Assessing the Validity of the Automatic Reinforcement Screening Assessment

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Assessing the Validity of the Automatic Reinforcement Screening Assessment

by

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Behavior Analysis
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ABSTRACT

Stereotypy is commonly observed in individuals with Autism Spectrum Disorder (ASD). (Bodfish et al., 2000; Koegel & Covert, 1972) and vocal stereotypy has been found to impede skill acquisition and be socially stigmatizing (Gibbs et al., 2018; Liu-Gitz, & Banda, 2010;).

Although vocal stereotypy is often maintained by automatic reinforcement (Ahearn et al., 2007), until recent years it was common practice to conduct a functional analysis consisting of multiple test conditions and at least one control condition (e.g., Iwata et al., 1982/1994) to identify its function. However, research suggests that a screening assessment (Querim et al., 2013) may be an efficient alternative for responses hypothesized to have an automatic function such as stereotypy. The purpose of this study was to replicate Querim et al. (2013) by assessing the correspondence between results of the automatic screening assessment and a typical functional analysis while extending the previous study by solely assessing the function of vocal stereotypy in young children. Three children with ASD participated in this study. Results indicated the automatic screening can be an efficient tool for assessing the function of vocal stereotypy.
CHAPTER ONE:
INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by deficits in communication and social skills and the presence of repetitive or restricted behaviors (American Psychiatric Association, 2013). A commonly observed repetitive behavior in individuals with ASD is stereotypy (Chebli et al., 2016). Stereotypy is usually classified as either motor stereotypy or vocal stereotypy (Wang et al., 2020). Motor stereotypy is defined as non-contextual repetitive movements of the whole or parts of the body (Digennaro Reed et al., 2012). An example of this is hand flapping, flicking fingers in front of the face, or body rocking. A non-example of this is dancing or exercising. Vocal stereotypy is the repetitive emission of words or sounds without a clear communication purpose (Lanovaz & Sladeczek, 2012). Although many infants and toddlers engage in repetitive behavior, in typically developing children these behaviors usually subside at a young age (DiGennaro Reed et al., 2012) whereas in individuals with ASD these behaviors usually increase over time (Bodfish et al., 2000). Stereotypy can be socially stigmatizing and therefore lead to fewer opportunities for social interactions (Cunningham et al., 2008), hinder skill acquisition (Cunningham et al., 2008), and impede acquisition of verbal skills (Koegel & Covert, 1972).

Vocal stereotypy is often maintained by automatic reinforcement (Ahearn et al., 2007; Rapp & Vollmer, 2005). That is, the behavior persists in the absence of social reinforcement (Vollmer, 1994). According to Vollmer (1994), the treatment of automatically maintained behavior poses challenges because it is not possible to control (i.e., withhold) automatic
reinforcement since it is the product of the behavior itself. To identify the functional reinforcer of vocal stereotypy a functional analysis (FA) is usually conducted (Iwata et al., 1984/1992). Identification of the function of problem behavior is imperative for treatment because it allows for the implementation of function-based treatments. For instance, Andorfer and colleagues (1994) conducted a descriptive assessment and a functional analysis to identify the function of five children’s problem behavior at home. Once the function of the problem behavior was identified, the children were taught functionally equivalent alternative behaviors, such as requesting for a parent to play with them, resulting in the target behavior of all participants decreasing. Furthermore, previous research has shown function-based treatments are more effective at decreasing problem behavior relative to non-function-based interventions (Ingram et al., 2005; Newcomer & Lewis, 2004).

A FA of problem behavior often consists of multiple conditions in which the environmental variables are manipulated to determine which variable is responsible for the maintenance of the behavior (Iwata et al., 1982/1994). For instance, the FA procedures employed by Iwata et al. (1982/1994), hereafter referred to as the typical FA, consisted of 15-min alone or no interaction, play, demand, and attention conditions and these conditions were conducted in a multielement format. The alone or no interaction condition is used to determine if the behavior is maintained in the absence of social consequences and this condition consists of the participant being alone in a room or with the experimenter standing far from them. Whether the participant is alone during this condition depends on the environment available and severity of the participant’s behavior. During the alone or no interaction, the participant receives no consequences for engaging in the problem behavior. If the behavior persists in this condition, the behavior is likely maintained by automatic reinforcement. During the play condition, also known
as the control condition the participant has continuous access to preferred tangible items and attention is delivered non-contingently throughout the session. The demand condition is used to test if the behavior is maintained by social negative reinforcement in the form of escape from a demand. It entails continuously placing demands until the participant engages in the target behavior. Once the problem behavior occurs, demands are removed and the experimenter turns away. Lastly, the attention condition is used to test if the behavior is maintained by social positive reinforcement in the form of attention. The participant receives verbal and physical attention contingent on engaging in the problem behavior and this condition determines if problem behavior is maintained by social positive reinforcement in the form of attention. Since the publication of the Iwata et al. (1982/1994) study, modifications have been made to the typical FA. For instance, Querim et al. (2013) also used a multielement design, but conducted sessions in a fixed sequence, alone or no interaction, attention, play, and demand, and sessions lasted only 5-min. In addition, other studies have also assessed whether problem behavior is maintained by social positive reinforcement in the form of access to preferred items (e.g., Hanley et al., 2003). During the tangible condition access to preferred toys, foods, or other tangible items are dependent on the participant engaging in the target behavior.

