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THE EFFECTS OF VERBAL OPERANT TRAINING AND RESPONSE INTERRUPTION AND REDIRECTION ON VOCAL STEREOTYPY

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THE EFFECT OF VERBAL OPERANT TRAINING AND RESPONSE INTERRUPTION
AND REDIRECTION (RIRD) ON VOCAL STEREOTYPY

by

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B.A. Dominican University, 2013

A Thesis

Submitted in Partial Fulfillment of the Requirements for the
Master of Science in Behavior Analysis and Therapy

Rehabilitation Institute
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A Thesis Submitted in Partial
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Master of Science
in the field of Behavior Analysis and Therapy

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Casey K. Trasatti, for the Masters of Science degree in Behavior Analysis and Therapy, presented on July 6, 2017, at Southern Illinois University Carbondale.

TITLE: THE EFFECTS OF VERBAL OPERANT TRAINING AND RESPONSE INTERRUPTION AND REDIRECTION (RIRD) ON VOCAL STEREOTYPY

MAJOR PROFESSOR: Dr. Jason Hirst, BCBA-D

Verbal operant training is a typical intervention for individuals with Autism Spectrum Disorder. Response Interruption and Redirection (RIRD) is a highly effective intervention for problem behavior and various forms of stereotypy. In this study verbal operant training was combined with RIRD to see if there was a bigger impact in decreasing vocal stereotypy. The participant was a 9-year old male, and the intervention was done across settings. The results showed that combined with intraverbal training and RIRD, vocal stereotypy decreased significantly in all settings. The results also indicate this is a highly effective treatment for vocal stereotypy when the function is non-social automatic reinforcement (i.e. self-stimulation).

Key words: Autism Spectrum Disorder, Intraverbal, Response Interruption and Redirection, RIRD, Verbal Operants, Vocal Stereotypy

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CHAPTER 1

INTRODUCTION

Autism Spectrum Disorder is a condition that affects individuals of all ages and ethnicities, mainly affecting communication and social behaviors. Autism has been called a “spectrum disorder,” because not all individuals are affected with the same symptoms, and severity of symptoms varies from person to person. According to the National Institute of Mental Health, the defining characteristics of Autism are; inability to interact socially, communication delays or inability to communicate, perseveration on specific topics, repetitive body movements, repeating of words often referred to as *echolalia*, and lack of eye contact (National Institute on Mental Health).

Stereotypic, or repetitive, behavior is one of the defining characteristics of Autism Spectrum Disorder. It involves repetitive movements, or repetitive vocalizations. There has been a lot of research into motor stereotypy and effective treatments, but only a little has been done to focus on vocal stereotypy. Stereotypic behavior is among the diagnostic criteria for Autism Spectrum Disorder, even though it affects many individuals, it is much more prominent in individuals with ASD (Ahearn, Clark, and MacDonald, 2007).

Stereotypy manifests in two very distinct topographies: motor and vocal. Motor and vocal stereotypy can have numerous topographies, each specific to the individual engaging in the behaviors. Motor stereotypy involves repetitive movements of limbs, whereas vocal stereotypy can involve repetitive sounds and words. Motor and vocal stereotypy can occur together, or in isolation of one another. The presence of one form of stereotypy does not mean the individual will engage in the other form of stereotypy. Both of these behaviors are viewed as barriers to social interactions, and are often targeted in behavior intervention programs.

Motor stereotypy is often referred to as “stimming,” and can impede an individual’s learning, social interactions, and functioning in daily living skills. Motor stereotypy can serve any function, but frequently serves as non-social self-stimulation, and may or may not also serve another function. Motor stereotypy can include repetitive movements of the hands (often referred to as “flapping”), feet, and head. The topography and frequency of these behaviors can have big impact on the individual and may need to be targeted in a behavior program in order to increase other skills inhibited by the individual’s stereotypic behaviors. There have been a lot of studies that focus on motor stereotypy, however, not as much has been done on its counterpart: vocal stereotypy.

Vocal stereotypy is also referred to as echolalia, delayed echolalia, and scripting. All of these terms describe the behavior of repetitive speech. Repetitive speech can be anything from repeating previously heard songs, sounds from an app on an electronic device, to statements heard from other individuals and what was read in a book. The difference between vocal stereotypy and other forms of speech that can be classified as echoic(s), is that there are no social consequences for vocal stereotypy (Lanovaz et al, 2011). Every individual is different, and the phrases they repeat can come from anywhere in their environment. However, vocal stereotypy directly affects communication skills and relationships with peers (Aherns et al, 2011). Individuals that engage in this behavior often engage in non-functional vocalizations, meaning they say the wrong thing, or words in the wrong order, or use a script to convey a message. Non-functional vocalizations impact the individual by preventing them from manding appropriately, or engaging in effective communication exchanges, just the way vocal stereotypy interferes with effective communication (Aherns et al, 2011).

Vocal stereotypy is a common behavior engaged in by individuals diagnosed with Autism

Spectrum Disorder, yet, until more recent years, there has not been a substantial amount of research into decreasing, or managing, this behavior effectively. Some studies that have ventured to develop interventions for vocal stereotypy are Lanovaz & Sladeczek, (2011), Haring, Breen, Pitts-Conway, & Gaylord-Ross, (1986), Lanovaz, et al (2014), Saini, Gregory, Uran, & Fantetti, (2015), Schumacher, & Rapp, (2011), and Shillingsburg, Lomas, & Bradley, (2012).

