Results of several studies suggest that delivery of supplemental (social) reinforcement for stereotypy might facilitate its subsequent extinction. We examined this possibility with 9 subjects who engaged in stereotypy by including methodological refinements to ensure that (a) subjects’ stereotypy was maintained in the absence of social consequences, (b) supplementary reinforcers were highly preferred and were shown to be reinforcers for some behavior, and (c) subjects were exposed to lengthy reinforcement and extinction conditions. In spite of these modifications, only 4 subjects’ stereotypy increased when supplementary reinforcement was delivered contingent on stereotypy, and no subject’s stereotypy decreased below initial baseline levels when social reinforcement was subsequently withheld. Decreases in stereotypy occurred with the implementation of noncontingent reinforcement. Thus, delivery of supplementary reinforcers either did not increase stereotypy or did not facilitate extinction of stereotypy maintained by automatic reinforcement. We discuss the practical and conceptual bases of these results with respect to our current understanding of function-based interventions.

Key words: stereotypy, functional analysis, extinction, treatment, automatic reinforcement, social consequences, noncontingent reinforcement

Results of prior research using functional analysis (FA) methods indicate that problem behavior exhibited by individuals with intellectual disabilities often is maintained by social reinforcement (see Iwata, Vollmer, & Zarcone, 1990, for a review). Some problem behavior, however, persists in the absence of social consequences and is maintained by automatic reinforcement that is produced directly by the response (Shore & Iwata, 1999; Vollmer, 1994). Stereotypy, described as “repetitious body movements without apparent adaptive effects” (Repp, Felce, & Barton, 1988, p. 281), is one form of behavior that often seems to be maintained by automatic reinforcement (Groskreutz, Groskreutz, & Higbee, 2011; Lovaas, Newsom, & Hickman, 1987).

Treatment of behavior maintained by automatic reinforcement is challenging because the source of reinforcement may be difficult to identify and control. Nevertheless, several function-based interventions have been effective in reducing problem behavior maintained by automatic
reinforcement, including noncontingent reinforcement (NCR), usually in the form of free access to leisure items (Goh et al., 1995; Ringdahl, Vollmer, Marcus, & Roane, 1997); extinction (EXT; Rapp, Miltenberger, Galensky, Ellingson, & Long, 1999; Rincover, 1978; Rincover & Devany, 1982); and various types of differential reinforcement contingencies (Cowdery, Iwata, & Pace, 1990; Shabani, Wilder, & Flood, 2001; Steege, Wacker, Berg, Cigrand, & Cooper, 1989; Wacker et al., 1990).

An interesting but seldom-used strategy for treating stereotypy is based on an unusual sequence of reinforcement and extinction. Described as *reinforcer displacement* (Neisworth, Hunt, Gallop, & Madle, 1985) or *interpolated reinforcement* (Schmid, 1986), the procedure involves superimposing a new response function over the original by explicitly reinforcing stereotypy. The goal of this intervention is to displace the original, automatic function of stereotypy with this new supplementary function, which might facilitate EXT when the new reinforcers are withdrawn. That is, if the newly acquired function displaces the preexisting automatic function (rather than just adding reinforcement value to it), then the subsequent withdrawal of supplementary reinforcement should extinguish the response or at least decrease it to levels below the original baseline. Prior research on this intervention has been rather mixed with respect to both findings: production of the supplementary reinforcement effect (i.e., increased responding) and reduction in responding below baseline after withdrawal of supplementary reinforcement.

Foxx and McMorrow (1983) presented two case studies in which the procedure was used. They found that increases in stereotypy were inconsistent during the supplementary reinforcement phase and that decreases were only temporary when supplementary reinforcement was withdrawn. Neisworth et al. (1985) subsequently conducted a more extensive evaluation. They collected data on two subjects’ stereotypy when no contingencies were in effect (baseline), when continuous supplementary reinforcement (small edible items) was delivered contingent on stereotypy (continuous reinforcement, CRF), and during subsequent conditions when edible reinforcement was no longer delivered (EXT and follow-up). During the CRF condition, one subject’s stereotypy increased from its baseline level, whereas the other subject’s stereotypy showed a slight decrease. In the EXT condition, during which supplementary reinforcement was withdrawn, both subjects’ stereotypy decreased markedly relative to its initial baseline. One subject’s stereotypy continued to decrease throughout EXT and follow-up; however, the other subject’s stereotypy eventually returned to its initial baseline level.

