded on the RIRD demand record form (see Appendix C). The final 20 demands chosen were then put into random order and printed on small cards which the researcher or research assistant could read from during RIRD interventions (See Appendix F). The purpose of creating these cards was to ensure that RIRD demands were varied over the course of the sessions.

Baseline. During baseline phases, the research assistant gave the subject a verbal cue to begin the task, "Mitch, it's time to do your job. You can begin now." At the same time, an iPad was handed to him which had the picture activity schedule for the task loaded and ready to use. The researcher observed and collected data, while the research assistant stood roughly 15 feet away from the subject. The researcher started a timer once the subject's hand touched the iPad being handed to him from the research assistant. This timer ran continuously until the end of the entire complex task (when the subject sat in a chair at a table). Vocal and motor stereotypy incidents were recorded for only the first five minutes of the session, as measured by an additional timer which was paused during intervention. This form of discontinuous data collection was common among previous RIRD studies and is believed to exclude counting stereotypy which may be a result of the intervention itself. Additionally, the number of individual steps completed during the five discontinuous minutes of data collection was also recorded. Data were recorded on the dependent variable record form (see Appendix B).

During the baseline sessions, the research assistant did not interrupt stereotypy or prompt the subject in any way. The instructor was permitted to respond to appropriate vocalizations, such as if the subject asked for help tying the apron. Once the 5 min data collection period had expired, the subject continued to complete the remaining steps of

the task. When all steps were completed, the total continuous time was documented on the dependent variable record form (see Appendix B). The research assistant was instructed to end the task if 30 min had passed and the subject had not finished all of the steps, but this was not necessary during any of the trials. The percentages of partial intervals containing stereotypy (motor, vocal, or both together) were calculated based on the total number of intervals within the 5 min of data collection. Steps completed within the 5 min data collection period were also documented. The observable indicators that a step was completed were defined clearly and are detailed on each task analysis specific to the tasks (see appendices G-I)

Intervention. During the intervention phase, the research assistant started the subject on the task in the same fashion she started him on the task during the baseline phase. The research assistant gave the subject a verbal cue and handed him an iPad with the picture activity schedule loaded and ready to use. RIRD interventions were applied within 2 s of the occurrence of either motor or vocal stereotypy until all steps listed on the task analysis and incorporated into the subject's picture activity schedule were completed. Data (e.g., % of intervals of stereotypy and frequency of RIRD interventions) were collected only during the first 5 minutes of the session, similar to the baseline phase. However, unlike in the baseline phase, the timer tracking the 5 min data collection period was paused during each RIRD intervention, so as to exclude collecting data on stereotypy that might have been a result of the intervention itself. The timer tracking the discontinuous 5 min data collection period was programmed to vibrate every 6 s to indicate to the researcher the start and end of each 6 s interval. This timer was stopped during the intervention phases and when it reached five minutes, which indicated the end

of the 5 min data collection period. The total time to complete the entire chain was also recorded with an additional timer that ran continuously and was not paused.

The research assistant was permitted to respond to appropriate vocalizations such as if the subject asked for help tying the apron or opening a jar. Procedures for RIRD are described below. Data collected during the intervention phase were collected using the dependent variable record form (see Appendix B).

RIRD procedure. As noted, the subject was given a verbal cue, “Mitch, it’s time to do your job. You can begin now.” He was simultaneously handed an iPad with a picture activity schedule loaded and ready to use. The researcher started two timers when the student took the iPad from the research assistant, similar to the baseline trials. Unlike in the baseline trials, the second timer was paused by the researcher each time the RIRD intervention was initiated by the research assistant, following the occurrence of motor or vocal stereotypy. It was then restarted following each RIRD intervention until five minutes had expired. Once the subject completed three consecutive RIRD demands without exhibiting motor or vocal stereotypy, the research assistant said, “back to work please” at which time the researcher restarted the second timer and continued data collection. When the second timer reached five minutes, data collection for stereotypy and the frequency of RIRD interventions was discontinued for the trial but the RIRD interventions continued as designed until the all steps of the task were completed. Following the final step in the task analysis, the first timer was stopped and the total time was recorded, which included the time it took to implement the RIRD interventions.

Following the occurrence of vocal or motor stereotypy, the research assistant initiated the RIRD procedure within 2 s. RIRD demands were administered using the

RIRD Demand List as a reference (Appendix F). The research assistant first initiated attention by saying the subject's name and making eye contact. The research assistant then gave an RIRD demand as prescribed from the list of incompatible behaviors (e.g., touch your head. If the subject completed the demand or made an attempt to complete the demand, and did not exhibit vocal or motor stereotypy, the research assistant gave a second demand. It was not important that the demand be executed exactly correct; approximations were acceptable and were not corrected. The same procedure was repeated for the third demand. If the subject did not respond to a motor demand at all, the research assistant repeated the demand again and/or modeled the behavior as necessary. Prescriptive prompting (Steege et al., 1987) was permitted to be used if necessary but was not needed during RIRD demands. If the subject exhibited stereotypy during the RIRD intervention, additional demands were given from the prescribed list until the subject completed three consecutive demands in the absence of stereotypy. Following three consecutive demands, the instructor would say, "back to work please."

Reinforcement procedure. Following the completion of the task, the subject was allowed to participate in an activity of choice, from an array of four activities which had been predetermined to be reinforcing during the preference assessments. For the two food preparation tasks the subject also had the option of eating the food prior to selecting an activity. The subject was given verbal praise such as, "nice job Mitch" and was allowed to choose from one of the four activities. Following completion of the activity he chose, the subject was returned to his typical daily routine.

Response Measurement and Reliability

Measurement data. Baseline and intervention data were collected for the first five minutes of each session but the baseline or intervention procedures continued through the entire chain of steps involved in each task analysis. The subject completed all of the steps on the task analysis in every session to prevent confusion or frustration related to ending a task before it was completed. Data collected during the first 5 minutes of each session included: (a) number of steps completed correctly, (b) intervals containing stereotypy (motor or vocal) using 6s partial interval recording, and (c) frequency of RIRD interventions. Additionally, the total time from starting the task to completion was recorded. During the 5 minute discontinuous data collection period the timer was paused during RIRD interventions, however an additional timer was used to collect the total continuous time of the task from start to finish. Such continuous data were used to determine the true efficiency and applicability of using RIRD in an applied setting.

Stereotypy occurring during actual RIRD demand sequences, when timer 2 was stopped, was not recorded because it would have been unclear if the RIRD demands had a relationship to the additional stereotypy. Excluding these data was congruent with previous RIRD studies (Ahearn et al., 2007; Ahrens et al., 2011; Athens et al., 2008; Cassella et al., 2011; Colon et al., 2012; Miguel, Clark, Tereshko, & Ahearn, 2009).

Vocal stereotypy. Vocal stereotypy was defined as any instance of noncontextual or socially dysfunctional speech and included utterances, phrases, and words unrelated to the present situation, words/phrases repeated within 5s of a prior occurrence, vocal noises with no social meaning, and rhythmic breathing patterns. Examples included high-pitched

sounds such as “blee, blee,” making noises into a cupped hand, and vocalized or repeated intelligible words with no verbal frame such as “I want” or “I see.” A specific example included saying “pizza” when no pizza was present. Nonexamples included vocalizations with a verbal frame such as, “I want pizza.” Similarly, mands or tacts made using a speech communication device were not considered to be stereotypy. Also, if the subject repeated a teacher or picture schedule direction one time, this was not considered stereotypy. A specific example of a verbalization not considered stereotypy was looking at a staff member and saying, “all done.”

Motor stereotypy. Motor stereotypy included motor movements that appeared to have no function related to the task. Examples included jumping up and down, holding or moving the fingers or hands under running water for more than 3 seconds, flapping hands or fingers, or waiving of the arms. Nonexamples of motor stereotypy included scratching an itch, wiping a foreign substance from a surface of the body, or functional gestures directed at another individual.

Interobserver agreement. Interobserver agreement (IOA) procedures were used for assessments conducted during all phases of the study. Video recordings of 30% of the preference assessment trials, functional analysis sessions, baseline, and intervention sessions were stored securely and viewed by a research assistant. The research assistant completed data collection while watching the videos. These additional data were then compared with data collected by the researcher. Interobserver agreement calculations are described below.