The Lanovaz and Sladeczek (2011) study attempted to use music to decrease vocal stereotypy. They used music in an attempt to match the stimulation of vocal stereotypy for four participant's. The study was inconclusive, at best, and only decreased stereotypy for two of the four participant's, but the results were variable and did not get down to near zero levels. The study also mentioned that although vocal stereotypy decreased for the two participant's, their inter-response time increased, and one participant was not affected by the music at all. The researchers of this study also conclude that in order to use music to decrease vocal stereotypy the intervention should be used with headphones and measure which pitch resulted in lower levels of stereotypy, as well as combine music with another intervention (Lanovaz et al, 2011).

Haring, Breen, Pitts-Conway, & Gaylord-Ross, (1986) is one of the few older studies that sought to reduce stereotypy using differential reinforcement of other behaviors (DRO). This unique study was successful in decreasing stereotypy in both participant's, however, since it used a DRO procedure, any behavior other than the target behavior was reinforced. DRO procedures can be risky because the researcher does not know if a problem behavior will develop (Haring et al, 1986).

Lanovaz et al, (2014) performed four different experiments that all involved non-contingent music combined with other interventions such as differential reinforcement of alternative behavior, prompting, and differential reinforcement of other behavior. They also

studied extending the access to music during sessions to see if magnitude of the reinforcer would affect vocal stereotypy. The overall results of this study concluded that differential reinforcement of alternative behavior did not have the same desired effect as differential reinforcement of other behavior, and longer sessions of non-contingent music with prompting. The results indicated that non-contingent music combined with differential reinforcement of other behaviors and prompting decreased vocal stereotypy and prevented motor stereotypy as a replacement behavior for vocal stereotypy (Lanovaz et al, 2014).

Response interruption and redirection (RIRD) is an intervention that involves interrupting an individual in the middle of stereotypic behavior, and redirecting them to a task using one to three demands (motor or vocal) in between the behavior that was interrupted and the redirection to prevent chaining the two behaviors together (Wunderlich & Vollmer, (2015)). This intervention has been applied to motor stereotypy, and in many studies, has resulted in near zero levels of the behavior (Aherns et al 2011). It has since been used on vocal stereotypy, but has also recently been studied to determine if it acts as a punishment procedure. If the response blocking or the demands are implemented contingent on the occurrence of the behavior, and the effect on the behavior is that it decreases behavior in the future then it can be classified as a punishment procedure. For studies like Aherns, Lerman, Kodak, Worsdell & Keegan (2011), nothing in the actual procedure changes, just how the procedure is viewed and when it is appropriate to use the intervention. Punishment procedures are meant to be used only when all efforts to use reinforcement and other non-aversive interventions have been exhausted (Bailey & Burch, 2016). However, the recent dilemma that has been posed is that there are very few, if any, procedures that have been determined effective for vocal stereotypy, other than RIRD.

The effects of response interruption and redirection, alone, on vocal stereotypy have been

studied in multiple studies (Ahearn, Clark, & MacDonald (2007), Aherns, Lerman, Kodak, Worsdell & Keegan (2011), Giles, St. Peter, Pence, & Gibson (2012), Martinez, Betz, Liddon, & Werle (2016), Saini, Gregory, Uran, & Fantetti (2015), Shumacher & Rapp (2011), and Shawler & Miguel (2015), and they all come to the same conclusion: RIRD is effective in decreasing vocal stereotypy.

Ahearn, Clark, & MacDonald (2007) studied the effects of RIRD on four children with autism who engaged in vocal stereotypy. The implementation of RIRD was done by presenting three vocal demands per instance of behavior, and the participant had to stop engaging in vocal stereotypy for three full demands in order for the presentation of demands to stop. The function of all four participant's behaviors was self-stimulatory in nature, therefore resistant to extinction procedures. Once RIRD was implemented non-functional vocalizations (i.e. vocal stereotypy) decreased significantly, and for one participant reached near zero levels. Unfortunately, in the return to baseline phase, the frequency of vocal stereotypy increased close to that of initial baseline levels, suggesting that RIRD did not maintain well after its implementation. However, the researchers did note that appropriate vocalizations did increase when RIRD was implemented (Ahearn et al, 2007).

Aherns, Lerman, Kodak, Worsdell & Keegan (2011) evaluated the two different types of RIRD (motor and vocal) on vocal stereotypy. According to the study both vocal and motor RIRD is effective in reducing vocal stereotypy. The researchers also found that the topography of the stereotypy and the topography of the RIRD did not matter when the intervention was applied. RIRD, motor and vocal, decreased vocal stereotypy equally. This study made significant advances in the treatment for vocal stereotypy, and determined that RIRD functioned as a punishment, and not extinction, (Aherns et al, 2011) for vocal stereotypy.

