



**TOPIC : INTERVENTIONS FOR STEREOTYPY FOR INDIVIDUALS WITH AUTISM**

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1. Interventions for Vocal Stereotypy.....	2
2. Interventions for Motor Stereotypy.....	4
3. Interventions for Mouthing.....	6
4. Interventions of Other Forms of Stereotypy.....	8



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## Interventions for Vocal Stereotypy

Vocal stereotypy can be defined in different ways for every individual who engages in the behavior. All forms of stereotypy, however, are contextually inappropriate, repetitive vocalizations that do not serve a social function. The following studies demonstrate the application of a variety of interventions used to treat vocal stereotypy of individuals with autism spectrum disorder.

### A. Assessing and Treating Vocal Stereotypy in Children with Autism

Ahearn, Clark, MacDonald, and Chung (2007) assessed vocal stereotypy to determine its function for four children with autism. Additionally, they focused on a treatment method using a response interruption and redirection (RIRD) technique to decrease non-communicative vocalizations.

#### Methods

**Independent variable:** A functional analysis was completed for each participant to identify the function of vocal stereotypy. Response interruption and redirection (RIRD) was then implemented. During this time, redirection using mastered vocal commands was used when participants engaged in the target behaviors. Commands were given until participants responded three times consecutively with the absence of vocal stereotypy.

**Dependent variable:** Non-communicative vocalizations and vocal stereotypy were measured.

**Type of research design:** An ABAB withdrawal design was used in this study with the addition of post-intervention probes for maintenance for three of the four participants.

**Type of participants in study:** Two boys and two girls were included in the study, all diagnosed with autism spectrum disorder (ASD).

#### Results/Outcomes

The functional analysis identified that vocal stereotypy was likely not maintained by social consequences. The authors found that vocal stereotypy decreased following RIRD compared to baseline levels. For three of the four participants, appropriate vocalizations increased following intervention. In addition, at follow-up, it was found that the participants maintained lower levels of vocal stereotypy.

#### Limitations/Future Research

The authors mentioned several limitations to the study. For one participant, the return to baseline was brief, not providing enough time to recover the initial baseline level. An additional

limitation includes the resources necessary to implement the intervention. With the intensity of the intervention, session length was, at times, increased. Also, the study did not provide much information regarding maintenance within the natural environment. In addition, different data collection procedures were used in assessment and treatment. Ahearn et al. (2007) suggested that future research should examine the social validity of RIRD. Also, future research should utilize the same data collection procedures throughout the study.

### B. Abatement of Intractable Vocal Stereotypy Using an Overcorrection Procedure

Four interventions were implemented, separately and in combination, to attempt to reduce the stereotypic vocalizations of a 7-year-old boy with autism.

#### Methods

**Independent variable:** Each of the four interventions was implemented for a minimum of at least one full day over a span of six and a half weeks. One intervention was a matched stimulation (using rock music, kids' music or the child's own vocal stereotypy through earphones). Another intervention was response cost. A third intervention was differential reinforcement of other behavior (DRO). Next, overcorrection was implemented (making a "shh" sign by placing his index finger to his lips). Also, DRA (Differential Reinforcement of Alternative Behavior) using legos was used, as well as overcorrection and DRA.

**Dependent variable:** Stereotypic vocalizations were measured.

**Type of research design:** An ABA reversal design was implemented.

**Type of participants in study:** One 7-year old boy with autism participated in the study.

#### Results/Outcomes

In the matched stimulation interventions, kids' music, recordings of the child's own voice and rock music all had abative effects on stereotypic vocalizations. However, as soon as the recording was stopped, the vocal stereotypy returned to baseline levels. This treatment was deemed impractical because the constant use of earphones would hinder educational opportunities. DRA alone also produced an initial reduction of stereotypy, but the reduced stereotypy was not maintained once the intervention was reversed. Neither response cost nor DRO alone adequately reduced the stereotypy. The use of overcorrection alone produced zero or near-zero levels of stereotypy during intervention and was more stable than the other interventions. However, high lev-



els of vocal stereotypy returned as soon as overcorrection alone stopped. The most successful intervention was the combination of overcorrection and DRA using a lego design task.