IOA: Preference assessment. A preference assessment was conducted prior to the study. The researcher conducted three preference assessments consisting of 12

presentations of picture pairs. The research assistant recorded one session on video and used the video to record data on the TARP: PA (see Appendix D). On the TARP: PA, the research assistant placed a check mark on each step listed to indicate that it had been completed as prescribed: (a) that the items were presented as prescribed, (b) selections were followed by access to the reinforcers, (c) and that selections were recorded accurately.

IOA: Functional analysis. The functional analysis consisted of three sessions of three conditions (9 sessions total). One session of each condition was video recorded. A research assistant reviewed the video recordings for each condition (e.g., alone, demand, attention). Using 6s partial interval recording procedures, the research assistant recorded any instances of stereotypy (motor or vocal) in each session on the dependent variable record form (see Appendix B). Percentage of agreement was calculated by dividing the number of 6s intervals with agreement by the total number of intervals with agreements plus disagreements and converting the ratio to a percentage.

IOA: RIRD probes. Using a list of 20 combined motor and vocal demands, developed through interviews with teachers, two research assistants asked the subject to complete each demand at different times during his school day. Those demands to which the subject responded with 100% accuracy were selected for use during the RIRD procedure. The RIRD demand record form was used to collect these data (see Appendix C). The research assistants were able to note which demands the subject completed accurately and which he could not complete and to list additional demands they thought he would be able to complete. The subject was able to complete all of the demands listed with 100% accuracy so additional demands did not need to be tested.

IOA of stereotypy, RIRD, and task completion. Roughly 30% of the baseline and intervention sessions were recorded on video. The video recordings were viewed by a research assistant and stereotypy was scored using 6s partial interval recording procedures. IOA was calculated by dividing the number of 6s intervals with agreement by the total number of intervals with agreements plus disagreements and converting the ratio to a percentage. An RIRD intervention was defined as beginning when the research assistant initiated getting the attention of the subject and ended following when the research assistant gave the verbal cue, "back to work please." RIRD interventions were recorded by frequency count. The task analysis for each task described specifically what behavior constituted the completion of each step in the task analysis. The research assistant recorded the number of steps completed fully within the five minutes. Partially completed tasks were not counted. The dependent variable record form was used to collect all of these data (see Appendix B).

Integrity assurance: RIRD procedure. Response interruption and redirection procedures were observed by a research assistant using the same videos described above. Data were collected using the TARP: RIRD (see Appendix E). The research assistant evaluated (a) whether the experimenter responded within 2s of each occurrence of stereotypy, (c) gained the subject's attention, (d) delivered the RIRD demands from the prescribed list (see Appendix F), (e) and, that the participant refrained from stereotypy for three consecutive RIRD demands prior to ending the RIRD demand procedure.

Chapter 3: Results

The primary data used in examining the results included the (a) number of tasks completed correctly, (b) percentage of partial 6s intervals containing stereotypy (motor or vocal), (c) frequency of RIRD interventions, (d) and total time to complete the entire chain of tasks, including time used for RIRD interventions. All data were graphed and analyzed using visual inspection and review of non-overlapping data points.

Preference Assessment

Over all trials combined, using the swing was the most preferred activity and was chosen 77% of the time when paired against the competing options (Table 1). Swing was followed by Music (61%), while Starfall (33%) and Walk (27%) were the least preferred. There was some variation in preference choices among the three preference assessment sessions: Swing (66%, 83%, 83%), Music (83%, 50%, 50%), Starfall (16%, 50%, 33%), and Walk (33%, 16%, 33%). A research assistant watched a video of one of the three sessions (33%) and documented procedural-fidelity on the TARP: PA (see Appendix D). The TARP: PA showed that 100% of the steps in the procedure were followed accurately.

Table 1

Forced Choice Preference Assessments Conducted over Three Days

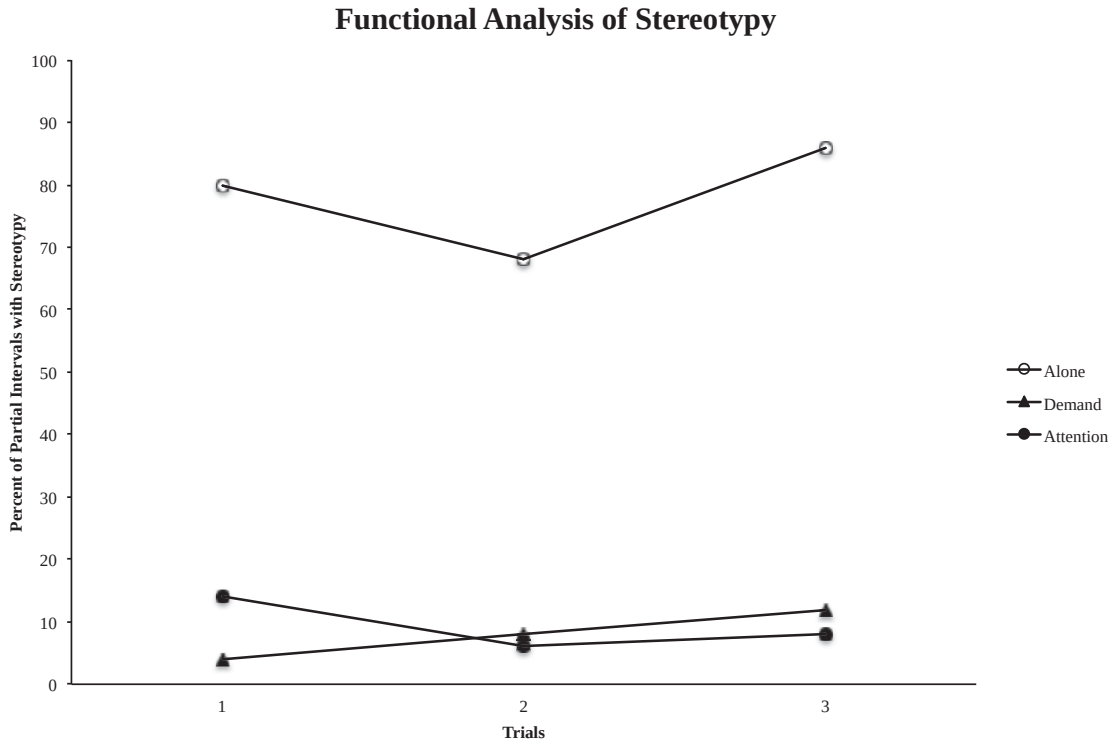
Activity	PA 1	PA 2	PA 3	Average
Swing	66%	83%	83%	77%
Music	83%	50%	50%	61%
Starfall	16%	50%	33%	33%
Walk	33%	16%	33%	27%

Functional Analysis

As shown in **Figure 1**, the subject exhibited the highest percentage of intervals of motor and vocal stereotypy during the alone condition (78%) as compared to the demand

condition (8%) and the attention condition (9%), which confirmed that stereotypy was maintained by automatic reinforcement. Mitch exhibited very similar percentages of stereotypy according to each condition type (see Table 2). The average IOA for stereotypy across conditions was 88%.

Figure 1. Functional Analysis of Stereotypy



Alone. Stereotypy occurred on average in 78% of the intervals across all three alone-condition sessions. There was little variation in rates of stereotypy among the three alone-condition sessions (e.g., 80%, 68%, and 86%). Overall IOA for the alone conditions was 73% agreement.

Table 2

Functional Analysis of Stereotypy Data (Partial Interval Recording)

	% Intervals with Stereotypy		
	Alone	Demand	Attention
Stereotypy (Average)	**78**	**8**	**9**
Session 1	80	4	14
Session 2	68	8	6
Session 3	86	12	8

Demand. Combined motor and/or vocal stereotypy occurred an average 8% during the three demand condition sessions. There was little variability of total stereotypy across the three demand conditions (4%, 8%, and 12%). Interobserver agreement for the demand condition overall was 97% agreement.

Attention. Combined motor and/or vocal stereotypy occurred an average 9% during the three attention-condition sessions. Interobserver agreement was 88% across all three sessions.

The most salient finding of this functional analysis was that the subject exhibited higher rates of stereotypy (either motor or vocal) during the alone conditions (see Table 3). This suggests that stereotypic behaviors were automatically reinforced for this subject. The current study procedures did not differentiate intervention based on the type of stereotypy exhibited by the subject.