FAs have been used to identify the function of a range of behaviors, such as perseverative speech (e.g., Kuntz et al., 2020), self-injury (Scheithauer et al., 2015), and food refusal (Bachmeyer, et al., 2019). For example, Kuntz and colleagues (2020) used FA procedures to assess the function of perseverative speech. They found participants’ perseverative speech was maintained by attention and used a function-based treatment for reduction of the behavior. Scheithauer and colleagues (2015) assessed the function of self-injury for one participant who was experiencing vision loss due to her severe self-injury. They conducted three FAs, a typical
FA, an FA where they blocked self-restraint, and an FA where an arm splint was worn to slow down the velocity of SIB. They found her self-injury was maintained by automatic reinforcement. Finally, Bachmeyer and colleagues (2019) assessed the function of food refusal by using a combined reversal and multielement design. They found one child’s food refusal was maintained by attention and escape and other two participants’ food refusal was maintained by escape.

FAs have been used to identify the function of behaviors across different settings, such as a dentist’s office (e.g., McConnell et al., 2020), schools (Hansen et al., 2019), and participant homes (Gerow et al., 2020) and with various populations. For example, McConnell and colleagues (2020) modified the demand condition to include dental demands and conducted the assessment at the dentist’s office. The dental demands included flossing, sitting in the dentist’s chair, fluoride treatment, and a visual check of teeth. They did this to measure whether the participant’s behavior was sensitive to escape from demands placed during a dental exam. Hansen and colleagues (2019) conducted FAs at the participants’ school. They conducted a FA inside the classroom and outside of the classroom for each participant. There was correspondence in the outcomes of the two FAs in only one out of three participants showing the environmental conditions can affect results of assessments. Lastly, Gerow and colleagues (2020) taught parents to conduct a brief FA within the participants’ homes with results suggesting it is possible to both train caregivers to conduct FAs and to complete these in natural environments. Additionally, FAs have been used to identify the function of behaviors across different populations. According to Hanley et al. (2003), 70% of FAs were conducted with children, and 37.2% with adults. From his sample, 20.9% of participants were diagnosed with ASD, 91.3% had a developmental disability, and 9% had no disability.
One limitation to conducting a typical FA is the amount of time it can require. For example, 44 15-min sessions were required to identify the function of problem behavior for one of the participants (i.e., child 1) from Iwata and colleagues (1982/1994). That is, the assessment required approximately 11 hr to complete. To address this limitation previous research has employed various iterations of the FA and made several modifications to the procedure to increase its efficiency. An example of a modification to address efficiency is session duration. Wallace and Iwata (1999) compared outcomes of functional analysis for 46 individuals who engaged in self injury or aggression. FAs consisted of 5-, 10- and 15-min sessions. Specifically, each session was 15-min however they analyzed the data from the first 5, 10, or the entire 15 min of the session. Results indicated that when comparing 10-min and 15-min sessions there was agreement. However, when comparing 5-min and 15-min sessions there were three disagreements (93% agreement). Another modification to address the efficiency of an FA is to conduct a trial-based FA. Trial-based FAs consist of alternating between control and test conditions (Bloom et al., 2011). This can be especially helpful when in a classroom setting due to the ability to conduct sessions when natural opportunities arise. In this study the authors compared the results of the trial-based FA to a typical FA with 10 participants who engaged in aggression, self-injury, “bizarre vocalizations”, or inappropriate touching; both assessments identified the same function for 7 out of 10 participants (Bloom et al., 2011). A brief FA has also been shown to require less time (e.g., 20% less; Tincani et al., 1999) to complete than a typical FA. Tincani et al. (1999) conducted a brief FA consisting of an analog assessment where each condition was presented once, functional communication training, and then a contingency reversal. The function was predicted from the analog assessment which included rapidly alternating a series of sessions in a multielement design with each condition presented once.
Next, a communicative response that resulted in access to the functional reinforcer was taught to the participant. Lastly, during the contingency reversal the target behavior no longer resulted in consequences and the functional reinforcer was delivered only following occurrences of the alternative behavior. Tincani and colleagues (1999) found the brief FA identified the same function as the typical FA for all three participants.

When assessing the function of severe behavior, or behavior that alters the environment, a typical FA can be difficult to implement. This is because it may be unsafe to evoke the behavior repeatedly or it may alter the environment in a way that the conditions must be adjusted within session (e.g., property destruction that makes the environment unsafe). A FA modification for this type of behavior is to use a latency-based FA. Latency-based FAs measure the time from the onset of the session to the occurrence of the first instance of the target behavior (Thomason-Sassi, et al., 2011) with sessions lasting 5-min, if the problem behavior does not occur. Thomason-Sassi and colleagues (2011) compared outcomes of the latency-based FA to the results of the typical FA and attained correspondence for 33 out of 38 of the participants. That is, their results suggest a latency-based FA can be a useful alternative when repeated instances of a behavior are dangerous to the participant or experimenter.

In cases when the hypothesized function of problem behavior is automatic reinforcement, researchers have included fewer conditions in the FA. For instance, after presuming hand mouthing was maintained by automatic reinforcement, Roscoe et al. (2013) omitted the play condition and conducted more alone conditions, at a 2:1 ratio. This suggests omitting conditions can be an efficient tool when behavior is predicted to be automatically reinforced (Roscoe et al., 2013). Similarly, Querim et al. (2013) employed an automatic screening assessment to determine if problem behavior was maintained by automatic or social consequences. This assessment
consisted of brief exposure to a minimum of three 5-min alone or no-interaction sessions. If behavior persisted at high, stable levels, it was presumed the behavior had an automatic function. They compared outcomes of the screening to that of a typical FA for 26 participants who engaged in stereotypy, self injury, aggression, or property destruction. One of the participants engaged in three problem behaviors and two participants engaged in two problem behaviors each. Therefore, their study included 30 datasets. The automatic screening accurately predicted a social function or an automatic function for 28 of the 30 datasets. However, Querim and colleagues (2013) noted the screening resulted in 93% correspondence with outcomes of the FA. This translates to a 7% loss of accuracy, which is of clinical significance (Querim et al., 2013). In addition, although the screening procedure correctly predicted a social function, it did not determine if problem behavior was maintained by social positive or social negative reinforcement. This suggests that the screening procedure must be followed by a subsequent assessment in cases when it predicts a social function.