### **Limitations/Future Research**

Anderson and Duy (2011) mentioned several limitations to the study. No parametric analysis of the overcorrection duration was conducted to determine whether or not an overcorrection procedure that lasted longer than approximately 45 seconds might be more effective in reducing vocal stereotypy. Results related to the response cost and DRO procedures were inconsistent and may have related more to the preference of the reinforcers being removed in the response cost procedures or the history with the activities presented in the DRO than the intervention being tested. In addition, no baseline data were collected prior to the DRA with overcorrection intervention from which the intervention could be compared. This study was conducted with only one participant, so more research would need to be conducted across more participants of various ages.

### **C. The Analysis of Treatment of Vocal Stereotypy in a Child with Autism**

In order to identify stimuli to compete with vocal stereotypy, Taylor, Hoch and Weissman (2005) conducted an analysis to examine preferred items that competed with vocal stereotypy. Following this, two different reinforcement procedures, utilization of a fixed-time interval and differential reinforcement of other behavior (DRO), were compared to determine which had the greatest effect in decreasing vocal stereotypy.

### **Methods**

Independent variable: Prior to the intervention, a functional analysis was implemented to determine the maintaining function of vocal stereotypy. Then, an antecedent analysis compared the amount of vocal stereotypy that occurred when playing with and without toys that produced auditory stimulation. The last assessment conducted before the intervention was a concurrent operant assessment. Next, the intervention focused on the comparison of two reinforcement procedures, a fixed-time interval of reinforcement and DRO. During the fixed-time interval of reinforcement, the participant was given access to an auditory toy every minute for 30 seconds. During the DRO intervention, a card was presented with the word ‘quiet.’ If the participant remained quiet during the length of time required, one minute, she received an auditory toy. If she did not remain quiet during that time, the timer was reset. The DRO increased in one minute intervals with the addition of a token board during the length of the intervention.

Dependent variable: Vocal stereotypy was measured.

Type of research design: An ABCBC reversal design was used.

Type of participants in study: The study included one participant, a 4-year old girl with autism.

### **Results/Outcomes**

The functional analysis revealed that vocal stereotypy was maintained automatically. It was found that the participant mostly chose toys that produced auditory stimulation and that these toys successfully competed with her vocal stereotypy. The fixed-time interval did not have an effect on the dependent variable; the DRO, however, decreased vocal stereotypy when auditory toys were used as reinforcers.

### **Limitations/Future Research**

Taylor, Hoch and Weissman (2005) presented several limitations to the findings. Appropriate vocalizations were not targeted or measured. Also, some preferred toys moved around and produced audio. This made it difficult to determine why certain toys were preferred more than others. The authors suggested that future studies should measure appropriate vocalizations to ensure they do not decrease during intervention.

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## Interventions for Motor Stereotypy

Similar to vocal stereotypy, motor stereotypy is repetitive and does not serve a social function. Most often, it is maintained by automatic reinforcement. The following studies evaluate interventions implemented to decrease motor stereotypy.

### A. Further Evaluation of Response Interruption and Redirection as Treatment for Stereotypy

Ahrens, Lerman, Kodak, Worsdell, and Keegan (2011) compared the effects of motor response interruption and redirection (RIRD) to vocal RIRD on vocal stereotypy for the first experiment. In the second experiment, motor and vocal RIRD were compared in their treatment of vocal and motor stereotypy.

#### Methods

**Independent variable:** During the first experiment, two types of RIRD were used: motor RIRD and vocal RIRD. During vocal RIRD, the experimenter stated the participant's name contingent on vocal stereotypy. After stating their name, instructions were given that required a vocal response. During the motor RIRD, the experimenter gave instructions that required a motor response. All instruction had been previously mastered by the participant. During both RIRD conditions, the instructor required a criterion of three consecutive trials without engaging in stereotypy. Once criterion was met, RIRD ceased. If participants made appropriate vocalizations during RIRD, experimenters responded and reinforced. The second experiment utilized both types of RIRD as well: motor and vocal RIRD. Most of the procedures used were similar to those used in the first experiment, though the instructions were contingent on both vocal and motor stereotypy.