Table 3

Interobserver Agreement for Functional Analysis of Stereotypy

	% Agreement			
	Alone	Demand	Attention	Across Conditions
IOA Stereotypy	73	97	93	88

Interobserver Agreement and Treatment Integrity

Interobserver agreement and treatment integrity were monitored across all three life skills experiments (See Table 4). Using video recordings of 29% of the sessions, a research assistant used an additional data collection form (See Appendix B) and the TARP: RIRD (See Appendix E) to calculate IOA and to calculate the percentage of steps of the RIRD procedure implemented correctly. Average IOA for all three experiments was 87% for stereotypy. It was calculated that 92% of the RIRD steps were completed correctly over all. The only treatment implementation mistakes involved initiating the intervention within two seconds of the occurrence of stereotypy. There were some initial sessions when there was a slightly longer latency between the onset of stereotypy and the RIRD intervention. These procedural errors were rare and did not appear to affect the subject's response to the intervention.

Table 4

Interobserver Agreement and Treatment Integrity

29% of Sessions via Video Recording	
IOA Stereotypy	87%
Steps of RIRD Procedure Correct	92%

Experiment 1

The first experiment included withdrawal ABAB conditions for the purpose of showing experimental control over the dependent variables. This experiment served as an analogue to experiments 2 and 3. Data were collected on the percent of intervals containing stereotypy, number of steps completed, frequency of RIRD intervention, and continuous time measuring the overall completion time of the entire task (all steps in the task analysis) which included the time it took for the researcher to implement RIRD

interventions. The task in Experiment 1 consisted of preparing a dish of yogurt with pears (YP) and involved 20 steps. A summary of the data collected during all sessions in experiment 1 is found in Table 5.

Table 5

Experiment 1

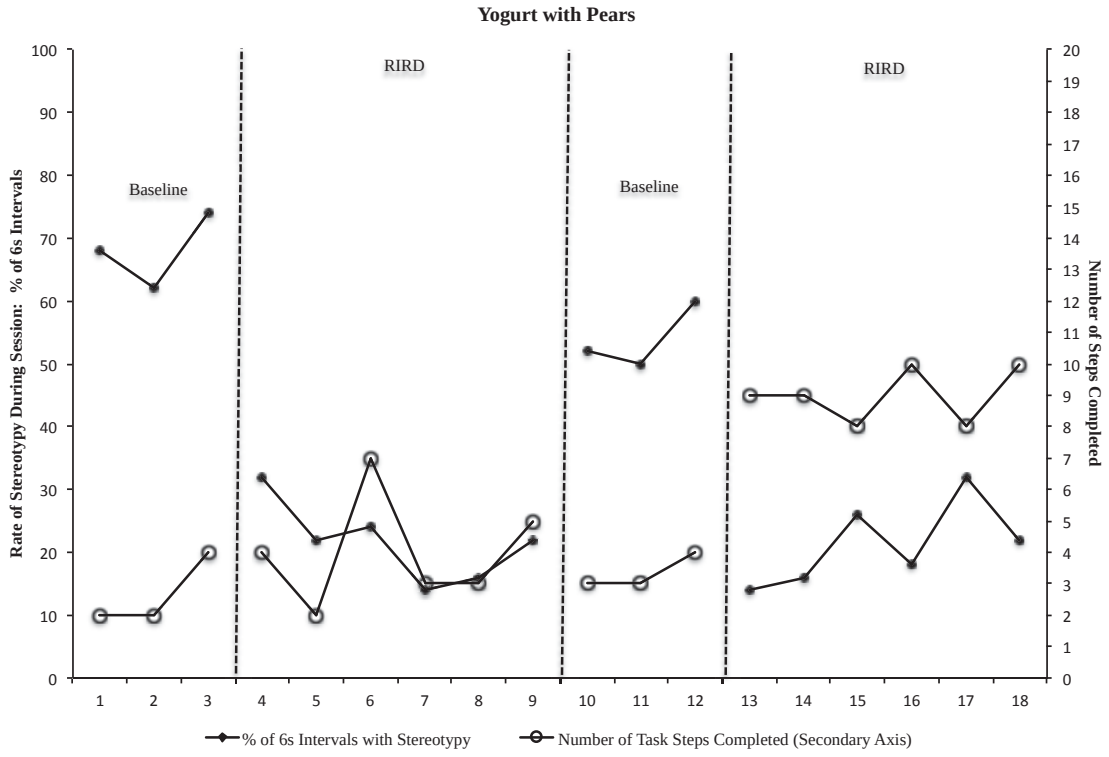
Analogue ABAB Withdrawal Data

Life Skills Task: Yogurt with Pears (20 steps)					
	Rate of Stereotypy (%)	# of Steps Completed in 5 min Interval	# of RIRD Interventions Total	Completion Time (minutes:seconds)	Completion Time (seconds)
BL1 Avg.	**68**	**2.67**	**-**	**18:15**	**1,095**
BL1 S1	68	2	-	18:16	1,096
BL1 S2	62	2	-	22:15	1,335
BL1 S3	74	4	-	14:13	853
Int.1 Avg.	**22**	**4**	**12**	**17:24**	**1,044**
Int.1 S4	32	4	29	23:43	1,423
Int.1 S5	22	2	10	16:23	983
Int.1 S6	24	7	6	14:04	844
Int.1 S7	14	3	6	15:16	916
Int.1 S8	16	3	8	12:30	1,230
Int.1 S9	22	5	13	14:26	866
BL2 Avg.	**54**	**3.33**	**-**	**17:45**	**1,065**
BL2 S10	52	3	-	19:05	1,145
BL2 S11	50	3	-	16:42	1,002
BL2 S12	60	4	-	17:28	1,048
Int.2. Avg.	**21**	**9**	**9.5**	**12:00**	**720**
Int.2 S13	14	9	6	11:19	679
Int.2 S14	16	9	9	12:03	603
Int.2 S15	26	8	11	13:17	797
Int.2 S16	18	10	9	13:42	822
Int.2 S17	32	8	12	11:57	717
Int.2 S18	22	10	10	11:43	703

A graph of the percent of intervals containing stereotypy and number of task steps completed during experiment 1 is found in Figure 2. A research assistant viewed videos of 29% of the sessions in experiment 1 and collected additional data using the Dependent Variable Record Form (See Appendix B) for IOA calculation. Integrity of the RIRD procedure was documented using the TARP: RIRD (see Appendix E).

IOA for stereotypy in experiment 1 averaged 87%. Integrity of the RIRD procedure averaged 92% accuracy. In the first phase of baseline conditions, the percent of intervals containing stereotypy ranged from 62 to 74% with a mean of 68%. During the first intervention phase, the mean percent of intervals with stereotypy dropped to 22%, with a range of 14 to 32%. When baseline conditions were reintroduced the average percent of intervals with stereotypy rose to 54% with a range of 52 to 60%.

Figure 2. Experiment 1: Analogue ABAB Withdrawal



When the intervention was implemented again, the average percent of intervals with stereotypy dropped back down to 21%, with a range of 14 to 32%. There was roughly a 30% reduction in stereotypy between the initial baseline phase and the final intervention phase of experiment 1, which is substantial and socially meaningful. It becomes more socially meaningful if the data show that the reduced stereotypy covaried with increases in productivity and independent functioning. It should be noted that during the preliminary intervention session when RIRD was first implemented, the research assistant responded to a very high frequency of stereotypic behaviors, which were likely under represented by the partial interval recording procedure. For example, during this initial introduction to the intervention, the research assistant implemented the RIRD procedure 29 times, which was roughly three times more often than was observed in any of the other sessions. Therefore, this data point represents an outlier and substantially affects the some of the aggregated data reported. However, it did not substantially affect the percent of intervals with stereotypy for that session, which was 33%.