Giles, St. Peter, Pence, & Gibson (2012) studied the different parts of RIRD, to see if response interruption or response blocking were more effective in reducing vocal stereotypy. Both components were determined to be effective, however, this study also brought up a great point about client choice. When asked which portion of the intervention the participant's preferred, more stated they preferred redirection as opposed to response blocking (Giles et al, 2012). This study furthered the literature and understanding of the use of the RIRD intervention by showcasing the importance of choice, and that even when broken down into its two components, RIRD is still effective. This study makes a great case for participant choice, but also how to decrease the use of punishment. That is, if the inclusion of response blocking reduces treatment acceptability because it is viewed as a punishment procedure, the other component of redirection can be used while maintaining effectiveness.

The aforementioned studies have all determined the effectiveness of RIRD as a solo intervention. Some studies have combined RIRD with other interventions to determine if the effectiveness of RIRD can be increased, and if results can be better maintained when RIRD is faded out, or removed completely. Studies such as the ones by Colon, Ahearn, Clark, & Masalsky, 2012, Love, Miguel, Fernand & LaBrie, 2012, Miguel, Clark, Tereshko, & Ahearn, 2009, Dickman, Bright, Montgomery, & Miguel, (2012) all use RIRD in conjunction with another intervention to see if RIRD is more effective than another intervention, or if RIRD combined with another intervention is more effective than previous studies that studied the effects of RIRD as a solo intervention for vocal stereotypy.

Colon, Ahearn, Clark, & Masalsky, 2012 used RIRD and verbal operant training, as two separate interventions, to decrease vocal stereotypy. This study focused on increasing the participant's tacting repertoire to see if teaching a verbal operant would decrease vocal

stereotypy separate from RIRD. Colon and fellow researchers wanted to see if implementing a typical verbal operant training program could decrease vocal stereotypy and increase appropriate vocalizations. The researchers determined that while tact training led to lower levels of vocal stereotypy and an increase in functional vocalizations, RIRD was still necessary (Colon et al, 2012). This study used vocal redirection, and concluded that verbal operant training and RIRD are highly effective when used together (Colon et al, 2012).

Love, Miguel, Fernand & LaBrie, 2012 studied the effects of RIRD and matched stimulation on vocal stereotypy. Their study had three distinct phases: RIRD alone, matched stimulation alone, and RIRD combined with matched stimulation. The researchers wanted to study the effects of each intervention on vocal stereotypy and determine if matched stimulation or RIRD had a more desirable effect on the behavior. The researchers in this study determined that separate, matched stimulation and RIRD both helped decrease vocal stereotypy, however, matched stimulation can be difficult to use appropriately. In order for matched stimulation to work properly, it needs to serve as an abolishing operation for the motivating operation of vocal stereotypy (Love et al, 2012). When combined together, RIRD and matched stimulation together was effective, however the researchers identified several problems with these two interventions, mainly dealing with the fidelity of the implementation of the intervention and identifying the appropriate stimuli for matched stimulation (Love et al, 2012).

Miguel, Clark, Tereshko, & Ahearn, 2009 studied the effect of RIRD and Sertraline on vocal stereotypy, as a package intervention, and with RIRD in isolation. Sertraline is a medication classified as a selective serotonin reuptake inhibitor, more commonly known as a SSRI. SSRI's are typically prescribed for individuals with obsessive compulsive disorder to decrease repetitive behaviors (Miguel et al, 2009). The researchers in this study used Sertraline

to evaluate its effect on repetitive behaviors in individuals in autism, because SSRI's and similar medications are regularly prescribed for stereotypic behaviors, but there is little information to support the use of SSRI's to treat stereotypy (Miguel et al, 2009). The results of this study supported the evidence that RIRD effectively reduces vocal stereotypy, however it did not support the use of SSRI's, specifically Sertraline, to decrease vocal stereotypy either on its own or in combination with RIRD. This study had several limitations, including the inability to reintroduce the use of Sertraline, because of parental denial to allow the administration of medication. The parents of the participant denied the researchers the consent to re-administer the medication during the RIRD and SSRI combination phase because vocal stereotypy remained low once the medication was stopped and RIRD was continued (Miguel et al, 2009).

The Miguel et al (2009), study contributed to the current literature, and intervention possibilities for the treatment of vocal stereotypy by furthering the evidence that supports the use of RIRD, and demonstrating little to no effect with the use of medication, specifically an SSRI (Miguel et al, 2009). This is important evidence, especially for caregivers, to support the use of behavioral over medicinal interventions for the treatment of vocal stereotypy.

Martinez, Betz, Liddon, & Werle (2016) researched the ability to transfer RIRD to the natural environment using a stimulus to indicate when vocal stereotypy was not allowed. The researchers used a large pink poster to indicate that talking was prohibited. (Martinez et al, 2016). This study identified a missing piece in the literature, in that few studies have researched how to transfer RIRD to the natural environment, and sustain low levels. This study was successful in transferring RIRD to the natural environment, however, the stimuli used did not acquire punishing properties, so it had no control over the participant's vocal stereotypy (Martinez et al, 2016).

Along with Martinez et al (2016), this study was based on the Colon et al, (2012) study. Both of these studies helped further the support for the use of RIRD in the treatment of vocal stereotypy, and the Colon et al (2012) study demonstrated that verbal operant training in conjunction with RIRD can decrease vocal stereotypy and increase appropriate vocalizations. This study used the RIRD procedure from the Ahearn et al (2007) study, and expanded on the Colon et al (2012) study by implementing verbal operant training while also implementing RIRD.

