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MOCK EXAMS

Interventions and Techniques for Use with Stereotypic Behaviors

Introduction

Stereotypic behaviors are a core descriptor and predominant symptom of autism spectrum disorder (ASD), interfering with skill acquisition and social conversations. Individuals exhibiting stereotypic behaviors may only pay attention to specific components of an object, such as wheels on a car, or become fixated and inflexible to certain routines or rituals that are part of their daily schedule. As these behaviors are both challenging for a clinician to treat and for an individual to experience in their day-to-day activities (i.e., fixated and inflexible to routines), an effective intervention that will decrease these behaviors to socially acceptable levels is necessary. In this course, participants will learn (1) the symptoms associated with ASD, (2) key aspects of stereotypic behaviors, (3) different antecedent and consequence-based strategies for decreasing occurrences of stereotypic behaviors.

Overview

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that is characterized by chronic and permanent conditions with symptomology and functioning being variable throughout the lifetime of the individual (Blumberg et al., 2016). Over the past 50 years, recognition and understanding of ASD has evolved from being viewed as a rare disorder with a focus of childhood onset to being recognized as a fairly common and lifelong disorder. Several of the core descriptors and symptoms manifest in an individual prior to three years of age (Becerra-Culqui et al., 2018; Lord et al., 2018), however, without intervention, they are likely to continue into adulthood. Although each individual diagnosed with ASD differs from one another, predominately all individuals with ASD exhibit social communication deficits, repetitive behaviors, and distinct sensory-motor behaviors that set them apart from neurotypical peers (American Psychiatric Association, 2013). These deficits and behaviors exist regardless of culture, race, ethnicity, or socioeconomic status.

As there is currently a lack of reliable biomarkers for diagnostic measures, diagnosis for ASD relies heavily on the basis of behavior (Lord et al., 2018). The *American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; APA, 2013) outlines the criteria required for diagnosis, including deficits in social communication and social interaction in conjunction with restricted, repetitive patterns of behavior. Furthermore, to demonstrate evidence for an ASD diagnosis, the individual must present difficulty within each of the three subdomains of social communication (i.e.,

social-emotional reciprocity; non-verbal communicative behaviors; development, maintenance, and understanding of relationships) and two of the four subdomains in restricted, repetitive patterns of behavior (i.e., stereotyped or repetitive movements and speech; inflexibility and adherence to routines; restricted interests; reactivity to sensory input is viewed as unusual).

One of the earliest concerns reported among parents of children diagnosed with ASD is delays and deficits with speech and language development. Parents note such delays in both receptive and expressive language specifically when their child exhibits reduced babbling and difficulty with joint attention, imitating others, pointing, and even responding to their own name when compared to neurotypical peers of the same age (APA, 2013). If the child is able to vocalize, parents may report concerns with abnormal prosody, which is an aspect of speech that encompasses variations in pitch, rhythm, and intonation. For individuals with ASD, their speech may sound robotic, presenting an additional social barrier among a child with ASD and their neurotypical peers. Furthermore, additional delays with speech and language development that include repetitive speech, known as echolalia, or even noncontextual or nonfunctional speech, known as stereotypy, may also be noted by parents as a concern.

Section 1: Overview of Stereotypic Behaviors

One of the defining characteristics of ASD that is cause for further exploration is the presence of restricted and repetitive patterns of behavior. This characteristic of ASD presents and is exhibited in a multitude of automatically reinforced behaviors that occur without socially-mediated consequences being present. Concerns of these patterns of behavior are often reported as an additional early concern by parents as these behaviors are typically present during the child's second year of life and persist beyond the age of two (Becerra-Culqui et al., 2018). Additional concerns arise when these exhibited behaviors are displayed with high intensity or frequency, are atypical in their manifestation, and interfere with functioning (Chebli et al., 2016).

Stereotypy is inclusive of a large set of repetitive behaviors that may also be viewed as maladaptive and disruptive to the acquisition of skills and is commonly used to classify both motor or vocal responses that are repetitive and viewed as not necessarily serving a specific adaptive function (Ahearn et al., 2007). It is a behavior that is not exclusively exhibited in individuals with disabilities; however, stereotypy is found more commonly in individuals with an ASD diagnosis (Martinez & Betz, 2013; Spencer & Alkhanji, 2018).

These restricted and repetitive patterns of behavior can encompass a large proportion of an individual's waking hours and affect the individual as they may become anxious, agitated, or disruptive if these behaviors are interrupted by others or occurrences within their environment. These behaviors can be found to be involuntary, patterned, non-reflexive, and repetitive (Chebli et al., 2016).

Stereotypic behaviors vary in topography (i.e., hand flapping, rocking of the body, various vocalizations); however, a common feature is their exhibition independent of social consequences. Automatically reinforced behavior can be exhibited in a variety of forms with several topographies being benign or advantageous for the individual exhibiting the behaviors. Other topographies of automatically reinforced behaviors may be undesirable in certain environments or situations or cause harmful outcomes for the individual exhibiting the behavior (i.e., ingesting inedible objects, self-injurious behaviors). Additionally, these behaviors are frequently targeted for decrease as they often interfere with acquisition of skills (Shawler & Miguel, 2015; Wells et al., 2016), typically competing with responses that are more functional in nature. Goals outlined for treatment often include a reduction of automatically reinforced behavior when the exhibited behavior leads to harm for the individual or those around them or prevents them from engaging and interacting with others and their community.

Stereotypy can also impede interactions with others and is often viewed as socially stigmatizing, decreasing opportunities for engagement with peers for social and learning opportunities (Shawler & Miguel, 2015). Parents may refrain from visiting public places or engaging in social situations as stereotypic behaviors may be perceived negatively by others. Furthermore, exhibition of stereotypic behaviors can be associated with lower levels of engagement in activities that are functional, poorer expressions of one's thoughts, decreased ability to understand others, and limited ability to demonstrate self-care. These behaviors have been found to interfere with observational learning, attempts to teach various play and social skills, responses to auditory stimuli, the ability to explore one's environment, and ability to perform discrimination tasks. Despite these limitations, research involving children with ASD has demonstrated that when stereotypic behaviors are reduced, there is a corresponding increase in functional play (Préfontaine et al., 2019), suggesting rationale for the further development of interventions to treat these behaviors.

Stereotypic behaviors are often difficult to treat as they are generally maintained by automatic reinforcement. This presents a challenge to clinicians as it can be difficult to identify the reinforcers that maintain stereotypic behaviors. Typical barriers that exist

between a function-based treatment and the reduction of stereotypic behavior include difficulty with interrupting response-reinforcer relations and difficulty with the delivery of socially acceptable automatic reinforcers (Potter et al., 2013).

Even though these barriers exist, several treatment options, both antecedent and consequence-based interventions, have been proposed and developed to treat stereotypic behaviors. Often, treatment plans will include differential reinforcement of a functionally matched alternative behavior as well as the inclusion of extinction of the undesirable behavior. These treatment components are typically effective for behavior that is maintained by socially mediated reinforcers; however, the self-mediated nature of automatically reinforced behaviors lead these behaviors to be resistant to extinction, causing other treatment components to be explored for reduction of these behaviors (Ryan et al., 2022).