**Dependent variable:** In the first experiment, vocal stereotypy and appropriate vocalizations were measured. In the second experiment, vocal and motor stereotypy were measured, as well as appropriate vocalizations.

**Type of research design:** In both experiments a combined reversal and multi-element design were used.

**Type of participants in study:** Two boys, ages 4-6 participated in each study. A total of four boys participated in the study.

#### Results/Outcomes

In the first experiment, Ahrens et al. (2011) found that vocal and motor RIRD were comparable in the reduction of vocal stereotypy. Also, both resulted in an increase in appropriate vocalizations. In the second experiment, it was found that both vocal and motor RIRD resulted in decreases in stereotypy, however motor RIRD produced a slightly greater decrease. Motor RIRD resulted in a greater decrease when measuring appropriate vocalizations as well. To summarize, the authors found that RIRD

was effective in decreasing stereotypy. The study showed that it did not matter what topography was targeted or what type of RIRD sequences were implemented.

#### Limitations/Future Research

Ahrens et al. (2011) noted limitations to the findings. The authors suggested appropriate vocalization outcomes were unclear for two participants. For one participant, appropriate vocalizations remained low. Also, individuals lacking a vocal repertoire may not increase appropriate vocalizations. The authors pointed to possible interaction effects and touched on the potential difficulty of implementing the intervention within an applied setting.

Future research should examine the effectiveness of RIRD within an applied, natural setting.

### B. A Stimulus Control Procedure to Decrease Motor and Vocal Stereotypy

O'Connor, Prieto, Hoffmann, DeQuinzio, and Taylor (2011) aimed to examine the function of conditioned stimuli on motor and vocal stereotypy in a child with autism.

#### Methods

**Independent variable:** The independent variable consisted of two stimuli, a green card and a red card. Both cards' functions were taught using discrimination training. The green card signaled that stereotypy would not be interrupted. During this condition, the participant was given free access to engage in stereotypy. The red card signaled that stereotypy would be blocked and redirected if it occurred. Generalization was also measured across two settings.

**Dependent variable:** During discrimination training, the percentage of 10 second intervals engaging in stereotypy was measured. During baseline and intervention phases, the latency of time passed not engaging in stereotypy was measured.

**Type of research design:** During the intervention phase, a changing criterion research design was implemented.

**Type of participants in study:** One male, 11-years old, diagnosed with autism, participated in the study.

#### Results/Outcomes

O'Connor et al. (2011) found that discrimination training effectively reduced stereotypy. Also, access to stereotypy functioned as a reinforcer, as it was used following the red card. In addition, the participant generalized responding to two different environments, the participant's classroom and the library.



### Limitations/Future Research

The authors stated several limitations to their findings. O'Connor et al. (2011) mentioned that termination of the session when the participant did not reach criterion may have functioned as a negative punisher, subsequently resulting in a decrease in stereotypy during the red card condition. Also, appropriate behaviors were not directly measured during discrimination training, only the occurrence and nonoccurrence of stereotypy.

The authors stated several ideas for future research. First, future research should examine whether participants could discriminate in environments less similar than those in which training was performed. Also, a procedure that does not involve contingent termination of sessions should be examined. In addition, to promote discrimination, the authors mentioned that training in alternate environments should be examined. O'Connor et al. (2011) also mentioned that appropriate behavior during the red card condition should be measured to analyze increases as a result of the conditioned stimuli.

### C. Practice of an Alternative Behavior as Intervention for Object Stereotypy: Comparison of Contingent and Noncontingent Implementation Across Evoking Stimuli

Luiselli, Ricciardi, Zubow, and Laster (2004) compared contingent and non-contingent practice of appropriate play to determine the impact both had on object stereotypy and appropriate play.