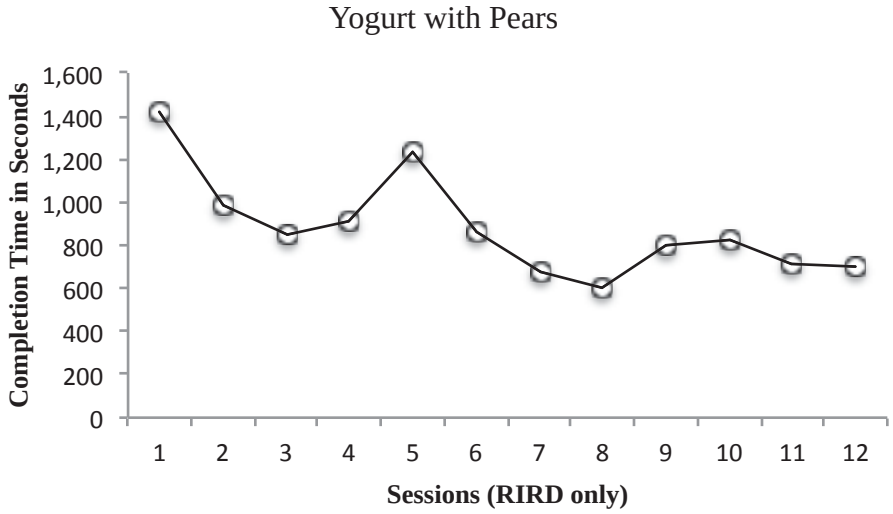
During the initial baseline condition in experiment 1, the subject fully completed an average of 2.67 steps within the discontinuous 5 min data collection period. The number of steps completed during this initial baseline phase ranged from 2 to 4. There was only a 1.5 step average improvement between the initial baseline and intervention sessions, with the subject completing an average of 4 steps during the first intervention session (range 2-7 steps completed). When the intervention was withdrawn, the subject's gains in step completion did not drop meaningfully on average. He continued to complete 3.33 steps on average (range 3-4) even when the intervention was removed during the return to baseline condition. When the intervention was re-introduced in the final phase

of the experiment, there was a noticeable and meaningful improvement in steps completed. The subject averaged 9 complete steps during the final intervention phase with a range of 8 to 10.

Average completion time during baseline of the first experiment was 18 min 15 s and ranged from 14 min 13 s to 22 min 15 s (see Figure 3). While a comparison group was not used to determine the amount of time an average individual would take to complete the 20 steps of the task, 18 min was interpreted to be an extraordinarily long time. During the first intervention phase, the improvement (about 1 min) in average completion time was not socially meaningful (17 min 24 s, with a range of 14 min 4 s to 23 min 43 s). Completion time remained nearly the same when the intervention was withdrawn during the return to baseline condition with an average completion time of 17 m 45 s (range 16 min 42 s to 19 min 5s). However, similar to the improvements observed in productivity during the reintroduction of RIRD, the subject's completion time did improve meaningfully during the final intervention phase with an average of 12 min to complete all of the 20 steps in the YP task (range 10 min 3 s to 13 min 42 s).

Considering the subject's motor skill limitations, this amount of time to prepare a small meal for breakfast independently is very reasonable. However, to have an additional person on hand to implement RIRD at the outset of stereotypical behavior would limit independence if there was a need for a high frequency of RIRD interventions in order to maintain increased productivity and efficiency. To address this question, researchers also maintained a frequency count of RIRD interventions throughout the entirety of each session.

Figure 3. Completion Times in YP Experiment (Intervention Phases Only)

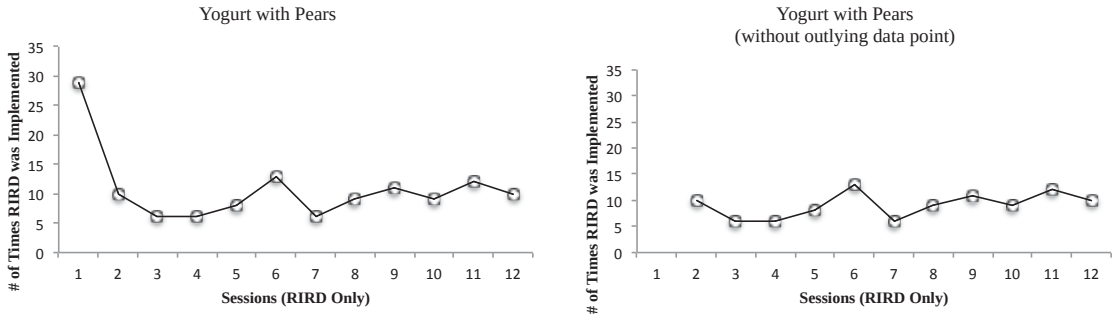


Since RIRD was not implemented during baseline conditions, only data points from the two intervention conditions were evaluated. On average, the research assistant had to implement RIRD during the first B phase 12 times per session with a range of 6 to 29. As noted, the frequency of RIRD interventions in the initial session of the first B phase, when the subject had never previously been exposed to the intervention, exceeded any of the other data points in the range by three fold (29 RIRD interventions during the first session). This initial frequency was interpreted as an outlier because it appeared to impact the aggregated data substantially for this variable. When the outlying data point was removed from consideration, the average frequency of RIRD intervention dropped to 8.6 times per session.

During re-implementation of the intervention condition (the second B phase) the data were less variable with a range of 6-12 interventions. RIRD was used on average 9.5 times per session during the second B phase. Without the initial outlying data point, the number of interventions needed to keep Mitch on task actually increased slightly between

the first B phase and the second B phase, but whether or not Mitch needed someone to implement an intervention 12 times, 8.6 times, or 9.5 times in order to make a simple meal is somewhat meaningless as these numbers all suggest that a second person was needed to keep him from engaging in stereotypy, which translates into limited independence.

Figure 4. Trend of RIRD Intervention Frequency: YP Experiment



It appears that RIRD intervention did have a functional relationship to stereotypy as evidenced in experiment 1. Also, The number of steps Mitch was able to complete covaried with the decreases in stereotypy and, as such, the first experiment served as an adequate analogue to be used as a rationale for extending the intervention to additional life skills tasks.

Experiments 2 and 3

The second and third experiments utilized a multiple baseline across tasks design to provide evidence that RIRD is a viable intervention to implement in the context of multiple types of life skills tasks. The task in experiment 2 was to prepare a toasted English muffin with butter (EM) and was comprised of 17 steps on the task analysis (see Appendix H). The second task was a package of grooming routines including washing

hands, washing face, brushing teeth, and brushing hair. Together as a package, the grooming routine (GR) task involved 32 steps on the task analysis (see Appendix I).

Baseline conditions for both tasks were initiated in the same week but the GR baseline condition was extended farther than the EM baseline condition to demonstrate the relationship between the intervention and the dependent variables. Mitch's typical educational program involved the life skills class every other day, which is when data for the EM experiment were collected. However, he was required to do the grooming routine daily as part of his typical school day, so sometimes data were collected for both the EM and GR experiments on the same day and sometimes only GR data were collected.

During the baseline sessions of the EM task Mitch exhibited high percentages of intervals with stereotypy, averaging 73% during the discontinuous 5 min period of data collection, with a range of 64-82%. During the intervention phase of the EM task, Mitch's average percent of intervals with stereotypy dropped to 12% with a range of 6 to 20% during the discontinuous 5 min data collection period.

For the GR task, Mitch's average percent of intervals with stereotypy during the baseline sessions was 85% with a range of 74 to 98%. During the intervention phase of the GR task, Mitch's average percent of intervals with stereotypy was 34%, with a range of 26 to 43%. As previously noted, the GR task involved running water which appeared to be a preference among Mitch's options for engaging in stereotypy, which is likely why the reductions in stereotypy were slightly less profound for the GR task than they were for the EM task. Regardless, the reductions were socially meaningful in both tasks and were immediate following the implementation of RIRD.

Similar to outcomes from experiment 1, Mitch completed a low number of steps in baseline conditions for both the EM and GR tasks, averaging 6.67 steps with a range of 4 to 10 for EM and averaging 15.17 steps for GR (range 12 to 18).

