*THE UTILITY OF ASSESSING MUSICAL PREFERENCE BEFORE
IMPLEMENTATION OF NONCONTINGENT MUSIC TO REDUCE
VOCAL STEREOTYPY*

MARC J. LANOVAZ

UNIVERSITÉ DE MONTRÉAL

JOHN T. RAPP

ST. CLOUD STATE UNIVERSITY

AND

STÉPHANIE FERGUSON

UNIVERSITÉ DE MONTRÉAL

We conducted a modified paired-choice preference assessment and used a multielement design to examine the effects of noncontingent access to high- and low-preference music on vocal stereotypy exhibited by children with autism. For 3 of the 4 participants, high-preference music (a) produced lower levels of vocal stereotypy than low-preference music and (b) reduced vocal stereotypy when compared to a no-interaction condition. Results underscore the potential importance of assessing musical preference prior to using noncontingent music to reduce vocal stereotypy.

Key words: automatic reinforcement, music, noncontingent reinforcement, preference assessment, vocal stereotypy

Horrocks and Higbee (2008) developed a modified paired-choice preference assessment to identify preferred auditory stimuli for individuals with developmental disabilities. When provided contingent on a behavior, preferred music (identified via the preference assessment) maintained higher levels of correct responding than nonpreferred music, which indicated that the methodology could be used to identify musical stimuli with potential reinforcing effects. In recent years, an increasing number of studies have shown that music also can be provided noncontingently to reduce vocal

stereotypy (e.g., Lanovaz, Sladeczek, & Rapp, 2011; Saylor, Sidener, Reeve, Fetherston, & Progar, 2012). However, researchers have not examined the utility of conducting a music preference assessment prior to implementing noncontingent music. Thus, it remains unknown whether the methodology described by Horrocks and Higbee also could be used to identify musical stimuli with more potent suppressive effects on vocal stereotypy. The purpose of this study was to extend and replicate the use of the modified paired-choice preference assessment by examining the effects of noncontingent access to experimentally identified high- and low-preference music on vocal stereotypy.

METHOD

Participants, Data Collection, and Interobserver Agreement

Four children who had been diagnosed with autism and who engaged in vocal stereotypy

This study was supported in part by an experimentation grant from the Office des Personnes Handicapées du Québec. We thank the Centre de Réadaptation de l'Ouest de Montréal for their collaboration with the study and Cyriel L'Homme for her assistance with data collection.

Correspondence concerning this article should be addressed to Marc J. Lanovaz, École de Psychoéducation, Université de Montréal, C.P. 6128, succursale Centre-Ville, Montréal, Québec H3C 3J7, Canada (e-mail: marc.lanovaz@umontreal.ca).

doi: 10.1901/jaba.2012.45-845

participated in the study. Eric was a 4-year-old boy who emitted acontextual monosyllabic sounds, but who also used vocalizations to communicate at an age-appropriate level. Fred was a 9-year-old boy who squealed, blew, hummed, and laughed out of context. He used pictures to communicate with others. Greg was a 6-year-old boy who hummed, whined, and emitted monosyllabic sounds, and who did not have an appropriate means of communication. David was a 6-year-old boy who hummed, repeated excerpts from favorite shows, laughed out of context, and emitted vowel sounds. He used vocal language appropriately to make two- to three-word statements. Sessions were conducted in a community center for Eric and in each child's home for Fred, Greg, and David.

During the preference assessment, two observers independently recorded song selection on each trial. *Selection* was defined as the child touching the card in front of the speaker associated with a song. Both observers agreed on all trials. During the brief comparison, free-operant observation period, and treatment assessment sessions, a graduate student videotaped each participant and subsequently measured the duration of vocal stereotypy using a computer-based data-collection program. *Vocal stereotypy* was defined as acontextual sounds or words produced by the vocal apparatus and was measured using a 2-s offset criterion. Specifically, we stopped measuring vocal stereotypy when participants had not engaged in the behavior for two consecutive seconds. A second observer scored 33% of the sessions to measure interobserver agreement using the block-by-block method with 10-s intervals. The mean interobserver agreement scores were 91% (range, 81% to 97%) for Eric, 92% (range, 86% to 95%) for Fred, 92% for Greg (range, 89% to 99%), and 89% (range, 86% to 91%) for David.

Design and Procedure

Music preference assessment. We evaluated each child's preference for five different songs. For each participant, we selected two or three

songs based on parental reports of preference; the others were chosen arbitrarily to ensure a variety of musical genres. We used a modified paired-choice preference assessment similar to that used by Horrocks and Higbee (2008) with one exception. In the current study, the participants touched cards in front of the speakers instead of compact disc players.