Section 1 Personal Reflection

Have you worked with an individual that exhibits stereotypic behaviors? If so, what interventions were used with this individual to decrease the occurrence of these behaviors?

Section 1 Key Words

Automatic Reinforcement - reinforcement that is not mediated by the deliberate action of another person

Echolalia - repetition or echoing of words or sounds that you hear someone else say

Stereotypy - motor or vocal responses that are repetitive and viewed as not serving a specific adaptive function

Section 2: Overview of Antecedent Treatment Interventions

An antecedent intervention is designed to alter an individual's environment, or an event within the environment, prior to the occurrence of a targeted behavior. These interventions are developed to include varying aspects within the setting that will address stimulus control that have previously prompted the individual to engage in the

challenging behavior. Ideally, the clinician's main focus is to identify the factors that exist which are reinforcing the maladaptive behavior and then modify the environment in a way that these identified factors no longer elicit the challenging behavior. Ultimately, antecedent interventions work toward reducing the likelihood that a stimulus will serve as a reinforcer or remove the cue from the environment that signals the availability of reinforcement.

Furthermore, the purpose of antecedent interventions is to prevent the occurrence of the challenging behavior. In opposition to consequence-based procedures, antecedent interventions are implemented prior to the challenging behavior being exhibited by the individual. For example, instead of a behavior analyst waiting for the individual to engage in elopement behavior to escape a task and then implementing a controlling consequence, the behavior analyst would use an antecedent intervention to manipulate the conditions so that the probability of elopement would not be encountered.

Antecedent interventions can be beneficial for significantly challenging behavior. While consequence-based interventions can prove to be effective, it is more desirable if various interventions did not have to be implemented such as response cost or restraint procedures. Also, challenging behavior often is exhibited under certain environmental conditions meaning that these specific conditions could be changed or altered with the result ending in permanent elimination of these problematic behaviors. However, these interventions are typically not incorporated as the only component of an intervention. Instead, they are often found in conjunction with one or more consequence-based intervention as part of a treatment package. Therefore, it is important to understand the conceptual framework that is used when creating an antecedent intervention.

Conceptual Framework for Antecedent Interventions

The physical environment that surrounds an individual as well as people within the environment can acquire stimulus control over behavior that is exhibited. For example, if a teacher in a classroom setting is continuously providing positive reinforcement to students during interactions with each of them, then the students may be more likely to follow the teacher's instructions and engage in classroom activities. On the other hand, if a teacher is consistently providing criticism and seldom has positive interactions with the students, then the students may avoid the teacher, refrain from interacting in class, and look for opportunities to avoid interactions with the teacher.

Stimulus control can be demonstrated through the pairing of antecedents with both positive and negative consequences (Luiselli et al., 2008). A discriminative stimulus is a stimulus that has been paired with positive reinforcement. When analyzing the framework for antecedent interventions, the principle of discriminative stimulus control encompasses a variety of manipulations that can occur in an effort to induce a change in behavior. For example, using the previous example of the teacher in the classroom setting that provides positive reinforcement, this same teacher could teach within the classroom alongside another staff member who is less effective with the ultimate goal of transferring stimulus control to this staff member. Once that control is obtained, the classroom teacher could remove themselves gradually so then the staff member is the one that is ultimately responsible for teaching the material to the class of students.

The same type of strategy can be applied to different environments. If a child becomes agitated when attending a medical appointment, a graduated approach sequence could be used to teach the child to tolerate various steps (i.e., sitting in the office, interacting with the receptionist, sitting in the medical exam room) until the child is able to attend the medical appointment without distress. This shows that an emphasis on stimulus control is able to be used as an antecedent intervention.

Another example of an antecedent manipulation is when the motivation of an individual is changed. An establishing operation is an environmental event, operation, or stimulus condition that affects an individual by momentarily changing the reinforcing effectiveness of other events and the frequency of occurrence to which the individual's repertoire acts to those events as consequences (Luiselli et al., 2008). An establishing operation increases the value of the consequences that have previously functioned as reinforcers and evokes behaviors that have previously been exhibited. For example, a child that has been reinforced by food for working on completing a task will be more motivated to complete the task if they are scheduled to work on this skill right before lunchtime rather than after they just eat. This is more likely to occur as a result of the child being in a state of deprivation which will then, in turn, increase the child's enjoyment of eating the food and increase the exhibition of the targeted behavior.

Establishing operations can be linked to other events in addition to food consumption. For example, social contact and sensory stimulation may be other items that are highly reinforcing. If a child has gone a long period of time without social contact, attention from a peer or parent may be highly reinforcing to them. In addition, a child that has not encountered much access to toys or motor activities may find sensory stimulation to be highly reinforcing. Although these examples may result in contact with highly

reinforcing events or items, a state of deprivation for an individual may result in either appropriate or inappropriate exhibition of behavior. An individual's motivation may lead them to attend to a class lecture better when food is used as a positive reinforcer, but it can also lead to an individual exhibiting the behavior of food-stealing which is inappropriate and unacceptable.

Establishing operations can also encompass biological influences and health conditions experienced by the individual. For example, challenging behavior that is exhibited could be found to occur more frequently when a child is experiencing allergy symptoms, symptoms from constipation and premenstrual syndrome, and pain associated with a toothache. Behavior analysts should consider utilizing a series of preventative and ameliorative health-care treatments as well as evidence-based behavior interventions to reduce occurrences of challenging behaviors associated with health conditions and biological influences (Luiselli et al., 2008).

Abolishing operations refers to events that are used or occur that decrease the effectiveness of consequences that were reinforcing and when the frequency of the behavior in question has been reinforced. Satiation is associated with abolishing operations. For example, if a child exhibits challenging behavior that is being reinforced by the attention that an adult provides, integrating more frequent and noncontingent attention and praise could be beneficial as the motivation to exhibit the challenging behavior may be lessened.

Therefore, it is important to understand that the conceptual framework for antecedent interventions include the use of discriminative stimulus control as well as motivational operations. The discriminative stimulus signals to the individual that reinforcement is available where the motivational operation determines the relative strength of the reinforcement.

Functional Assessment and Analysis

By conducting a functional assessment and analysis, a behavior analyst is attempting to identify variables that are associated and hypothesized to cause the challenging behavior that is being exhibited by the individual. These methods provide information regarding the conditions that elicit and those that maintain the challenging behavior. As a behavior analyst is able to know the conditions that set the occasion for the challenging behavior to be exhibited as well as the interaction that occurs with the

consequence events, the behavior analyst is able to formulate an antecedent intervention that is matched with the source of control.

There are different response-reinforcer relationships that a behavior analyst will focus on within the context of functional assessment and analysis. One relationship is that of social-positive reinforcement. This relationship refers to challenging behavior that is ultimately maintained by a form of attention. For example, a child in a classroom setting may engage in making loud and inappropriate noises because the child enjoys the resulting reactions from other children in the classroom who laugh, smile, or interact with the child in a preferred manner.

