

November 2017

Further Evaluation of Treatments for Vocal Stereotypy: Response Interruption Redirection and Response Cost

Kiersty McNamara

University of South Florida, kiersty1@mail.usf.edu

Follow this and additional works at: <https://digitalcommons.usf.edu/etd>



Part of the [Social and Behavioral Sciences Commons](#)

Scholar Commons Citation

McNamara, Kiersty, "Further Evaluation of Treatments for Vocal Stereotypy: Response Interruption Redirection and Response Cost" (2017). *USF Tampa Graduate Theses and Dissertations*.
<https://digitalcommons.usf.edu/etd/7061>

This Thesis is brought to you for free and open access by the USF Graduate Theses and Dissertations at Digital Commons @ University of South Florida. It has been accepted for inclusion in USF Tampa Graduate Theses and Dissertations by an authorized administrator of Digital Commons @ University of South Florida. For more information, please contact digitalcommons@usf.edu.

Further Evaluation of Treatments for Vocal Stereotypy: Response Interruption Redirection and
Response Cost

by

Kiersty McNamara

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts
Applied Behavior Analysis
Department of Child and Family Studies
College of Behavioral and Community Science
University of South Florida

Major Professor: Catia Cividini-Motta, Ph.D., BCBA-D
Kimberly Crosland, Ph.D., BCBA-D
Andrew Samaha, Ph.D., BCBA-D

Date of Approval:
November 2, 2017

Keywords: matched stimulation, reinforcer assessment, decrease, RIRD + RC

Copyright © 2017, Kiersty McNamara

Table of Contents

List of Tables.....	ii
List of Figures.....	iii
Abstract.....	iv
Introduction.....	1
Method.....	6
Participants, Setting, and Materials.....	6
Dependent Variable and Data Collection.....	6
Interobserver Agreement (IOA) and Treatment Integrity.....	7
Experimental Design.....	8
Pretreatment assessments.....	8
Preference assessment.....	8
Competing items assessment.....	9
Reinforcer assessment.....	9
RIRD Probe.....	10
Functional Analysis.....	11
Treatment Evaluation.....	12
Baseline.....	12
Toy baseline.....	12
Response Cost (RC).....	12
RIRD (RIRD).....	13
RIRD and RC.....	13
Social Validity.....	14
Results.....	15
Discussion.....	28
References.....	33
Appendices.....	39
Appendix A: Reinforcement Assessment for Individuals with Severe Disabilities (RAISD).....	40
Appendix C: Paired Stimulus Preference Assessment.....	43
Appendix C: RIRD data collection.....	44
Appendix D: Social Validity Questionnaire.....	45
Appendix F: IRB Letter of Approval.....	46

List of Tables

Table 1: Results of RIRD Probe	21
Table 2: Results of Paired Stimulus Preference Assessment.....	21
Table 3: Results of Social Validity Questionnaire.....	21

List of Figures

Figure 1: Percentage of vocal stereotypy during competing items assessment	24
Figure 2: Frequency of response during reinforcer assessment.....	24
Figure 3: Percentage of vocal stereotypy during functional analysis.	25
Figure 4: Percentage of vocal stereotypy during treatment not including treatment intervals	26
Figure 4: Percentage of vocal stereotypy during treatment including treatment intervals	27

Abstract

The purpose of this study was to expand on research by evaluating the effects of response interruption redirection and response cost alone to reduce vocal stereotypy and to evaluate whether response cost increases the effectiveness of response interruption redirection. Treatment phases included response interruption redirection, response cost, and response interruption redirection plus response cost. We saw high rates of vocal stereotypy during baseline, toy baseline, and pre-intervention phases. During all treatment phases, we saw substantial decreases in stereotypy. For two of the three participants response interruption redirection and response cost was a slightly more effective treatment suggesting that using response interruption redirection with an additive of response cost may further suppress stereotypy. These results were replicated across phases. For one participant response interruption redirection was the most effective treatment. All three treatments reduced vocal stereotypy to clinically acceptable levels for two participants. For one participant, there was only a slight decrease in stereotypy when RC was implemented. We discuss limitations and areas for future research.

Introduction

Many individuals diagnosed with an autism spectrum disorder (ASD) or other developmental disabilities engage in high rates of repetitive or non-functional vocal or motor responses referred to as stereotypy. In fact, repetitive behavior is a defining behavior characteristic of ASD (American Psychiatric Association, 2013). Vocal stereotypy, a common type of repetitive behavior, is defined as “any repetitive sounds or words produced by an individual’s vocal apparatus that are maintained by nonsocial reinforcement” (Lanovaz & Sladeczek, 2012) and it may include repetitive noises, scripting movie lines, or humming. Stereotypy has been found in many cases to be automatically reinforced (e.g., Bodfish, Symons, Parker & Lewis, 2000; Falcomata, Roane, Hovanetz, Kettering, & Keeney, 2004; Rapp & Vollmer, 2005) therefore it is difficult to treat because the functional reinforcer is hard to access and/or manipulate (Vollmer, 1994). Stereotypy can also hinder engagement in more appropriate behavior and can be disruptive to other individuals (Athens, Vollmer, Sloman & Pipkin, 2008) thus additional research on effective treatments for stereotypy is necessary.

Treatment for vocal stereotypy includes antecedent and consequence based interventions such as non-contingent reinforcement (NCR), differential reinforcement, response interruption and response redirection (RIRD), response cost (RC), and punishment. In non-contingent reinforcement, access to a preferred item is given continuously or on a time basis throughout a session independent of the individual’s behavior and this treatment has been found to be effective in reducing vocal stereotypy. For instance, two studies found that non-contingent access to leisure items or toys that matched the stimulation produced by the participant’s stereotypy led

to a suppressed in levels of stereotypy (Britton, Carr, Landaburu, & Romick, 2002; Piazza, Adelinis, Hanley, Goh, & Delia, 2000). In addition, several studies have found that non-contingent access to music reduced vocal stereotypy (e.g., Lanovaz & Sladeczek, 2012; Lanovaz, Sladeczek, & Rapp, 2012; Saylor, Sidener, Reeve, Featherstone, & Progar, 2012). Although NCR has been found to reduce vocal stereotypy, it has also been associated with an increase in other topographies of stereotypy. For instance, Rapp (2005) and Rapp and colleagues (2013) demonstrated that non-contingent music led to a decrease in vocal stereotypy but motor stereotypy increased during treatment. Additional limitations of NCR include the fact that prolonged continuous access to a reinforcer may result in loss of its effectiveness over time due to satiation and that NCR does not strengthen an alternative response (Lanovaz & Sladeczek, 2012).

An alternative treatment of vocal stereotypy is that may be associated with an increase in appropriate responses is differential reinforcement. Multiple types of differential reinforcement procedures are available, differential reinforcement of other behaviors (DRO), differential reinforcement of alternative behavior (DRA), differential reinforcement of lower rates (DRL), and differential reinforcement of incompatible behavior (DRI). In the treatment of vocal stereotypy, DRO and DRA have been found to be effective in reducing stereotypy. For example, Lanovaz, and colleagues (2014) and Taylor, Hoch, and Weissman (2005) examined the effects of DRO on stereotypy and found that it was most effective in reducing vocal stereotypy than NCR. Previous research has also shown that DRA is effective in decreasing stereotypy while increasing appropriate sitting and/or engagement with other toys or activities (Lanovaz, Rapp, & Ferguson, 2013; Lancioni et al., 2008a; Lancioni et al., 2008b; Stahmer & Schreibman, 1992). However,

Fellner, Laroche, and Sulzer-Azaroff (1984) found that differential reinforcement was only effective when implemented as part of a treatment package including response blocking.

Another procedure that has been effective in decreasing stereotypy is response interruption and response redirection (RIRD; e.g., Ahearn, Clark, MacDonald, & Chung, 2007; Liu-Gitz & Banda, 2010). RIRD consists of interrupting the participant anytime he or she engages in vocal stereotypy and redirect him or her to engage in 3 different responses (Ahearn et al., 2007) and praise is usually provided following compliance with these tasks in the absence of stereotypy. One advantage of RIRD over other interventions such as NCR or DRO is that by redirecting the individual to engage in an alternative response it may result in an increase in appropriate responses such as vocalizations (e.g., Ahearn et al., 2007; Cassella, Sidene, Sidener, and Progar, 2011; Liu-Gitz & Banda, 2010; Love, Miguel, Fernand, & LaBrie; 2012). Ahearn and colleagues (2007) found that for all 4 participants vocal stereotypy decreased to acceptable levels and for 3 of their 4 participants appropriate vocalizations increased.

Despite some research supporting the efficacy of RIRD in decreasing vocal stereotypy, the procedure may be difficult to implement, especially initially, if the individual engages in high levels of stereotypy thus requiring frequent intervention. Additionally, RIRD does not always increase appropriate vocalizations. For example, when Cassella and colleagues (2011) replicated Ahearn and colleagues (2007) study appropriate vocalizations failed to increase for any of their participants. RIRD may also be difficult to implement with individuals who do not comply with redirection tasks (Ahrens, Lerman, Kodak, Worsdell, & Keegan, 2011). Furthermore, RIRD has not yet been implemented during natural occurring activities so the effectiveness of RIRD in the natural environment is unknown (see review by Martinez & Betz, 2013).