Although Neisworth et al. (1985) showed promising results, some limitations prevent clear interpretation of the data. First, a clear demonstration of a reinforcement effect was not obtained for either subject because both subjects’ responding was highly variable during both the baseline and CRF conditions, with a great deal of overlap in the ranges. This general lack of a reinforcement effect was compounded by the fact that experimenters terminated and discounted a session during the CRF condition if a subject did not engage in 25 instances of stereotypy within a 15-min window that began with the first occurrence of stereotypy. These were the first four and five CRF sessions conducted, which would have shown large decreases, rather than increases, in stereotypy from baseline. In addition, session length during the CRF condition was dependent on the subject’s responding. A session continued until 25 intervals of stereotypy occurred, which could have artificially inflated or deflated the percentage of intervals with stereotypy based on whether the subject engaged in stereotypy at a low (longer session) or high (shorter session) rate. Third, it is unclear whether stereotypy was maintained by automatic reinforcement, because there was no attempt to identify the reinforcers for stereotypy prior to treatment.
Schmid (1986) attempted to replicate and extend the findings of Neisworth et al. (1985) with six individuals with intellectual disabilities who engaged in various behaviors (e.g., climbing on furniture, naming objects in the room, scribbling on a blackboard, etc.) that were incompatible with a training program. Following baseline, supplementary reinforcement (CRF delivery of edible items) was delivered contingent on the target behavior and then was subsequently withheld during a reversal to baseline. Schmid obtained a supplementary reinforcement effect and a subsequent decrease in the target behavior with four subjects. The initial reinforcement effect was not obtained for the remaining two subjects, one of whom showed a decrease in the target behavior following the introduction of supplemental reinforcement. In addition, a functional analysis was not conducted to verify the function of the target behaviors, which were quite varied (at least topographically). Thus, it is unclear whether similar effects would have been observed with behavior clearly maintained by automatic reinforcement.

Finally, Sidener, Carr, and Firth (2005) conducted a study similar to those by Neisworth et al. (1985) and Schmid (1986), but first conducted an FA to verify that the stereotypy of their two subjects was not maintained by social reinforcement. They subsequently conducted baseline (no consequences), supplementary reinforcement (edible items delivered contingent on stereotypy), and return-to-baseline conditions. Neither subject showed an increase in stereotypy during the supplementary reinforcement condition. In addition, stereotypy did not decrease from the initial to the final baseline condition. Given the absence of an initial reinforcement effect, it is possible that the stimuli used as consequences would have been ineffective as reinforcers for any behavior, not just stereotypy.

Although the procedures and findings from the studies cited above have been quite variable, they provide some insight into methods that might be helpful in clarifying the effects of supplementary reinforcers first delivered and subsequently withheld for stereotypy. An FA like that conducted by Sidener et al. (2005) would verify that stereotypy, in fact, was not maintained by social reinforcement. Second, the stimulus to be delivered as a consequence for stereotypy should be demonstrated to function as a reinforcer for at least some response, suggesting that it might serve as a reinforcer for stereotypy (only Neisworth et al., 1985, reported that this was done, but the evidence was anecdotal). Finally, sufficient exposure to contingencies should be provided to allow the possibility that a new function may be acquired during the supplementary reinforcement condition and that extinction might be observed during the subsequent return to baseline. We extended previous research on supplemental reinforcement and extinction of stereotypy by including these methodological refinements. When this procedure was found to be ineffective for decreasing stereotypy, NCR was implemented with three subjects.

METHOD

Subjects and Setting

Subjects were nine individuals ranging in age from 8 to 58 years old who had been diagnosed with intellectual disabilities. All engaged in noninjurious stereotypy: straw flicking (Eric), finger rubbing (Alec and Arlene), finger movements (Kevin), card lining (Ray), nose flicking (Cal), finger mouthing (Kerry), and finger tapping (Orville and Harriet). Sessions were conducted two to five times per day, 3 to 5 days per week, in a treatment room at a vocational program, school, or group home. All session rooms were equipped with a table, chairs, and materials needed for the session.