Another response-reinforcer relationship encompasses social-negative reinforcement. This relationship includes challenging behavior that is maintained by either avoidance or escape of a condition that is not preferred by the individual. For example, a student in a classroom setting may not enjoy completing math problems. The student may become disruptive each time math problems are presented, resulting in the student being removed from the classroom and not having to complete the math problems. In this example, the student's behavior is producing escape from completing the math problems and is negatively being reinforced.

Another response-reinforcer relationship is entitled automatic reinforcement. Challenging behavior, in this category, is reinforced by its own sensory consequences. Some challenging behaviors in this category include stereotypy and self-injurious behaviors. These behaviors may be maintained by behavior producing visual, tactile, or proprioceptive stimulation. Ultimately, behaviors that are exhibited within this category are exhibited independent of social contingencies.

Within a functional assessment, the primary goal is to identify the various conditions that are associated with the challenging behavior that is being exhibited. On the other hand, a functional analysis attempts to directly manipulate different controlling conditions.

Functional assessments are divided into two different categories: indirect and descriptive. Indirect functional assessments include the use of subjective reporting by those that know the individual. Information is gathered through informal review or by having individuals complete an inventory or protocol. Examples of these include the Motivation Assessment Scale (MAS) or the Functional Assessment Interview (FAI). Descriptive functional assessments include the use of behavior recording through use of a scatter-plot or antecedent-behavior-consequence (ABC) method. Both the indirect and

descriptive functional assessments help a behavior analyst develop a hypothesis as to the function that exists pertaining to the challenging behavior. However, it is important to understand that these findings are purely correlational and no cause-and-effect relationship can be established or inferred based on this information.

A functional analysis, though, relies on direct observation of the challenging behavior under a minimum of one test condition. The effects of a consequence for a specified challenging behavior are evaluated while in the presence of an establishing operation and one control condition where the same consequence and establishing operation are not present. A behavior analyst should complete both a functional assessment and functional analysis prior to developing an intervention for a challenging behavior. Often, behavior analysts will rely solely on the completion of functional assessments that are obtained through indirect and descriptive methods as they are easier to complete. However, it is important for behavior analysts to conduct both a functional assessment and functional analysis when able to so that data can be compared and analyzed across both methods.

Section 2 Personal Reflection

What is your experience with implementing either a functional assessment or functional analysis?

Section 2 Key Words

Abolishing operation - events that are used or occur that decrease the effectiveness of consequences that were reinforcing and when the frequency of the behavior in question has been reinforced

Antecedent intervention - designed to alter an individual's environment, or an event within the environment, prior to the occurrence of a targeted behavior

Descriptive functional assessment - the use of behavior recording through use of a scatter-plot or antecedent-behavior-consequence (ABC) method.

Establishing operation - environmental event, operation, or stimulus condition that affects an individual by momentarily changing the reinforcing effectiveness of other events and the frequency of occurrence to which the individual's repertoire acts to those events as consequences

Functional analysis - conducted to determine the function of a behavior by contriving situations and testing different conditions: play (control) condition, alone condition, contingent escape condition or demand, contingent attention condition

Functional assessment - conducted to identify the various conditions that are associated with the challenging behavior that is being exhibited

Indirect functional assessment - the use of subjective reporting by those that know the individual

Stimulus control - behavior that occurs more often in the presence of a stimulus than in its absence

Section 3: Antecedent Treatment Interventions for Stereotypic Behaviors

There are various antecedent intervention procedures that are evidence-based and have been effective for children that exhibit stereotypic behaviors. These interventions can be used in isolation or in combination with other interventions as a treatment package. Several antecedent interventions that have been used to decrease the occurrence of stereotypic behaviors include the use of noncontingent reinforcement (NCR), discrimination training, and implementation of matched stimuli.

Noncontingent Reinforcement (NCR)

NCR is a powerful method to reduce maladaptive behaviors and has been used to treat various challenging behaviors exhibited by individuals with developmental and intellectual disabilities. During NCR, individuals are provided with access to a specified reinforcer on a frequent basis so that the individual is no longer motivated to exhibit the challenging behavior as a method of obtaining the same reinforcer. The success of NCR-based interventions relies heavily on the frequent access to the reinforcer when compared to interventions that withhold reinforcement, potentially eliciting a brief increase in challenging behaviors. NCR is based on providing access to reinforcement regardless of the reinforcement schedule that may exist and is provided independent of behavior on a fixed or variable-time schedule. Often, NCR is used alongside other interventions for reducing challenging behavior such as extinction. This combination

usually begins by implementing a dense schedule of reinforcement that is gradually titrated.

NCR has also been utilized to describe response-independent delivery of alternate reinforcers for challenging behaviors that are maintained by automatic reinforcement. Often, these alternative reinforcers are referred to as arbitrary as they are not the reinforcer that is solely responsible for maintaining the challenging behavior that is being exhibited. However, these reinforcers are far from arbitrary as researchers and behavior analysts alike have used empirical assessments to select these alternative reinforcers for use in the treatment of challenging behaviors that are maintained by automatic reinforcement (Phillips & Iannaccone, 2017). The methods that have been employed to select the alternative reinforcer have evolved over time. Early on, stimuli were selected based on structural properties that were believed to produce the same type of reinforcement that the challenging behavior was thought to have produced. Preference assessments were conducted and stimuli were selected based on the results of these assessments. On the other hand, alternative stimuli have been noted to be selected by using a competing stimulus assessment. This type of assessment involves selecting stimuli based on the extent of which the challenging behavior decreases when the selected stimulus is readily available to the individual exhibiting the behavior.

There are several advantages that are associated with the implementation of NCR. NCR is fairly easy to use as it typically does not require the use of monitoring of the exhibition of behavior. It also has minimal risk of low or no reinforcement periods associated with its implementation. This can often be found with differential reinforcement of alternative behavior (DRA) procedures if a delineated response requirement has not been met by the individual.

Despite the success of NCR, there are several limitations with interventions using this principle. For example, challenging behaviors may represent themselves when the NCR schedule of reinforcement is thinned (i.e., decreasing the amount/frequency of reinforcement that the individual receives). Additionally, the individual may receive reinforcement following the exhibition of aberrant behavior resulting in the continued engagement of the behavior as a method of obtaining other reinforcement. NCR may not be practical to implement in every situation and may possibly require the use of other ABA-based antecedent procedures that provide reinforcement in the presence of a specific stimulus and no reinforcement during the presentation of other stimuli. Another potential concern with NCR is that an extinction burst may occur when the aberrant behavior is not reinforced. When this occurs, this aberrant behavior may be

accidentally maintained and can produce incidental reinforcement effects. In addition to these concerns with NCR, although it may be a potentially powerful intervention to implement for behavior reduction purposes, it may also require considerable effort from the clinicians implementing the intervention in the initial stages of behavior reduction. This effort may limit the use of NCR as educators and clinicians may not be able to uphold these requirements and therefore will limit the effects of the intervention.