Finally, RC, has also been evaluated as treatment for stereotypy. Response cost is the removal of a reinforcer contingent on target behavior and is a common component of behavior reduction plans (Conyers et al., 2004; Falcomata, Roane, Hovanetz, Kettering, & Keeney, 2004). Previous research evaluating the effects of RC on stereotypy has usually included additional components such as NRC, DRO, token economies, and RIRD. For instance, Falcomata and colleagues (2004) first evaluated the effects of NCR on stereotypy and given that it was ineffective, the authors then evaluated NCR paired with RC, which led to a reduction in stereotypy to acceptable levels. Similarly, Shillingsburg, Lomas, and Bradley (2012) combined RC, DRO, and a token economy to successfully reduce vocal stereotypy for one participant. However, treatment was limited to a controlled school setting and was found to not be effective when the researchers attempted to fade in a demand.

Several studies have combined RIRD procedures with a RC component to decrease stereotypy. All of the studies found that this treatment package was most effective in suppressing stereotypy (e.g., Love et al., 2012; Shawler and Miguel, 2015). For instance, Shawler and Miguel (2015) evaluated a variation of motor and vocal RIRD, which included a RC component and found that variations of RIRD (motor and vocal) combined with RC reduced vocal stereotypy. Love and colleagues (2012) also used a variation of RIRD, which included a RC component and access to matched stimulation, and that treatment packaged was successful in reducing vocal stereotypy for both participants. These findings indicate that RIRD combined with RC is effective in decreasing stereotypy but because previous research has not evaluated these treatments separately, their relative effects are unknown.

The findings of previous studies suggest that RIRD and RC combined have been found to be effective in reducing vocal stereotypy but it is unclear whether RC increases the efficacy of

RIRD. Furthermore, previous treatments for stereotypy have not led the response to extinguish. Therefore, the purpose of this study was to add to the literature by evaluating the effects of these treatments alone and to evaluate whether RC increases the effectiveness of RIRD.

Method

Participants, Setting, and Materials

This study included three participants diagnosed with an Autism Spectrum Disorder (ASD) who engaged in vocal stereotypy that was reported to interfere with their daily life. Karl was a 9-year-old boy who expressed his wants and needs in full vocal sentences. He imitated a variety of motor and vocal responses. Sammy was an 8-year-old boy with a limited vocal repertoire. He emitted 1- to 2-word mands and he also imitated a variety of vocal and motor responses. Jon was an 11-year-old boy who emitted vocal mands using two to three words and he could imitate a variety of vocal and motor tasks. Sessions were conducted by the primary investigator and took place in a small room in the participant's home. Participants were recruited from local behavior analytic agencies. Each condition during treatment was associated with a semi-randomly assigned colored wristband. In addition, the color of the wristband was different across conditions and participants. The colored wristband was used to help establish discrimination across the conditions. All sessions were video recorded for the purpose of data collection. Toys identified during preference, reinforcer, and competing items assessment were used for each client. The Countee © application was used to measure duration of vocal stereotypy.

Dependent Variable and Data Collection

The primary dependent variable in this study was vocal stereotypy. Vocal stereotypy for Karl was defined as any instance of nonfunctional vocalizations including singing, scripting lines, yelling, humming, spitting, and/or repetitive sounds. Vocal stereotypy for Sammy was

defined as any instance of nonfunctional vocalizations including repeated sounds, clucking, and humming. Vocal stereotypy for Jon was defined as any instance of nonfunctional communication including repetitive noises, humming, singing, scripting, and repetitive words (e.g., “ball” “ball”, “ball”, “ball”). Data were collected on continuous duration of vocal stereotypy. These data were summarized as the percentage of session with stereotypy by dividing the total duration of vocal stereotypy by the total duration of the session and multiplied by 100. Stereotypy that occurred during the implementation of RIRD, RC, and RIRD and RC were also measured as recommended by Wunderlich and Vollmer (2015).

Interobserver Agreement (IOA) and Treatment Integrity (TI)

A second independent and trained observer scored sessions to assess interobserver agreement and treatment integrity. The observer scored at least 33% of videotaped sessions of pre-assessment and treatment phases for each participant. Interobserver agreement was determined using total duration IOA which was calculated by dividing the shorter duration by the longer duration of stereotypy per session and multiplying by 100. Agreement for the preference and reinforcer assessments was 100% for all three participants. For the competing items assessment agreement for Karl was 93% (range, 96-99%), Sammy 99% (range 99-99%), and Jon 96% (range 94-98%). In the functional analysis, interobserver agreement was 93% (range 90-98%) for Karl, 92% (range, 80-100%) for Sammy, and 93% (83-100%) for Jon. Lastly, IOA for the treatment evaluation for Karl was 93.2% (range, 80-100%), for Sammy 93.3% (range, 80-100%), and for Jon 96.2% (range, 93-100%). Treatment integrity was assessed using a task analysis describing the procedures for the each of the assessments completed and treatments evaluated. To determine treatment integrity the number of steps completed correctly was divided that by the total number of steps, and then multiplied by 100. Treatment integrity was measured

in at least 33% of the sessions. Treatment integrity score for the reinforcer assessment was 100% of all three participants and for the competing items assessments 100% Karl, 100% for Sammy, and 95% Jon (range, 90-100%). Similarly, integrity scores for the functional analysis for Karl was 98.8% (range, 95-100%), or Sammy 98.1% (range, 89-100%), and for Jon 97.8% (range, 87-100%). Finally, for the treatment evaluation TI was 100% for Karl, 99.6% (range, 97-100%) for Sammy, and 99.6% (range, 96-100%) for Jon.

Experimental Design

A reversal with an embedded multielement design was used to assess the effectiveness of RIRD, RC, and RIRD and RC as treatments for vocal stereotypy. For the competing items, reinforcer assessment, and functional analysis an alternating treatments design was employed.

Pre-treatment assessments

Prior to conducting the treatment analysis, multiple assessments were completed to identify preferred and reinforcing stimuli as well as non-competing items for each of the participants. In addition, a functional analysis was completed to ensure that stereotypy was automatically reinforced for each participant.

Preference assessment. The purpose of this assessment was to identify at least 1 preferred toy per participant. Items selected for the preference assessment were chosen based on the results of the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Piazza, Bowman, & Amari, 1996). After completion of the RAISD at least one paired stimulus preference assessment was conducted. The paired stimulus preference assessment consisted of trials where the researcher presented two toys to the participant. If the participant approached one toy within 5 s the participant was given access to the toy for 20-30 s and the other toy was immediately removed. If the participant did not approach any of the items the toys were re-

presented one more time. If the participant continued to not approach either toy, both were removed and the trial was ended. Across the entire assessment each toy was paired with each other at least once and placement of items were counterbalanced (Fisher, Piazza, Bowman, Hagopian, Owens, & Slevin, 1992).

Competing items assessment. The purpose of this assessment was to ensure that the toy included in the treatment phase did not suppress levels of stereotypy. The procedures for competing items assessment were based on those employed in the matched stimulus assessment completed by Love and colleagues (2012). In this assessment, we alternated between baseline and competing item sessions. At least one highly preferred toy from the preference assessment was evaluated. If the preferred item was found to suppress stereotypy, then another preferred item was evaluated. During baseline, no toy was present in order to assess the level of stereotypy in the absence of toys. The participants were free to move about the room but no social interaction took place. During the competing item condition the participants were seated in a room with the toy in front of him or her and had continuous access to the toy throughout the entire session. At least two sessions with each target toy were completed. Toys continued to be assessed until we identified at least one that did not suppress vocal stereotypy. The degree of variability of stereotypy for a toy to be a non-competing item was no more than a mean 10% increase or decrease.

Reinforcer assessment. The purpose of this assessment was to ensure that the toys identified through the preference and competing item assessments were reinforcing. The reinforcer assessment was based on Kelly, Roscoe, and Hanley (2014). Prior to beginning of the assessment, at least 2 forced exposure trials were completed. The experimenter prompted the participant to engage in the target response and provided the appropriate consequence. We

alternated between extinction and reinforcer sessions with each potential reinforcer evaluated at least twice. During the extinction session, the participants were seated in a room and provided with a task. During the extinction session the experimenter stated, “You can complete “task” but I will not give you anything.” The experimenter provided no consequences for responding. The reinforcer sessions were similar to extinction except the experimenter stated, “You can do “task” and I will give you (potential reinforcer).” Contingent on each target response, the participant received access to the preferred stimulus for 20 s. to equate duration of time during which the participant could emit the target response during both extinction and reinforcer sessions, the session timer was paused during reinforcer consumption intervals. For Karl and Jon, the target response was sorting playing cards into piles of red and black. This response was defined as picking up a card from a pile placed in front of the participant and placing it in the corresponding pile. Sam was instructed to place blocks into a basket. The target response was defined as picking up a block and placing it into the basket. Any attempts to grab more than one card or block were blocked.

