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Effects of multiple interventions for reducing vocal stereotypy: Developing a sequential intervention model☆

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ABSTRACT

Despite the availability of several interventions designed to reduce engagement in vocal stereotypy, few studies have compared two or more interventions together. Consequently, practitioners have limited amount of data to make informed decisions on whether an intervention may be more suitable than another to begin treating vocal stereotypy. The purpose of the study was to address this limitation by examining the direct and collateral effects of multiple interventions in 12 individuals with autism and other developmental disabilities in order to guide the development of a sequential intervention model. Using single-case experimental designs, we conducted a series of four experiments which showed that (a) noncontingent music generally produced more desirable outcomes than differential reinforcement of alternative behavior, (b) differential reinforcement of other behavior reduced vocal stereotypy in two participants for whom noncontingent music had failed to do so, (c) the addition of simple prompting procedures may enhance the effects of the interventions, and (d) the effects of noncontingent music may persist during sessions with extended durations. Based on these results, we propose a sequential intervention model to facilitate the initial and subsequent selection of an intervention most likely to reduce vocal stereotypy while producing desired collateral outcomes.

1. Introduction

Individuals with autism spectrum disorders often engage in various forms of vocal stereotypy (e.g., repeating previously heard words, producing meaningless sounds), which may be disruptive to others and interfere with social inclusion (Lanovaz & Sladeczek, 2012; MacDonald et al., 2007; Matson, Dempsey, & Fodstad, 2009; Mayes & Calhoun, 2011). Response interruption and redirection (RIRD; e.g., Ahearn, Clark, MacDonald, & Chung, 2007; Schumacher & Rapp, 2011), response cost (e.g., Falcomata, Roane, Hovanetz, Kettering, & Keeney, 2004; Watkins & Rapp, 2014), noncontingent music (e.g., Lanovaz & Sladeczek, 2011; Saylor, Sidener, Reeve, Fetherston, & Progar, 2012), and differential reinforcement of other behavior (DRO; Rozenblat, Brown, Brown, Reeve, & Reeve, 2009; Taylor, Hoch, & Weissman, 2005) are examples of interventions that have amassed varying levels of empirical support for the treatment of vocal stereotypy in the research literature. Despite the availability of several interventions, few studies have compared two or more interventions together (Shabani & Lam, 2013).

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Consequently, practitioners have limited amount of data to make informed decisions on whether an intervention may be more suitable than another to begin treating vocal stereotypy.

In a notable exception, Love, Miguel, Fernand, and LaBrie (2012) compared the effects of RIRD and noncontingent access to toys that produce auditory stimulation on engagement in vocal stereotypy and appropriate vocalizations in two school-aged boys with autism. Their results indicated that both interventions reduced vocal stereotypy to similar levels, but that RIRD produced larger increases in appropriate vocalizations. One of the main strengths of the study was that the researchers measured the effects of the intervention on other behavior. Measuring vocal stereotypy alone would have indicated that both interventions were equally effective whereas considering the appropriate vocalizations suggested that RIRD produced a more desirable outcome. In some settings, individuals with developmental disabilities may be expected to engage in alternative behavior other than appropriate vocalizations. For example, the vocalizations may be disruptive to others (e.g., classmates, colleagues) or interfere with other alternative behavior (e.g., completing a task). Then again, other individuals may be unavailable to respond to the appropriate vocalizations. Practitioners should also note that RIRD often requires the ongoing implementation of a punishment contingency (e.g., Carroll & Kodak, in press; Cassella, Sidener, Sidener, & Progar, 2011), which may be challenging in certain settings or when the contingent demands evoke aggressive behavior.

Two interventions that may be appropriate alternatives in such settings are noncontingent access to music and differential reinforcement of alternative behavior (DRA). Noncontingent music involves playing preferred music continuously through external speakers or headphones (e.g., Lanovaz & Sladeczek, 2011; Saylor et al., 2012). The main advantage of noncontingent music is that it is arguably the simplest intervention to implement for vocal stereotypy. The practitioner only needs to turn on preferred music, which allows her to attend to other tasks during this time. Moreover, the intervention may not be disruptive to others when headphones are used to provide the music. Whether noncontingent music will interfere with a person's own appropriate behavior remains unclear in the research literature. Burleson, Center, and Reeves (1989) found that background music increased task accuracy in children with autism. In another study, Lanovaz, Sladeczek, and Rapp (2012) reported mixed results on the functional play of four children: music increased functional play in one participant, reduced functional play in another, and produced no effect on the same behavior of the remaining participants.

A second concern is that playing noncontingent music may increase engagement in untargeted forms of motor stereotypy (Rapp, 2005; Rapp et al., 2013). From a clinical standpoint, reducing one form of stereotypy with an intervention that increases a second form would be counterproductive. An effective intervention should reduce, or at least not increase, untargeted motor forms of stereotypy. Finally, researchers have generally assessed the effects of noncontingent music during 5- to 10-min brief sessions (e.g., Rapp et al., 2013; Saylor et al., 2012). Results of a study conducted using items that were manipulated by participants indicated that the effects of noncontingent access may not continue during extended sessions because individuals may stop to engage with the items following repeated exposure (Lindberg, Iwata, Roscoe, Worsdell, & Hanley, 2003). That said, the effects of extended application of music may differ because the individual does not need to engage in a response to access the auditory stimulation; the music plays throughout the entire session regardless of the individual's behavior.

Another potential treatment is DRA, which is one of the behavioral interventions with the most empirical support to reduce engagement in stereotypy (DiGennaro Reed, Hirst, & Hyman, 2012; Rapp & Vollmer, 2005). The main advantage of DRA is that the intervention may simultaneously strengthen an appropriate behavior, minimizing the probability that it will be replaced by another form of stereotypy (Lanovaz, Robertson, Soerono, & Watkins, 2013). However, most prior studies have examined the effects of DRA on *motor* stereotypy. Given that engagement in vocal stereotypy is not necessarily incompatible with many alternative behavior (e.g., playing, completing a task), the effects of DRA may differ from those observed with motor forms of the behavior. In a recent exception, Lanovaz, Rapp, and Ferguson (2013) found that reinforcing an appropriate behavior associated with low levels of vocal stereotypy (i.e., sitting) produced reductions in vocal stereotypy for one participant. In applied settings, the alternative behavior targeted for increase may not necessarily be associated with low levels of stereotypy. As such, it remains unclear whether strengthening an appropriate behavior, independent of its association with low levels of vocal stereotypy, would also produce desirable outcomes.

Based on the previous limitations, the main purpose of the study was to investigate the direct and collateral outcomes of multiple interventions in individuals with autism and other developmental disabilities in order to guide the development of a sequential intervention model for vocal stereotypy. We first examined the effects of noncontingent music and DRA on engagement in vocal stereotypy, motor stereotypy, and appropriate alternative behavior. The study also aimed to identify potential modifications when the interventions did not reduce engagement in vocal stereotypy, or produced one or more undesirable collateral effects. Lastly, we examined potential limitations in order to assist practitioners in making informed decisions when selecting an intervention to reduce engagement in vocal stereotypy.

2. General method

2.1. Participants, data collection, response definitions, and interobserver agreement

Twelve individuals with autism and other developmental disabilities participated in one or two experiments. Four of the participants (i.e., David, Eric, Fred and Greg) had been involved in other experiments on the assessment and treatment of stereotypy conducted by the first two authors (see Lanovaz, Rapp, & Ferguson, 2012; Rapp et al., 2013). Each participant