General Sequence

An FA was conducted first to verify that levels of stereotypy persisted in the absence of social reinforcement. A preference assessment then was
conducted to identify highly preferred edible items, and a reinforcer test was conducted to show that the edible items served as reinforcers for an arbitrary response. If the edible items served as a reinforcer for some behavior, it was possible that they would serve as a reinforcer when delivered contingent on stereotypy. Next, the treatment analysis consisted of a baseline condition in which preferred edible items and praise were delivered contingent on stereotypy to establish a history of supplementary reinforcement, and a reversal to baseline to determine whether extinction-like effects would be observed. Three subjects (Orville, Eric, and Ray) were exposed to an NCR condition to demonstrate therapeutic reductions in stereotypy via a more traditional function-based intervention. Before implementation of NCR, a competing items assessment was conducted to identify leisure items that competed with stereotypy.

Response Measurement and Interobserver Agreement

Trained graduate and undergraduate students served as observers and recorded data using handheld computers or preprinted data sheets. Target responses and procedures during various phases of the study are described below.

Functional analysis and treatment. Data were collected on stereotypy during these sessions. Eric’s stereotypy consisted of straw flicking, defined as holding a plastic straw in his hands near his forehead or his ear and flicking it up and down with his fingers repetitively (i.e., two or more straw flicks within 2 s). Alec’s and Arlene’s stereotypy consisted of finger rubbing, defined as repetitive contact and movement between two or more fingers when no object was in the hands. Kevin’s stereotypy consisted of moving his fingers back and forth or flicking his thumb and index fingers together repetitively. Ray’s stereotypy consisted of lining cards in horizontal and vertical patterns on tables. Cal’s stereotypy consisted of flicking his nose with his finger repetitively. Kerry’s stereotypy consisted of finger mouthing, defined as the insertion of one or more fingers past the plane of her lips. Orville’s and Harriet’s stereotypy consisted of tapping in the form of repetitive contact between fingers (Orville) or hand (Harriet) against any surface (usually a table or the wall). Eric’s, Alec’s, Arlene’s, Kerry’s, Kevin’s, and Harriet’s stereotypy was recorded using partial-interval recording (i.e., the percentage of 10-s intervals during which stereotypy was observed). Ray’s, Cal’s, and Orville’s stereotypy was recorded as a frequency count. Data also were collected on the percentage of 10-s intervals during which subjects manipulated particular items during NCR conditions and competing items assessments (conducted to determine items to use during NCR). Item manipulation was defined as having one or both hands touching a particular item. Finally, data also were collected on therapist responses (delivery of consequences) in order to assess procedural integrity.

Preference assessment. The target response consisted of selecting (moving or pointing toward) one of two stimuli presented during a trial. Observers recorded each selection. Items were ranked by the percentage of trials on which each item was selected.

Reinforcer test. Arbitrary responses that consisted of simple and discrete movements (button pressing, card touching, clapping) were selected as target behaviors. All responses were recorded as frequency counts and were summarized as responses per minute. Data also were collected on therapist responses in order to assess procedural integrity and are available from the first author.

An independent observer collected data during at least 25% of all sessions in each phase. Interobserver agreement for interval data during FA and treatment sessions was calculated by dividing session time into 10-s intervals, dividing the number of intervals in which observers agreed on either the occurrence or nonoccurrence of a response by the total number of intervals, and converting the result to a percentage. Interobserver agreement on response frequency during FA, reinforcer test, and treatment sessions was
calculated by dividing session time into consecutive 10-s intervals, dividing the smaller response count by the larger response count for each interval, averaging these fractions across intervals, and converting the result to a percentage. Agreement on selection responses during the preference assessment was calculated by dividing the number of trials with scoring agreements by the total number of trials in a session and converting the result to a percentage. The mean agreement scores across subjects were 91% (range, 75% to 98%) for the FA, 93% for treatment (range, 88% to 96%), 100% for the preference assessment, and 97% (range, 90% to 99.8%) for the reinforcer test.