RIRD probe. The purpose of the RIRD probe was to identify appropriate social questions, target sounds, vocal or motor tasks for each participant to complete during each implementation of RIRD. This RIRD probe was based on the procedures described by Wunderlich and Vollmer (2015). The probe took place before the treatment evaluation began and consisted of 15 vocal and motor tasks identified via information from caregivers and current educational objectives. During each session five tasks were presented five times in a random order (25 trials). Participants were given 5 s to complete the task independently. In the case of a motor task, if the participant did not respond a 3-step prompting procedure was used consisting of verbal, model and physical prompts each presented with a 5-s interval. In the case of vocal

tasks, if the participant did not respond the task was presented a second time. If the participant continued to not respond or responded incorrectly a model prompt was presented (e.g., “say ball” pause 2 s “ball”) and the demand was placed again. If after 5 s the participant continued to respond incorrectly or did not respond the trial was ended. Sessions were continued until at least six tasks that the participant completed independently with at least 90% accuracy were identified. Based on the results of this assessment vocal tasks were selected for each of the participants. See Table 1 for results of this assessment.

Functional analysis (FA). The purpose of the functional analysis was to identify the function of the participant’s vocal stereotypy. Procedures were consistent with Roscoe, Carreau, MacDonald, and Pence (2008) in which we used a 2:1 ratio of the no interaction to demand and attention condition. The hypothesized function of vocal stereotypy was automatic reinforcement so for this reason we omitted the play condition and extended the no interaction instead. If stereotypy persisted in the social conditions further analysis took place.

Attention. The experimenter and participant entered the room together where low preferred toys were available. The participant was instructed to play with the toys while the experimenter sat in the corner reading a book. Attention, in the form of brief disapproval statements and physical contact, was provided contingent on each instance of vocal stereotypy.

Demand. Four to five academic tasks based on the participant’s current educational program and functioning level were selected. For Karl two different math work sheets were selected, Sammy a writing work sheet and a spelling work sheet, and Jon sorted cards and did a math worksheet. During the demand condition the participant and experimenter were seated at a table or on the floor. The experimenter presented the demand to the participant and gave him 5 s to begin task. If the task was not started, then a 3-step prompting sequence was used consisting

of instructions, instructions paired with a model, and instructions paired with a physical prompt. Each prompt was presented following a 5 s interval. In addition, brief praise was delivered if the participant complied with the task without requiring physical guidance. During the demand condition, any instances of vocal stereotypy resulted in the experimenter removing the demands (and related materials) for 30 s. After the 30s break, the demands were re-presented.

No interaction. During the no interaction phase the participants were placed in a room without any toys or materials and no consequences were provided contingent on vocal stereotypy. The researcher was seated at least 15 ft from the client in the same room, but did not initiate or respond to any interactions made by the participant.

Treatment Analysis

During the treatment analysis, we evaluated the effects of RIRD, RC, and RIRD and RC on levels of vocal stereotypy. Sessions were 5 minutes however, when including the duration of stereotypy during treatment intervals, sessions lasted a maximum of 30 min. No session ever exceeded 23 minutes.

Baseline. This consisted of the same procedures as the no interaction condition from the FA.

Toy Baseline. Toy baseline was conducted as baseline except it included a toy identified as highly preferred and reinforcing that did not suppress stereotypy during the competing items assessment. The purpose of this phase was to further prove the toy did not compete with stereotypy.

Response cost (RC). During the RC condition the participant and experimenter were seated at a couch or on the floor together. A colored wristband was placed on the participants arm along with the statement “it is “color” time”. For Karl and Sammy this color was blue and

for Jon this was yellow. The participants had continuous access to a highly preferred and reinforcing toy but contingent on vocal stereotypy the toy was removed for 10 s. If the participant engaged in vocal stereotypy during the RC intervals, the 10 s interval was reset.

RIRD. During RIRD the same procedures as Ahearn et al. (2007) were followed. At the beginning a colored wristband was placed on the participant's wrist and the experimenter said, "It is "color" time". The wristband was purple for Karl, white for Sammy, and pink for Jon. The participant and experimenter sat on the couch or floor without any toys present. Contingent on vocal stereotypy the experimenter interrupted the participant by stating his name while initiating eye contact and prompted him to engage in the selected vocal tasks. The participant was required to comply with three tasks in the absence of stereotypy. For example, contingent on vocal stereotypy the experimenter said "Karl" while initiating eye contact followed by "what is your favorite color?" If the Karl did not respond to the request within 5 s the question was repeated. If the Karl still did not respond to the request within another 5 s a model prompt was provided, "what is your favorite color? (pause) say blue". If the participant still had not responded the therapist moved on to a new task. If the participant responded independently or after being prompted neutral praise was provided. Once the participant had complied with 3 consecutive tasks in the absence of vocal stereotypy RIRD was terminated.

RIRD and RC. This condition was based on the procedures described by Love and colleagues (2012) except that a highly preferred toy that did not compete with stereotypy was used. In the beginning of the session a colored wristband was placed on the participant's wrist along with the statement "its "color" time." For Karl the wristband was blue, for Sammy orange, and for Jon green. The participant had continuous access to a toy throughout the session.

Contingent on vocal stereotypy the toy was removed and RIRD was implemented per the description above. Once RIRD was completed, the toy was returned to the participant.

Social Validity. A social validity questionnaire (see Appendix D) was provided to the parents following completion of study. Results from social validity are depicted in Table 3. The caregivers were shown a short clip (1-2 min) and a written description of baseline and each treatment. Caregivers then answered each question about acceptability and effectiveness of the treatment using a 5-point Likert scale consisting of 1 (strongly disagree) to 5 (strongly agree). The mean score given by Karl's caregiver for each of the treatment was 4 for RIRD, 2.5 for RC, and 4 for RIRD plus RC. For Sammy, his mother's mean score for RIRD was 5, for RC 3, and for RIRD plus RC 4.5. Lastly, Jon's caregiver scored RIRD as 4, RC as 3.5, and RIRD plus RC as 3.5. Overall, all three caregivers reported they preferred RIRD over the other treatments.

Results

Results for all pre-assessments are listed below and shown in table 2 and Figure 1 and 2. The results of the preference assessments are shown in Table 2. This table contains a list of each of the items selected on at least 80% of the trials for each of the participants. Items identified as highly preferred for Karl were Thomas the TankTM, Tigger, iPad®, and Whinny the Pooh. Sammy chose the iPhone® and for Jon was a fidget spinner. All items identified as highly preferred were included in the competing items assessment (Figure 1), however these graphs depict data only for the highly preferred items that did not compete with stereotypy. Karl engaged in stereotypy in an average of 33% of the session when no toys were present and in 37% of the session when he had access to Thomas the TankTM. Similarly, stereotypy occurred in an average of 45% of the sessions when he had no toys and 46% of the sessions when he had access to Tigger. Sammy's stereotypy occurred in an average of 40% of the sessions when he had access to an iPhone® and in 43% of the sessions when he did not have access to an item. Lastly, during the competing items assessment for Jon, stereotypy occurred in an average of 20% of the sessions with the fidget spinner and in 23% without access to an item. Because access to the toys did not increase nor decrease levels of stereotypy by more than 5% in comparison to the no toy condition, these items were selected for inclusion in the reinforcer assessment.

The results for the reinforcer assessment for each participant are found in Figure 2. All items identified as highly preferred that did not suppress stereotypy were evaluated however these figures show data only for the items found to be reinforcing. During both reinforcer assessments completed for Karl, one using Thomas the TankTM (left panel) and the other Tigger

(right panel), he engaged in low levels of problem behavior during the extinction sessions and high levels during the reinforcer sessions. Similar levels of responding were observed with Sammy when we evaluated the reinforcing efficacy of the iPhone®, and with Jon when we assessed the reinforcing value of the fidget spinner. Thus, we identified two reinforcing items for Karl and one for Sammy and Jon. During subsequent assessments Karl was allowed to choose one of the items, Thomas the Tank™ or Tiger, before the beginning of each session. He always chose Thomas the Tank™.

The results of the functional analysis for all participants are found in Figure 3. Karl (top panel) engaged in high levels of vocal stereotypy during the no interaction (M=51%), Demand (M=34%), and attention (M=40%) conditions. Given that level of stereotypy was on an increasing trend during the attention condition, another session was conducted and levels of stereotypy decreased to levels similar to the other sessions. We then conducted a series of repeated no interaction sessions and because stereotypy persisted we concluded that it was likely automatically reinforced. Sammy (center panel) engaged in high but variable levels of vocal stereotypy during the no interaction condition (M=48%), low levels during attention (M=19%), and near zero levels during demand (M=6%). These results suggested that his stereotypy was also automatically reinforced. Finally, Jon (lower panel) engaged in higher levels of stereotypy during the no interaction (M=19%), and lower levels during the attention (M=12%), and demand (M=6%) conditions. Initially stereotypy occurred at levels during the attention condition so additional no interaction sessions (M=23%) were conducted. Stereotypy continued to occur in moderately and stable levels suggesting that it was automatically reinforced.