Table 6

Experiments 2 and 3: Multiple Baselines Across Tasks Data

Life Skills Tasks: English Muffin (17 Steps) / Grooming Routine (32 Steps)					
	Rate of Stereotypy (%)	# of Steps Completed in 5 min Interval	# of RIRD Interventions Total	Completion Time (minutes:seconds)	Completion Time (seconds)
English Muffin					
BL Avg.	**73**	**6.67**	**-**	**10:11**	**611**
BL T1	64	10	-	8:32	512
BL T2	82	6	-	9:30	570
BL T3	72	4	-	12:32	752
Int. Avg.	**12**	**11.43**	**5**	**8:45**	**525**
Int. T4	8	16	4	7:46	466
Int. T5	18	9	6	9:08	548
Int. T6	10	10	5	9:43	583
Int. T7	20	8	11	11:08	668
Int. T8	6	10	5	10:07	607
Int. T9	6	12	3	6:45	405
Int. T10	14	15	4	6:36	396
Grooming Routine					
BL Avg.	**85**	**15.17**	**-**	**9:56**	**596**
BL T1	98	12	-	11:19	679
BL T2	96	12	-	14:54	894
BL T3	76	17	-	6:10	370
BL T4	74	18	-	9:31	571
BL T5	84	16	-	9:36	576
BL T6	84	16	-	8:07	487
Int. Avg.	**34**	**32**	**10**	**6:13**	**373**
Int. T7	26	32	10	6:17	377
Int. T8	31	32	8	4:45	285
Int. T9	41	32	14	6:14	374
Int. T10	30	32	8	6:54	414
Int. T11	43	32	11	6:57	417

When the intervention was implemented during the EM task, during the discontinuous 5 min interval of data collection, Mitch was able to complete an average of 11.3 steps per session (range 4 to 10). For the GR routine, Mitch completed all 32 steps of the task within the discontinuous 5 min data collection period during every intervention session. This was a socially meaningful improvement.

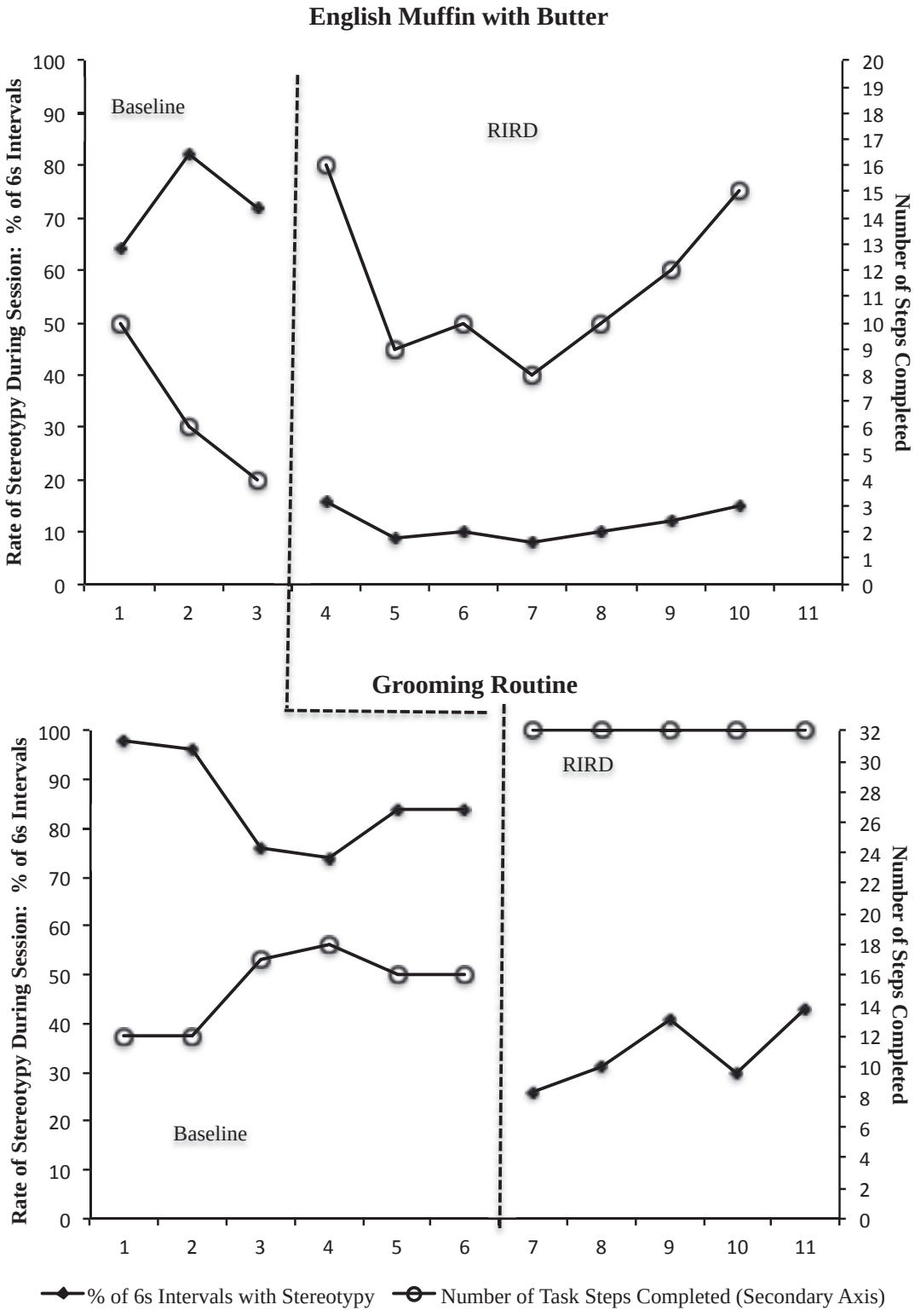
During the baseline condition for the EM task, Mitch's average completion time, which included the time it took to implement the RIRD interventions, was 10 min 11 s. The range of completion times during this condition was 8 min 32 s to 12 min 32 s. When RIRD was implemented, his completion time improved by about 2 min, averaging 8 min 45 s during the intervention phase (range 6 min 36 s to 11 min 8 s).

During baseline, his average completion time for all 32 steps of the GR task was 9 min 56 s (range 6 min 10 s to 14 min 54 s). When RIRD was implemented, Mitch's completion times improved by about 4 min for the GR task averaging 6 min 13 sec (range 4 min 45 s to 6 min 57 s).

On average, RIRD interventions were delivered 5 times per session during the EM intervention phase with a range of 3 to 11 RIRD interventions. During the intervention sessions of the GR task, RIRD interventions were delivered 10 times per session on average with a range of 8 to 14 RIRD interventions.

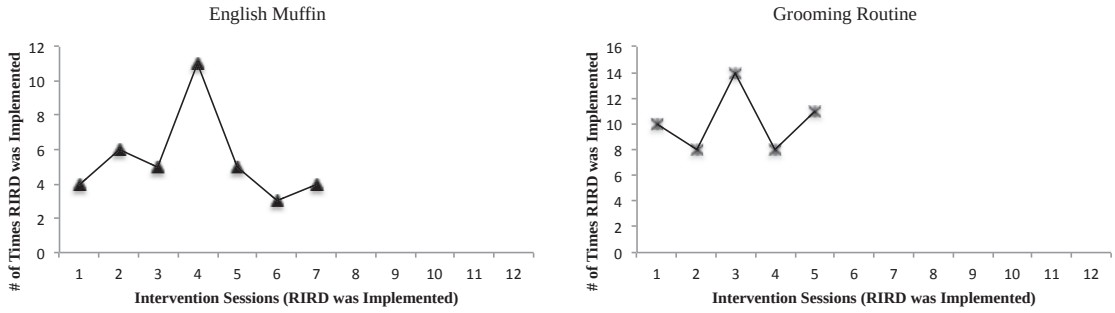
Improvements in total completion times were observed for both the EM and GR tasks. Similarly, the data representing the frequency of RIRD intervention suggested that there was an increased need for intervention during Experiment 3 but that there was a slightly decreased need for intervention over time for Experiment 2.

Figure 5. Experiments 2 and 3: Multiple Baselines Across Tasks



This increased need for RIRD intervention for the GR task may have been related to the fact that Mitch showed a strong preference for using water for stereotypy making that particular behavior more resistant to treatment. In addition, the number of intervention sessions for the GR task may have been insufficient to produce an eventual decreasing trend in the data.

Figure 6. Trend of RIRD Intervention Frequency: EM and GR Experiments



Chapter 4: Discussion

This study examined several questions: (a) will an RIRD intervention reduce stereotypic behavior that a subject exhibits during completion of complex life skills tasks; (b) will task step completion increases covary if stereotypy is reduced; and (c) will the need to implement an RIRD intervention decrease over time, such that the frequency is low enough to allow for increased independent task completion by the subject. Prior to experiments 1, 2, and 3, researchers conducted a functional analysis to determine whether or not the subject's stereotypic behaviors were primarily maintained by automatic reinforcement as documented in previous studies. Our results evidenced that the subject's stereotypy occurred most frequently during alone conditions, which suggested that these behaviors were maintained by automatic reinforcement.