Results of the study by Querim et al. (2013) indicate it may be possible to forgo conducting a typical FA when it is hypothesized the target behavior has an automatic function. It has also been reported that 63% of children who engage in stereotypy have an automatic function (Hanley et al., 2003). While the topography of stereotypy is unique to the individual, evidence suggests an automatic function is likely. As such, it may be most efficient to begin assessing for an automatic function before proceeding to functional assessment (Wilke et al., 2012).

Therefore, the purpose of this study was to replicate and extend Querim et al. (2013) study by assessing the correspondence between results of the automatic screening assessment and typical FA when assessing the function of vocal stereotypy. The current study extends on the Querim et al. (2013) study by focusing solely on vocal stereotypy and conducting the evaluation
with younger participants whose primary diagnosis is ASD. Querim et al. (2013) evaluated motor stereotypy, vocal stereotypy, self-injury, aggression, and property destruction in participants’ ranging in age from 9 to 47-years-old who had had a variety of diagnoses, including ASD, intellectually disabled, and/or speech language impairment.
CHAPTER 2:

METHOD

Participants, Materials, and Setting

Three children with a diagnosis of ASD who engaged in vocal stereotypy participated in this study. Leo was a 6-year-old white male who communicated vocally using 3-5 word mands. He could follow 1-2 step instructions and imitate fine and gross motor movements. He received Applied Behavior Analysis (ABA) services for 2 years prior to the onset of this study. At the time of his participation he was receiving 30 hr of ABA therapy per week and attended a specialized school. Calvin was a 10-year-old white male who communicated vocally using 1-2 word mands. He could follow 1 step instructions and imitate gross motor movements. He has received ABA services for seven years. At the time of his participation in this study he received 18 hr of ABA a week. Finally, Pete was an 8-year-old white male who communicated vocally using 3-5 word mands. He could follow 1-2 step instructions and imitate fine and gross motor movements. He had received ABA, speech therapy, and occupational therapy for the past 5 years. At the time of the study he received 10 hr of ABA, and 30 min of speech and occupational therapy each a week. Materials for data collection consisted of a pen, scoring sheets, a recording device, a smart phone to use the Countee© application, and a stopwatch. Additional materials included participant specific tangible reinforcers and different colored shirts to distinguish between FA conditions. All sessions were recorded for later scoring. Sessions for Leo and Calvin
were conducted in a room at the clinic where they receive ABA services. Sessions for Pete were conducted in a room of his home.

**Recruitment Procedures**

Participants were recruited through flyers distributed to agencies who gave a letter of support. Flyers were distributed via email and social media. Flyers stated the purpose of the study, inclusion criteria, and contained the primary investigator’s contact information.

Caregivers interested in the study contacted the primary investigator to set up an initial phone meeting. During the phone screening the primary investigator described the inclusion criteria for the study and asked the caregiver if their child fit that criteria. If the caregiver indicated the child did, then an additional meeting was scheduled to review the study procedures in detail and attain parental consent and participant assent, if applicable.

**Response Definitions and Measurement**

During the preference assessments data were collected on a trial-by-trial basis on item selection. Item selection was defined as pointing to, touching, or picking up the item within 5 s of the onset of the trial. Data from the preference assessments were summarized as percentage of opportunity by dividing the number of times an item was selected by the total number of times the item was available and multiplying by 100.

During the automatic screening assessment and typical FA, data were collected on the continuous duration of vocal stereotypy using the Countee© application. Vocal stereotypy consisted of any instance of contextually inappropriate vocalizations, or repeated words and sounds. Leo’s vocal stereotypy consisted of whispering, singing, giggling, and repeating words such as “equals 9”. Calvin’s stereotypy consisted of repeating sounds or words like “dump
truck”, “eeeeehh” and “oh no”. Finally, Pete’s stereotypy consisted of repeated phrases such as “just tip over the bucket with your finger,” or “since Mr. Smee’s not here”. The on-set and off-set for each occurrence of stereotypy was 2 s. Percentage of sessions with vocal stereotypy was calculated by dividing the total duration of vocal stereotypy by the total duration of the session multiplied by 100.

**Interobserver Agreement (IOA) and Procedural Integrity (PI)**

The experimenter trained research assistants (RA) to collect IOA and PI data. Training of the RAs consisted of written instructions detailing the behavior definitions and treatment procedures. Once the RA read the instructions, they had time to ask questions and watch sample videos of the defined behaviors. The data collection procedure was modeled by the experimenter, then the RAs watched a session and practiced taking data. They received feedback and continued scoring sessions until they reached 90% agreement.

IOA was calculated for at least 33% of sessions across participants and assessments. IOA for the preference assessments was calculated using the trial-by-trial method. That is, for each trial of the preference assessment data recorded by each observer were compared, the total number of trials with agreements was calculated, divided by the total number of trials in the session, and then multiplied by 100. The IOA score for the preference assessment for Leo is still being calculated. IOA for Pete’s preference assessment was 100%. Due to lost videos IOA was not calculated for Calvin’s preference assessment.