Figure 6 and 7 shows the results of the treatment analysis for all 3 participants. Figure 6 includes the percentage of stereotypy per session, excluding the treatment intervals. The top

panel of Figure 6 shows the results for Karl. During the initial baseline (M=60%) and toy baseline (M=52%) conditions vocal stereotypy occurred in similar high levels and these levels were replicated during the second baseline (M=47%) and toy baseline (M=47%) phases. Upon introduction of treatments, stereotypy decreased to near zero levels across all three conditions. He engaged in vocal stereotypy in an average of 9% of the sessions during RIRD, 5% of RC, and 4% of RIRD and RC. When treatments were reintroduced, there was an immediate decrease in level of vocal stereotypy across all treatments. Karl engaged in vocal stereotypy for an average of 2% during RIRD, 4% of RC, and of RIRD and RC 1%. Thus, for Karl, results were replicated across phases. In general, RIRD and RC was a little more effective than these treatments alone.

Similar results were obtained for Sammy (middle panel of Figure 6). During the first baseline and toy baseline phases vocal stereotypy occurred in an average of 50% and 52% of the sessions, respectively. Stereotypy decreased to near zero levels upon introduction of the treatments. Sammy engaged in vocal stereotypy during an average of 6% of RIRD, 4% of RC, and 4% of RIRD and RC sessions. During the second baseline and toy baseline phases vocal stereotypy occurred in an average of 42% and 43% of sessions, respectively. Finally, Sammy engaged in vocal stereotypy in an average of 4% of RIRD, 3% of RC, and 6% of RIRD and RC sessions. Results for Sammy indicated that both RIRD and RIRD and RC were equally effective in reducing vocal stereotypy although all three treatments suppressed vocal stereotypy to clinically acceptable levels.

The bottom panel of Figure 6 shows the results for Jon. Stereotypy occurred in an average of 27% of the baseline and 29% of the toys baseline sessions. During the initial treatment phase, he engaged in vocal stereotypy an average of 2% of RIRD, 2% of RC, and 1% of RIRD and RC sessions. Vocal stereotypy increased to an average of 29% of the sessions

during the second baseline and 28% of the sessions during the second toy baseline phases. Once treatment was reintroduced vocal stereotypy immediately decreased to near zero levels across all three conditions. During RC, stereotypy occurred in an average of 9% of the sessions as compared to 2% of the RIRD and 3% of the RIRD and RC sessions. Thus, for Jon RIRD and RIRD and RC appeared to be more effective in decreasing stereotypy.

Figure 7 shows the percentage of stereotypy during sessions including the treatment intervals. Over all, levels of stereotypy were higher when the stereotypy occurring during the treatment intervals were included. This was especially the case for RC as shown by the data for the first treatment phase for Karl and both treatment phases for Jon. Although levels of stereotypy were slightly higher among treatments, RIRD and RIRD and RC still resulted in lower levels of stereotypy as compared to BL for all three participants. For Jon, his stereotypy occurred at high near BL levels during the first treatment phase and results were replicated during the second treatment phase. These results indicated that RC was ineffective at reducing is stereotypy.

Table 1.Results of RIRD Probe

Participant	RIRD Tasks
Karl	The Sky is ____, How old are you? What is your brother's name? What is my Name? The grass is ____? What color is Thomas?
Sammy	What is your name? How old are you? Say "Hi", Say "bye" Say "please", Say "a", Say "b"
Jon	What is your favorite color? Say "blue" Say "go", How old are you? Say "couch" Say "car", Say "dog"

Table 2.Results of Paired-Stimulus Preference Assessment

Participant	Items
Karl	IPad® Thomas™ Winnie the Pooh Tigger
Sammy	IPhone®
Jon	Fidget Spinner

Table 3. *Results of Social Validity Questionnaire*

<i>Question</i>	<i>Karl</i>	<i>Sammy Score</i>	<i>Jon</i>
1. Treatment RIRD reduced my child's vocal stereotypy.	4	5	5
2. I am willing to implement Treatment RIRD with my child.	4	5	3
3. I would recommend RIRD to other children.	4	5	5
4. Treatment RC reduced my child's vocal stereotypy.	2	3	2
5. I am willing to implement Treatment RC with my child	3	4	4
6. I would recommend Treatment RC to other children	2	2	2
7. Treatment RIRD & RC reduced my child's vocal stereotypy.	4	5	4
8. I am willing to implement Treatment RIRD and RC with my child.	4	5	3
9. I would recommend Treatment RIRD and RC to other children	4	4	4
10. Which of the treatments do you prefer?	RIRD	RIRD	RIRD

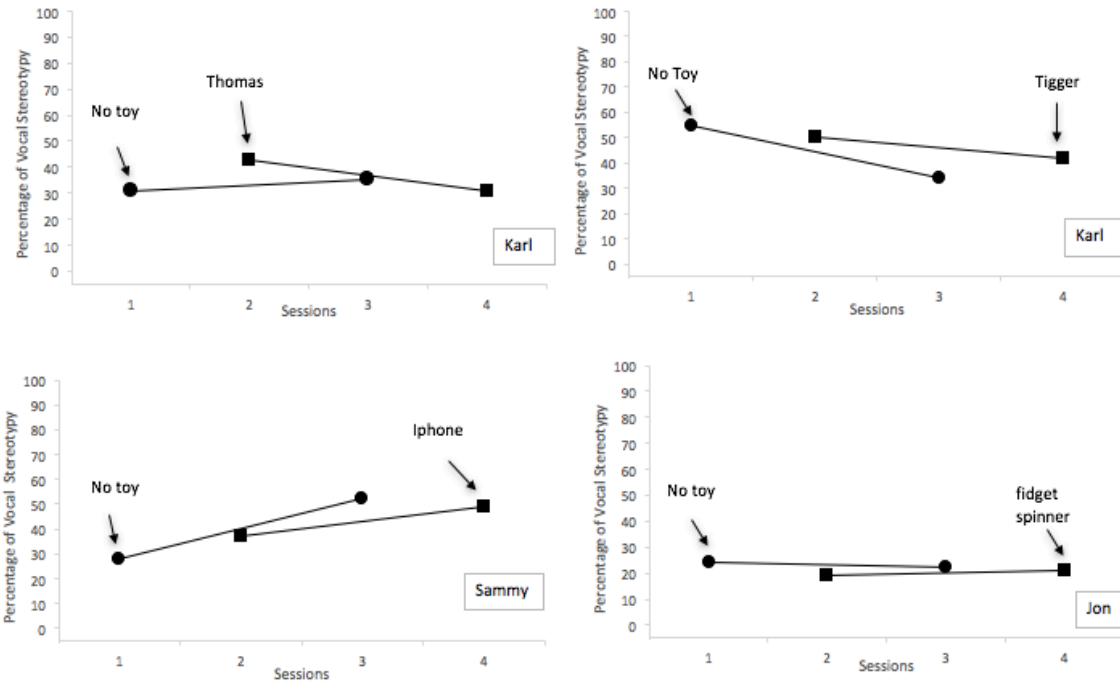


Figure 1. The Percentage of vocal stereotypy during competing item assessments for Karl (top two panels), Sammy (lower left panel), and Jon (lower right panel).

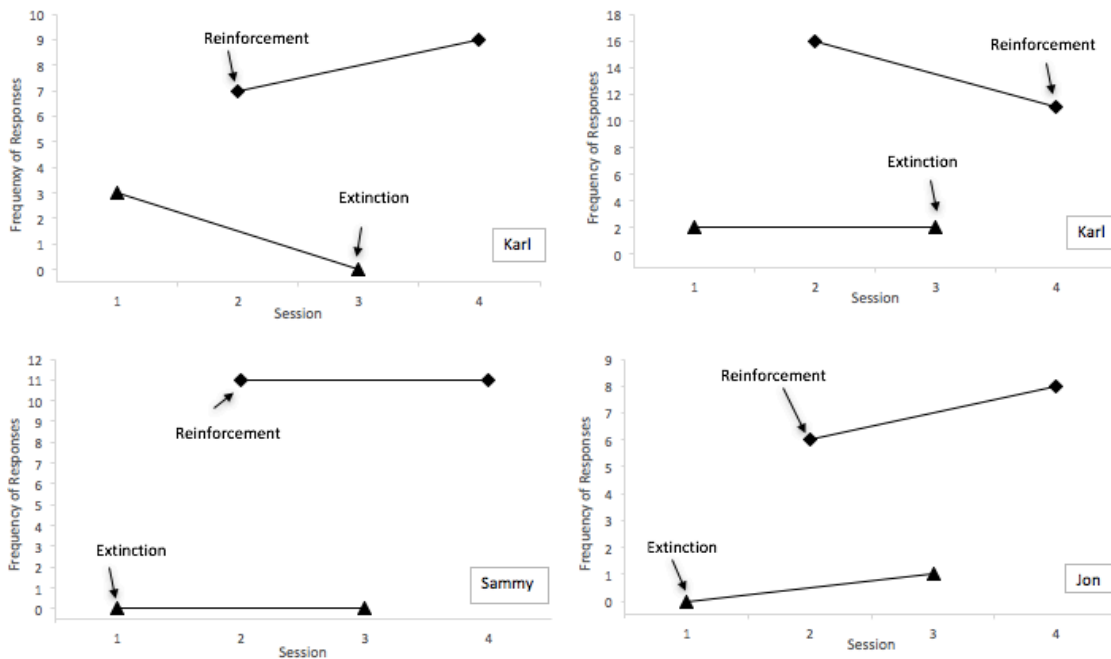


Figure 2. Frequency of responses during the reinforce assessment for Karl are depicted in the top panels. The top right left panel shows results for Thomas and left for Tigger. The bottom left panel shows results for Sammy (iPhone®) and bottom right for Jon (fidget spinner).