To answer the first question of whether RIRD would reduce stereotypy while the subject engaged in a complex life skills task, an experimental design using an intervention withdrawal format was employed and showed that initially the subject exhibited very high rates of stereotypy. Once the intervention was implemented, the rates of stereotypy dropped significantly. The relationship between the subject's stereotypy and the intervention was demonstrated by returning the subject to the baseline condition where he exhibited high rates of stereotypy again. Re-implementing the intervention a second time resulted in substantial decreases in stereotypy. Similar meaningful reductions in stereotypy were observed during experiments 2 and 3. Reductions in stereotypy were substantial in response to all of the intervention conditions, suggesting that RIRD was effective at reducing immediate stereotypy even when applied in the context of life skills tasks.

In order to answer the second research question, the results needed to indicate that the reductions in stereotypic behaviors covaried with increases in the subject's productivity, as measured by the number of task steps completed. In order to determine this, researchers used a discontinuous 5 min data collection period and found that the number of steps completed within the 5 min data collection period increased in conjunction with decreases in stereotypical behaviors. In the first experiment, from the initial baseline condition to the final intervention condition, the number of steps the subject completed within the 5 min interval increased by roughly 30%. In the second and third experiments the numbers of steps completed increased by roughly 14% for one task and by roughly 50% for the other. These increases in productivity were meaningful to our subject and the tasks selected, and would be to individuals with disabilities, specifically with regard to learning, caring for self, and working.

When individuals are more productive in a classroom, they have more opportunity for repeated practice, fluency building, and exposure to more varied educational opportunities. When they are more efficient at self-care tasks they experience the same benefits associated with those of the classroom but also blend into their home environment more naturally (Cuvo, Jacobi, & Sipko, 1981). In the work force, the benefits of increased productivity are likely to be associated with increased access to more favorable employment conditions, pay, and job opportunities (Hendricks, 2010). While less interference from distracting stereotypy and increased productivity are beneficial in many ways on their own, independence of functioning is the most important component of behavioral improvement for individuals with severe disabilities.

The third question in this study targeted the concept of increased independence. The reason this question was so important to this study was because few studies to date have demonstrated a lasting effect of RIRD, when an additional party is no longer present to implement the intervention upon occurrence of stereotypy. Also, there is some question as to whether the data recording procedures used in previous RIRD studies overestimate reductions in stereotypy (Carroll & Kodak, 2014). Specifically, nearly all of the RIRD studies to date tracked stereotypy using a discontinuous data recording procedure and paused the timer during intervention implementation, not counting stereotypy that occurred during the intervention. The rationale behind interrupted data recording is to control for additional stereotypy that occurs in response to the intervention itself, that presumably would not have occurred if the intervention were not implemented. However, in at least one study it was found that stereotypy rates were roughly the same during RIRD intervention than they were during no-interaction conditions (Carroll & Kodak, 2014).

Also, the intervention itself takes some time to implement, and requires that a second person be present to implement it. Several studies have evidenced that over time there were few if any reductions in the frequency or duration of RIRD interventions (Carroll and Kodak, 2014; Cassella et al., 2011). Intuitively, true independence during task completion has an inverse relationship to the need for support of a second individual.

The final question that this study attempted to answer was whether the need to implement an RIRD intervention decreased over time, such that the frequency was low enough to allow for increased independent task completion by the subject. Data relating to this third question included the frequency of RIRD interventions and total continuous

completion time needed to complete all steps in the tasks, including the time it took for an additional person to implement RIRD. Mixed results were found across the three experiments conducted in this study, but some of the data were promising. In our first experiment the number of RIRD interventions needed initially appeared to have a decreasing trend suggesting that over time the intervention may be needed less and less. However, the initial data point in the series, which represented the very first time RIRD was introduced to the subject, was a statistical outlier and influenced the trend line dramatically. When this data point was excluded the trend actually showed a slightly increasing trajectory over time. In contrast, with regard to total completion time, even with RIRD intervention the subject completed the steps of the task more and more quickly (see Figure 3).

For the second experiment involving preparation of an English muffin with butter, the trend suggested that fewer RIRD interventions were needed over time, and also that the subject completed all of the steps with increasing efficiency. However, in the third experiment involving a package of grooming routines, the data suggested a slight increase in the need for intervention over time yet a meaningful decrease in total completion time.

It appears that data from the present study support RIRD as an effective intervention for reducing stereotypy, at least in terms of immediate effects. These data also showed that productivity increased in response to reduced rates of stereotypy. Nonetheless, the data suggested that RIRD intervention was still needed over time. Considering that overall completion times for the three experiments showed improving trends, it could be reasonable to surmise that even though RIRD requires an additional

individual to implement, and that it takes some time to implement, overall it has social validity with regard to improved efficiency.

Limitations and Future Research

While some promising data were presented in this study, there were several limitations that need to be considered. The most compelling limitation in this study, and in most of the studies involving RIRD, involved the potential effects of the data collection procedure. As shown by Carroll and Kodak (2014) and mentioned previously, interrupted data collection procedures might overestimate the effects of RIRD. However, the dilemma compelling this type of data collection is related to the possible eliciting effects that administering the intervention could have on the rates of stereotypy. Seemingly the only way to control for these would be to exclude data collected during RIRD intervention at the risk of over-estimating effects. It would be beneficial to consider more longitudinal data in future research so as to determine more lasting effects rather than focusing so much attention on the immediate effects of RIRD.

Another limitation of this study involved the lack of control over the possible confounding effects of repeated practice. When designing the study, researchers postulated that, because the subject had familiarity with the tasks and practiced the tasks regularly as part of his curriculum over time, that practice effects would be limited. However, with the exception of the grooming routine, a task which he did everyday, the history of exactly how often the subject was required to prepare yogurt with pears or English muffins with butter was not precisely measured. We knew that the subject had practiced these skills among one additional food preparation task often in the life skills class which met every other day, but we did not know exactly how many times each task

had been accomplished prior to the study. Also, these tasks were alternated regularly depending on supplies and teacher discretion when he completed them during class. So we did not have data to explain the sequence, frequency, or schedule of when he was exposed to the tasks. As soon as the study began, the subject only completed one task at a time during life skills class until all data were collected for that task. As a result, it is possible and likely that he increased fluency as a result of repeated practice.

A third limitation of this study was that time constraints may have had an effect on the results of at least the grooming routine data. Because this portion of the study began after the initial experiment was completed and the intervention was withheld to extend the baseline condition, it was somewhat late in the school year by the time the intervention was implemented. As a result, the grooming routine intervention phase data consisted of only five data points. This was sufficient to show a relationship between RIRD and stereotypy but more data during this phase might have produced results in the other variables that were more similar to the two food preparation tasks, for which more data had been collected in the intervention phase.

Fourth, follow up maintenance sessions were common in the previous studies reviewed. It would have been advantageous to have designed this component into the present study to determine what effects were maintained over time for Mitch.

Finally, it became clear to the researchers that, in addition to motor and vocal stereotypy which are observable, there may exist a third type of stereotypy, which was not observable. There were times during task completion when the subject was neither working on tasks nor engaging in motor or vocal stereotypy. In essence he was observed to be thinking, staring and not moving, or what might be considered daydreaming. While

this is considered a private event, the subject exhibited this behavior for extended periods at times and it interfered with productivity and efficiency. Although other causes, such as mild seizures were not ruled out, it would be interesting for future RIRD research to investigate the effects of clearly defining and interrupting this behavior to see if it responds the same to RIRD as observable stereotypy.

Chapter 5: Summary

Response interruption and redirection has shown strong immediate effects in reducing stereotypy. This study replicated these effects using RIRD intervention in the context of an applied educational setting while the subject completed complex life skills tasks. While reductions in stereotypy in response to RIRD were strong, and productivity was found to improve during intervention, there did not appear to be a decreased need for intervention over time. Data were somewhat mixed, but suggested an overall increase in efficiency of task completion when RIRD was implemented. However, confounding effects related to repeated practice may have played some role in the improvements in efficiency. Overall the researchers found that RIRD was a viable intervention to use in the context of an applied setting and that it was effective at reducing stereotypy.