After reviewing the current literature, there were very few studies that involved using verbal operant training and RIRD, along with a visual stimulus in the natural environment as a package intervention. One of the limitations of the Colon et al (2012) study was that verbal operant training, in this case tact, was done separate of RIRD, and RIRD was only done after verbal operant training to decrease vocal stereotypy to more acceptable levels according to the researchers (Colon et al 2012). One of the limitations of the Martinez et al (2016) study was that the researchers did not conduct a thorough functional analysis (Martinez et al, 2016).

The current study used RIRD, both vocal and motor, along with verbal operant training, in this case intraverbals, to decrease vocal stereotypy in one participant diagnosed with Autism Spectrum Disorder. This study was done across settings and in the natural environment to promote generalization. Intraverbal training was done only in the participant's home, during discrete trial instruction, but was not started until the first setting began the intervention of RIRD. The purpose of this study was to determine if combining intraverbal training and RIRD simultaneously would decrease vocal stereotypy to acceptable levels. (Acceptable levels included inaudible vocalizations that did not evoke off task behavior in others in the participant's environment.)

CHAPTER 2

METHODS

Participant and Setting

The participant was a 9-year old vocal verbal male. He was diagnosed with Autism Spectrum Disorder and Sensory Processing Disorder at eighteen months old. The participant takes part in a special education program designed specifically for children with autism. He participates in a mainstream classroom for sixty minutes a day. The participant also receives occupational therapy for sensory integration and speech therapy. These therapies were conducted independently of the researcher and the study.

The participant is able to complete grade level academic work. The primary behavioral issue at the time of the study was the presence of vocal stereotypy (scripting) at high rates. Vocal stereotypy affected every aspect of the participant's life. He was unable to function appropriately at home during functional living skills such as getting dressed, putting on his shoes, or washing his hands. He was also unable to complete simple directions, such as "get in the car," "get a cup," or "get a pencil" without redirection. While at school he was unable to complete work tasks, finish snack in a timely manner, transition efficiently from one station to another, complete a work task on an electronic device, or communicate effectively with teachers and peers. In the community, the participant was unable to follow any directions or engage in any communication exchanges with peers during the entire duration of being in the community, and frequently would walk away from peers while engaging in vocal stereotypy.

The participant's vocal stereotypy involved statements from movies, apps on tablets, books, and people in his environment. His vocal stereotypy also included sounds made in books that have buttons to press for sound, sounds from pressing buttons on an app or device, and

humming or singing a tune (with no words).

The study was conducted in three separate settings; school, home, and community. In the school and community settings the Response Interruption and Redirection (RIRD) procedure only was implemented. However, in the home, both RIRD and verbal operant training consisting of intraverbals was implemented.

The school setting was the participant's regular special education classroom. During each session, there were four other adults present, five including the researcher. The other adults were the participant's teacher, and three aides. The number of students in the room varied from three to five, including the participant. The reason for the variation was that certain students were pulled out for various other activities and tasks, or were absent that day. The classroom had four work stations, one time-out "thinking" pod for when an individual experienced problem behavior, a Smart Board, cubbies for each student, and a desk with a chair for each student.

The home setting was the client's own home. The family was present for all sessions. The session areas consisted of the basement and dining room. The basement consisted of the participant's toys, three couches, a television, and an air hockey table. The dining room consisted of a large table with four chairs and two bench seats.

The community setting was the clinic where the participant currently receives services. Peers present for each session varied depending on the day. Activities available, but not limited to, were a roller coaster, crash pad, train table, marble track, and chalk wall. Snack was also provided for sessions that lasted two hours.

Response Measurement and Dependent Variables

Partial interval recording was done for 15-minute sessions, with each interval lasting 30 seconds, for a total of 30 intervals per 15 minutes. Duration data were taken for how long the

behavior occurred. For the purposes of the study vocal stereotypy was defined as: any audible vocalization (i.e. speech sound, noises, or full adult form word) that is non-functional and non-related to the situation the individual is currently in, or is identifiable as a statement made by an item or activity the individual has engaged in, such as repeating statements from a game/electronic app, television show, book, or movie.

For 29.6 percent of sessions the second observer was the participant's BCBA. For partial interval data interobserver agreement was calculated using interval by interval method. An agreement was recorded when both observers scored an occurrence of the behavior during a given interval. A disagreement was recorded when the two observers disagreed about the occurrence of a behavior for a given interval. IOA was calculated as number of agreements divided by number of agreements plus disagreements, multiplied by 100%. For duration data, IOA was calculated using the total duration method. Interobserver agreement was done in the home and community with agreement reaching an average of 90% with a range of 72%-100% for interval data, and an average of 92% with a range of 89%-97% for duration data.

Experimental Design

The experimental design was a multiple probe design across settings. The multiple probe design was used because the researcher was unable to conduct consecutive sessions in the proper order for a typical multiple baseline design across settings. The participant and researcher did not have constant access to the community or school setting, therefore the pattern of sessions required for a typical multiple baseline design was not achievable. Horner and Baer (1978) describe the multiple probe design as an alternative to the multiple baseline design when continuous baseline measurement is impractical (such as this study), among other criteria not applicable to this study.