Brief comparison. Each child participated in one brief 30-min assessment to compare the effects of high- and low-preference music on vocal stereotypy. Each condition lasted 5 min, and no social consequences were provided for vocal stereotypy. The participants did not have access to toys, with the exception of Eric, who eloped when toys were absent. The song that the participant selected most often during the music preference assessment played continuously during the high-preference music condition, whereas the song that the participant selected least often played continuously during the low-preference music condition. High-preference music conditions were alternated with low-preference music conditions in a multielement design.

Free-operant observation period. We observed each participant for one 45- to 50-min observation period or for two 30-min observation periods in the setting in which the intervention was to be implemented. During these periods, the children had access to toys that did not produce auditory stimulation (e.g., books, figurines, puzzles), and no social consequences were provided for vocal stereotypy. The sessions were divided into 5-min intervals to examine whether vocal stereotypy persisted in the absence of social consequences.

Treatment assessment. To validate the results of the brief comparison, we conducted a series of 10-min sessions during free-time periods. No-interaction sessions were alternated with high-preference music sessions in a multielement design. No more than one session was conducted per day. With the exception of duration, the no-interaction sessions were identical to the free-operant observation peri-

ods. The high-preference music sessions were similar to the no-interaction sessions, but the most preferred song played in a loop during the entire 10-min period.

RESULTS AND DISCUSSION

Figure 1 shows the results of the preference assessment (left) and the percentage of time each participant engaged in vocal stereotypy during the brief comparison of high- and low-preference music (right). During the preference assessment, Eric selected the Caillou song most often (88% of trials) and the Chopin song only once (13%). In the brief comparison, he engaged in lower levels of vocal stereotypy during high-preference music ($M = 3\%$; range, 1% to 6%) than during low-preference music ($M = 30\%$; range, 18% to 47%). Fred preferred the Lady Gaga song, which he selected on all trials (100%), whereas he selected the Rihanna song least often (13%). During the brief comparison, high-preference music ($M = 6\%$; range, 4% to 8%) produced lower levels of vocal stereotypy than did low-preference music ($M = 16\%$; range, 13% to 19%). Greg selected the Shakira song on nearly all trials (88%). He selected the Arabic 1 and Beatles songs on 25% of trials. Given that Greg had shown moderate preference for another Arabic song, we used the Beatles song as low-preference music. Levels of vocal stereotypy remained generally lower in the high-preference music condition ($M = 6\%$; range, 3% to 11%) than in the low-preference music condition ($M = 14\%$; range, 12% to 16%). Finally, David selected the Beyoncé song on the most trials (88%) and the Shakira song on the fewest trials (25%). Contrary to the other participants, David engaged in higher levels of vocal stereotypy during high-preference music ($M = 56\%$; range, 55% to 59%) than during low-preference music ($M = 46\%$; range, 41% to 51%).

Figure 2 depicts the percentage of time each participant engaged in vocal stereotypy during the free-operant observation periods (left) and

the treatment assessment (right). Vocal stereotypy persisted across 45- to 60-min observation periods (left) for Eric ($M = 56\%$; range, 32% to 81%), Fred ($M = 70\%$; range, 38% to 87%), Greg ($M = 73\%$; range, 61% to 86%), and David ($M = 48\%$; range, 41% to 56%). The results suggest that each participant's repetitive vocalizations were maintained at least partly by automatic reinforcement. During the treatment assessment, levels of Eric's vocal stereotypy remained lower in the high-preference music sessions ($M = 1\%$; range, 0% to 3%) than in the no-interaction sessions ($M = 45\%$; range, 27% to 66%). Similarly, Fred engaged in lower levels of vocal stereotypy when high-preference music played ($M = 22\%$; range, 1% to 41%) than when no music played ($M = 65\%$; range, 41% to 89%). Greg also engaged in lower levels of vocal stereotypy in the high-preference music sessions ($M = 15\%$; range, 10% to 21%) than in the no-interaction sessions ($M = 62\%$; range, 54% to 72%). Because levels of vocal stereotypy during the free-operant observation period ($M = 48\%$) were similar to those observed when both songs played during the brief comparison (see Figure 1, lower right), we did not implement noncontingent music as an intervention to reduce David's vocal stereotypy.

Overall, noncontingent access to high-preference music produced lower levels of vocal stereotypy than did noncontingent access to low-preference music for three of four participants. For these three participants, high-preference music also reduced vocal stereotypy when compared to baseline levels. The current study extends prior research by providing further support for the use of the modified paired-choice stimulus preference assessment to identify preferred music. Horrocks and Higbee (2008) demonstrated that the procedures could be used to identify auditory stimuli that produced reinforcing effects when applied contingent on adaptive behaviors; we replicated and extended their study by showing that the methodology also could be used to identify music that may decrease vocal stereotypy when provided non-

Figure 1. Percentage of trials Eric, Fred, Greg, and David selected each song (left), and percentage of time each participant engaged in vocal stereotypy when high- and low-preference music played (right).

