

*NONCONTINGENT PRESENTATION OF ATTENTION AND
ALTERNATIVE STIMULI IN THE TREATMENT OF
ATTENTION-MAINTAINED DESTRUCTIVE BEHAVIOR*

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Previous research has demonstrated that destructive behavior may be reduced through noncontingent presentation of attention when attention is identified as the stimulus responsible for behavioral maintenance. Because it may not always be possible to deliver attention in all situations, we examined the extent to which alternative stimuli that have been identified through a choice assessment would substitute for attention (the functional analysis-based reinforcer) in a noncontingent reinforcement procedure. Prior to treatment, functional analyses demonstrated that the destructive behavior of 2 clients with mental retardation was maintained by adult attention. Next, a stimulus choice assessment identified highly preferred tangible items for the 2 clients. Finally, we compared the effectiveness of two noncontingent reinforcement procedures: continuous noncontingent access to attention and continuous noncontingent access to the tangible item identified in the choice assessment. For both clients, these noncontingent reinforcement procedures reduced destructive behavior. The results are discussed in terms of the clinical implications for the treatment of destructive behavior using functional and alternative stimuli.

DESCRIPTORS: noncontingent reinforcement, extinction, satiation, developmental disabilities, preference assessments

Functional analysis is a method for assessing the sensitivity of aberrant behavior to environmental events. Attention is one environmental event that has been hypothesized to maintain maladaptive behavior (Carr, 1977). For example, Derby et al. (1992) found that 23% of clients demonstrated problem behavior that was maintained by adult attention. Iwata et al. (1994) reported a similar outcome for clients with self-injurious behavior (SIB). When a variable such as adult attention is found to maintain maladaptive behavior, treatments based on the function of the behavior can be developed.

Noncontingent reinforcement (NCR) has

been demonstrated to effectively reduce destructive behavior maintained by adult attention (Hagopian, Fisher, & Legacy, 1994; Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). NCR involves response-independent delivery of the stimuli (usually on a time-based schedule) that have been demonstrated to maintain the problem behavior. Vollmer et al. (1993) used NCR with 3 clients whose SIB was maintained by social attention. Initially, attention was delivered almost continuously, while SIB no longer produced attention (i.e., extinction). The schedule of attention was faded gradually over time until noncontingent attention was delivered only once every 5 min. The SIB of all 3 clients was reduced to low levels with the NCR treatment. Hagopian et al. (1994) replicated and extended the findings of Vollmer et al. by showing that NCR could be applied to behaviors other than SIB and by demonstrating that a dense schedule of NCR was more effective initially than a lean schedule in reducing destructive behavior.

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Vollmer *et al.* (1993) suggested that NCR may be effective because the procedure involves delivery of the reinforcer responsible for behavioral maintenance. However, Fischer, Iwata, and Mazaleski (1997) recently showed that noncontingent presentation of a preferred food produced immediate and dramatic reductions in problem behavior that was maintained by social positive reinforcement even when SIB continued to produce attention. That is, food was an effective substitute for attention. If food or other preferred stimuli (e.g., toys) are as effective in reducing destructive behavior as the reinforcer responsible for behavioral maintenance, clinicians would have more options when designing NCR treatments. Identifying reinforcers that are substitutable may be clinically useful, especially when it is difficult to deliver the reinforcer that is responsible for behavioral maintenance (e.g., when the adult is taking a shower, delivery of attention would not be practical).

The goal of the current investigation was to determine the extent to which alternative stimuli identified through a choice assessment (Fisher *et al.*, 1992) would effectively substitute for attention, which was the reinforcer that had been identified through the functional analysis as being responsible for behavioral maintenance (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). To address this goal, two NCR treatments were compared: one using attention and the other using an alternative stimulus identified through a choice assessment.

GENERAL METHOD

Participants and Setting

Two participants were admitted to an inpatient unit specializing in the assessment and treatment of destructive behavior. Rick was an 11-year-old boy who had been diagnosed with moderate mental retardation, oppositional defiant disorder, left hemi-

paresis, and mild obesity. His target destructive behaviors included aggression (hitting, kicking, pinching, hair pulling, biting, and throwing objects at others) and property destruction (banging, kicking, ripping, breaking, or overturning furniture). Rick's aggressive behavior had resulted in the hospitalization of his teacher and his mother. He was independent with his self-care skills, could follow complex instructions, and had good expressive and receptive communication skills (e.g., he could cook muffins with prompting and could tell you what he did on the weekend). He was not on any medication at the time of this investigation.