Research Supporting the Use of NCR for Reducing Stereotypic Behaviors

Although limitations may exist with the use of NCR, it still can be an effective intervention at reducing stereotypic behaviors, particularly when used in conjunction with other training components such as functional communication training (FCT). For instance, researchers have used a modified reversal design to evaluate the effects of FCT and NCR on stereotypic behaviors, in the form of opening and closing doors, that were automatically maintained (Boyle et al., 2018). The study was conducted at a community center and university-based clinic, both of which had at least two doors present in the environment. Results of the study indicated that the most effective treatment package for reducing stereotypic behaviors included the combination of FCT and NCR (Boyle et al., 2018). This combination of interventions produced an overall lower and more stable level of stereotypic behavior than either intervention solely. These results indicated that often a combination of approaches may be more successful at reducing a behavior than an intervention in isolation, demonstrating that the combination of NCR and FCT was effective at reducing stereotypic behaviors.

Furthermore, when evaluating a combination of approaches to reduce the exhibition of vocal stereotypy, research has examined the benefits of providing noncontingent access to music to decrease incidents of vocal stereotypy. For example, researchers have examined the effects of noncontingent access to high and low preference music on vocal stereotypic behaviors (Lanovaz et al., 2012). Two conditions were presented in this study, alternating between no-interaction sessions and high-preference music sessions. In the no-interaction sessions, participants were allowed access to toys that did not produce auditory stimulation, while in the high-preference music sessions, music continuously played while each participant was allowed access to toys that did not produce auditory stimulation. No social consequences were provided in either condition. Results of the study indicated that high-preference music produced lower levels of vocal stereotypy than in the low-preference music condition and in the no-interaction condition. Additionally, these results indicated that noncontingent access to

preferred stimuli typically produce more of a decrease in the exhibition of automatically reinforced behaviors than the use of less preferred stimuli.

Researchers have also evaluated the effects of noncontingent access to auditory stimulation on the exhibition of vocal stereotypy. The researchers evaluated the effects of white noise, music, and a recording of the participant's own stereotypic behavior on vocal stereotypic occurrences (Saylor et al., 2012). During each session, participants wore headphones and were provided access to non-auditory yet preferred toys. There were three different sets of headphones; each was a different color, with each color associated with a specific condition (i.e., white noise, music, own stereotypic behavior). In the treatment conditions, each participant was allowed to select their preferred color of headphones and the coinciding auditory stimulation was played for two minutes. Results indicated that the music condition was associated with a larger decrease in vocal stereotypy, almost to near-zero levels and was additionally selected by each participant as the most preferred treatment.

The effects of noncontingent social interaction (SI) on vocal and motor stereotypy have also been evaluated as an antecedent intervention. Typically, during an SI session, continuous interaction (i.e., reading aloud from a Kindle e-reader) is provided to the individual. Noncontingent attention can be useful for a practitioner in that it can be directly incorporated into teaching sessions when compared to interrupting a session to provide access to a toy or other tangible item. Also, opportunities could present for social engagement, potentially providing teachable opportunities for an area of deficiency in children with ASD.

Although NCR can be beneficial for practitioners to use to reduce the occurrence of stereotypic behaviors, there are also other antecedent interventions that can be used that produce similar effects. An example of another type of antecedent intervention is discrimination training.

Discrimination Training

Discrimination training is an ABA-based procedure that allows for a targeted behavior to be reinforced in the presence of one stimulus while being extinguished in the presence of a different stimulus. For discrimination training to occur, at a minimum there is to be one targeted behavior and two antecedent stimulus conditions that exist. Environmental stimuli have been shown to exert an inhibitory control on behaviors that are exhibited that are automatically reinforced after discrimination training (Esposito et

al., 2021). With discrimination training, the individual is learning to tell the difference between two or more discriminative stimuli (SD). An SD is viewed as either being the instruction or another antecedent that is used to evoke a specific response. An SD acts as a cue to the individual that reinforcement will be provided for a correct response that is given. For example, when teaching a child to sit in a chair when the word "sit" is spoken, the child could receive reinforcement when sitting in the chair after hearing "sit" and not receive reinforcement when exhibiting any other behavior besides sitting after hearing the word "sit."

There are two types of discrimination training that can occur: simultaneous discrimination training and successive discrimination training. Simultaneous discrimination training occurs when there are multiple objects that are placed in front of the individual and they are asked to touch or point to one of the items that are in front of them. Successive discrimination training occurs when the targeted item and the distractors are not able to be presented at the same time. A distractor item can include targets that are used in the stimulus presentation when attempting to teach discrimination to an individual. These items can either be known or unknown to the individual.

Research Supporting the Use of Discrimination Training for Reducing Stereotypic Behaviors

Various studies have evaluated the effects of discrimination training on stereotypic behaviors (Haley et al., 2010; O'Connor et al., 2011). For instance, some researchers have used an adaptive alternating treatment design to evaluate the effects of a discrimination training intervention (Haley et al., 2010). Baseline sessions consisted of interrupting the vocal stereotypy verbally and redirecting the individual to another task. If the individual was able to refrain from engaging in stereotypy for two minutes, then a check was placed on a chart. An accumulation of 10 checks resulted in access to a five-minute activity of the individual's choice. During the intervention phase, two visuals were used consisting of a red three inch by five inch card with the participant's name and the word "quiet" in the center of the card, and a green three inch by five inch card with the individual's name and the phrase "okay to speak out" in the center of the card. At the conclusion of the study, the individual was able to discriminate using the cues, decreasing the exhibition of vocal stereotypy when compared to baseline conditions.

Additionally, research has shown that discrimination training has been effective at reducing not only vocal stereotypic behaviors but motor stereotypic behaviors as well

(O'Connor et al., 2011). During the discrimination training, both red and green colored stimuli were used. The red stimuli signaled to the individual that any attempts of motor or vocal stereotypic behaviors would be blocked and other tasks would be prompted. In contrast, the green stimuli signaled to the individual that any attempts to exhibit motor or vocal stereotypic behaviors would not be blocked. Results from this study indicated that discrimination training was an effective intervention for reducing both motor and vocal stereotypic behaviors.

Research has shown that discrimination training is an effective antecedent intervention that can be used to decrease stereotypic behaviors (Haley et al., 2010; O'Connor et al., 2011). Although these interventions are effective, they often require immense resources that practitioners are unable to provide. Clinicians are often required to implement several trials that may be time consuming prior to the effects of discrimination training being observed. Educators may only be provided with a limited window of opportunity to implement these trials in a classroom setting, therefore limiting access to intervention implementation in other classroom settings throughout the school day (Haley et al., 2010). Additionally, generalization to multiple exemplars, including environments, may be problematic if discrimination training is limited to a small set of stimuli. Therefore, it is also important to evaluate other antecedent interventions that can capitalize on an individual's motivation and are still as effective at reducing stereotypic behaviors as some of the more resource demanding interventions.

Matched Stimulation (MS)

An additional antecedent intervention that has been shown to be effective at reducing stereotypic behaviors is that of matched stimulation (MS). MS is defined as decreasing the motivating operation for engaging in stereotypic behaviors by presenting stimuli that produce the same hypothesized sensory consequence as the challenging behavior. Behavior analysts view matched stimuli as satiating the individual exhibiting the challenging behavior through the consequences provided by the challenging behavior and abolishing the reinforcing effects of the stimuli. This process also restricts the opportunity for the individual to engage in the challenging behavior, deprives the individual of the consequences provided by the challenging behavior, and establishes those consequences provided by the stimuli as reinforcement. There are interventions that seek to replace challenging repetitive behaviors with appropriate activities that provide stimulation that competes with or substitutes for the consequences of the challenging repetitive behaviors. This is implemented in an effort to reduce the occurrence of challenging repetitive behaviors.