Procedures

Prior to any interaction with the participant, consent for treatment was obtained. Sessions were conducted two to three times per week. Each session was one to two hours long depending on the participant's availability. Within each one- to two-hour long session, smaller 15-minute sessions were conducted with partial interval recording. There was a five-minute break in between the 15-minute sessions.

Pre-test. A pre-test was conducted using the ABLLS-R (Partington, 2010). The domains included in the pre-test were: visual performance (B), receptive language (C), motor imitation (D), vocal imitation (E) was omitted given the participant's advanced verbal skills, requests/manding (F), labeling/tacting (G), and intraverbals (H).

Figure 1 depicts how the participant scored on the intraverbal section of the ABLLS-R. After calculating the results of the initial assessment, the only domain that was significantly defective was intraverbals (44% of the skills assessed were known).

Functional assessment. Prior to baseline, a brief functional assessment was conducted to determine the function of the participant's behavior, included an indirect assessment (QABF) and a direct assessment. The results for the QABF are displayed in Figure 2. The results supported an automatic function for stereotypy.

The results of the QABF were confirmed during a brief functional analysis. The participant engaged in motor stereotypy during all conditions. He engaged in this behavior for 90% of the time during the demand condition, 88% during the attention condition, 91% during the alone condition, and 78% during the tangible condition.

RIRD. During RIRD, the researcher carried a red and green scripting stop/go card constantly visible by the participant. This was a laminated card that was red on one side, with

writing that said “stop scripting,” and green on the other side with writing that said “scripting ok,” was presented to the participant. When the red side of the card was shown, the participant was expected to refrain from vocal stereotypy. When the green side was shown the participant was allowed to engage in this behavior. The participant was reminded he was “on red,” and the red side of the card was tapped, after the RIRD procedure was completed. This card was meant to serve as a reminder for when it was ok to engage in vocal stereotypy (alone time, in the bathroom, or free play), and when it was not ok to engage in vocal stereotypy (engaging with peers, work time, etc.).

Response interruption involved getting the participant’s attention by either a) tapping him on the shoulder using one finger, or b) saying his name. The researcher mixed up which interruption was used to decrease the amount of times a demand was followed by the participant’s name. Redirection was done by presenting at least three known motor imitations or vocal demands, and then the researcher saying, “you’re on red,” and presenting the red side of the index card. If the participant did not stop engaging in vocal stereotypy the researcher would repeat the intervention until the participant stopped engaging in this behavior during the procedure (i.e. no stereotypy during three motor imitations, and reminding the participant he was on “red”).

Verbal operant training. For intraverbal training the participant and researcher sat at a kitchen table, across from each other. The intensive teaching trials were conducted at the beginning of every session at home, twice per week for 30 minutes per session. Trial data were collected for every response to the targeted intraverbal questions, and the prompt level required was recorded if errorless learning or error correction needed to be conducted. The new targets were interspersed with known skills on a ratio of 50/50; a known skill was presented, then a

target, and if no error was made, then another known skill. During the study a variable ratio of eight was used because his clinician indicated this was an effective schedule of reinforcement, for this participant.

When the intraverbal training began, goals derived from the tasks in the intraverbal section were chosen. The researcher developed targets relevant to the participant's community and immediate environment. Some targets included "What do you do at a library," "who keeps you safe," "when do you shovel snow," "how do you set the table," and "where do you mail a letter?"

Once the targets were developed, they were presented to the participant in a discrete trial format. Initially, the targets were individually presented and asked three times as a baseline. The targets were not asked in a row, but rather mixed in with the learners known skills. If the learner answered correctly three times, the target was considered "mastered in baseline" and added to the participant's pile of known skills. If the target was asked three times, and the participant answered incorrectly for any of the three trials, the target was considered unknown.

If the participant emitted a wrong response to a target the error correction (Luciano, 1986) procedure was utilized. For the error correction procedure, after the client emitted the wrong response the researcher created a pause in between the incorrect response and the prompt for the correct response by putting her hand up and removing eye contact for 3 seconds, and then representing the SD with a full vocal prompt and placing visual stimuli on the table in front of the participant (Luciano, 1986). The transfer trial was done with a faded prompt (partial vocal and no visual stimuli), if able. If the participant's VR was too high, he was reinforced, if not 3-4 distractors were done, and then the SD for the targeted response was probed. The participant did not error on any probes when error correction was conducted.

Post-test. The intraverbal domain of the ABLLS-R was re-scored using the targets mastered during the intensive teaching trials. The purpose was to demonstrate learning and progress within the intraverbal domain. Some of the new skills attained were the ability to answer rotating “wh” questions (who, what, where, when), answering “which” questions when vocally provided with two options, and engaging in communication exchanges for longer than one minute and more than five exchanges with a peer and adult.

CHAPTER 3

RESULTS

Figure 5 represents the percentage of occurrence and duration of vocal stereotypy per session. Across all settings the baseline probes had high rates of vocal stereotypy, however, the duration of his behavior was variable across all settings, with duration being the shortest in the home, and highest in the community. All settings demonstrated an increasing trend in the behavior in the baseline phase.