Hank was a 16-year-old boy who had been diagnosed with severe mental retardation with autistic-like features, chromosomal (2) deletion, lactose intolerance, cataracts, and chronic sinusitis. His target destructive behaviors were self-injury (fist-to-head hitting and head banging) and aggression (pulling hair and pinching). Hank's SIB had resulted in severe tissue damage in the form of bleeding, bruising, and multiple scars to his hands, wrists, and head. He was dependent on others for most of his self-care skills (e.g., bathing, dressing). He could follow a few simple instructions (e.g., "stand up" and "sit down") and was semi-independent with feeding (i.e., he could bring food to his mouth but needed assistance putting food on a utensil). He did not use any recognizable means to communicate. Hank received 0.1 mg BID of clonidine (0.007 mg/kg/day) throughout his hospital admission.

PHASE 1: FUNCTIONAL ANALYSIS

Procedure

A functional analysis was conducted with both participants. The conditions during the functional analyses were similar to those described by Iwata *et al.* (1982/1994) and included demand, social attention, toy play, alone (Hank only), and tangible (Rick only).

A tangible condition was conducted with Rick because the removal of a preferred item (specifically, a children's video) had been identified by his caretakers to be a problem at home and school. A tangible condition was not conducted with Hank because the removal of preferred items had not been identified by his caretakers to be a problem at his residence or school. The alone condition was not conducted with Rick because his primary problem behavior was aggression. Sessions were conducted in an individual treatment room (3 m by 3 m) equipped with a one-way mirror. During all assessment sessions, Hank wore a helmet without a face shield.

During social attention sessions, the client was given toys and was instructed to play. The therapist presented attention in the form of a brief verbal reprimand contingent upon target destructive responses. All other responses were ignored. During demand sessions, the therapist issued simple requests to Hank (e.g., "hand me the block," "stand up") and presented academic tasks to Rick (e.g., "write your name," "identify the word") approximately once every 30 s. Requests were delivered using a three-step prompting procedure (i.e., verbal, gestural, and physical prompts). Destructive behavior resulted in a 30-s break from the task (i.e., escape). Compliance, defined as correct completion of the request prior to initiation of the third prompt, resulted in brief praise and attention from the therapist. During the alone sessions, Hank was alone in an otherwise empty treatment room. During the tangible sessions, Rick was given access to the children's video for 2 min prior to the session. At the onset of the session, the therapist turned off the video. Destructive behavior resulted in access to the video for 30 s, and all other responses were ignored. During toy play, the therapist played with the client and delivered attention once every 30 s contingent on the first 5-s period in which

the targeted destructive behavior did not occur. During functional analysis, a multielement design was used to assess the target behaviors in four conditions for both clients. Sessions were 10 min in length and were conducted in a random order.

Data Collection and Interrater Agreement

During all functional analysis sessions, observers used laptop computers to record the frequency of Rick's and Hank's destructive behaviors. Rick's destructive behaviors were aggression and property destruction. Hank's destructive behaviors were SIB and aggression. Two independent observers scored the target responses simultaneously but independently during 60% of the functional analysis sessions. Agreement coefficients were calculated by partitioning each session into 10-s intervals, dividing the number of exact agreements on the occurrence of behavior by the sum of agreements plus disagreements, and multiplying by 100%. Mean exact agreement for destructive behavior was 94.9% for Rick and 97.0% for Hank.

PHASE 2: STIMULUS CHOICE ASSESSMENT

Procedure

Stimulus choice assessments (Fisher et al., 1992) were conducted to identify preferred stimuli for each client. Selection of stimuli for inclusion in the preference assessment was based on a structured interview administered to caregivers (*Reinforcer Assessment for Individuals with Severe Disabilities*, Fisher, Piazza, Bowman, & Amari, 1996). Each stimulus (nine for Rick, eight for Hank) was presented once with every other stimulus (i.e., paired presentation) in a random order. The client was given brief access (5 s) to the first stimulus he approached. Simultaneous approach to both stimuli was blocked, and the two stimuli were re-presented.