#### Methods

Independent variable: Two different procedures were compared. One procedure consisted of contingent practice of an alternative behavior, appropriate play. The alternative, appropriate behavior was prompted contingent on object stereotypy. The other procedure consisted of non-contingent practice. During this procedure, the child was instructed to engage in appropriate play during evenly spaced intervals of time.

Dependent variable: Object stereotypy and appropriate play with blocks and figures were measured.

Type of research design: An ABAB yoked control design was implemented.

Type of participants in study: One boy, 5-years old, diagnosed with autism, participated in the study.

#### Results/Outcomes

Luiselli et al. (2004) showed that each procedure had different

effects on the dependent variables. Results showed a decrease in stereotypy following appropriate play with blocks contingent on stereotypy. Also, appropriate play increased with contingent practice. There was no increase in appropriate play with non-contingent practice. Using the figures, both contingent and non-contingent practice resulted in a decrease in stereotypy; however during the return to baseline, the levels remained low. Non-contingent practice with the figures did not result in an increase in appropriate play. The authors concluded the findings showed contingent practice reduced stereotypy with blocks.

### Limitations/Future Research

Luiselli et al. (2004) noted the participant's preferences were not assessed, nor were additional items identified that may result in less frequent stereotypy. In addition, it was difficult to measure changes in appropriate toy play in both procedures. Also, a functional analysis was not conducted to determine the maintaining function of stereotypy. Future research should continue to evaluate the effects of non-contingent reinforcement for stereotypy and other problem behaviors. Also, functional analyses should be conducted to ensure treatment approaches are targeting appropriate maintaining functions.

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## Interventions for Mouthing

The stereotypic behavior of mouthing can also be defined as repetitive and lacking a social function. Also, mouthing has a potential to negatively impact one's health. Frequently mouthing objects or one's self can impact dental health and can cause choking or infectious disease. The following studies demonstrate various interventions targeting the behavior of mouthing.

### A. Immediate and Subsequent Effects of Differential Reinforcement of Other Behavior and Noncontingent Matched Simulation on Stereotypy

Lanovaz and Argumedes (2010) compared the effects of differential reinforcement of other behavior (DRO) and noncontingent matched stimulation (NMS) on stereotypy using similar conditions of stimulus delivery.

#### Methods

Independent variable: First, the authors conducted a functional analysis to determine the function of the participant's mouthing behavior. Next, a paired-choice stimulus preference assessment was conducted to determine reinforcers to deliver during the intervention phase. DRO and NMS were then implemented in a pairwise fashion and compared.

Dependent variable: The dependent variable was the percentage of time the participant engaged in the targeted stereotypy, mouthing.

Type of research design: The experimenters used a three-component multiple-schedule design combined with brief reversals. The DRO intervention was alternated with baseline. Then the NMS intervention was alternated with baseline.

Type of participants in study: One 3-year old girl, diagnosed with autism, participated in the study.

#### Results/Outcomes

Following the functional analysis, the authors found that mouthing was automatically reinforced. Lanovaz and Argumedes (2010) found that DRO and NMS interventions were effective at decreasing stereotypy, with the NMS producing larger reductions in behavior.

#### Limitations/Future Research

One limitation stated by Lanovaz and Argumedes (2010) was that order effects of the DRO and NMS sequences may have had an effect on outcomes. NMS may have had a larger effect because it followed the DRO intervention.

Future research should examine a possible assessment to de-

termine the most effective interventions to reduce stereotypies. In addition, research should examine the components of the interventions that influenced behavior change. It was also suggested that future research should examine if other behavior is increased following a reduction in stereotypy.

### B. The Effects of Noncontingent Access to Food on the Rate of Object Mouthing Across Three Settings

Roane, Kelly, and Fisher (2003) aimed to decrease the mouthing behavior of a young boy diagnosed with autism, cerebral palsy and moderate mental retardation. They examined treatment using continuous access to foods that were shown to compete with mouthing.