Interventions, such as response cost or token economies, that have shown to reduce stereotypic behaviors may involve resources that are not readily available to clinicians due to time constraints or procedures that require numerous implementations to guide reductions in behavior. Therefore, these interventions can be counterbalanced through MS. For example, individuals may receive continuous access to items, such as tapping a drumstick, that produce the same stimulation as other motor stereotypic behaviors.

Research has indicated that a greater decrease in the exhibition of challenging behaviors was exhibited when continuous, noncontingent access was provided to stimuli hypothesized to match the form of stimulation provided by the challenging behavior.

Therefore, it may be of importance to understand how providing access to competing stimuli may ultimately decrease challenging behaviors. By enriching an individual's environment with access to toys, preferred items, or other stimuli that produce stimulation that is similar to the consequences of the stereotypic behaviors, then these provided items may serve as a replacement behavior that also satisfies the sensory need of the individual.

Research Supporting the Use of MS for Reducing Stereotypic Behaviors

Research indicates that suppressive effects were able to be demonstrated with vocal stereotypic behaviors when implementing treatment interventions using MS. Greater levels of suppression were observed when MS was used in conjunction with response interruption and redirection (RIRD) techniques (Love et al., 2012). Ultimately, research results have indicated that MS used in combination with RIRD is an effective intervention for reducing vocal stereotypic behaviors.

Additionally, other research has evaluated the effectiveness of noncontingent matched stimulation (NCR-M) compared with RIRD on reducing levels of stereotypic behaviors. Results from the research indicated that both RIRD and NCR-M resulted in a reduction in stereotypic behaviors, and an increase in appropriate vocalizations was also noted (Gibney et al., 2019).

Overall, antecedent based interventions (i.e., noncontingent reinforcement, discrimination training, matched stimulation) have been shown to be effective at decreasing the exhibition of stereotypic behaviors. However, these interventions may not always be the best selection when choosing an intervention due to the resources required to implement these interventions. These resources include the effort of the

clinician or educator to implement the intervention in the initial stages of behavior reduction, the numerous trials required for generalization of the intervention to occur to other stimuli and environments, and the limited window of opportunity for implementation of the intervention based on staffing needs or the individual's schedule (Haley et al., 2010). Therefore, it would be beneficial to further evaluate other interventions, particularly consequence-based interventions, that may allow for the same behavioral effect without the drain on resources that some interventions may impose.

Section 3 Personal Reflection

Have you witnessed an antecedent based intervention being implemented to reduce the occurrence of stereotypic behaviors in an individual? If so, was the intervention effective or did another intervention need to be implemented at a later time?

Section 3 Key Words

Alternative reinforcer - a reinforcer that is not solely responsible for maintaining the challenging behavior that is being exhibited

Differential reinforcement of alternative behavior (DRA) - a technique where an undesired behavior is placed on extinction while simultaneously providing providing reinforcement to an appropriate behavior

Discrimination training - allows for a targeted behavior to be reinforced in the presence of one stimulus while being extinguished in the presence of a different stimulus

Discriminative stimulus - viewed as either being the instruction or another antecedent that is used to evoke a specific response

Distractor - can include targets, either known or unknown to the individual, that are used in the stimulus presentation when attempting to teach discrimination to an individual

Extinction - a procedure where reinforcement that usually occurs after a behavior is withheld in an effort to decrease or eliminate future engagement in the behavior

Extinction burst - an increase in a behavior that occurs when the reinforcement that previously maintained the behavior has been removed

Functional communication training - an approach used for teaching individuals and appropriate way to communicate their wants and needs

Matched stimulation - decreasing the motivating operation for engaging in stereotypic behaviors by presenting stimuli that produce the same hypothesized sensory consequence as the challenging behavior

Noncontingent reinforcement (NCR) - based on providing access to reinforcement regardless of the reinforcement schedule that may exist and is provided independent of behavior on a fixed or variable-time schedule

Preference assessment - observations or evaluations used to identify potential reinforcers

Simultaneous discrimination training - occurs when there are multiple objects that are placed in front of the individual and they are asked to touch or point to one of the items that are in front of them

Successive discrimination training - occurs when the targeted item and the distractors are not able to be presented at the same time

Section 4: Consequence-based Treatment Interventions for Stereotypic Behaviors

Consequence-based interventions rely on modifying an individual's environment and the contingencies that transpire after the exhibition of a behavior (Boyd et al., 2012). In an effort to decrease challenging behaviors, consequence-based interventions can be implemented to minimize the reinforcement delivered or obtained for the undesirable behavior and can focus on increasing the reinforcement received for a behavior that is desirable. Individuals may be redirected towards engagement of alternative responses that are associated with an increase in effectiveness of social and communicative responses. When evaluating the effects of consequence-based treatment interventions for stereotypic behaviors, three main areas of research that include differential reinforcement of other behavior, punishment strategies, and RIRD are at the forefront of discussion. Each of these areas encompass an overview of select interventions that have been implemented to decrease exhibition of stereotypic behaviors.

Differential Reinforcement of Other Behavior (DRO)

DRO is an ABA-based reinforcement procedure that emphasizes delivery of reinforcement for any response other than the targeted behavior for a certain interval of time. Implementation of reinforcement occurs for zero rates or zero occurrences of a specified behavior, and discrimination occurs as the individual learns the contingency of when and for what behavior reinforcement is obtained. It is an ABA-based procedure that emphasizes the decrease of an undesirable behavior through use of positive reinforcement techniques. Often, individuals diagnosed with ASD, who engage in repetitive behaviors maintained by automatic reinforcement, have intervention plans with DRO procedures to decrease these behaviors (Nuerenberger et al., 2013). DRO procedures have shown to be effective when using both preferred and competing stimuli to reduce repetitive behaviors. DRO procedures can be used in a variety of settings and across a variety of behaviors. For example, a dog may not stop barking at cars as they are driving by the house. An acceptable alternative behavior would be to reward any behavior that does not include barking at cars. If the dog is walking in the yard without barking for a specified period of time, then reinforcement should be provided. If the dog is playing fetch outside without barking for a specified period of time, then reinforcement should be provided. If the dog barks, though during this specified time period, nothing should be done as you do not want to reinforce the behavior of barking. The focus is on reinforcement of the good behavior being exhibited by the dog.

Research Supporting the Use of DRO for Reducing Stereotypic Behaviors

Research has been implemented to evaluate the effects of DRO on vocal stereotypic behaviors. In one study, during the treatment conditions, any instance of vocal stereotypic behaviors would reset the interval for the participant and postpone reinforcement. Reinforcement was delivered contingent on the absence of the exhibition of vocal stereotypic behaviors and at the end of the specified interval. Intervals were gradually increased as the participant decreased the percentage of time intervals spent engaging in vocal stereotypy. The results of this study indicated that the DRO was effective at reducing the occurrences of vocal stereotypic behaviors (Dounavi, 2011).