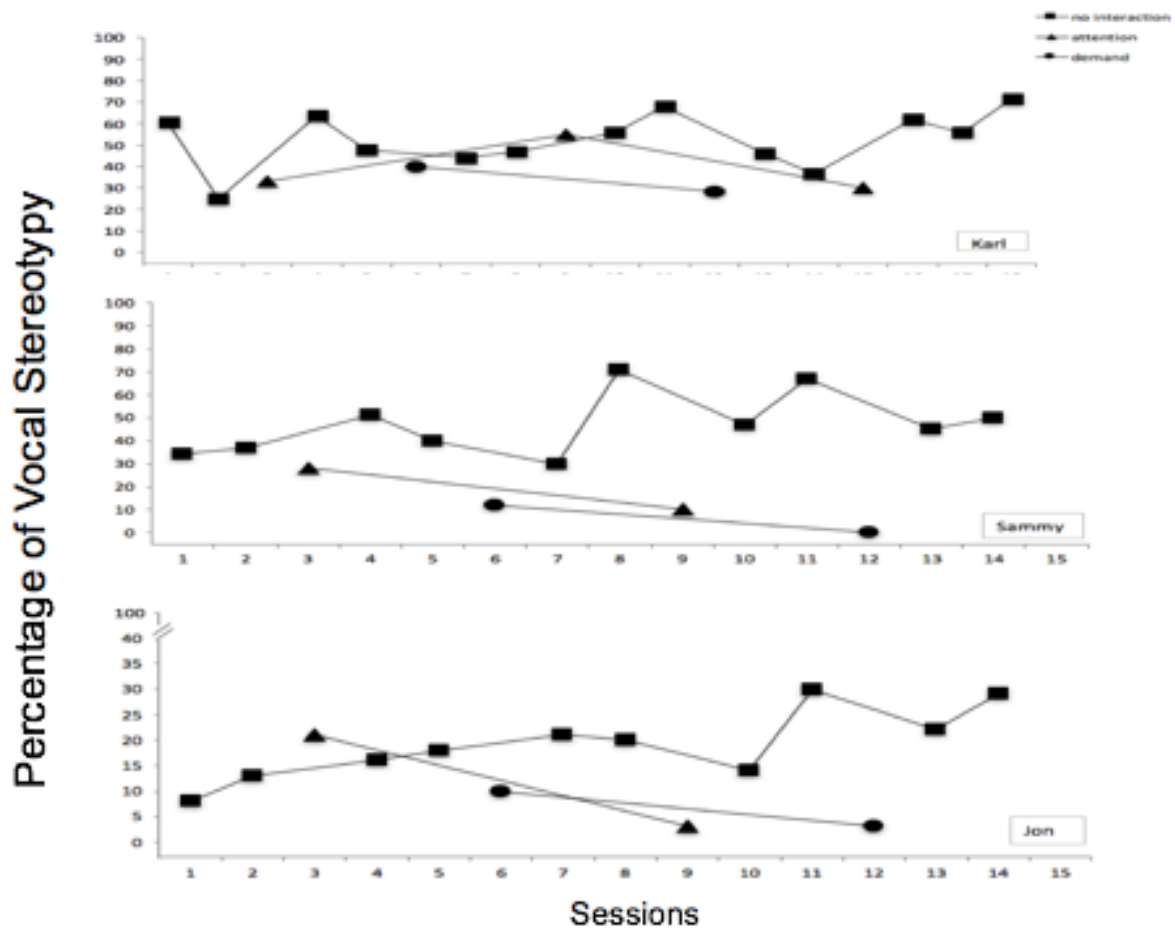


Figure 3. Percentage of vocal stereotypy for Karl (upper panel), Sammy (middle panel), and Jon (bottom panel) across different conditions of their functional analysis. The squares represent no interaction, the triangles represent attention, and the circles present demand.

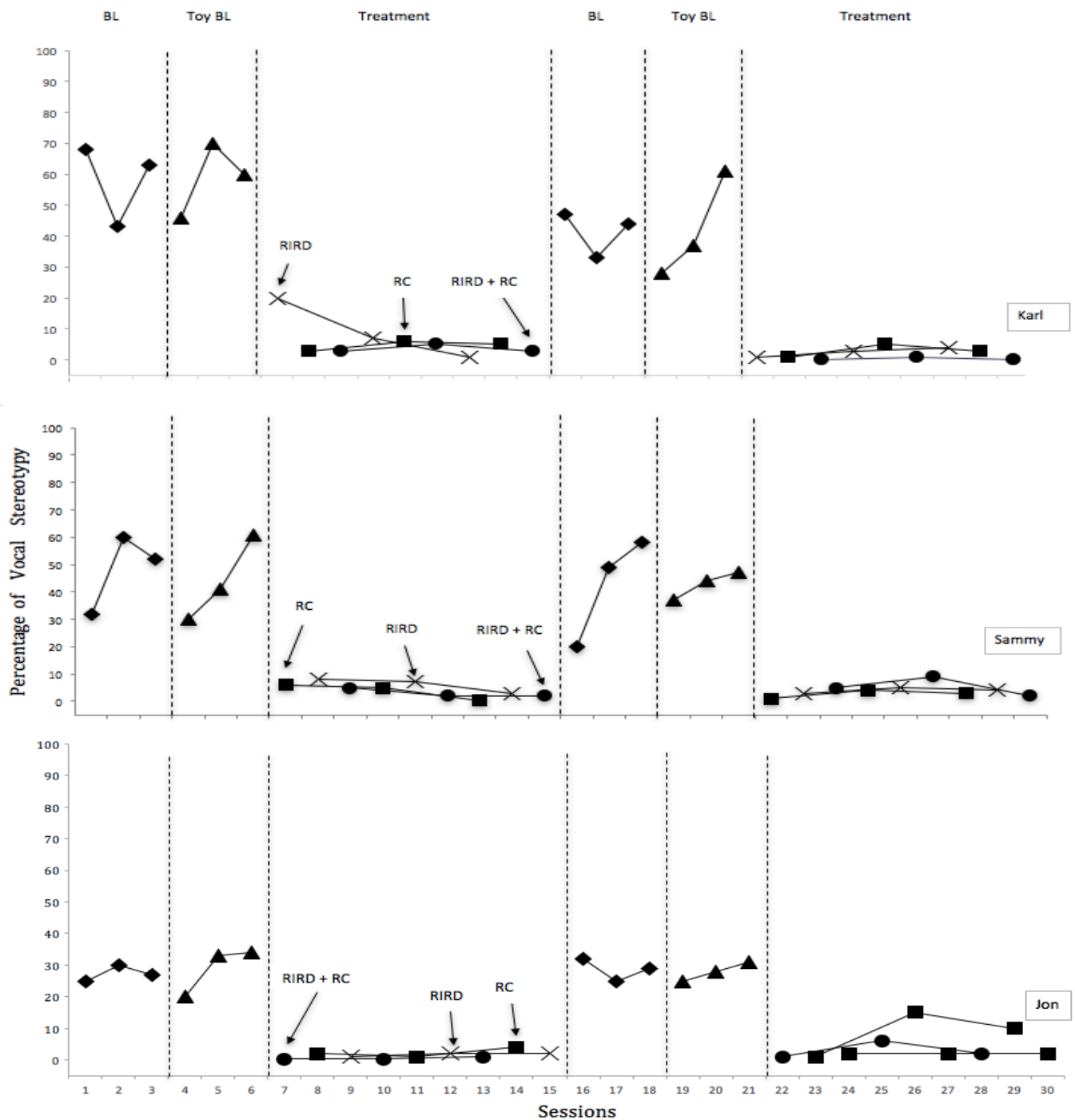


Figure 4. The percentage of stereotypy that occurred each session (not including treatment intervals) is displayed for Karl (top panel), Sammy (middle panel), and Jon (bottom panel). The squares represent response cost, X's represent response interruption redirection, and circles represent response interruption and response cost combined.