IOA for vocal stereotypy was calculated using the mean-duration-per-interval method (Cooper et al., 2020). To do this, sessions were divided into 10-s intervals and data were compared for each interval. The smaller duration in each interval was divided by the larger
duration. These proportions were added and divided by the cumulative number of intervals in the session, and multiplied by 100 to obtain a percentage. When the IOA scores fell below 80% the experimenter and RA met, and additional training was provided as needed.

For all three participants IOA was calculated for the automatic screening and typical FA. Calvin’s IOA for the automatic screening was calculated for 43% of the sessions and the mean IOA score was 83% (range, 75% to 91%). Calvin’s IOA was calculated for 33% of the FA and the mean IOA score was 81% (range, 73% to 91%). Leo’s IOA for the automatic screening was calculated for 38% of sessions and the mean IOA score was 77% (range, 74% to 84%). Leo’s IOA was calculated for 27% of the FA and the mean score was 91% (range, 80% to 100%). Pete’s IOA for the automatic screening was calculated for 33% of sessions and the mean IOA score was 100%. Pete’s IOA was calculated for 36% of the FA and the mean IOA score was 90% (range, 83% to 99%).

To assess PI, the experimenter created condition specific task analyses (TA) detailing all the steps the experimenter needed to complete (Appendices A and B). The RA reviewed sessions and recorded data on whether the experimenter implemented the procedures as described in the TA. The PI scores were calculated by dividing the number of steps completed correctly by the total number of steps in the TA and multiplied by 100. When scores fell below 80% the experimenter took part in a booster training until 90% mastery was achieved.

PI was assessed for the preference assessment, automatic screening assessment, and typical FA. PI for the preference assessment is still being calculated for Leo. PI for the preference assessment was 100% for Pete. PI for Calvin was not calculated due to lost videos. For Calvin’s automatic screening PI was conducted for 43% of sessions and the mean PI score was 100%. For
Calvin’s FA, PI was conducted for 33% of sessions and the mean PI was 100%. For Leo, PI is still being assessed for the automatic screening. For Leo’s FA, PI was conducted for 27% of sessions and the mean PI was 100%. For Pete’s automatic screening PI is still being assessed. For Pete’s FA, PI was conducted for 36% of sessions and the mean PI score was 95% (range, 73% to 100%).

**Experimental Design**

This study employed a multielement design during the typical functional analysis.

**Phase One: Pre-Assessments**

Prior to the functional assessment phase, the experimenter interviewed the caregiver and conducted a preference assessment to identify highly preferred tangible items for each participant.

**Caregiver Interview**

Once parental consent and participant assent, if applicable, were obtained, the experimenter interviewed the caregiver. During this interview the participant’s demographic information was obtained. There was also a series of questions regarding the participant’s preference for edible items and tangible items. The caregiver interview is available in Appendix C.

**Preference Assessment**

To identify preferred tangible and edible items for use in skill acquisition, the experimenter conducted a paired-stimulus preference assessment (Fisher et al., 1992). The stimuli for this assessment were chosen based on information from the caregiver interview. Prior to the
assessment the participant was given a chance to interact with each item for 15 s. During the assessment the experimenter presented each stimulus in pairs and each item was paired with the others twice, once on the right side and the other on the left side to assess for potential side bias. The items were placed on the table approximately 15 cm apart and the experimenter stated, “Pick one”. The experimenter then allowed up to 5 s for the participant to make a selection. Once the participant selected an item, the non-selected item was removed, and the participant was allowed to interact with the chosen item for 15 s. If the participant did not make a selection the items were removed and then the same trial was represented. If the participant still did not make a choice, “no selection” was recorded for the trial and then the next trial was presented. If during a trial the participant attempted to grab both items they were blocked, the items were removed and then the same trial was represented. The session continued until all pairings were presented (see Appendix D). Results of the preference assessment were graphed and sorted in a hierarchy from most to least preferred (i.e., stimulus selected most often to stimulus selected on the fewest numbers of trials). The two stimuli selected most often were deemed as highly preferred and the next two stimuli within the hierarchy were deemed as moderately preferred. Based on results of the preferred assessment, for Calvin the ball and nesting dolls were deemed highly preferred, and the view finder and sock were deemed moderately preferred. For Leo the trains and car were deemed highly preferred, and the view finder and doll were deemed moderately preferred. For Pete the “peso” doll and train were deemed highly preferred and the caterpillar, and stuffed dog were deemed moderately preferred.
Phase Two: Functional Assessment

Automatic Screening Assessment

The automatic screening assessment was completed based on the procedures described by Querim et al. (2013) and consisted of a series of 5-min no-interaction sessions that were completed in a room that did not contain any toys/leisure items. However, because Leo engaged in crying and repeated mands for attention during the initial automatic screening assessment sessions, he was allowed to have access to one item (i.e., brain flakes) during the automatic screening assessment. During the no-interaction sessions the experimenter brought the participant to the room and stated a variation of, “Stay here for a while.” The experimenter then moved at least 1.5 m away from the participant. No consequence was provided if the participant engaged in vocal stereotypy. After each session the participant had a brief 30-s to 1-min break. During this break participants received minimal attention, no consequences for engaging in vocal stereotypy, and they had access to low preferred items.

No additional sessions were completed if results of the assessment indicated an automatic function. This was demonstrated as moderate to high rates of vocal stereotypy and an increasing trend or stable level of responding. Additional sessions were completed until a clear pattern of responding was identified (see Appendix A).