Additionally, other research has evaluated the effects of a non-resetting and a resetting DRO procedure on stereotypic behavior. A non-resetting DRO procedure requires that the DRO interval is not to be reset once the individual engaged in the targeted behavior.

In contrast, a resetting DRO procedure necessitates that the DRO interval is immediately reset after the individual engaged in the targeted behavior. When the participant completed the entire ten second DRO interval without engaging in stereotypic behaviors, the researcher provided an edible item from the multiple-stimulus without replacement (MSWO) assessment to the participant. Results indicated that both the non-resetting and resetting DRO conditions were effective at reducing stereotypic behaviors; however, there was not a significant difference shown between the two conditions (Gehrman et al., 2017).

Adding to the research conducted on the use of DRO procedures, one study evaluated the effects of a self-management treatment package (SMTP) on stereotypic behaviors (Moore, 2009). During the SMTP, the participant was allowed to initiate various components of a predetermined process: to start a watch at the beginning of a session, to stop the watch if exhibition of stereotypic behaviors occurred, to pour a drink if the watch beeped, and to restart the watch to begin the next DRO interval. Points were awarded to the participant that could later be exchanged for preferred items based on successful intervals in which the participant self-monitored. The participant was exposed to three different resetting DRO intervals throughout the training sessions. If stereotypic behaviors were not exhibited during an interval, the watch would beep, and a beverage would be self-delivered. Results of the study indicated that there was an increase in latency to stereotypic behaviors during the training sessions and the SMTP was effective at reducing stereotypic behaviors (Moore, 2009).

DRO procedures have shown to be effective at reducing stereotypic behaviors (Dounavi, 2011; Gehrman et al., 2017; Moore, 2009). In some situations, these procedures can be an effective treatment option for automatically maintained challenging behaviors. Often, these procedures involve providing access to a reinforcing alternative stimulus after the individual has refrained from engaging in the targeted behavior for a specified time interval. These procedures can also be easy to use in a classroom or school setting. However, DRO procedures can be time intensive for practitioners during implementation as they require continuous monitoring of behavior and the reinforcement of undesired behaviors may occur as reinforcement is delivered at the termination of an interval if the targeted behavior has not occurred. This leaves the practitioner open to reinforcing other behaviors that may be inappropriate; therefore, it would be fruitful to evaluate other interventions when attempting to reduce the occurrences of stereotypic behaviors to determine the most appropriate intervention for the individual you are working with as well as for the behaviors they are attempting to alter.

Punishment Strategies

Punishment strategies refer to a consequence that subsequently follows a behavior with the effect of reducing the future occurrences of the targeted behavior. When punishment strategies are implemented, the chances of a behavior being exhibited again in the future have decreased due to an event that occurred after the behavior was exhibited. To clarify, individuals are less likely to repeat something they did as a result of what occurred after their actions previously. If the behavior exhibited does not decrease, then punishment has not occurred. The term punishment does not necessarily mean that something good or bad has occurred. Instead, it refers to how the exhibited behavior changes. Punishment strategies should only be used when multiple attempts have been made to use reinforcement strategies and those alone have not been effective at reducing the challenging behavior. If a behavior analyst plans on implementing punishment strategies, it is best practice for punishment strategies to be used in combination with reinforcement strategies in an effort to establish more appropriate behavior that the individual can exhibit.

There are two different stimulus change operations that can occur with the use of punishment strategies: positive punishment and negative punishment. Positive punishment exists when the presentation of or an increase in intensity of an already existing stimulus occurs following a specified behavior that results in the decrease of the future occurrence of the behavior. For example, if you are driving in your car at 75 MPH when the speed limit is 55 MPH, you are likely to get pulled over by a police officer. If a police officer pulls you over and issues you a ticket for speeding, you are more than likely going to exhibit the behavior of driving within the speed limit after this incident occurs. The act of you driving over the speed limit has decreased as a result of the police officer issuing you a speeding ticket. Negative punishment, on the other hand, occurs when the presentation of a stimulus is terminated or the intensity of an already existing stimulus decreases following a specified behavior that results in the decrease of the future occurrence of the behavior. For example, a teacher may implement a point system in the classroom setting. Each time a student raises their hand, the teacher provides the student with a point. If the student talks first without raising their hand, the teacher removes a point. If the student's behavior of talking without raising their hand decreases, then the point removal acts as negative punishment.

The situation that the antecedent stimulus occurs in often determines the particular environmental conditions that the suppressive effects of the punishment strategy will be demonstrated (Cooper et al., 2019). Several punishment strategies have

demonstrated a decrease in occurrences of vocal stereotypic behavior in individuals. These strategies include response cost, verbal reprimands, and punisher assessments.

Response Cost

Response cost strategies are implemented to reduce the occurrence of a specified behavior through the removal of a stimulus as a direct consequence of the behavior. Response cost strategies are designed to remove reinforcement for a behavior that is being exhibited that is undesirable or disruptive. When something is removed that an individual prefers, such as tokens, physical items, or special privileges, the likelihood that undesirable or disruptive behavior is exhibited will decrease. For example, if a parent were to take away a child's electronic items for not completing their homework, this would be an example of a response cost strategy as an item was removed as a result of the child's response. Commonly, this strategy may be implemented in classroom settings to instill a toll or fine on a child for the display of inappropriate behavior and are often paired with token economies that have been put in place in an attempt to increase a desired behavior.

Research Supporting the Use of Response Cost Strategies for Reducing Stereotypic Behaviors

Research has examined the effects of NCR either with or without response cost as an intervention to decrease inappropriate vocalizations that were maintained by automatic reinforcement. Results indicated that the NCR plus response cost condition produced a further reduction in inappropriate vocalizations when compared to the NCR alone condition (Falcomata et al., 2004).

Additionally, further research has evaluated the effects of a treatment package containing noncontingent attention, contingent demands, and response cost on exhibition of vocal stereotypy (Athens et al., 2008). The researchers implemented a fading technique where the therapist was faded that implemented the procedures. The time that the therapist spent out of the room was increased systematically contingent on the exhibition of vocal stereotypy, implementing this fading procedure until the participant spent less than 3% of the session exhibiting vocal stereotypy. Results indicated that both the two and three component intervention packages decreased the exhibition of vocal stereotypy. Exhibition of vocal stereotypy remained at low levels after the fading intervention was completed. This study provided evidence that

response cost strategies may be easy to implement and also effective at reducing occurrence of vocal stereotypic behavior.

Further research in this area has provided continued evaluation of treatment packages with a response cost component to reduce stereotypic behaviors. Research has evaluated the effects of a response cost intervention on vocal stereotypic behavior using a reversal (ABABAB) design and a concurrent multiple baseline (BL) design (Watkins et al., 2011). The results of this research indicated that the response cost intervention reduced and eventually eliminated vocal stereotypy for the participants.