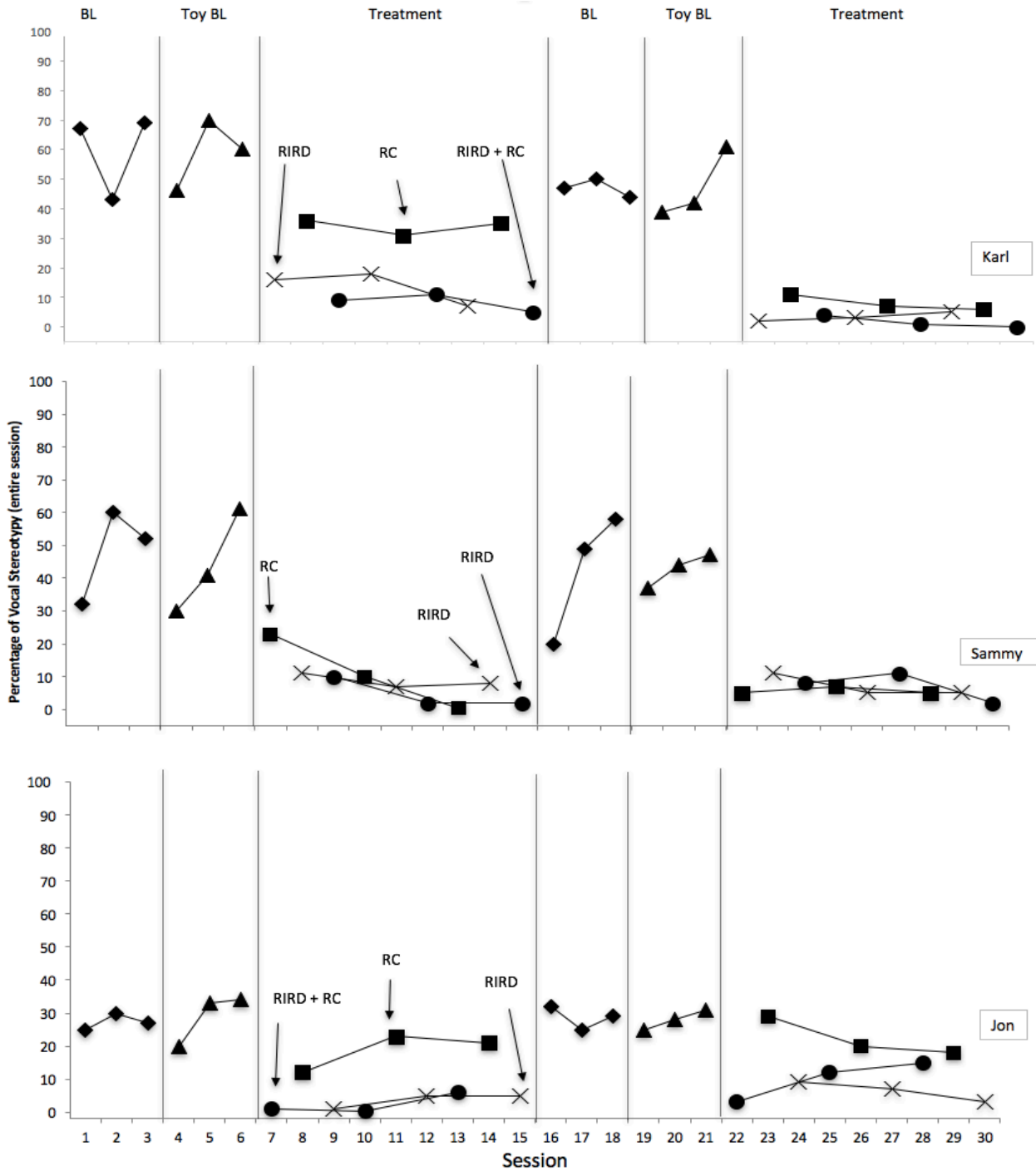


Figure 5. Results for treatment including vocal stereotypy that occurred during the session and treatment intervals are depicted for Karl (top panel), Sammy (middle panel), and Jon (bottom panel). The squares represent response cost, X's represent response interruption redirection, and circles represent response interruption and response cost combined.

Discussion

Results of this study indicated that all three treatments may be effective in reducing vocal stereotypy to clinically acceptable levels. This was the case for all three participants when we did not measure stereotypy during the treatment intervals. In addition, the results of the treatment evaluation indicated that in some cases problem behavior may continue to occur during treatment intervals. This was the case for one of our participants, Jon, for whom response cost (RC) did not suppress stereotypy when we evaluated its effect on the stereotypy occurring throughout the overall session, including treatment intervals. Furthermore, in this study the treatment package consisting of response interruption and redirection (RIRD) plus RC led to more immediate decreases in vocal stereotypy across all three participants although RIRD alone was most effective for Jon.

The findings of this study are consistent with previous research in multiple ways. First, they replicated findings from past studies showing that RIRD (e.g., Ahearn et al., 2007, Ahrens et al., 2011) and RIRD and RC (e.g., Love et al., 2000, Shawler & Miguel, 2015) are effective treatments for vocal stereotypy. Similarly, the current results are consistent with previous studies showing that the addition of a RC component to RIRD may further suppress stereotypy (e.g., Love et al., 2000, Shawler & Miguel, 2015). The results for Jon also are consistent with outcomes of previous studies showing that stereotypy may continue to occur during treatment intervals (e.g., Wunderlich & Vollmer, 2015) thus overestimating the efficacy of interventions. Finally, our findings replicated previous studies showing that vocal RIRD is effective in decreasing vocal stereotypy (e.g., Ahearn et al., 2007; Athens et al., 2008.)

Our study, however, differs from previous research in that it appears to be the first to evaluate the effects of both treatments separately and as a treatment package. This format allowed us to determine whether RIRD plus RC lead to a greater suppression in vocal stereotypy than either of these treatments alone. Moreover, our study found that RC alone was effective in suppressing stereotypy for at least some of the participants, yet previous research has proposed that RC may only be effective in suppressing problem behavior when combined with another intervention (e.g., Falcomata et al., 2004). In addition, our study assessed preference for and the reinforcing efficacy of the items included in the treatment conditions that involved response cost, and also determined that access to these items did not suppress levels of stereotypy. This is important because without the results of a competing assessment and the toy baseline, we would not be able to tease apart whether a decrease in stereotypy during the RC condition was due to negative punishment, access to alternative reinforcement in the form of a competing item, or a combination. In fact, previous research using RIRD plus RC as a treatment for vocal stereotypy used toys that were found to compete with vocal stereotypy (e.g., Love et al., 2012;) or did not assess whether access to the items suppressed levels of stereotypy (e.g., Shawler and Miguel, 2015).

Although all three treatments suppressed vocal stereotypy during sessions, minor differences in treatment efficacy were found for our participants. First, RC was not effective for Jon and there are many factors that may have contributed to these results. For instance, it is possible that removal of the item did not serve as a negative punisher because the item's reinforcing efficacy decreased overtime. This would be consistent with results of Shawler and Miguel (2015). Future research should consider conducting reinforcer assessments on a regular basis to assess the reinforcing properties of the stimuli included in the RC intervention.

Alternatively, it is possible that RC was not effective because the item was removed for a brief period. We chose a brief duration, 10 s, because previous research using a RC cost component found that the treatment package was effective when problem behavior resulted in removal of the item for 5- 20 s (e.g., Falcomata et al., 2004; Shillingsburg & Bradley, 2012). Future research on RC should consider evaluating the optimal duration of item removal during response cost. In addition, because we did not block stereotypy during the RC intervals, the participants had access to a different source of reinforcement (i.e., stereotypy) when the reinforcing item was removed. This means that a concurrent schedule of reinforcement was in effect during the RC condition in that the participant could access reinforcement from engaging with the preferred and reinforcing stimulus or from engaging in stereotypy. Future research may want to consider assessing preference and/or the reinforcing efficacy of preferred items and stereotypy, and try to identify stimuli that are more preferred and/or reinforcing than stereotypy to include in treatment. Finally, it is possible that the attention the participant received during the RC condition was preferred, thus accidentally reinforcing the occurrence of stereotypy. Anecdotal information from sessions indicated that Jon would often laugh when the therapist attempted to remove access to the preferred toy suggesting that he enjoyed that form of interaction. Future research should consider ways to minimize the amount or quality of attention received during RC.

There are additional limitations of the current study that must be reviewed. First of all, sessions were completed in a controlled environment thus potentially limiting the generality of these outcomes to natural settings. Future research should therefore consider conducting treatment sessions in other settings such as the child's regular classroom or common areas of the home. Secondly, we evaluated the efficacy of RIRD consisting of vocal tasks on vocal stereotypy. This may not be a feasible intervention for individuals with a limited vocal repertoire.

However, previous research has shown that RIRD which requires participants to complete tasks that are not in the same mode as the target stereotypy (e.g., motor tasks for vocal stereotypy) can be effective at decreasing stereotypy (e.g., Casella et al., 2011; Ahrens et al., 2011). Future research should continue to evaluate procedures for identifying tasks to be used during RIRD and the efficacy of using tasks that do not match the topography of stereotypy.