#### Methods

Independent variable: Prior to the implementation of the intervention, a functional analysis was performed. Once the function was determined, the treatment condition entailed continuous access to food that competed with mouthing. During the intervention, the participant wore a fanny pack to provide continuous access to edibles.

Dependent variable: The behavior of mouthing was measured.

Type of research design: A multiple baseline design across settings was implemented.

Type of participants in study: One boy, 8-years old, participated in the study. The participant had a diagnosis of autism, cerebral palsy, and moderate mental retardation.

#### Results/Outcomes

The functional analysis revealed that mouthing was maintained by automatic reinforcement. Roane, Kelly, and Fisher (2003) found that mouthing decreased across each setting once the participant was provided non-contingent access to edibles.

#### Limitations/Future Research

Roane, Kelly, and Fisher (2003) mentioned several limitations to the study. One limitation was that there was only one participant and the nature of the observation was brief. Another limitation was that continuous access to food has the potential of resulting in satiation. The authors mentioned that future research could examine alternative replacement behaviors such as leisure activities.



### C. Establishing Stimulus Control of Vocal Stereotypy Displayed by Young Children with Autism

Tarbox, Tarbox, Ghezzi, Wallace, and Yoo (2007) examined whether blocking a stereotypic behavior, such as object mouthing, decreased the object mouthing behavior of two boys diagnosed with autism.

#### Methods

Independent variable: First, Tarbox et al. (2007) conducted a preference assessment to determine potential reinforcers. Following this, baseline was conducted to evaluate maintenance of a mastered response with the absence of a reinforcer following the response. Next, the authors implemented a no-blocking condition, where participants were given access to preferred items for a limited amount of time. After, a return to baseline was implemented. A blocking condition was then implemented. During this condition, all procedures were the same as the no-blocking condition, with the addition of blocking object mouthing.

Dependent variable: Object mouthing and toy contact were measured.

Type of research design: An ABACACAB reversal design was used.

Type of participants in study: Two boys, ages 4 and 5, participated in the study. Both had a diagnosis of autism.

#### Results/Outcomes

Tarbox et al. (2007) found that the preferred item was effective as a reinforcer even when object mouthing was blocked. Also, they found that stereotypy decreased for both participants.

#### Limitations/Future Research

The authors discussed several limitations to the study. First, the authors did not measure other behaviors to determine whether appropriate interaction with the leisure item occurred. Another limitation included not extending the blocking phase to determine if an increased amount of blocking resulted in a reinforcer losing its effectiveness.

Future research should examine longer phases of blocking to assess the impact they have on reinforcer effectiveness.

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## Interventions of Other Forms of Stereotypy

Individuals with autism spectrum disorder may engage in stereotypy. A stereotype is often expressed in behaviors that are repetitive in nature, such as hand flapping, body rocking, and the fixation of objects. The following studies show interventions for several different stereotypic behaviors including door-play, scratching and a variety of others.

### A. Assessment and Treatment of Elopement Maintained by Access to Stereotypy

Falcomata, Roane, Feeney and Stephenson (2010) aimed to examine the impact of functional communication training (FCT) on elopement maintained by stereotypy, door-play.

#### Methods

**Independent variable:** During the elopement/door-play evaluation, the participant was blocked from engaging in door play. During the FCT treatment evaluation, the participant was taught to provide a communicative response via a communication card. When communicating with the card, the participant was allowed brief access to door play. Door-play was blocked when the participant eloped and did not request for it appropriately. A delay fading procedure was utilized to decrease access to door-play.

**Dependent variable:** The number of times the participant eloped was tracked, as well as the amount of self-stimulatory behavior (door-play) and attempts. The amount of communication attempts was tracked as well.

**Type of research design:** An ABAB reversal design was used within a multiple baseline design across settings design.

**Type of participants in study:** One young male, 5-years-old, participated in the study.

#### Results/Outcomes

When the participant was allowed free access to door-play, he engaged in the self-stimulatory behavior more often than during the blocking condition, which showed a decrease in door-play attempts. It was also found that when he eloped, the participant often engaged in door-play behaviors soon after. The authors found that using FCT resulted in a decrease in elopement and door-play.