Despite the research that has been conducted in support of the use of response cost strategies to reduce stereotypic behaviors, there are some limitations to the use of these strategies. Response cost strategies could lead to the exhibition of aggression and emotional responding in the individual that is having their item taken away. Additionally, the individual may avoid the situation and/or the stimulus instead of learning to respond in an alternative manner. Lastly, a response cost strategy could result in legal and ethical issues if not utilized correctly and without the proper consents in place.

Although there may be some limitations to the use of response cost strategies, there are some advantages associated with these strategies as well. Research using a response cost component has scored the highest on the Treatment Evaluation Inventory (TEI), indicating a high level of social validity when compared to other punishment procedures (i.e., verbal reprimands, physical punishment) (Watkins et al., 2011). The TEI is an instrument used to assess the parents' acceptance of procedures that are used with children with behavior problems. Response cost strategies are often easy for parents to use. Consequences for disruptive or undesirable behavior are determined ahead of time so that any overreaction to challenging behavior is minimized. Although these strengths have been demonstrated in previous research, other punishment strategies should also be evaluated to determine their effectiveness at reducing stereotypic behaviors as other interventions may provide behavior reduction strategies that are more effective.

Verbal Reprimands and Punisher Assessments

Verbal reprimands are also viewed as a punishment strategy as they are delivered to reduce the future occurrences of a behavior. Reprimands are recognized as brief statements of disapproval or instruction. Often, verbal reprimands are a conditioned punisher as they are used to decrease an exhibited behavior. However, some verbal

reprimands, even ones that are intended to be used as a conditioned punisher, can actually act as reinforcer for other individuals. Reprimands can include any attempt to decrease behavior through verbal means such as talking, lecturing, pleading, yelling, or even threatening.

Verbal reprimands are typically more effective when paired with eye contact and physical restraint as well as delivered when the individual that is exhibiting the behavior intended for decrease is in close proximity. They are also more effective when administered immediately rather than waiting several minutes before delivering and when they are shorter in duration rather than longer. When compared to other forms of punishment strategies, reprimands are not considered the most powerful form of punishment that can be implemented. Often, teachers and parents rely on these strategies as they can be relatively easy to administer.

Just because these strategies are easy to implement, does not mean they should be used freely. Instead, a verbal reprimand or punishment procedure of any kind that is used in a corrective manner or as an intervention method to decrease behavior, should be used with caution, in moderation, and only after careful consideration has been provided to the individual and other treatment options that are applicable. Punishment strategies should be a last resort alternative and used when reinforcement strategies are unable to provide the behavior change that is being requested. They should be reserved for use with specific situations and paired with reinforcement based strategies.

Research Supporting the Use of Verbal Reprimands for Reducing Stereotypic Behaviors and the Need for Punisher Assessments to be Conducted

Research has been conducted to evaluate the effects of verbal reprimands on the exhibition of stereotypic behaviors. Research has indicated that verbal reprimands were found to be a more effective punisher of vocal stereotypy when they were paired with the removal of toys that was contingent on vocal stereotypy (Rapp et al., 2009). Furthermore, results of this research indicated that the removal of preferred stimulation that is contingent on a response is able to produce a greater decrease in an automatically reinforced behavior than non-contingent access to the preferred stimulation. This research was also able to show that a less intrusive procedure can be an effective punisher after repeated pairings occurred with an intrusive punisher.

In further efforts to evaluate an alternative method for identifying punishers to reduce automatically reinforced problematic behaviors, research has been conducted to

identify potential punishers using a reinforcement-based intervention, NCR and DRA, to evaluate the intervention's effects using reinforcement alone to reduce problem behaviors (Verriden & Roscoe, 2019). This research also used a punisher assessment in conjunction with the reinforcement-based intervention to determine an effective punisher to reduce the problematic behavior. Results of this research indicated that NCR and DRA were enhanced with the addition of punishment procedures. This study was able to show that punishment can be used to reduce automatically maintained problematic behaviors and evaluated conducting a reinforcement-based intervention prior to punishment-based strategies. One limitation worth noting, is that the punisher still needed to be implemented several times per minute for the automatically maintained problem behavior to occur at a decreased rate. This is important to identify as vocal stereotypic behaviors are oftentimes maintained by automatic reinforcement and may require several implementations of an intervention to reduce the stereotypy.

Research in this area has shown the potential for practical and acceptable procedures that can be implemented to reduce stereotypic behaviors to low levels through application of a punishment strategy (Rapp et al., 2009; Verriden & Roscoe, 2019). Eliminating an individual's stereotypic behaviors in one setting and allowing them in a different context may be key and of benefit to the skill acquisition of an individual. Therefore, further research should be evaluated that uses other punishment strategies in an effort to reduce the exhibition of automatically reinforced stereotypic behaviors.

Response Interruption and Redirection (RIRD)

RIRD has been used as an intervention to reduce occurrences of vocal stereotypy in individuals diagnosed with ASD (Ahearn et al., 2007). RIRD is an intervention that uses principles based on response blocking techniques and overcorrection procedures as a method of interrupting instances of vocal stereotypy and redirecting the individual to either elicit or engage in a different response (Spencer & Alkhanji, 2018).

Response blocking is a positive punishment technique that is typically implemented as a method of preventing an individual from emitting a targeted behavior. Within this procedure, the individual implementing the response blocking procedure intervenes as soon as the individual begins to emit a targeted behavior so that the targeted behavior is prevented from being completed. During response blocking procedures, the individual implementing the procedure should use the least amount of restraint and/or physical contact as possible that still allows for the exhibition of the targeted behavior to be blocked.

Overcorrection procedures are implemented after the occurrence of an inappropriate behavior that requires the individual that exhibited the inappropriate behavior to engage in a repetitive behavior repeatedly as a punishment procedure with the intended outcome that the inappropriate behavior will decrease in the future. There are three primary ways that overcorrection procedures can be implemented: positive practice, negative practice, and restitutional. Positive practice is the most often used overcorrection procedure that requires the individual that exhibited the inappropriate behavior to perform the correct form of the behavior over and over in an effort to practice the correct behavior within that situation. This allows the correct behavior to be reinforced within that situation. Negative practice requires the individual that exhibited the inappropriate behavior to repeatedly exhibit the inappropriate behavior while being told that this behavior is inappropriate. It is believed that by engaging in this technique, the individual exhibiting the inappropriate behavior would form an aversion to exhibiting the inappropriate behavior and would then view the behavior similarly as punishment. Restitutional procedures require that the individual that exhibited the inappropriate behavior to return to the space where the inappropriate behavior was exhibited and then perform the appropriate behavior instead of the inappropriate behavior.

Frequently, RIRD requires the individual to respond to a question or demand with a response that would typically be answered correctly vocally (i.e., listener responding or echoic tasks). Once the individual responds correctly, reinforcement is delivered for their appropriate response. RIRD has been identified as an evidence-based intervention for individuals with ASD (Sheehey & Wells, 2016).

Research Supporting the Use of RIRD for Reducing Stereotypic Behaviors

Stereotypic behavior that is maintained by automatic reinforcement has been referenced as challenging to treat. Despite this difficulty, promising research has shown that various antecedent and consequence-based strategies can be implemented to help provide a reduction in this behavior. Within consequence-based strategies specifically, RIRD has also been proven effective and as an evidence-based intervention that can be used to further reduce occurrences of stereotypic behaviors.