Another limitation of this study was that it targeted only vocal stereotypy and that RIRD consisted of vocal tasks. Although this may limit the generality of our findings, research has shown that unmatched RIRD demands (e.g., Casella et al., 2011) and a combination of matched and unmatched tasks (e.g., Ahrens et al., 2011) is also effective in decreasing stereotypy. Future research should investigate whether matched, unmatched, or a combination leads to greater suppression in stereotypy. In addition, we employed a multielement design during the treatment evaluation thus it is possible that the suppression of stereotypy across all treatments was due to carry over effects. Future research may want to consider using a reversal design. Moreover, we did not measure appropriate behavior nor the frequency of treatment implementation per session, thus future research should consider collecting data on these items as these variables are important in considering the feasibility of implementing these treatments in clinical settings.

In conclusion, this study found that RIRD, RC and RIRD plus RC may all be effective treatments for reducing vocal stereotypy. The addition of RC to RIRD may lead to further and quicker suppression of vocal stereotypy. Our findings also indicate that in evaluating the efficacy of behavioral treatments, it is important to measure whether problem behavior continues to occur during treatment intervals. Additional research on this topic is however necessary to address the limitations of the current study.

References

- Ahearn, W. H., Clark, K. M., MacDonald, R. P., & Chung, B. I. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 40*, 263-275.
- Ahrens, E. N., Lerman, D. C., Kodak, T., Worsdell, A. S., & Keegan, C. (2011). Further evaluation of response interruption and redirection as treatment for stereotypy. *Journal of Applied Behavior Analysis, 44*, 95–108.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed). Arlington, VA: American Psychiatric Publishing.
- Athens, E. S., Vollmer, T. R., Sloman, K. N., & Pipkin, C. S. P. (2008). An analysis of vocal stereotypy and therapist fading. *Journal of Applied Behavior Analysis, 41*, 291-297.
- Bodfish, J. W., Symons, F. J., Parker, D. E., & Lewis, M. H. (2000). Varieties of repetitive behavior in autism: Comparisons to mental retardation. *Journal of Autism and Developmental Disorders, 30*, 237–243.
- Britton, L. N., Carr, J. E., Landaburu, H. J., & Romick, K. S. (2002). The efficacy of noncontingent reinforcement as treatment for automatically reinforced stereotypy. *Behavioral Interventions, 17*, 93–103.
- Cassella, M. D., Sidener, T. M., Sidener, D. W., & Progar, P. R. (2011). Response interruption and redirection for vocal stereotypy in children with autism: A systematic replication. *Journal of Applied Behavior Analysis, 44*, 169-173.
- Cavalari, R. N., DuBard, M., Luiselli, J. K., & Birtwell, K. (2013). Teaching an adolescent with

autism and intellectual disability to tolerate routine medical examination: Effects of a behavioral compliance training package. *Clinical Practice in Pediatric Psychology*, 1, 121.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). Applied behavior analysis.

Conyers, C., Miltenberger, R., Maki, A., Barenz, R., Jurgens, M., Sailer, A., Kopp, B. (2004). A comparison of response cost and differential reinforcement of other behavior to reduce disruptive behavior in a preschool classroom. *Journal of Applied Behavior Analysis*, 37, 411–415.

Doughty, S. S., Anderson, C. M., Doughty, A. H., Williams, D. C., & Saunders, K. J. (2007). Discriminative control of punished stereotyped behavior in humans. *Journal of the Experimental Analysis of Behavior*, 87, 325–336.

Falcomata, T. S., Roane, H. S., Hovanetz, A. N., Kettering, T. L., & Keeney, K. M. (2004). An evaluation of response cost in the treatment of inappropriate vocalizations maintained by automatic reinforcement. *Journal of Applied Behavior Analysis*, 37, 83-87.

Fellner, D. J., Laroche, M., & Sulzer-Azaroff, B. (1984). The effects of adding interruption to differential reinforcement on targeted and novel self-stimulatory behaviors. *Journal of Behavior Therapy and Experimental Psychiatry*, 15, 315–321.

Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with systematic choice assessment to enhance reinforcer identification. *American Journal of Mental Retardation*, 101, 15-25.

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

- Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1982). Toward a functional analysis of self-injury. *Analysis and Intervention in Developmental Disabilities, 2*, 3-20.
- Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27*, 197-209.
- Kelly, M. A., Roscoe, E. M., Hanley, G. P., & Schlichenmeyer, K. (2014). Evaluation of assessment methods for identifying social reinforcers. *Journal Of Applied Behavior Analysis, 47*, 113.
- Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Sigafoos, J., Didden, R., Smaldone, A., & Oliva, D. (2008). Helping a man with multiple disabilities increase object-contact responses and reduce hand stereotypy via a microswitch cluster program. *Journal of Intellectual and Developmental Disability, 33*, 349-353.
- Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Sigafoos, J., Didden, R., Oliva, D., & Cingolani, E. (2008). A girl with multiple disabilities increases object manipulation and reduces hand mouthing through a microswitch-based program. *Clinical Case Studies, 7*, 238-249.
- Lanovaz, M. J., & Sladeczek, I. E. (2011). Vocal stereotypy in children with autism: Structural characteristics, variability, and effects of auditory stimulation. *Research in Autism Spectrum Disorders, 5*, 1159-1168.
- Lanovaz, M. J., & Sladeczek, I. E. (2012). Vocal stereotypy in individuals with autism spectrum disorders A review of behavioral interventions. *Behavior Modification, 36*, 146-164.
- Lanovaz, M. J., Sladeczek, I. E., & Rapp, J. T. (2012). Effects of noncontingent music on vocal

- stereotypy and toy manipulation in children with autism spectrum disorders. *Behavioral Interventions*, 27, 207–223
- Lanovaz, M. J., Rapp, J. T., & Ferguson, S. (2013). Assessment and treatment of vocal stereotypy associated with television: A pilot study. *Journal of Applied Behavior Analysis*, 42, 544–548.
- Lanovaz, M. J., Rapp, J. T., Maciw, I., Prigent-Pelletier, É., Dorion, C., Ferguson, S., & Saade, S. (2014). Effects of multiple interventions for reducing vocal stereotypy: Developing a sequential intervention model. *Research in Autism Spectrum Disorders*, 8, 529-545.
- Liu-Gitz, L., & Banda, D. R. (2010). A replication of the RIRD strategy to decrease vocal stereotypy in a student with autism. *Behavioral Interventions*, 25, 77-87.
- Love, J. J., Miguel, C. F., Fernand, J. K., & LaBrie, J. K. (2012). The effects of matched stimulation and response interruption and redirection on vocal stereotypy. *Journal of Applied Behavior Analysis*, 45, 549-564.
- Martinez, C. K., & Betz, A. M. (2013). Response interruption and redirection: Current research trends and clinical application. *Journal of Applied Behavior Analysis*, 46, 549-554.
- O'Connor, A. S., Prieto, J., Hoffmann, B., DeQuinzio, J. A., & Taylor, B. A. (2011). A stimulus control procedure to decrease motor and vocal stereotypy. *Behavioral Interventions*, 26, 231-242.
- Piazza, C. C., Adelinis, J. D., Hanley, G. P., Goh, H. L., & Delia, M. D. (2000). An evaluation of the effects of matched stimuli on behaviors maintained by automatic reinforcement. *Journal of Applied Behavior Analysis*, 33, 13-27.
- Rapp, J. T., (2005). Some effects of audio and visual stimulation on multiple forms of

- stereotypy. *Behavioral Interventions*, 20, 255–272.
- Rapp, J. T., Patel, M. R., Ghezzi, P. M., O'Flaherty, C. H., & Titterton, C. J. (2009). Establishing stimulus control of vocal stereotypy displayed by young children with autism. *Behavioral Interventions*, 24, 85-105.
- Rapp, J. T., Swanson, G., Sheridan, S. M., Enloe, K. A., Maltese, D., Sennott, L. A., ... Lanovaz, M. J. (2013). Immediate and subsequent effects of matched and unmatched stimuli on targeted vocal stereotypy and untargeted motor stereotypy. *Behavior Modification*, 37, 543-567.
- Rapp, J. T., & Vollmer, T. R. (2005). Stereotypy I: A review of behavioral assessment and treatment. *Research in Developmental Disabilities*, 26, 527–54
- Saylor, S., Sidener, T. M., Reeve, S. A., Fetherston, A., & Progar, P. R. (2012). Effects of three types of noncontingent auditory stimulation on vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis*, 45, 185-190.
- Shawler, L. A., & Miguel, C. F. (2015). The Effects of Motor and Vocal Response Interruption and Redirection on Vocal stereotypy and Appropriate Vocalizations. *Behavioral Interventions*, 30, 112-134.
- Shillingsburg, M. A., Lomas, J. E., & Bradley, D. (2012). Treatment of vocal stereotypy in an analogue and classroom setting. *Behavioral Interventions*, 27, 151-163.
- Stahmer, A. C., & Schreibman, L. (1992). Teaching children with autism appropriate play in unsupervised environments using a self-management treatment package. *Journal of Applied Behavior Analysis*, 25(2), 447-459.
- St Peter, C. C., Byrd, J. D., Pence, S. T., & Foreman, A. P. (2016). Effects of treatment-integrity failures on a response-cost procedure. *Journal of Applied Behavior Analysis*, 49, 308.