Data Collection and Interrater Agreement

During the stimulus choice assessments, observers scored approach responses for all stimulus presentations. Approach was defined as moving a hand toward the stimulus within 5 s of presentation. Two independent observers scored approach responses simultaneously but independently for 100% of the trials. Agreement coefficients were calculated by dividing the number of agreements (i.e., both observers agreed that the same stimulus was approached) by the sum of agreements plus disagreements and multiplying by 100%. The mean agreement coefficient for Rick was 100% and 86.9% for Hank.

PHASE 3: SIMULTANEOUS TREATMENT EVALUATION

Procedure

For each client, baseline sessions were identical to the attention condition of the functional analysis. The client was given toys and was instructed to play. The therapist provided a verbal reprimand following each occurrence of destructive behavior. Following baseline, two treatment conditions were conducted: noncontingent attention (NCA) and noncontingent tangible (NCT). During NCA, attention (the reinforcer that had been identified in the functional analysis of destructive behavior) was delivered noncontingently on a continuous schedule. Attention consisted of continuous verbal praise (e.g., "you're doing a good job"), physical interaction (e.g., pats on the back), and interactive play with the materials present in baseline (e.g., bouncing a ball back and forth). During NCT, the tangible item (the item that had been identified by the stimulus choice assessments as most highly preferred) was available noncontingently on a continuous schedule. The tangible item was a computer game for Rick and cookies for Hank. Rick was given the computer game at

the beginning of the session. Bite-sized portions of cookies were available to Hank on a napkin located on a plastic table in the middle of the session room. Sufficient amounts of cookies were available on the napkin such that the therapist did not have to put more cookies out at any time during the session. In the NCT condition, the therapist sat in a chair reading a magazine and did not interact with the client during the session. No differential consequence was delivered for destructive behaviors across treatment conditions (extinction). A combination multielement and ABAB design was used in the treatment evaluation for both clients. Phase A (baseline) was followed by Phase B (the simultaneous assessment of the two treatments, NCA and NCT). A return to baseline and a subsequent return to the simultaneous treatment evaluation were then conducted.

Data Collection and Interrater Agreement

During all treatment sessions, observers used laptop computers to record the frequency of the target destructive behaviors. Two independent observers scored the target responses simultaneously but independently during 78.7% of the treatment evaluation sessions for Rick and 72.0% for Hank. Mean exact agreement for destructive behavior was 92.7% for Rick and 97.0% for Hank.

RESULTS

Results of the functional analyses for Rick and Hank are depicted in Figure 1. The mean rates of target behaviors for Rick were (a) social attention, 24.2 responses per minute; (b) demand, 4.1; (c) tangible, 2.5; (d) toy play, 0. Hank's mean rates were (a) social attention, 6.8; (b) demand, 3.9; (c) alone, 5.6; and (d) toy play, 3.1. These results suggested that Rick's destructive behavior was sensitive to adult attention, access to a chil-