#### Limitations/Future Research

Falcomata et al. (2010) stated that the target behavior, door-play, was not directly addressed. The authors also stated that assessing door-play alone would have made apparent the relation between elopement and door-play.

The authors mentioned future research should examine procedural integrity. With this, the effectiveness of the intervention should be evaluated as well.

### B. Teaching Children with Autism to Prefer Books or Toys Over Stereotypy or Passivity

Nuzzolo-Gomez et al. (2002) examined the use of reinforcement conditioning procedures to teach toy play conditioning skills to children diagnosed with autism.

#### Methods

**Independent variable:** In the first experiment, a procedure used to teach toy play conditioning was implemented. Following baseline, where the experimenters observed free-play with books, the toy conditioning procedure was used. When the participant engaged in the target behavior, vocal praise and edible reinforcement were delivered. If he did not engage in the target behavior, a physical prompt and vocal correction were delivered. The second experiment utilized a toy play conditioning procedure as well. Also, a set of scripted procedures was utilized. In addition, vocal praise and edible reinforcement were used when participants engaged in target behavior. A physical prompt was provided when the participants did not play with the toys. Both experiments utilized concurrent free-play sessions with the same procedures applied in baseline.

**Dependent variable:** The first experiment measured two behaviors: looking at books and passivity. The second experiment measured two behaviors: toy play and stereotypy. Stereotypy was defined as hand flapping or clapping, flicking fingers, noise making, mouthing, and rocking.

**Type of research design:** The first experiment used an ABCA design, with the addition of two follow-up probes. The second experiment utilized a multiple baseline across participants design.

**Type of participants in study:** The first experiment consisted of one 3-year old boy diagnosed with autism. The second experiment consisted of three students, two boys and one girl, diagnosed with autism spectrum disorder.

#### Results/Outcomes

In the first experiment, it was found that conditioning resulted in an immediate increase in looking at books and a significant decrease in passivity. The probes conducted at follow-up showed maintenance of skills. For the second experiment, all participants increased toy play behavior and decreased stereotypy following the conditioning procedure.



### **Limitations/Future Research**

Nuzzolo-Gomez et al. (2002) expressed that future research be conducted on reinforcement conditioning procedures.

### **C. Superimposition and Withholding of Edible consequences as Treatment for Automatically Reinforced Stereotypy**

Sidener, Carr, and Firth (2005) examined the impact of the delivery of edible items, withholding edibles, and environmental enrichment on the stereotypy behavior of two children with autism.

### **Methods**

**Independent variable:** To begin, the experimenters conducted a functional analysis to determine the function of the stereotypy. The conditions within the functional analysis consisted of attention, demand, no-interaction, and control. Baseline consisted of no programmed consequences for the target behavior of scratching. Following baseline, edible items were delivered contingent on stereotypy. The next condition withheld edible items. The third intervention implemented environmental enrichment that consisted of allowing the participants free access to three items that are functionally related to the target behavior.

**Dependent variable:** Both participants engaged in scratching, a stereotypic behavior defined as movement from the fingertips or fingernails across a surface. Toy engagement was also tracked during the environmental enrichment intervention that was defined as touching a toy without scratching it.

**Type of research design:** A non-concurrent multiple baseline design across participants was used.

**Type of participants in study:** Two 6-year old girls, diagnosed with autism, participated in the study.

### **Results/Outcomes**

Upon functional analysis, Sidener, Carr, and Firth (2005) found that one of the participant's scratching behavior was maintained independent of social consequences. The second participant engaged in high responding during the no-interaction condition, thus resulting in both participants' behaviors appearing to be maintained by nonsocial functions. The authors found that scratching behavior decreased during the environmental enrichment condition.

### **Limitations/Future Research**

The authors expressed that it is difficult to determine whether the edibles maintained behavior during the superimposed-edible-

items condition, as there was no increase in scratching. Future research should examine implementing a longer superimposition procedure to determine the effects that a reinforcer may have on a target behavior.

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