Typical FA
To assess the validity of the results of the automatic screening assessment a typical FA was conducted using procedures similar to the ones employed by Iwata et al. (1982/1994). This assessment consisted of four conditions and each condition was associated with a different colored shirt worn by the experimenter to facilitate discrimination of the contingencies in effect
during each condition. The conditions of this assessment were no-interaction, attention, play, and demand. However, sessions were 5-min (Querim et al., 2013) and at least three sessions of each condition were completed. Additionally, sessions were completed in a fixed sequence consisting of no-interaction, attention, play, and demand (see Appendix B). Once three sessions of each condition were completed the experimenter completed a visual analysis of the data to determine if additional sessions were necessary. For instance, for Leo, a pairwise analysis consisting of play and attention was also completed. To ensure safety to the experimenter and participants, criteria to terminate sessions were established and it consisted of terminating the session if the participant engaged in self-injury or aggression. These criteria were not met.

The experimenter wore a blue shirt during the no-interaction condition. The participant was in the room with no toys or leisure items, for the exception of Leo who had access to the same toy as during the automatic screening assessment. A no-interaction condition was completed for Leo, Calvin, and Pete. Procedures were similar to the automatic screening assessment except that during the no-interaction condition the experimenter was as far from the participant as possible and turned away in a manner so that they could still observe the participant. If the participant approached the experimenter, they did not move away. At the beginning of the no interaction condition the experimenter stated “Stay here for a little while I will be sitting right there”.

In the attention condition the experimenter wore a pink shirt. The participant was in a room with access to two moderately preferred leisure items (Querim et al., 2013) as identified in the preference assessment. The experimenter remained close to the participant, but looked away and looked busy with work materials (e.g., reading a magazine or typing on the). The experimenter began the session by stating, “I have work to do”, and turning away from the
participant. If the participant engaged in vocal stereotypy the experimenter turned towards the participant and provided 3-5 s of verbal (e.g., “hey that’s really loud” or “What’s going on?”) and physical attention (e.g., rubbing the participants back and/or gently touching the participants arm). Next, the experimenter turned away and continued to engage with work materials. No consequences were provided for non-target behavior.

In the play condition the experimenter wore a green shirt. The participant was in a room with access to two highly preferred items as identified in the preference assessment. The experimenter remained near the participant and every 30 s, or when appropriate vocalizations were emitted the experimenter provided 3-5 s of verbal (e.g., “I like your shirt”, “great job sitting down”) and physical attention (e.g., rubbing the participants back and gently touching their arm). At the onset of the session the experimenter stated, “You can go play.” No consequences were provided for non-target behavior.

In the demand condition the experimenter wore a black shirt. The experimenter and participant were seated at a table and the experimenter continuously presented academic tasks in a semi-random sequence. These consisted of tasks the participant had not mastered and that did not require vocal responses by the participant. For Calvin, the tasks were receptive identification of common items, matching colors, and following 1-step instructions. For Leo, the tasks were writing, receptive identification of emotions and actions, and identifying which material was the same or different. For Pete the tasks were receptive identification of time, addition facts, and letters. To begin the session, the experimenter stated “time to do work” and then the experimenter presented the first instruction. The experimenter waited 2-3 s for a response before prompting the participant to complete the task. Contingent on non-target behavior (i.e., manding, or moving away from material), an error, or noncompliance, a three-prompt sequence was
implemented (verbal instruction, model prompt, physical prompt) and these were presented with
a 2-3 s inter prompt interval. Contingent on vocal stereotypy all work materials were removed
and the experimenter turned away for 30 s. At the end of the 30 s interval, the experimenter
represented the work materials and the same instruction. Brief praise (e.g., “thank you for
listening”, “nice job”, “that’s matching the colors”) in a neutral voice was provided following
independent or responses emitted following a model prompt.

**Correspondence Check**

One doctoral student and two masters level students enrolled at a public university in an
ABA program, examined graphs of the automatic screening assessment and typical FA
separately and identified the function predicted by the automatic screening assessment (i.e.,
automatic or social) and the function identified by typical FA (see Appendix E). Results of these
two assessments were interpreted in a similar manner as Querim et al. (2013). An automatic
reinforcement function was presumed based on results of the automatic screening when vocal
stereotypy occurred at moderate to high levels and persisted across for three or more sessions of
the automatic screening assessment, whereas a social function was hypothesized when stereotypy
occurred at decreasing levels (i.e., downward trend) ending in zero or a near-zero levels.

During the typical FA an automatic function was identified when vocal stereotypy
occurred at the highest level in the alone or no interaction condition, or at high levels across all
conditions. If vocal stereotypy was high in the attention condition in comparison to the play (i.e.,
control condition) but not in any other conditions, it was determined to be maintained by social
reinforcement in the form of attention. If vocal stereotypy was high in the demand condition in
comparison to the play condition but not in any other conditions, it was determined that vocal
stereotypy was maintained by negative reinforcement in the form of escape from demands.
During comparison checks two types of errors (i.e., miss) could have occurred (Querim et al., 2013). The first error would consist of the automatic screening assessment suggesting an automatic function while the results of the typical FA indicated vocal stereotypy was maintained by social reinforcement; the second error would consist of the automatic screening assessment indicating a social function while the results of the typical FA indicated that vocal stereotypy was maintained by automatic reinforcement. On the other hand, an agreement (i.e., “hit”) consisted of both assessments indicating either an automatic function or a social function (Querim et al., 2013).
CHAPTER THREE:

RESULTS

A paired-stimulus preference assessment (Fisher et al., 1992) was conducted with each participant and each assessment included five leisure items. The purpose of this assessment was to identify highly and moderately preferred items to use in the typical FA. Results for Calvin are in Figure 1. Calvin allocated 88% of responding to the stacking dolls and 75% to the tennis ball, indicating these as highly preferred items. He selected the tube in 63% of opportunities and the view finder for 25%, indicating these as moderately preferred items. Results for Leo are in Figure 1. Leo allocated 75% of responding to the toy car and 63% to the trains, indicating these as highly preferred items. He selected the view finder in 63% of opportunities and the figurine for 50%, indicating these as moderately preferred items. Lastly, Pete’s results are displayed in Figure 1. He allocated 75% responding to a figurine toy and 63% to choosing a toy train. These were deemed highly preferred. He also selected a toy dog in 50% of opportunities and sensory caterpillar toy in 50%, indicating these as moderately preferred items.