The intervention was implemented in the participant's classroom first. The data is slightly variable until session 40. After session 40 there is a slight increase in the occurrence of vocal stereotypy, and then a steady decreasing trend. His duration of stereotypy had an increasing trend during the baseline phase at school, but remained very low during the intervention phase.

The second setting where the intervention was implemented was the participant's home. The data for the first five probes during baseline in the home were highly variable, ranging from 30%-89% of intervals where vocal stereotypy occurred. A baseline probe was conducted at sessions 21 and 24, and his behavior had a sharp increasing trend, so the intervention was put in place during session 26. After session 26, the participant's vocal stereotypy frequency remained at near zero levels. The duration of his behavior remained at near zero levels for all intervention phases.

The last setting was the community setting. The participant engaged at in very high levels of vocal stereotypy, in both frequency and duration. There is a sharp increasing trend in the data after session one, with a slight dip at session three, causing a large variability in the first three data points. However, after session three there is a sharp increasing trend for the rest of the

baseline phase, with levels of both frequency and duration reaching 100% of occurrence and duration for five sessions before the intervention was put into place during session 47. The community setting also experienced an extinction burst at session 51, after an episode of problem behavior lasting 45 minutes with the researcher the previous day. After the extinction burst, the data show a sharp decreasing trend, with percentage of occurrence remaining steady at 10%, and duration remaining lower than 10 seconds.

During the pre-test for ABLLS-R, the participant completed 44% of the tasks required for mastery. After the intensive teaching trials the participant had 74% of the intraverbal section mastered.

CHAPTER 4

DISCUSSION

Autism Spectrum disorder is a developmental disorder that has many characteristics, with varying levels of severity, that affect numerous individuals (National Institute of Mental Health). Stereotypy is one such characteristic that impedes an individual's ability to learn and engage in social activities. Several studies have been done on the effects of RIRD on motor stereotypy, but much less has been done on the effects of RIRD (alone and combined with other interventions) on vocal stereotypy. The purpose of RIRD is to punish vocal stereotypy, so levels of this behavior decrease to more appropriate levels. Some studies have attempted to combine interventions with RIRD to further decrease vocal stereotypy, and those that have been successful, and the most practical, were Colon et al (2012), where the researchers used verbal operant training, then RIRD, and Martinez et al, (2016) where the researchers attempted to use a stimulus to transfer RIRD to the natural environment.

The combined interventions of intraverbal training, a stimulus indicating when vocal stereotypy was ok, and when it needed to stop, and Response Interruption and Redirection were effective in decreasing frequency of vocal stereotypy across all settings. The participant's functional vocalizations were not measured. Anecdotally, the researcher, parents, and teachers noticed an increase in communication exchanges, as represented in the ABLLS-R grid in Figure 1. The participant also began interacting with his peers, age appropriate games, and responding quicker when given a demand or task.

This study extended the research of Colon et al (2012) by combining verbal operant training and RIRD simultaneously, rather than separately and conducting a component analysis. Also in the Colon et al (2012) study, the verbal operant of focus was tact, whereas in this study it

was the intraverbal. Like the Colon et al (2012) and Martinez (2016) studies, the participant's vocal stereotypy decreased significantly.

Intraverbal training was chosen because it was the participant's defective verbal operant and it is a potential mechanism that might contribute to a reduction in vocal stereotypy. RIRD, in the absence of training an alternative behavior, can potentially result in the generalized suppression of verbal behavior, so a good companion to RIRD is to train a verbal operant. The verbal behavior training essentially provides alternative appropriate behavior that might compete with the inappropriate vocal stereotypy. Providing reinforcement for appropriate behavior is also considered to be a best practice when using an aversive intervention.

Intraverbals are an integral part of communication, therefore promote more appropriate responses and assist in maintaining communication exchanges. Better communication exchanges and decreased vocal stereotypy allow for better connections with peers and success in communication overall. This study helped show that using RIRD in combination with intraverbal training helps decrease non-functional vocalizations significantly.

These conclusions should be tempered due to the presence of several limitations. Because there was only one participant, the degree to which the results of this study apply to other individuals may be limited. Replication of these results with other similar cases would improve the strength of evidence for this package intervention. Another limitation is that because the researcher was unable to get another baseline probe in the community before implementing the intervention, it is unclear whether the vocal stereotypy would have improved in the absence of the intervention. No follow-up probes were able to be conducted, so maintenance of the effects is unknown. Combining the interventions allowed for intraverbal learning to take place and increase functional vocalizations, however, since a component analysis cannot be done, it is

unclear how much impact intraverbal training and RIRD had on the participant's behavior individually.

Overall the study was effective and demonstrates that vocal stereotypy can be decreased to a reasonable level using RIRD and intraverbal training potentially helped increase functional vocalizations and promote better and longer communication exchanges. Future studies should focus on which component is more effective, with a larger sample size, and to what degree RIRD is effective. Since it is a punishment procedure, it would be prudent to find out if the number of demands can be effectively reduced when combined with intraverbal training, or if the red/green stimulus card can be faded in and RIRD faded out.

Response interruption and redirection may serve as a punishment procedure. However, the literature supports the use of RIRD, and does not support other treatments as consistently as RIRD. Despite the potentially aversive nature of response blocking and contingent demands, the intervention is less intrusive than some alternative treatments (i.e. medication). Participants and clients have the right to effective treatment that is determined to be effective, safe, and supported within the literature.