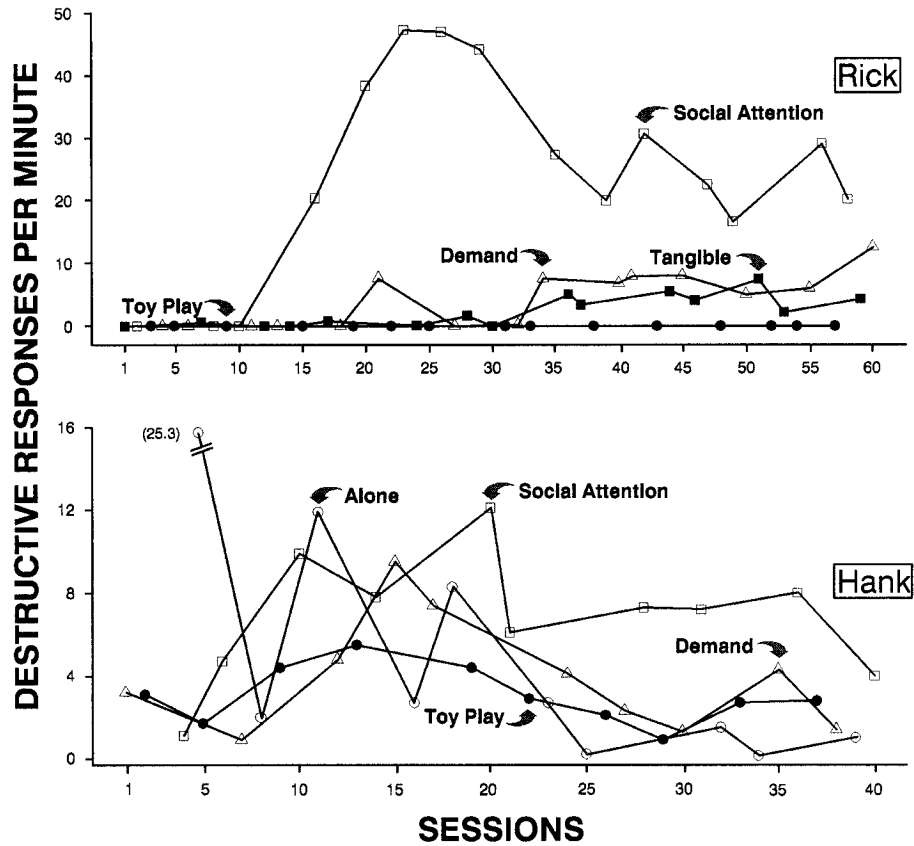


Figure 1. Number of responses per minute of destructive behavior for Rick (top panel) and Hank (bottom panel) during functional analyses.

dren's video, and escape from instructions as reinforcement. Hank's destructive behavior appeared to be sensitive to adult attention as reinforcement.

The percentage of stimulus choice trials in which each stimulus was approached is depicted in Figure 2. Rick approached the computer game on 100% of the trials and

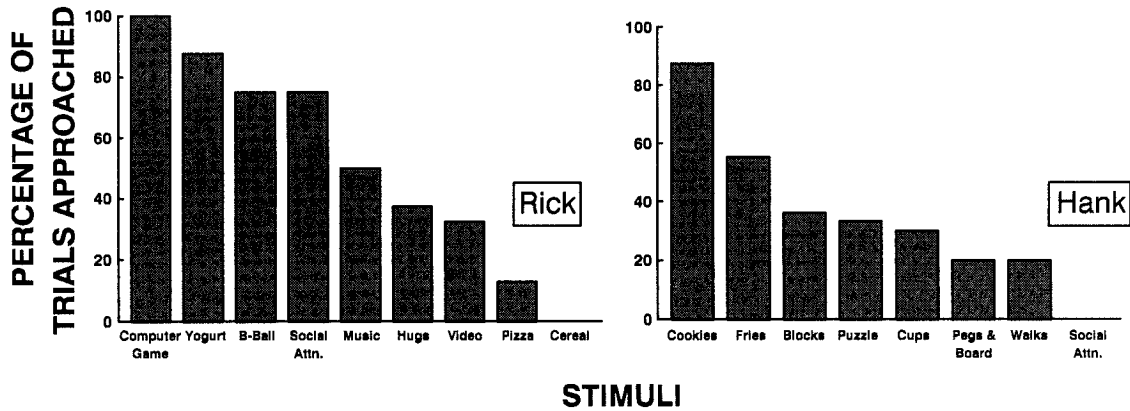


Figure 2. Percentage of trials during which each stimulus was approached by Rick (left panel) and Hank (right panel) during stimulus choice assessments.