Figure 2 shows results of Calvin’s automatic screening and typical FA. For the screening procedure, vocal stereotypy occurred at high level but with variable data (M = 63%, range = 41% - 84%). Vocal stereotypy persisted throughout the assessment suggesting his behavior was maintained by automatic reinforcement. During the typical FA Calvin continued to engage in vocal stereotypy across all conditions at a high level with the alone mean at 75% (range = 67% - 83%), the attention mean at 58% (range = 56% - 61%), the demand mean at 55% (range = 53% -
and the play mean at 61% (range = 42% - 90%). The FA confirmed the screening procedure prediction that vocal stereotypy was maintained by automatic reinforcement.

Figure 3 shows results for Leo’s automatic screening and FA. During the initial two sessions of the automatic screening Leo engaged in high levels of crying and manding for attention. Thus, his automatic screening procedure was modified to include a leisure item. During subsequent sessions vocal stereotypy occurred at moderately high levels with a variable data and persisted across all sessions, suggesting his behavior was maintained by automatic reinforcement (M = 48%, range = 8% - 73%). Leo continued to engage in moderate levels of vocal stereotypy in the alone (M = 35%, range = 16% - 52%) and play (M = 26%, range = 4% - 38%) conditions. In the demand condition Leo’s vocal stereotypy was at a low level and decreased to zero (M = 3.9%, range = 0% - 11%). In the attention condition it increased in level, and was higher than alone and play conditions (M = 31%, range = 1% - 73%). Therefore, a pairwise analysis was conducted to test for an additional attention function. In the play condition levels decreased to near zero (M = 13%, range = 2% - 28%), and the attention condition was variable, but remained elevated in comparison (M = 40%, range = 20% - 64%). Therefore, the automatic screening partially confirmed an automatic function, however vocal stereotypy is also partially maintained by attention.

Figure 4 shows the results for Pete’s automatic screening and FA. The data showed a decreasing trend and low levels of vocal stereotypy suggesting there was a social function (M = 25%, range = 9% - 38%). During his FA there was variability across all conditions. In the demand condition the level remained low (M = 11%, range = 0% - 24%). The attention condition (M = 36%, range = 5% - 60%) was elevated in comparison to the alone (M = 38%, range = 12% - 76%) and play (M = 22%, range = 6% - 71%) conditions. Taken together, it appears the
screening did not fully correspond to the FA as vocal stereotypy is at least partially automatically maintained with an additional attention function.

In summary, the automatic screening procedure at least partially predicted the function of vocal stereotypy in 3 out of 3 participants (see Table 1). Calvin’s screening procedure predicted his vocal stereotypy was maintained by automatic reinforcement and the FA confirmed this function. Leo’s screening procedure predicted his vocal stereotypy was maintained by automatic reinforcement and attention. Pete’s screening procedure indicated his vocal stereotypy was maintained by social reinforcement and his FA confirmed his vocal stereotypy was maintained by automatic reinforcement with an additional attention function.
Results of the Paired-Stimulus Preference Assessment

Figure 1
Figure 2

Results of the Automatic Screening and Typical Functional Analysis
Results of the Automatic Screening and Typical Functional Analysis
Figure 4

Results of the Automatic Screening and Typical Functional Analysis
Table 1

Summary of Results

<table>
<thead>
<tr>
<th>Participant</th>
<th>Screening</th>
<th>FA</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calvin</td>
<td>Automatic</td>
<td>Automatic</td>
<td>Hit</td>
</tr>
<tr>
<td>Leo</td>
<td>Automatic</td>
<td>Automatic and Attention</td>
<td>Partial</td>
</tr>
<tr>
<td>Pete</td>
<td>Social</td>
<td>Automatic and attention</td>
<td>Partial</td>
</tr>
</tbody>
</table>
CHAPTER 4

DISCUSSION

This study compared the outcomes of the automatic screening assessment and the typical FA for three individuals with ASD who engaged in vocal stereotypy. For 3 out of 3 participants the results of the automatic screen were at least partially confirmed by the typical FA, meaning the screening assessment resulted in 60% correspondence with the outcomes of the FA. These results indicate the screening assessment has the potential to be an efficient tool for determining the function of automatically reinforced vocal stereotypy.

The results of the current study are consistent with findings from previous research. For instance, all three participant FAs indicate at least a partial automatic function. This supports the findings from Hanley and colleagues (2003) that vocal stereotypy is often maintained by automatic reinforcement. Three out of the 3 participants’ automatic screening also, at least partially predicted the function of vocal stereotypy. Similarly, Querim and colleagues (2013) correctly predicted 28 out of 30 participants behavior using the automatic screening. Specifically, in regard to vocal stereotypy they correctly predicted 16 out of 16 participants who engaged in automatically reinforced vocal stereotypy. They also correctly predicted one social function and missed an attention function for vocal stereotypy, meaning 17 out of 18 participants with vocal stereotypy had a correct prediction using the automatic screening.