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APPENDIX A

Preference Assessment Record Form
RIRD Study

Student ID: _____

1. Allow student to sample each of the four items.
    a. If the item is food, give a taste or small sample.
    b. If the item is an activity allow 5 – 10 seconds of play.
    c. If the item is a preferred object allow 5 – 10 seconds of interaction.
2. Clear all items from table.
3. Display 2 items together roughly 1.5 feet apart.
4. Arrange according to examiner's left/right as indicated for each trial.
5. Say, "make a choice."
6. Allow 10 seconds for student to make a choice (i.e., touching, picking up item, looking fixedly at item, pointing to item or any other behavior clearly indicating choice).
7. Allow student to sample/access the item chosen for 5-10 seconds, record the choice.
8. If no choice after 10s, remove items, record no choice, and present the next trial.

Date _____

T1	1	2	No choice
T2	4	3	No choice
T3	2	4	No choice
T4	3	1	No choice
T5	4	2	No choice
T6	2	1	No choice
T7	1	3	No choice
T8	3	2	No choice
T9	1	4	No choice
T10	2	3	No choice
T11	3	4	No choice
T12	4	1	No choice

Total Day 1

Item 1: ___ / 6 x 100 = ____%
Item 2: ___ / 6 x 100 = ____%
Item 3: ___ / 6 x 100 = ____%
Item 4: ___ / 6 x 100 = ____%

Date _____

T1	4	1	No choice
T2	3	4	No choice
T3	2	3	No choice
T4	1	4	No choice
T5	3	2	No choice
T6	1	3	No choice
T7	2	1	No choice
T8	4	2	No choice
T9	3	1	No choice
T10	2	4	No choice
T11	4	3	No choice
T12	1	2	No choice

Total Day 2

Item 1: ___ / 6 x 100 = ___%
Item 2: ___ / 6 x 100 = ___%
Item 3: ___ / 6 x 100 = ___%
Item 4: ___ / 6 x 100 = ___%

Date _____

T1	1	2	No choice
T2	4	3	No choice
T3	2	4	No choice
T4	3	1	No choice
T5	4	2	No choice
T6	2	1	No choice
T7	1	3	No choice
T8	3	2	No choice
T9	1	4	No choice
T10	2	3	No choice
T11	3	4	No choice
T12	4	1	No choice

Total Day 3

Item 1: ___ / 6 x 100 = ____%
Item 2: ___ / 6 x 100 = ____%
Item 3: ___ / 6 x 100 = ____%
Item 4: ___ / 6 x 100 = ____%

APPENDIX B

Dependent Variable Record Form
RIRD Study

Student ID: _____ Date: _____

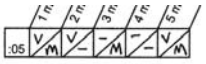
Vocal stereotypy. Vocal stereotypy will be defined as any instance of noncontextual or nonfunctional speech and includes phrases and words unrelated to the present situation, words/phrases repeated within 5s of a prior occurrence, vocal noises with no social meaning, and rhythmic breathing patterns. Examples include high-pitched sounds such as "blee, blee," making noises into a cupped hand, and vocalized or repeated intelligible words with no verbal frame such as "I want" or "I see." A specific example includes saying "pizza" when no pizza is present. Nonexamples include vocalizations with a verbal frame such as "I want pizza." Similarly, mands or tacts made using a speech communication device will not be considered stereotypy. Also, if the subject repeats a teacher or picture schedule direction one time, this will not be considered stereotypy. Another example of a verbalization not considered stereotypy includes looking at a staff member and saying, "all done," or other functional statements.

Motor stereotypy. Motor stereotypy will include motor movements that appear to have no function related to the task. Examples include jumping up and down, holding or moving the fingers or hands under running water for more than 3 seconds, flapping hands or fingers, or waiving of the arms. Nonexamples of motor stereotypy include scratching an itch, wiping a foreign substance from a surface of the body, or functional gestures directed at another individual.

Stereotypy: 6s partial interval recording
Record if the behavior occurs at all during any portion of the 6s interval.
When RIRD is given in the middle of an interval, record the interval then stop.
Resume with new interval after praise is given following completion of 3 RIRD demands.

(V) if vocal stereotypy is observed
(M) if motor stereotypy is observed
(-) if no stereotypy is observed

Example: V/M



	1 min	2 min	3 min	4 min	5 min
:05					
:11					
:17					
:23					
:29					
:35					
:41					
:47					
:53					
:59					

_____Total (motor and/or vocal)

_____Vocal

_____Motor

Number of Tasks Completed During 5 min Interval _____
Completed tasks/Total number of tasks (i.e. 5/12).
Do not count partially completed tasks.

Total Time (Timer 1) _____
Start timer following the instructions "…you can begin now."
Stop timer following completion of final step in TA

Frequency of RIRD (~~𝍸~~ II) _____
1 RIRD = Interruption + 3 demands + praise following 3rd demand

APPENDIX C

RIRD Demand Record Form
RIRD Study

Student ID: _____ Researcher: _____

Mark "Yes" if student attempts. Mark "No" if student does not attempt. Allow 3 seconds for student response. Accuracy of response is not important.

Say the following. Provide modeling for motor demands.

Motor Demands	Yes	No
Touch your head		
Touch your shoulders		
Touch your nose		
Touch your toes		
Pat your belly with both hands		
Reach up high		
Clap your hands 3 times		
Touch your knees		
Bend your knees then stand up straight		
Put your hands on your hips		

Vocal Demands	Yes	No
What's your name?		
Say, "ball"		
Say, "computer"		
Say, "paper"		
Say, "plate"		
Say, "stars"		
Say, "wallet"		
Who am I?		
Say, "silverware"		
Say, "pencil"		

Additional demands that are likely to be successful:

Motor Vocal

APPENDIX D

TARP: PA
Adapted from Mark W. Steege and T. Steuart Watson (2009)

Student ID: ____________________ Researcher: ______________________

Preference Assessment Procedure Fidelity Check

Date:

Preference Assessment Steps	Correct	Incorrect	N/A
1. Allowed student to sample items (5-10s for play/object interaction)			
2. Cleared all items from table.			
3. Displayed items at same time.			
4. Items roughly 1.5 feet apart.			
5. Items arranged as depicted in PA data sheet.			
6. Verbal command given, "make a choice."			
7. Allowed up to 10s for choice to be made.			
8. Recorded choices or no choice accuratly.			
9. Accuratly calculated %			

Date:

Preference Assessment Steps	Correct	Incorrect	N/A
1. Allowed student to sample items (5-10s for play/object interaction)			
2. Cleared all items from table.			
3. Displayed items at same time.			
4. Items roughly 1.5 feet apart.			
5. Items arranged as depicted in PA data sheet.			
6. Verbal command given, "make a choice."			
7. Allowed up to 10s for choice to be made.			
8. Recorded choices or no choice accuratly.			
9. Accuratly calculated %			

Date:

Preference Assessment Steps	Correct	Incorrect	N/A
1. Allowed student to sample items (5-10s for play/object interaction)			
2. Cleared all items from table.			
3. Displayed items at same time.			
4. Items roughly 1.5 feet apart.			
5. Items arranged as depicted in PA data sheet.			
6. Verbal command given, "make a choice."			
7. Allowed up to 10s for choice to be made.			
8. Recorded choices or no choice accuratly.			
9. Accuratly calculated %			

Date:

Preference Assessment Steps	Correct	Incorrect	N/A
1. Allowed student to sample items (5-10s for play/object interaction)			
2. Cleared all items from table.			
3. Displayed items at same time.			
4. Items roughly 1.5 feet apart.			
5. Items arranged as depicted in PA data sheet.			
6. Verbal command given, "make a choice."			
7. Allowed up to 10s for choice to be made.			
8. Recorded choices or no choice accuratly.			
9. Accuratly calculated %			

Date:

Preference Assessment Steps	Correct	Incorrect	N/A
1. Allowed student to sample items (5-10s for play/object interaction)			
2. Cleared all items from table.			
3. Displayed items at same time.			
4. Items roughly 1.5 feet apart.			
5. Items arranged as depicted in PA data sheet.			
6. Verbal command given, "make a choice."			
7. Allowed up to 10s for choice to be made.			
8. Recorded choices or no choice accuratly.			
9. Accuratly calculated %			

Date:

Preference Assessment Steps	Correct	Incorrect	N/A
1. Allowed student to sample items (5-10s for play/object interaction)			
2. Cleared all items from table.			
3. Displayed items at same time.			
4. Items roughly 1.5 feet apart.			
5. Items arranged as depicted in PA data sheet.			
6. Verbal command given, "make a choice."			
7. Allowed up to 10s for choice to be made.			
8. Recorded choices or no choice accuratly.			
9. Accuratly calculated %			

APPENDIX E

TARP: RIRD

Adapted from Mark W. Steege and T. Steuart Watson (2009)

Student ID: ____________________ Researcher: _______________________

RIRD Procedure Fidelity Check

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

Date:

RIRD Steps	Correct	Incorrect	N/A
1. Stopped visual timer within 2s of stereotypy			
2. Initiated attention (say name and establish eye contact)			
3. Gave 3 RIRD demands as prescribed from ordered list.			
4. Gave additional demands from list if stereotypy occurred during RIRD.			
5. Attained 3 consecutive RIRD deamands with no stereotypy before next step.			
6. Provided praise and task orienting prompt "Nice job, back to work please"			
7. Restarted visual timer			

APPENDIX F

RIRD Demand List

Student ID: _____ Researcher: _____

Use the following demands for RIRD interventions. If the subject exhibits stereotypy when completing a demand, select an additional demand. When 3 demands have been completed without stereotypy say, "Nice job. Back to work please," and provide a task orienting prompt such as pointing to the work area or picture schedule.