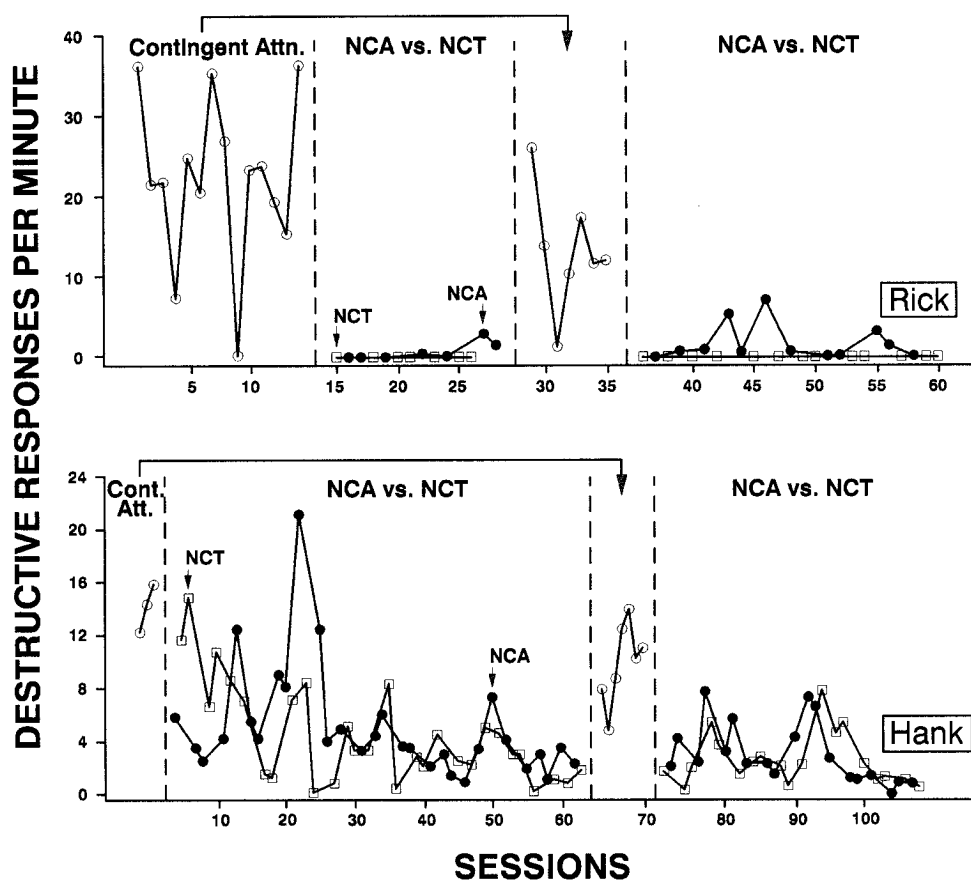


Figure 3. Number of responses per minute of destructive behavior for Rick (top panel) and Hank (bottom panel) during baseline (contingent attention), noncontingent attention (NCA), and noncontingent tangible (NCT).

Hank approached the cookies on 87.5% of the trials, indicating high preferences for those items.

Figure 3 depicts the number of destructive responses per minute during the treatment evaluation. The mean rate of destructive behaviors for Rick was 22.4 during baseline, 0.7 during NCA, and 0 during NCT. The return to baseline resulted in a mean of 13.3 responses per minute. During the return to the simultaneous treatment evaluation, the mean rate of destructive behavior was 1.7 during NCA and 0 during NCT. Rick's destructive behavior decreased 86.6% from baseline during NCA and 100% from baseline during NCT.

The mean rate of destructive behaviors for

Hank was 14.1 during baseline, 5.1 during NCA, and 4.4 during NCT. The return to baseline resulted in a mean of 9.8 responses per minute. During the subsequent return to the simultaneous treatment evaluation, mean rate was 3.0 in NCA and 2.5 in NCT. Hank's destructive behavior decreased 66.6% from baseline in the NCA condition and 68.1% from baseline in the NCT condition.

DISCUSSION

In the current investigation, a series of analyses was conducted to assess and treat the destructive behavior of 2 clients with mental retardation. Results of functional

analyses indicated that destructive behavior was sensitive to attention as reinforcement. Stimulus choice assessments identified highly preferred stimuli for the 2 clients. In the final phase, we compared the effectiveness of two noncontingent reinforcement procedures: continuous access to attention and continuous access to the tangible item identified through the choice assessment. For both clients, NCA and NCT were effective in reducing destructive behavior. NCT was somewhat more effective than NCA for Rick; the differences between the effects of the two treatments were negligible for Hank.

Continuous presentation of the reinforcer that is responsible for behavioral maintenance during NCR generally results in rapid and dramatic decreases in problem behavior without an extinction burst (e.g., Hagopian et al., 1994; Vollmer et al., 1993) by altering the establishing operation and thus decreasing motivation to respond (Vollmer et al., 1993). Thus, one possible explanation for these results is that the tangible items were effective substitutes for attention and altered the clients' motivation to display destructive behavior. Substitutability is usually discussed in terms of relative responding in the presence of concurrently available reinforcers (Green & Freed, 1993). In the current investigation, substitutability was not directly evaluated because the stimuli (attention and tangible items) were not presented concurrently; therefore, the relative consumption of each stimulus under conditions of simultaneous availability is unknown. However, under conditions that had previously established attention as reinforcement for destructive behavior, alternative high-preference stimuli were used in an NCR schedule and appeared (with Rick, at least) to decrease motivation to display destructive behavior (i.e., functioned as a substitute establishing operation).