The results of this study have immediate implications for practice. Board Certified Behavior Analysts (BCBA) often do not conduct FAs in practice (Roscoe et al., 2015).
According to the survey completed by Roscoe et al. (2015) 34% of BCBAs reported that they use FAs when determining interventions for problem behavior. Nearly 56% reported they did not conduct FAs due to a lack of trained staff. However, since the automatic screening consists of one condition only this may simplify training for staff and encourage the use of this direct assessment method. Furthermore, 43% of BCBAs also reported time constraints were the reason they did not use FAs in practice (Roscoe et al., 2015). As such, the automatic screening is a viable alternative to typical FAs given the shorter duration for implementation as demonstrated in this study. For Calvin, his screening procedure and FA took 35 min and 75 min respectively. For Leo, his screening procedure and FA took 50 min and 170 min respectively. Lastly, Pete’s screening procedure and FA took 15 min and 140 min respectively. Therefore, the screening was completed in 26% of the time it took to complete the typical FA. Given these factors, BCBAs working with individuals who engage in vocal stereotypy may potentially benefit from using the automatic screening procedure.

There are several limitations with this study. This includes the addition of using a microphone for Calvin and Leo’s screening assessments in the middle of the assessment. This was done because of the volume of their stereotypy as it was difficult to hear for data collection purposes. Future research should test audio prior to beginning the assessment. In addition, adding in a toy for Leo’s screening assessment and no interaction condition was a limitation. This was done due to Leo’s reactivity to being left alone and his prior experience with attention extinction. Future research should examine the effects on the no interaction and alone conditions on participants who have a history of attention extinction.

Another limitation for this study was the time that lapsed between sessions, due to COVID-19 and limited time in the clinic setting as sessions were spread out over the course of
several months. Future research should look into the validity of FAs completed over longer periods of time in comparison to outcomes of FAs conducted in shorter time frames. The need to conduct a pairwise FA for Leo was also a limitation, due to unclear results in his typical FA. Lastly, the limited pool of participants, and the lack of diversity between participants was a limitation. All three participants for the current study were white male children. Future research should assess the validity for varying ethnicities, ages, genders, and diagnoses to ensure the tool is applicable outside the population used in this study.

Finally, future research should evaluate the automatic screening procedure with more participants to determine the accuracy of the screening procedure in predicting an automatic function for individuals with vocal stereotypy. Future research should also assess the ability to teach parents to conduct an automatic screening. Studies have shown success in teaching parents (Germansky et al., 2020) to conduct FAs and automatic screening procedures require less training due to only using one condition.

In summary results of the current study provides additional support the Querim et al. (2013) study. In this study, the screening assessment was a partially accurate tool for predicting the function of automatically reinforced behavior. This tool is also useful when a typical FA cannot be conducted due to time constraints and limited resources.
REFERENCES


34
https://doi.org/10.1002/bin.297

https://doi.org/10.1002/Jaba.747

https://doi.org/10.1016/j.ridd.2004.11.005

https://doi.org/10.1002/Jaba.14


https://doi.org/10.1002/Jaba.230


## Appendix A: Screening Procedure  PI Datasheet

Querim et al. (2013)

Participant:________ Date:________ Therapist:________

Primary or IOA (circle one)

<table>
<thead>
<tr>
<th>Participant Behavior</th>
<th>Therapist Behavior</th>
<th>Opportunities</th>
<th>Correct performance</th>
<th>Incorrect performance</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bring participant to prescribed location and make sure that no materials are present in the area. Say “Stay here, I will be back in a few minutes.” Complete countdown to signal beginning of session (3, 2, 1) then exit the room and close the door.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant remains in room</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in stereotypy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant requests as item</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in other topography of problem behavior does not pose a risk of injury</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant attempts to leave the room</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Block attempt</td>
</tr>
</tbody>
</table>

PI Score: _______ / _______ X 100= __________
### Appendix B: Functional analysis PI data sheet

#### Alone or no interaction condition

<table>
<thead>
<tr>
<th>Participant Behavior</th>
<th>Therapist Behavior</th>
<th>Opportunities</th>
<th>Correct performance</th>
<th>Incorrect performance</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bring participant to prescribed location and make sure that no materials are present in the area. Say “Stay here for a little while, I will be back soon” or “stay here for a little while, I will be sitting right here”. Start the timer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant remains in room</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in stereotypy</td>
<td>No consequences (record data)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant requests an item</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in other topography of problem behavior does not pose a risk of injury</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant attempts to leave the room</td>
<td>Block attempt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Attention condition**

<table>
<thead>
<tr>
<th>Participant Behavior</th>
<th>Therapist Behavior</th>
<th>Opportunities</th>
<th>Correct performance</th>
<th>Incorrect performance</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bring participant to prescribed location and make sure two moderately preferred items are in the area. Say “Say I have work to do” and turn away while remaining close and engaging with work materials.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant remains in room</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in stereotypy</td>
<td>Turn towards the participant and deliver 3-5 seconds of verbal and physical attention. For example “Hey, that’s really loud”, “What’s going on?”, “you’re making a lot of noise”, rubbing the participants back, or gently touching the participants arm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant requests as item</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in other topography of problem behavior does not pose a risk of injury</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant attempts to leave the room</td>
<td>Block attempt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Play condition

<table>
<thead>
<tr>
<th>Participant Behavior</th>
<th>Therapist Behavior</th>
<th>Opportunities</th>
<th>Correct performance</th>
<th>Incorrect performance</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant remains in room</td>
<td>Bring participant to prescribed location and make sure two highly preferred items are available. Remain close to the participant and provide verbal and physical attention every 30 seconds. For example “great job sitting down”, “I like your shirt” and “that’s so cool!”.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in stereotypy</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate vocalizations</td>
<td>Provide verbal and physical attention for 30 seconds. For example “great job sitting down”, “I like your shirt” and “that’s so cool”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in other topography of problem behavior does not pose a risk of injury</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant attempts to leave the room</td>
<td>Block attempt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Demand condition**

