RESPONSE COMPETITION AND STIMULUS PREFERENCE IN THE TREATMENT OF AUTOMATICALLY REINFORCED BEHAVIOR: A COMPARISON

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Clinicians are particularly challenged by the development of interventions for behavior maintained by automatic reinforcement because reinforcers that maintain the responses often cannot be directly observed or manipulated. Researchers have conducted either preference assessments or competing items assessments when developing effective treatments for behavior maintained by automatic reinforcement. However, interventions based on these assessments have not been directly compared. The current study evaluated procedures to make such a comparison. High-competition items resulted in greater reductions in vocal stereotypy than did high-preference items for a preschool boy with autism.

Key words: automatic reinforcement, preference assessment, competing items assessment, response competition, vocal stereotypy

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Accurate assessment and successful treatment of problem behavior have improved though application of functional analysis methodology to identify the variables that maintain the behavior (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). After these variables are identified, function-based interventions that maximize reinforcement for alternative behaviors and minimize or withhold reinforcement for the problem behavior can be designed. Problem behavior maintained by automatic reinforcement poses additional difficulty, because clinicians often cannot directly observe or measure the reinforcing consequences for the behavior. In such situations, additional assessment methods may be helpful.

Researchers and practitioners may use two additional assessment strategies to augment functional analysis outcomes when designing treatments for behavior maintained by automatic reinforcement. Stimulus preference assessments focus on the identification of items that an individual will differentially select or engage with relative to other items (e.g., DeLeon & Iwata, 1996; Fisher et al., 1992; Roane, Vollmer, Ringdahl, & Marcus, 1998). Assessment results may then be used in interventions designed to reduce behavior maintained by automatic reinforcement. For example, Vollmer, Marcus, and LeBlanc (1994) successfully included high-preference stimuli identified via a stimulus preference assessment in a treatment designed to reduce automatically reinforced problem behaviors.

Competing items assessments determine the relative preference between items and problem behavior by measuring interaction with available items and occurrence of problem behavior (Piazza et al., 1998). Assessment results are then used to select items to be included in treatment. Several studies (e.g., Ahearn, Clark, Gardenier, Chung, & Dube, 2003; Piazza et al., 1998) have demonstrated that noncontingent delivery of competing items (i.e., items associated with higher levels of interaction and lower levels of problem behavior) can decrease problem behavior maintained by automatic reinforcement.

Given that researchers have developed effective interventions for automatically reinforced problem behavior using two general forms of assessment, closer examination of these assess-

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ments is warranted. The term *high preference* can describe stimuli that are selected more often than other stimuli (e.g., Vollmer et al., 1994), and the term *high competition* can describe stimuli that result in increased suppression of problem behavior in the presence of stimuli (e.g., Piazza et al., 1998; Ringdahl, Vollmer, Marcus, & Roane, 1997). Given the same set of stimuli, it is possible that these assessments will identify different stimuli for inclusion in interventions. Moreover, for a given individual, treatment outcomes may vary as a function of the inclusion of high-preference or high-competition stimuli. To date, no studies have directly compared the effects of treatments based on these two assessment strategies for the same individual. Therefore, the purpose of the current study was to evaluate a methodology for determining the relative effects of high-preference and high-competition stimuli on levels of automatically reinforced behavior.

METHOD

Participant and Setting

Steve was a 4-year-old boy with autism who attended a preschool for children with autism spectrum disorders. He requested familiar food items using pictures and did not request or label using vocal speech or vocal approximations. He reliably responded to fewer than 10 simple, one-step instructions (e.g., pick up, come here). Steve was identified for participation as part of an ongoing assessment and intervention for vocal stereotypy and at the request of his parents. Results of a functional analysis of his vocal stereotypy were consistent with behavior maintained by automatic reinforcement (Iwata et al., 1982/1994). All sessions were conducted in Steve's instructional cubicle (3 m by 3 m) that included a table and two chairs.

Response Measurement and Reliability

Vocal stereotypy was defined as unrecognizable vocalizations lasting longer than 1 s or two or more vocalizations occurring within 1 s of each other, ending when Steve was quiet for 3 s. Common vocalizations included high-pitched screeching. During the preference assessment, observers recorded Steve's approach responses (i.e., touching one item). During the competing items assessment, observers collected data on vocal stereotypy and item interaction (i.e., touching the item) using 6-s partial-interval recording. During the treatment evaluation, observers collected data on vocal stereotypy using 6-s partial-interval recording.