An alternative explanation is that the reductions in destructive behavior during

NCA and NCT resulted from discontinuation of contingent attention for destructive behavior (extinction). NCR packages typically include an extinction component (e.g., Vollmer et al., 1993). Thus, it is possible that the effects of both treatments resulted primarily or exclusively from extinction, and it mattered little whether the reinforcer responsible for behavioral maintenance or a substitute stimulus was presented noncontingently. However, Lalli, Casey, and Kates (1997) have shown that for 1 client, NCR without extinction was effective in reducing destructive behavior that was maintained by access to tangible items. For Rick, NCA and NCT reduced destructive behavior to zero in the first treatment session; therefore, it is difficult to attribute the reductions in his behavior to extinction (i.e., he never displayed destructive behavior during NCT and thus had no opportunity to learn that the behavior no longer produced attention). The gradual reduction in Hank's destructive behavior was more characteristic of typical extinction curves, and it is not possible to determine from these data whether noncontingent access to attention or the substitute stimulus hastened the course of extinction.

The primary limitation of the current investigation is that the extent to which the alternative stimuli functioned as maintaining reinforcers for problem behavior was not evaluated. To make such a determination, it would have been necessary to present the tangible stimuli contingent on destructive behavior. Thus, it is possible that the tangible items were functional reinforcers, and the treatments were effective because the NCT procedure involved presentation of a maintaining reinforcer. However, the clinical findings of the investigation are not substantially affected by this limitation. That is, our results have clinical relevance for the treatment of individuals whose aberrant behavior is maintained by attention, regardless of

whether the behavior is also maintained by access to tangible items.

Problem behavior that is maintained by attention is likely to occur when caregivers are occupied. Under such conditions, it is not always practical for caregivers to interrupt their ongoing activity to deliver noncontingent attention. The results of our assessment suggested that we can provide caregivers with an alternative and more practical form of noncontingent reinforcement based on the results of a paired choice assessment, which may be used to reduce problem behavior under stimulus conditions that evoke attention-maintained problem behavior. The alternative stimulus identified through a paired choice assessment may or may not maintain the problem behavior when presented contingently, but this issue becomes less important when the purpose of the assessment is to identify an alternative stimulus for clinical use in low-attention situations (e.g., every time the parent goes to the bathroom, he or she could give the child a preferred toy).

The findings of the current investigation are also consistent with those of Steege, Wacker, Berg, Cigrand, and Cooper (1989) and Vollmer, Marcus, and LeBlanc (1994). Steege *et al.* conducted a preference assessment to identify stimuli for use in a differential-reinforcement-of-alternative-behavior procedure to reduce the SIB of 1 client. Vollmer *et al.* used a choice assessment to identify preferred stimuli for 3 clients whose SIB was maintained independent of the social environment. These investigations demonstrated that alternative stimuli that are identified through preference assessments may be effective in treatments designed to reduce destructive behavior independent of the function of the behavior.

One potential limitation of substituting an alternative preferred stimulus for the reinforcer that is responsible for behavioral maintenance is satiation. That is, if toys or

food are substituted for attention during NCR and the individual becomes satiated on these substitute stimuli, attention-maintained destructive behavior may increase. By contrast, if attention is used during NCR and the individual becomes satiated on attention, attention-maintained destructive behavior would be unlikely. If this is true, it would be important to use substitute stimuli sparingly (i.e., only when it is most difficult to deliver the reinforcer that is responsible for behavioral maintenance). Future investigations should focus on the relative advantages and limitations of substituting alternative stimuli for the reinforcer that is responsible for behavioral maintenance during NCR.

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STUDY QUESTIONS

1. What is the practical value of finding stimuli other than maintaining reinforcers when using noncontingent reinforcement (NCR) to reduce the frequency of behavior problems?
2. Describe the results obtained during the functional analysis.
3. What were the alternative reinforcers selected for the 2 participants, and how were these stimuli identified?
4. What type of experimental design was used to compare the two NCR procedures, and what were the similarities and differences between them?
5. Summarize the results obtained during the treatment phase of the study.
6. What three explanations did the authors provide to account for behavior reduction associated with the NCT variation of NCR?
7. What additional procedures might permit more definitive statements regarding the above explanations?
8. What important point did the authors make about satiation to maintaining reinforcers versus alternative reinforcers, and what are its implications for treatment?

Questions prepared by SungWoo Kahng and Eileen Roscoe, University of Florida

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