In addition to collecting agreement data on stereotypy, we collected data on the experimenter's delivery of supplementary reinforcers during all sessions of the reinforcement extinction evaluation. For target responses measured as frequencies, correct reinforcement delivery was scored if it occurred within 2 s of a target response. For target responses measured as percentage of intervals, correct reinforcement delivery was scored if it occurred within the same interval or the subsequent interval in which the target response occurred. The consistency of reinforcer delivery was calculated by dividing the number of correct reinforcement deliveries by the number of correct plus incorrect reinforcement deliveries. Mean consistency for the reinforcement extinction evaluation was 94% (range across subjects, 92% to 99%).

Phase 1: Functional Analysis

An FA was conducted of each subject's stereotypy. We should note that the FAs were not used in a prescriptive manner; that is, as a basis for developing an intervention. Given that our purpose was to evaluate an intervention most likely to be effective with stereotypy, which often is maintained by automatic reinforcement, FA results were used as a screening procedure to select individuals whose stereotypy was not maintained by social reinforcement. Although the assessment did not identify the specific characteristics of nonsocial (automatic) reinforcement that maintained behavior, it ruled out social reinforcement by demonstrating that behavior was maintained in its absence.

Procedures were similar to those described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994). Subjects were exposed to three conditions: Attention, escape, and no-interaction sessions were alternated in a multielement design. No-interaction sessions initially were alternated with attention and demand sessions in a two-to-one ratio and later were conducted in an uninterrupted series for some subjects. A toy play (control) condition was not included in this analysis because the sole purpose was to rule in or out automatic reinforcement as the maintaining variable. Sessions lasted 5 or 10 min.

During the attention condition, the subject was told that the therapist needed to work and that he or she was free to interact with leisure materials (e.g., magazine, paper and markers) present in the room. The therapist sat in a chair, pretended to engage in work-related tasks (e.g., reading), and did not interact with the subject except to deliver 3 to 5 s of attention (a mild statement of concern and physical contact) contingent on the occurrence of stereotypy. During the demand-escape condition, the therapist presented a series of trials that consisted of academic or household tasks (e.g., drawing shapes, folding socks) using a three-step (verbal, model, physical) prompting sequence. The therapist delivered praise contingent on compliance but terminated the trial and turned away from the subject for 30 s if he or she engaged in stereotypy at any time during the sequence. During the no-interaction condition, the therapist was present in the room but did not interact with the subject in any way.

Phase 2: Preference Assessment and Reinforcer Test

Preference assessment. A paired-stimulus assessment (Fisher et al., 1992) was conducted to identify three highly preferred edible items. Eight to 10 items were included in the preference
assessments. The three highest ranked items were selected for use during reinforcer test and treatment sessions.

Reinforcer test. This test was conducted to demonstrate that highly preferred edible items identified during the preference assessment served as reinforcers in some context. Arbitrary responses (e.g., button pressing, card touching) were selected as targets. Baseline and reinforcement conditions were implemented in either reversal (ABA) or multiple baseline designs across behaviors. All sessions lasted 5 min. Before each session, the therapist delivered a single prompt for the subject to engage in the response and delivered the relevant consequence. During baseline, no consequences were delivered. During the reinforcement condition, the therapist delivered a small piece of a preferred edible item in a rotating order after each occurrence of the target response.

Phase 3: Treatment

Subjects were exposed to baseline and reinforcement conditions in reversal (ABA) designs. Three subjects subsequently were exposed to baseline and NCR conditions in either reversal or nonconcurrent multiple baseline designs across subjects. Before we evaluated the effects of NCR, we conducted a competing items assessment (Piazza, Fisher, Hanley, Hilker, & Derby, 1996) to identify items to deliver during NCR sessions. In this assessment, eight to 10 leisure items were presented to the subject one at a time, and the percentage intervals of item engagement and stereotypy in the presence of each leisure item was measured. These assessments lasted 2 or 5 min. Items used in the competing items assessment were not the same as those included in the attention condition of the FA, and included crossword puzzles, massagers, beads, and sewing activities. The item with the highest level of interaction and lowest level of stereotypy was used during NCR conditions. Treatment sessions lasted 10 min.