Say, "wallet"	What's your name?	Touch your toes
Say, "silverware"	Reach down low	Say, "ball"
Touch your toes	Reach up high	Bend your knees, stand up
Reach up high	Touch your knees	Touch your head
Touch your head	Who am I?	Say, "wallet"
Say, "ball"	Touch your toes	Touch your shoulders
Pat your belly with both hands	Say, "silverware"	Say, "paper"
Say, "pencil"	Say, "ball"	Put your hands on your hips
Who am I?	Touch your shoulders	Touch your nose
Say, "plate"	Say, "plate"	Reach up high
Touch your knees	Say, "pencil"	What's your name?
Say, "paper"	Put your hands on your hips	Touch your knees
Touch your nose	Say, "paper"	Say, "pencil"
Reach down low	Bend your knees, stand up	Say, "plate"
Put your hands on your hips	Say, "computer"	Say, "stars"
Say, "computer"	Touch your nose	Say, "silverware"
Say, "stars"	Pat your belly with both hands	Reach down low
Bend your knees, stand up	Say, "wallet"	Say, "computer"
Touch your shoulders	Say, "stars"	Who am I?
What's your name?	Touch your head	Pat your belly with both hands

APPENDIX G

Task Analysis: Yogurt with Pears

#	Description	Step Complete When:
1	Wash hands	Water is turned off
2	Get apron	Apron is held in hand without touching shelf
3	Put on apron	Apron is tied
4	Get cutting board	Cutting board touches counter free from hands
5	Get spoon	Spoon rests on counter or cutting board and does not touch hands
6	Get knife	Knife rests on counter or cutting board and does not touch hands
7	Get fork	Fork rests on counter or cutting board and does not touch hands
8	Get bowl	Bowl rests on counter or cutting board and does not touch hands
9	Get yogurt	Yogurt rests on counter or cutting board and does not touch hands
10	Spoon yogurt 2 times into bowl	Second spoon full of yogurt in bowl, spoon not touching bowl
11	Put yogurt away	Yogurt on shelf in refrigerator and not touching hand
12	Get pears	Jar of pears rests on counter or cutting board and does not touch hands
13	Take one pear	One pear or pear slice rests in bowl or on cutting board and not touching
14	Cut pear into pieces	Pear cut into ≥ 3 pieces and not touching utensil
15	Put pieces into bowl	All pear pieces rest in bowl not touching utensil
16	Put pears away	Pear jar touching shelf in refrigerator and not touching hand
17	Put silverware and cutting board into sink	Silverware (except fork) and cutting board all rest in sink without touching hand
18	Get napkin	Hand holds napkin, napkin not touching dispenser
19	Bring Bowl, utensil and napkin to table	Bowl touches table
20	Sit at table to eat	Bottom touches seat of chair

APPENDIX H

Task Analysis: English Muffin with Butter

#	Description	Step Complete When:
1	Get plate	Plate rests on countertop free from hands
2	Get knife	Knife rests on countertop without touching hands
3	Get Spray Butter	Butter container rests on countertop without touching hands
4	Get English Muffins	English muffin package rests on countertop without touching hands
5	Task out English Muffins	One whole English muffin removed and is no longer touching container
6	Separate English Muffin	Two halves of English muffin no longer touching
7	Put pieces in toaster	Pieces inserted into toaster not touching hands
8	Push lever down	Toaster lever stays down and hand no longer touching
9	Put knife in sink	Knife rests in sink without being touched by hands
10	Put away English muffins	English muffin package rests on shelf without touching hand
11	Wait until English muffins pop up	English muffin pops up in toaster and is touched
12	Put English muffins on plate	English muffins rest on plate and are not being touched by hands
13	Use Spray Butter	≥1 squirt of butter on both halves of muffin
14	Put away spray butter	Spray butter container rests on shelf and is not touched by hands
15	Get napkin	Napkin is held in hand and is not touching dispenser
16	Bring plate and napkin to table	Plate touches table
17	Sit at table to eat	Bottom touches seat part of chair

APPENDIX I

Task Analysis: Grooming Routine

#	Description	Step Complete When:
1	Turn on water	Water comes out of faucet
2	Soap on hands	Any soap dispensed & hand stops touching dispenser
3	Scrub hands	Hands put together, rubbed ≥2 times, hand touches water
4	Rinse in water	Hands held under water, hand touches faucet to turn off
5	Turn water off	Water stops coming from faucet
6	Get towel	Towel ripped from dispenser completely
7	Dry hands	Wipe attempt made followed by motion to throw towel away
8	Put towel away	Towel touches receptacle and free from hand of subject
9	Get tooth brush	Holds tooth brush in hand
10	Get tooth paste	Holds tooth paste tube in hand
11	Put tooth paste on brush	Tooth paste is on brush and tip of tube is not touching brush
12	Put away tooth paste	Tooth paste touches bottom of drawer with or without cap on
13	Brush teeth	≥2 brushing motions are made with brush on teeth & when tooth brush no longer touches mouth
14	Rinse tooth brush	Brush held under water for any time, water is turned off
15	Put away tooth brush	Tooth brush touches bottom of drawer without touching hand
16	Get face cloth	Cloth held in hand and not resting on anything
17	Wash mouth	Cloth touches lips, ≥ 2 wiping motion followed by not touching lips
18	Wash nose	Cloth touches nose, ≥2 wiping motion followed by not touching nose
19	Wash cheek (right)	Cloth touches right cheek, ≥2 wiping motion followed by not touching cheek
20	Wash cheek (left)	Cloth touches left cheek, ≥2 wiping motion followed by not touching cheek
21	Wash forehead	Cloth touches forehead, ≥2 wiping motion followed by not touching forehead
22	Wash chin	Cloth touches left chin, ≥2 wiping motion followed by not touching chin
23	Wash neck	Cloth touches neck, ≥2 wiping motion followed by not touching neck
24	Wash ear (right)	Cloth touches right ear, ≥2 wiping motion followed by not touching ear
25	Wash ear (left)	Cloth touches left ear, ≥2 wiping motion followed by not touching ear
26	Put face cloth away	Facecloth touches receptacle without touching hand
27	Get hair brush	Brush held in hand not touching drawer
28	Brush hair (right side)	≥2 brushing motion on right side of hair followed by not touching hair
29	Brush hair (left side)	≥2 brushing motion on left side of hair followed by not touching hair
30	Brush hair (back head)	≥2 brushing motion on back side of hair followed by not touching hair
31	Brush hair (front head)	≥2 brushing motion on front side of hair followed by not touching hair
32	Put away brush	Brush touches bottom of drawer and is not touching hand

BIOGRAPHY OF THE AUTHOR

Ryan Long was born in Manchester, New Hampshire. Ryan earned a B.A. in Communications and an M.A. in Counseling from the University of New Hampshire as well as an M.S. in Educational Psychology from the University of Southern Maine. He holds a New Hampshire license as a Clinical Mental Health Counselor, and national certification as a Board Certified Behavior Analyst. Ryan is also certified as a School Psychologist and Guidance Counselor in New Hampshire. Ryan has served New Hampshire's youth and families since 2005 working in the community mental health, private, and public school settings. Most recently, Ryan has been providing mental health and psychological services as a school psychologist in the lakes region of New Hampshire.