Figure 2. Percentage of time Eric, Fred, Greg, and David engaged in vocal stereotypy during the free-operant observation periods (left), and during no-interaction and high-preference music sessions (right).

contingently. Furthermore, results for three of four participants replicate the findings obtained by Vollmer, Marcus, and LeBlanc (1994) using edible and tangible items to reduce motor response forms of stereotypy. These findings indicate that the noncontingent delivery of more preferred stimuli typically produces larger reductions in automatically reinforced behavior than do less preferred stimuli.

Clinicians and researchers should note that reductions in vocal stereotypy were not associated necessarily with increases in appropriate behavior (e.g., functional play, dancing, singing). On the contrary, our observations indicate that when music was playing, participants sometimes oriented themselves towards the speakers and engaged in motor stereotypy. Thus, combining noncontingent music with other interventions designed to produce response reallocation towards appropriate behavior may be important for some participants. Unexpectedly, vocal stereotypy during high-preference music was higher during the treatment assessment than during the brief comparison for Fred and Greg. Apart from duration, the only difference between the brief comparison and the treatment assessment was the absence or presence of toys. One potential explanation is that the presence of toys evoked higher engagement in vocal stereotypy during the treatment assessment. Alternatively, order effects or variability produced by uncontrolled events outside the music sessions may have produced the observed differences.

From a clinical standpoint, results underscore the importance of considering preference when using noncontingent music to reduce vocal stereotypy. Nonetheless, highly preferred music produced higher levels of vocal stereotypy for one participant; therefore, clinicians should consider measuring the effects of high- and low-preference music prior to implementation of the intervention on a regular basis. To this end, the 30-min brief comparison may be a rapid method of identifying those songs that are most likely to produce desirable changes in vocal stereotypy.

Results of the study are limited in at least four potential ways. First, the brevity of the free-operant observation periods and the absence of other analogue conditions prevent us from ruling out the possibility that the repetitive vocalizations were maintained in part by social reinforcement. Second, we did not compare the effects of low-preference music to a no-interaction condition. Our results suggested that high-preference music had more desirable effects; thus, the clinical utility of implementing a less effective alternative (i.e., low-preference music) was debatable. Third, the differences observed in levels of vocal stereotypy during high- and low-preference music conditions remained relatively small for some participants. Assessment of musical preference may still be important for most individuals, because clinicians currently have no other method of determining whether differences between low- and high-preference music will be large (as for Eric) or small (as for Fred and Greg). Finally, the environmental conditions under which the effects of noncontingent music were assessed limit the applicability of the results. For example, treatment sessions lasted 10 min. Hence, the results cannot be generalized to longer session durations because satiation may reduce the abative effects of noncontingent music. Furthermore, assessment of the use of headphones in the presence of other children may be important before the intervention is applied in inclusive settings (e.g., school).

In the future, the procedures should be replicated with a larger number of participants and with a comparison of both structurally matched and unmatched stimulation. Researchers also may examine the effect of prior discrimination skills on responding during the music preference assessment. Lastly, future research should aim to facilitate the social integration of children with autism spectrum disorders by combining noncontingent music with other interventions designed to increase engagement simultaneously in a variety of appropriate behaviors.

REFERENCES

- Horrocks, E., & Higbee, T. S. (2008). An evaluation of a stimulus preference assessment of auditory stimuli for adolescents with developmental disabilities. *Research in Developmental Disabilities, 29*, 11–20. doi:10.1016/j.ridd.2006.09.003
- Lanovaz, M. J., Sladeczek, I. E., & Rapp, J. T. (2011). Effects of music on vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 44*, 647–651. doi:10.1901/jaba.2011.44-647
- Saylor, S., Sidener, T. M., Reeve, S. A., Fetherston, A., & Progar, P. R. (2012). Effects of three types of noncontingent auditory stimulation on vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 45*, 185–190. doi:10.1901/jaba.2012.45-185
- Vollmer, T. R., Marcus, B. A., & LeBlanc, L. (1994). Treatment of self-injury and hand-mouthing following inconclusive functional analyses. *Journal of Applied Behavior Analysis, 27*, 331–344. doi:10.1901/jaba.1994.27-331

Received January 13, 2012

Final acceptance July 13, 2012

Action Editor, Thomas Higbee