<table>
<thead>
<tr>
<th>Participant Behavior</th>
<th>Therapist Behavior</th>
<th>Opportunities</th>
<th>Correct performance</th>
<th>Incorrect performance</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bring participant to prescribed location and sit at a table with work material ready.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant remains in room</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in stereotypy</td>
<td>Remove work materials and turns way for 30 seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate vocalizations</td>
<td>No consequences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant engages in other topography of problem behavior does not pose a risk of injury during demands</td>
<td>Start three-prompt sequence (verbal instruction, model prompt, physical prompt) with a 2-3 seconds inter prompt trial.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant attempts to leave the room</td>
<td>Block attempt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C: Caregiver Interview

1. What is your child’s name?
2. When is your child’s birthday?
3. Does your child have any diagnosed disabilities? If so, which one (s)? And when was your child diagnosed?
4. What is the ethnicity of your child?
5. What is the primary language spoken at home?
6. How does your child communicate?
7. How many items can your child request for?
8. Does your child receive any services such as applied behavior analysis, occupational therapy or speech? How many hours a week? How long have they been receiving services?
9. Does your child play with blocks?
10. Does your child listen to music or have favorite songs? What are they?
11. Has your child used headphones? If so, what kind?
12. Can your child repeat words or sounds you make?
13. Can your child follow one or two step directions?
14. What toys does your child play with? Are there any your child appears to prefer?
15. Does your child have any favorite foods? Do they have any food restrictions or known allergies?
16. Does your child engage in repetitive vocal behavior? What does it sound like?

17. Does your child engage in more repetitive vocal behavior in certain places or during certain activities?

18. How often does the repetitive vocal behavior occur (hourly, daily, weekly, monthly)?

19. Does your child engage in any other disruptive behaviors (i.e., self-injury, aggression, property destruction)?

20. Is there anything else you would like to share with us about your child?
Appendix D: Toy Preference Assessment Data sheet and PI

Participant/Session: Thera USER: Observer: 

<table>
<thead>
<tr>
<th>Stimulus 1</th>
<th>Stimulus 2</th>
<th>Stimulus 3</th>
<th>Stimulus 4</th>
<th>Stimulus 5</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Therapist has data sheet</th>
<th>Therapist has writing utensil</th>
<th>Therapist has Items</th>
<th>Therapist has timer</th>
<th>Therapist is seated across from table from the participant</th>
<th>Therapist conducts exposure trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial</th>
<th>Placement</th>
<th>Participant attending</th>
<th>Correct Placement</th>
<th>Remove non selected item</th>
<th>Allow consumption</th>
<th>Represent trial if no selection in 5 s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 2</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
<tr>
<td>2</td>
<td>5 4</td>
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<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
<tr>
<td>3</td>
<td>3 1</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
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</tr>
<tr>
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<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
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<td>Y N</td>
</tr>
<tr>
<td>5</td>
<td>4 5</td>
<td>Y N</td>
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</tr>
<tr>
<td>6</td>
<td>3 2</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
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<tr>
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<td>1 5</td>
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<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
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<tr>
<td>8</td>
<td>3 4</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
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<tr>
<td>9</td>
<td>5 1</td>
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<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
<tr>
<td>10</td>
<td>1 4</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
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<tr>
<td>11</td>
<td>2 3</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
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<td>Y N</td>
</tr>
<tr>
<td>12</td>
<td>3 5</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
<tr>
<td>13</td>
<td>4 2</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
<tr>
<td>14</td>
<td>5 2</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
<tr>
<td>15</td>
<td>4 3</td>
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<tr>
<td>16</td>
<td>2 5</td>
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<td>Y N</td>
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<tr>
<td>17</td>
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<tr>
<td>19</td>
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<td>Y N</td>
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<td>Y N</td>
</tr>
<tr>
<td>20</td>
<td>2 1</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
<td>Y N</td>
</tr>
</tbody>
</table>

PI: ___/100 * 100 = ___%  IOA: ___/20 * 100 = ___%
Appendix E: Correspondence check data sheet

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Student (Masters or PhD)</td>
<td></td>
</tr>
<tr>
<td>Year in current program</td>
<td></td>
</tr>
<tr>
<td>Experience with Functional Analysis</td>
<td></td>
</tr>
</tbody>
</table>

Screening procedure:

- An **automatic reinforcement** function was identified if vocal stereotypy occurred at moderate to high levels and persisted across for three or more sessions of the autoscreen.
- A social function was identified if vocal stereotypy occurred at decreasing levels (i.e., downward trend) ending in zero or a near-zero levels.

Functional analysis:

- An **automatic reinforcement** function was identified when vocal stereotypy occurred at the highest level in the alone or no interaction condition, or at high levels across all conditions.
- A **social function** was identified if vocal stereotypy was high in the attention condition in comparison to the play (i.e., control condition) but not in any other conditions.
- A **negative reinforcement function** was identified if vocal stereotypy was high in the demand condition in comparison to the play condition but not in any other conditions.
Screening procedure graphs

1. Circle one: Automatic / Social

2. Circle one: Automatic / Social
Circle one: Automatic / Social
Functional analysis graphs

1.

Circle one: Automatic / Social positive / social negative / undifferentiated
Multiple (specify): _____________
Circle one: Automatic / Social positive / social negative / undifferentiated

Multiple (specify): ________________
3.

Circle one: Automatic / Social positive / social negative / undifferentiated

Multiple (specify): ______________