Research has indicated that independent vocalizations that are contingently reinforced with preferred items (i.e., specific toy, edible item) can be utilized to reduce the exhibition of stereotypic behaviors (Ahearn et al..2007). During the intervention phase of the study, a response blocking technique was implemented to block or interrupt the

instances of vocal stereotypy. When an instance of vocal stereotypy occurred, the researcher prompted appropriate language until three consecutive correct responses occurred in the absence of vocal stereotypy. Praise was then delivered for appropriate language use by the participant. A session clock was stopped each time RIRD was implemented. The session clock was then restarted once the researcher delivered social praise for appropriate language use by the participant. The session occurred until the session clock indicated that five minutes had passed where the child did not engage in vocal stereotypy. Results of the study indicated that RIRD produced lower levels of vocal stereotypy and higher rates of appropriate vocalizations than that was obtained during baseline sessions.

Additionally, further research has evaluated the effects of both motor and vocal RIRD on stereotypic behavior. Results indicated that both vocal and motor RIRD were effective similarly at decreasing exhibition of stereotypy (Ahrens et al., 2011). Appropriate vocalizations also increased during this experiment. Motor RIRD was more effective than vocal RIRD at decreasing both vocal and motor stereotypy, though. Results also indicated that matching the form of the RIRD to the topography of the stereotypy did not result in further advantages but instead indicated that a variation of RIRD may produce quicker reductions in stereotypy. Results indicate that RIRD is an effective intervention at decreasing exhibition of vocal stereotypy, even if alterations are made from the initial Ahearn et al. (2007) design.

Other treatment packages have been evaluated using a combination of reversal and multielement designs (i.e., RIRD, DRA, and RIRD plus DRA) to evaluate the effects of RIRD and DRA, both individually and in combination, on stereotypy and appropriate responses (Cividini-Motta et al., 2019). Results of this study indicated that RIRD and RIRD plus DRA were effective at reducing stereotypy although none of the interventions resulted in a prolonged increase in appropriate vocalizations (Cividini-Motta et al.,

2019). This is a limitation of the study and could be due to the reinforcers used for each participant and being incompatible with the response of vocalizing. A strength of the study is that it evaluated the effects of DRA alone on stereotypy, which few studies have evaluated. This is an important component as it allows for an evaluation of a procedure alone without the effects of a multicomponent treatment package.

Additionally, the effects of MS in combination with RIRD and RIRD alone on vocal stereotypy have been evaluated (Gibbs et al., 2018). Results indicated that the MS plus RIRD condition allowed for greater reduction in vocal stereotypy and an increase in on-

task behavior. These results provide evidence for a multicomponent treatment package to reduce the exhibition of stereotypic behaviors.

Other research with a multi-treatment component package that provided support for the effectiveness of an RIRD intervention at reducing stereotypic behavior used a reversal and alternating treatments design to evaluate the effects of the RIRD intervention and response cost alone as a treatment intervention (McNamara & Cividini-Motta, 2019). Results indicated that vocal stereotypy decreased in each of the three conditions. This study was the first to evaluate various effects of both treatments as an inclusive package and also alone.

In an effort to replicate and extend previous research (Ahearn et al., 2007) on RIRD, additional research has focused on using motor responses as an RIRD intervention in novel settings (Cassella et al., 2011). In the intervention phases, the researcher stated the participant's name, obtained eye contact, and provided a one-step direction following each occurrence of vocal stereotypic behavior. Generalization was conducted by implementing this procedure in two novel settings with two novel researchers, one time for each setting and researcher. Assessment of generalization was conducted by evaluating the RIRD intervention in a novel room with an instructor that had not previously implemented the intervention with the participant. Results indicated a decrease in vocal stereotypic behavior for both participants in the treatment phase with lower occurrences occurring in the initial session during the return to baseline phase. Subsequent increases in vocal stereotypic behavior were observed as baseline sessions continued. Results also indicated that the reduction in vocal stereotypic behaviors did not generalize to a novel setting or with instructors. However, this study only evaluated generalization effects by conducting a single probe using the RIRD intervention in a novel location.

Although stereotypic behaviors may be difficult to treat as they are often maintained by automatic reinforcement, there are still several treatment options, both antecedent and consequence-based interventions, that can be utilized to decrease occurrences of stereotypic behaviors. It is important for clinicians to determine the most effective strategy that coincides with the individual's goals and needs, as well as to observe the challenging behavior to determine the best course of action on an individual by individual basis.

Section 4 Personal Reflection

Have you witnessed any consequence-based strategies implemented in an effort to decrease occurrences of stereotypic behaviors? If so, which strategies have you seen implemented and are there any other strategies discussed that you think could have had different results?

Section 4 Key Words

Consequence-based interventions - rely on modifying an individual's environment and the contingencies that transpire after the exhibition of a behavior

Differential Reinforcement of Other Behavior (DRO) - an ABA-based reinforcement procedure that emphasizes delivery of reinforcement for any response other than the targeted behavior for a certain interval of time

Multiple-stimulus without replacement (MSWO) assessment - an array of items are placed in front of an individual, and the individual is allowed to select an item. After the individual interacts with the selected item, the individual selects another item to interact with. This process continues until all items in the array have been selected. This allows for a hierarchy of preferred items to be established.

Negative practice - overcorrection procedure that requires the individual that exhibited the inappropriate behavior to repeatedly exhibit the inappropriate behavior while being told that this behavior is inappropriate.

Negative punishment - occurs when the presentation of a stimulus is terminated or the intensity of an already existing stimulus decreases following a specified behavior that results in the decrease of the future occurrence of the behavior

Non-resetting DRO procedure - requires that the DRO interval is not to be reset once the individual engaged in the targeted behavior

Overcorrection procedures - are implemented after the occurrence of an inappropriate behavior that requires the individual that exhibited the inappropriate behavior to engage in a repetitive behavior repeatedly as a punishment procedure with the intended outcome that the inappropriate behavior will decrease in the future

Positive practice - overcorrection procedure that requires the individual that exhibited the inappropriate behavior to perform the correct form of the behavior over and over in an effort to practice the correct behavior within that situation

Positive punishment - exists when the presentation of or an increase in intensity of an already existing stimulus occurs following a specified behavior that results in the decrease of the future occurrence of the behavior

Punishment strategies - refer to a consequence that subsequently follows a behavior with the effect of reducing the future occurrences of the targeted behavior

Reprimands - recognized as brief statements of disapproval or instruction

Resetting DRO procedure - necessitates that the DRO interval is immediately reset after the individual engaged in the targeted behavior

Response blocking - positive punishment technique that is typically implemented as a method of preventing an individual from emitting a targeted behavior

Response cost strategies - are implemented to reduce the occurrence of a specified behavior through the removal of a stimulus as a direct consequence of the behavior

Response interruption and redirection (RIRD) - intervention that uses principles based on response blocking techniques and overcorrection procedures

Restitutional procedures - overcorrection procedure that requires that the individual that exhibited the inappropriate behavior to return to the space where the inappropriate behavior was exhibited and then perform the appropriate behavior instead of the inappropriate behavior

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