For the purpose of interobserver agreement, a second observer collected data on approach responses during the preference assessment. For a given trial, agreements were defined as both observers scoring approach to the same item or no response. Interobserver agreement was calculated by dividing agreements by agreements plus disagreements and converting to a percentage. Agreement, calculated for 100% of trials during the preference assessment, was 100%. A second observer also collected data on vocal stereotypy and item interaction during the competing items assessment and on vocal stereotypy during treatment sessions. For vocal stereotypy and item interaction, an agreement was scored if both observers recorded the occurrence or nonoccurrence in an interval. Interobserver agreement was calculated by dividing agreements by agreements plus disagreements and converting to a percentage. Agreement data were collected on 27% of competing items assessment sessions and averaged 92% (range, 86% to 96%) for vocal stereotypy and 95% (range, 86% to 100%) for item interaction. Agreement data were collected on vocal stereotypy during 33% of treatment sessions and averaged 93% (range, 80% to 98%).

Assessment

Therapists conducted a paired stimulus preference assessment to identify Steve's preference among eight items (Fisher et al., 1992). Steve was familiar with all eight items and was given access to each item for 2 min before beginning the study. Each pair of stimuli was

presented to Steve twice in a quasirandom order. The two stimuli selected most often were identified as high-preference (HP) items. A competing items assessment was then conducted using the same eight items to identify levels of vocal stereotypy and interaction with each item. After each item was presented once, all items were presented a second time in a different order. The four items that resulted in lowest rates of vocal stereotypy were presented a third time to provide three opportunities from which to calculate means for vocal stereotypy and item interaction. Mean levels of vocal stereotypy and item interaction were calculated by dividing the number of intervals with vocal stereotypy or item interaction by the total number of intervals and converting to a percentage. The two stimuli associated with the lowest levels of vocal stereotypy during the competing items assessment were identified as high-competition (HC) items.

Design and Procedure

An ABCBC reversal design was used to compare the effects of baseline (A), fixed-time (FT) access to HC items (B), and FT access to HP items (C). All sessions lasted 5 min, with one to four sessions conducted daily, 3 to 5 days per week. No items were present, and the therapist provided no consequences for vocal stereotypy during baseline. Before starting sessions (B and C phases), Steve selected one item from either the two HC items or the two HP items. The selected item was then presented on an FT 30-s schedule, under which Steve was given 15-s access to the item after 30 s without access, regardless of levels of vocal stereotypy. This schedule was used to approximate the levels of vocal stereotypy observed during the competing items assessment. During the competing items assessment, vocal stereotypy occurred in 33% of intervals, so 15-s access followed by 30 s without access was arranged to result in an identical 33% of the session with access to an HP or HC item.

RESULTS AND DISCUSSION

Figure 1 shows the results of the preference assessment (top), competing items assessment (middle), and treatment comparison (bottom). The Slinky and Frisbee were identified as HP items, and the microphone and guitar were identified as HC items. During the treatment comparison baseline, vocal stereotypy occurred during 50% to 60% of intervals and was on an increasing trend. The HC condition resulted in decreases in vocal stereotypy. During the first HP phase, vocal stereotypy occurred at variable but somewhat higher levels than in the HC condition. Levels of vocal stereotypy again decreased when the HC condition was reintroduced. In contrast, reintroduction of the HP condition was associated with an immediate and large increase in responding. Therefore, HC items resulted in lower levels of vocal stereotypy than HP items presented on the same FT 30-s schedule.

Conducting the current study with a single participant limits the results in several ways. HC and HP items may or may not be different for other individuals, and HC items may not result in more effective interventions than HP items. Identifying HP items before HC items also possibly affected the results due to shifts in preference over time. To minimize this possibility, all assessments occurred within a week prior to treatment, and Steve was given a choice between two HP or HC items prior to each session (Graff & Libby, 1999). Finally, data were collected only on the primary dependent variable during treatment (i.e., vocal stereotypy), but data on item interaction during treatment also may have been informative.