This study furthers the example of the success of behavioral treatment for automatically maintained behaviors, over some more common treatments like medication. It also demonstrates that the proper use of a punishment procedure can decrease a behavior with no harmful effects, as the participant did not engage in any problem behavior when RIRD was implemented. RIRD is also an aversive procedure with a high degree of social validity for vocal stereotypy, as opposed to other treatments commonly prescribed, like medication. In sharp contrast to medication, behavioral treatment has more social validity than medical treatment. Medical treatment for vocal stereotypy can vary, but typically encompasses the use of medication, like

SSRI's as described in the Miguel et al, (2009) study. Medications carry some serious risks ranging from organ damage to decreased response time, and up to and including death.

Behavioral treatment carries none of these risks, which can be a major reason why it carries more social validity.

This study used a multiple probe design and the data shows there was no decrease in vocal stereotypy in other settings, during baseline phases, once a phase change was made, and RIRD was implemented in one setting. This demonstrated experimental control, however, it also shows how RIRD will not generalize without specific training. This demonstrates that RIRD may need specific training in various settings in order to be effective.

Future studies should focus on promoting generalization, and how to fade out RIRD. There has been a lot done on the overall effectiveness of RIRD alone, this study supports the use of verbal operant training, so future studies should start with RIRD in the natural environment.

H49	■	■	■	■
H48	■	■	■	■
H47	■	■	■	■
H46	■	■	■	■
H45	■	■	■	■
H44	■	■	■	■
H43	■	■	■	■
H42	■	■	■	■
H41	■	■	■	■
H40	■	■	■	■
H39	■	■	■	■
H38	■	■	■	■
H37	■	■	■	■
H36	■	■	■	■
H35	■	■	■	■
H34	■	■	■	■
H33	■	■	■	■
H32	■	■	■	■
H31	■	■	■	■
H30	■	■	■	■
H29	■	■	■	■
H28	■	■	■	■
H27	■	■	■	■
H26	■	■	■	■
H25	■	■	■	■
H24	■	■	■	■
H23	■	■	■	■
H22	■	■	■	■
H21	■	■	■	■
H20	■	■	■	■
H19	■	■	■	■
H18	■	■	■	■
H17	■	■	■	■
H16	■	■	■	■
H15	■	■	■	■
H14	■	■	■	■
H13	■	■	■	■
H12	■	■	■	■
H11	■	■	■	■
H10	■	■	■	■
H9	■	■	■	■
H8	■	■	■	■
H7	■	■	■	■
H6	■	■	■	■
H5	■	■	■	■
H4	■	■	■	■
H3	N/A			
H2	■	■	■	■
H1	■	■	■	■

Figure 1: ABLLS-R assessment score for the intraverbal section

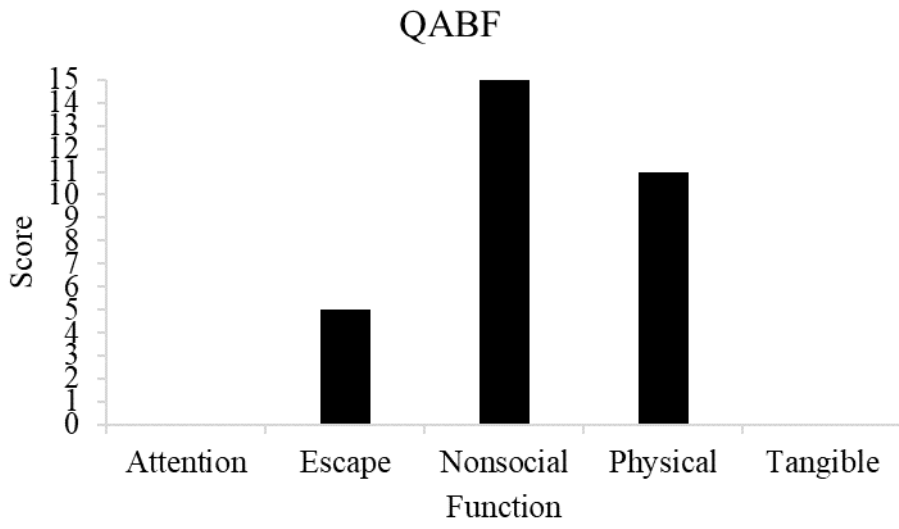


Figure 2: QABF results indicating that nonsocial/self-stimulation and nonsocial/pain attenuation are possible functions for the participant’s vocal stereotypy.