- Taylor, B. A., Hoch, H., & Weissman, M. (2005). The analysis and treatment of vocal stereotypy in a child with autism. *Behavioral Interventions, 20*, 239-253.
- Vollmer, T. R. (1994). The concept of automatic reinforcement: Implications for behavioral research in developmental disabilities. *Research in Developmental Disabilities, 15*, 187-207.
- Wunderlich, K. L., & Vollmer, T. R. (2015). Data analysis of response interruption and redirection as a treatment for vocal stereotypy. *Journal of applied behavior analysis, 48*, 749-764.

Appendices

Appendix A: Reinforcer Assessment for Individuals with Severe Disability (RAISED)

Fisher, W.W. Piazza, C.C., Bowman, L.G., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment. *American Journal on Mental Retardation*, 101, 15-25.

Student's Name: _____

Date: _____

Name of Reporter: _____

The purpose of this structured interview is to get as much specific information as possible from the informant (e.g., teacher, parent, or caregiver) as to what they believe would be useful reinforcers for the student. Therefore, this survey asks about various categories of stimuli. After the informant has generated a list of preferred stimuli, ask additional probe questions to get more specific information on the student's preferences and the stimulus conditions under which the object or activity is most preferred (e.g., What specific TV shows are his favorite? What does she do when she plays with a mirror? Does she prefer to do this alone or with another person?).

We would like to get some information on _____'s preferences for different items and activities.

1. Some children really enjoy looking at things such as a mirror, bright lights, shiny objects, spinning objects, TV, etc. What are the things you think _____ most likes to watch?

2. Some children really enjoy different sounds such as listening to music, car sounds, whistles, beep, sirens, clapping, people singing, etc. What are the things you think _____ most likes to listen to?

3. Some children really enjoy different smells such as perfume, flowers, coffee, pine trees, etc. What are the things you think _____ most like to smell?

4. Some children really enjoy certain food or snacks such as ice cream, pizza, juice, graham crackers, McDonald's hamburgers, etc. What are the things you think _____ most likes to eat?

5. Some children really enjoy physical play or movement such as being tickled, wrestling, running, dancing, swinging, being pulled on a scooter board, etc. What activities like this do you think _____ most enjoys?

6. Some children really enjoy touching things of different temperatures, cold things like snow or an ice pack, or warm things like a hand warmer or cup containing hot tea or coffee. What activities like this do you think _____ most enjoys?

7. Some children really enjoy feeling different sensations such as splashing water in a sink, a vibrator against the skin, or the feel of air blown on the face from a fan. What activities like this do you think _____ most enjoys?

8. Some children really enjoy it when others give them attention such as a hug, a pat on the back, clapping, saying "Good Job," etc. What forms of attention do you think _____ most enjoys?

9. Some children really enjoy certain toys or objects such as puzzles, toy cars, balloons, comic books, flashlight, bubbles, etc. What are _____'s favorite toys or objects?

10. What are some other items or activities that _____ really enjoys?

After completion of the survey, select all the stimuli which could be presented or withdrawn contingent on target behaviors during a session or classroom activity (e.g., a toy could be presented or withdrawn, a walk in the park could not). Write down all of the specific information about each selected stimulus on an index card (e.g., "Having an adult female read him the Three Little Pigs story"). Then have the informant select the top 16 stimuli and rank order them using the cards. Then list the ranked stimuli below.

- | | |
|----|-----|
| 1. | 9. |
| 2. | 10. |
| 3. | 11. |
| 4. | 12. |
| 5. | 13. |
| 6. | 14. |
| 7. | 15. |
| 8. | 16. |

Are there any items (from the above list) that you would not want to use?

Are there any items (from the above list) you would not want to limit _____'s access?

Appendix B: Paired Stimulus Preference Assessment

Based off of: Fisher, Piazza, Bowman, Hagopian, Owens, and Slevin (1992)

Session Location: Assessment room or an isolated room at residence or clinic

Materials: Between 6-10 stimuli, each will be assigned a number

Dependent Variable: Item selected

Session Duration: About 30 min.

Criteria to terminate sessions: All pairs of stimuli presented

Procedure for terminating session: Continue the sequence until there are no more items or until there are no items selected from the beginning of the trial.

Safety precautions: Discuss session termination based on risk of problem behavior. Block attempts to get items that were not chosen during a trial.

Additional information: If there is no differentiation between stimuli, continue to conduct assessment until differentiation is observed.

Pre-session sampling: Allow participants to interact with the item or activity for 30 seconds. If the item is a novel object, show the participant how the stimuli work and how to use it.

Participant: _____ Date completed: _____
 Completed by: _____ IOA: _____

- 1. Donald 3. Mickey 5. Darby
- 2. Minni 4. Goofy 6. Car

1. 1 2 NA	2. 2 3 NA	3. 3 4 NA	4. 4 5 NA	5. 5 6 NA
6. 1 3 NA	7. 2 4 NA	8. 3 5 NA	9. 4 6 NA	10. 1 4 NA
11. 2 5 NA	12. 3 6 NA	13. 1 5 NA	14. 2 6 NA	15. 1 6 NA

Item 1: /5= Item 4: /5=
 Item 2: /5= Item 5: /5=
 Item 3: /5= Item 6: /5=

Rank:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Appendix C: RIRD data collection

Demand	Independent/ prompt	Independent/ prompt	Independent/ prompt	Independent/ prompt	Independent/ prompt	% independent
1. Whats your name? C: "Kenny"						
2. Touch your nose						
3. Touch your belly						
4. The sky is _____ C: "blue"						
5. how old are you? C: "9"						
6. Raise your arms						
7. What is your brothers name? C: "Kevie"						
8. Where do you go to school? C: "Anona"						
9. clap your hands						
10. Whats my name? C" "Miss Kiersty"						
11. what is your last name? C: "Wurster"						
12. touch your ear						
13. give me 5						
14. grass is _____ C;"Green"						
15. what color is Thomas? C: "Blue"						

Appendix D: Social Validity

Directions: The parent will view a brief (1-2) video of baseline followed by a brief clip of each treatment (RIRD, RC, and RIRD + RC). Make sure clip shows each of the intervention being implemented at least 2 times. After viewing each clip the parent(s) will answer the following questions.

Treatment A: when your child engages in stimming he is briefly interrupted and asked to repeat a word and/or answer 3 questions in a row

Treatment B: when your child engages in stimming the toy he has access to is removed until he goes 10 seconds without stimming

Treatment C: when your child stims the toy he has access to is removed and he is required to repeat a word and/or answer 3 questions in a row before the toy is removed

Key:

Strongly Disagree 1 Disagree 2 Somewhat 3 Neutral 4 Somewhat Agree 5 Strongly disagree

1. Treatment RIRD reduced my child's vocal stereotypy.
2. I am willing to implement Treatment A with my child.
3. I would recommend RIRD to other children.
4. Treatment B (RC) reduced my child's vocal stereotypy.
5. I am willing to implement Treatment B with my child.
6. I would recommend Treatment C to other children.
7. Treatment C (RIRD & RC) reduced my child's vocal stereotypy.
8. I am willing to implement Treatment C with my child.
9. I would recommend Treatment C to other children.
10. Which of the treatments do you prefer and why? A B C

Appendix G: IRB Letter of Approval



RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

April 26, 2017

This letter supersedes the letter dated November 30, 2016

Kiersty McNamara
ABA-Applied Behavior Analysis
Tampa, FL 33612

RE: **Expedited Approval for Initial Review**

IRB#: Pro00028496

Title: Further Evaluation of Treatments for Vocal Stereotypy: Response Interruption
Redirection, Response Cost, and Discrimination Training

Study Approval Period: 11/30/2016 to 11/30/2017

Dear Ms. McNamara:

On 11/30/2016, the Institutional Review Board (IRB) reviewed and **APPROVED** the above application and all documents contained within, including those outlined below.

Approved Item(s):

Protocol Document(s):

[Protocol](#)

Consent/Assent Document(s)*:

[Assent, Version 1 .pdf](#)

[LAR Permission, Version 1 .pdf](#)

[Parental Permission, Version 1 .pdf](#)

[Verbal Assent Form. Ver 1](#) (not a stamped form)

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent document(s) are only valid during the approval period indicated at the top of the form(s).

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110. The research proposed in this study is categorized under the following expedited review category:

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Study is under Children CFR 45.404 Research not involving more than minimal risk.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval via an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) calendar days.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kristen Salomon', followed by a horizontal line.

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board