Although functional analysis methods have greatly improved assessment and treatment of socially reinforced problem behaviors, development of additional assessments may be especially important for behaviors that are maintained by automatic reinforcement (Rapp, 2007). The occurrence of automatically reinforced behaviors may be understood in the
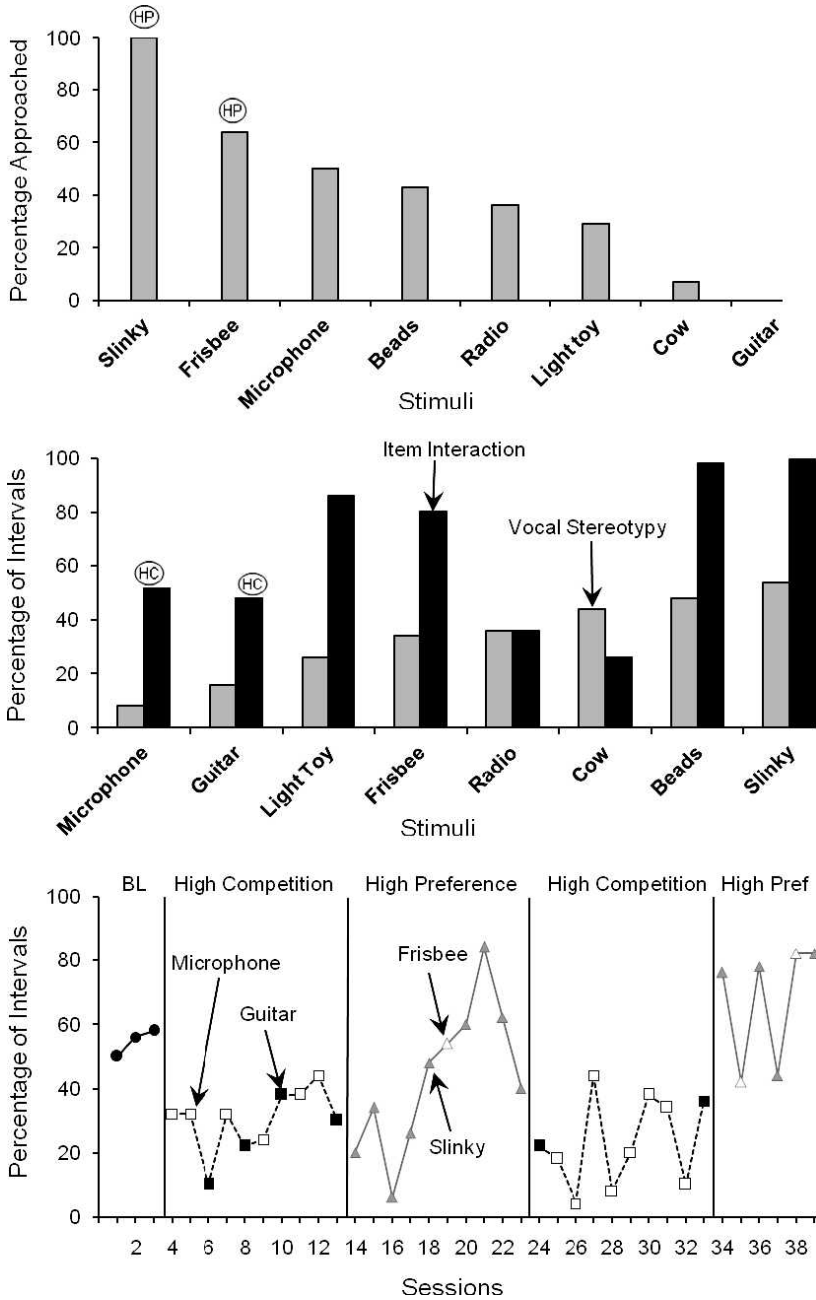
Figure 1. Approach responses to stimuli presented during the paired-stimulus preference assessment (top). Percentage of 6-s intervals with vocal stereotypy and item interaction during the competing items assessment (middle). Percentage of 6-s intervals with vocal stereotypy during the treatment comparison with items available for 15 s on an FT 30-s schedule (bottom).

context of a choice paradigm (see Fisher & Mazur, 1997, for a review), in which an individual's behavior is allocated to the currently available automatic reinforcers instead of consequences for alternative behaviors. With this in mind, it may not be surprising that HC items were more effective than HP items, because only the competing items assessment included a direct measure of responding between the concurrently available consequences for problem behavior and interaction with alternative items. The reliability of this finding, however, cannot be determined from this study. Instead, the current study offers a methodology for conducting additional research on the relative effects of HC and HP items with other participants, target behaviors, and interventions.

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