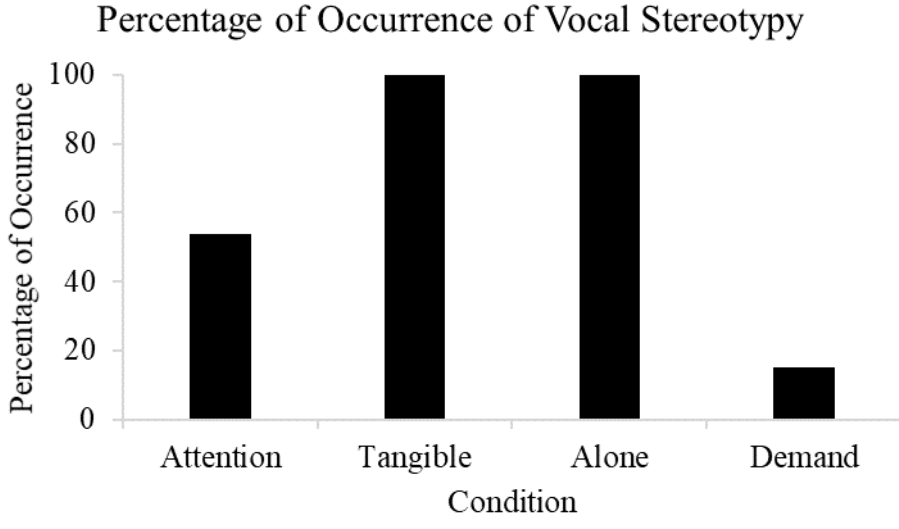


Figure 3: Percentage of occurrence of vocal stereotypy for each condition in the brief functional assessment.

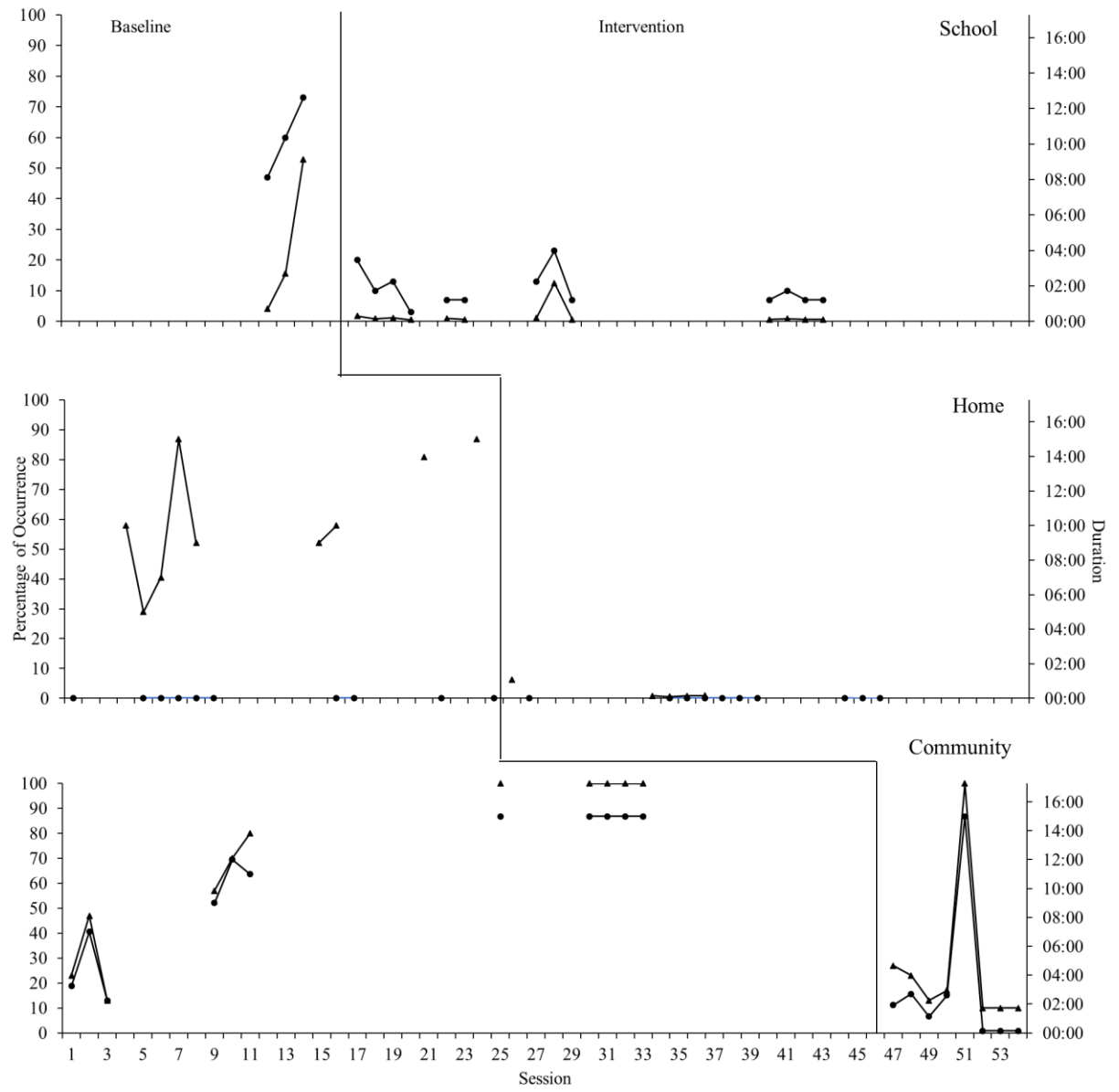


Figure 4: Multiple probe design across settings representing percentage of occurrence of vocal stereotypy during baseline and intervention conditions. Triangular data point represent frequency and circular data points represent duration.

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The effects of verbal operant training and response interruption (RIRD) and redirection on vocal stereotypy

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