Baseline. This condition was identical to the no-interaction condition of the FA. In fact, for all subjects except Kevin, all sessions in the no-interaction condition of the FA (Ray, Cal, Arlene, Kerry, Alec, Harriet, and Eric) or the sessions from the extended no-interaction part of the FA (Orville) were used as the initial baseline. A therapist was present but did not interact with the subject at any time throughout the session.

Supplementary reinforcement. The therapist delivered praise and the edible items used during the reinforcer test following occurrences of stereotypy. These stimuli were delivered on a fixed-ratio 1 schedule for discrete topographies of stereotypy (e.g., tapping) and on a fixed-interval 10-s schedule for continuous topographies of stereotypy (e.g., finger mouthing). Edible items were used for several reasons. First, previous studies that have evaluated supplementary reinforcement have shown a reinforcement effect only when edible items were used as reinforcers. Second, we hypothesized that delivery of potent primary reinforcers was most likely to result in a reinforcement effect. Third, edible reinforcers did not seem to compete with the occurrence of stereotypy as much as delivery of preferred leisure items did.

NCR. This condition was similar to baseline except that the therapist provided continuous access to items found to result in high levels of item interaction and low levels of stereotypy during the competing items assessment (e.g., crossword puzzle and beads for Eric, sewing and beads for Ray). Although the edible items delivered in the reinforcement condition could have been used in the NCR condition, we chose to use leisure items because they were more likely to be provided continuously and for longer periods of time by the staff and caregivers who worked with the subjects. Thus, to increase the likelihood of high treatment integrity after staff were taught to use the intervention throughout the day, we chose to use leisure items.

RESULTS

FA results (Figure 1) indicate that all subjects' stereotypy was maintained in the absence of social
Two general patterns of responding were observed. Six subjects (Harriet, Orville, Cal, Eric, Kevin, and Ray) engaged in low levels of stereotypy during attention and escape conditions but higher levels during the no-interaction condition. In addition, levels of stereotypy were maintained for Harriet, Orville, and Cal when consecutive no-interaction sessions...
were conducted. It is somewhat surprising that low levels of stereotypy occurred in the attention condition of the FA for these six subjects because of the similarity between the attention condition and the no-interaction condition; however, it is possible that the moderately preferred activities provided during the attention condition competed with the occurrence of stereotypy or that reprimands delivered in earlier sessions functioned to punish it. The remaining three subjects (Arlene, Kerry, and Alec) engaged in high levels of stereotypy across all conditions. In addition, Arlene and Kerry both continued to engage in stereotypy when consecutive no-interaction sessions were conducted, indicating that their stereotypy was not maintained by social reinforcement.

Results of the reinforcer tests showed that the items found to be preferred during the preference assessment functioned as reinforcers for arbitrary responses that were different in topography from target stereotypy. Figure 2 shows patterns of responding (card touches for Alec and button presses for Arlene) that were typical for all nine subjects: very low rates of responding during baseline, high rates during the reinforcement condition, and clear reversals during the return to baseline. Thus, results of the reinforcer test for all subjects demonstrated that the preferred edible items served as a reinforcer for some behavior and suggested that they might serve as reinforcers for stereotypy.

Results of the initial treatment, in which we first delivered and then withdrew supplementary

![Figure 2](image-url)  
Figure 2. Rates of target responses during the reinforcer tests for Alec and Arlene. Highly similar results were observed with all subjects.
reinforcement for stereotypy, were mixed. An increase in stereotypy from the initial baseline to the supplementary reinforcement condition was observed for four (Arlene, Kerry, Kevin, and Eric) of nine subjects. However, when supplementary reinforcement was subsequently withdrawn for these subjects, a decrease in responding below initial baseline levels did not occur. There was no increase in stereotypy when supplementary reinforcement was delivered for the remaining five subjects (Harriet, Cal, Alec, Orville, and Ray) and no decrease below initial baseline levels when supplementary reinforcement was withdrawn.

Figure 3 shows the data for the six subjects who experienced only the baseline and supplementary reinforcement conditions (i.e., those who did not experience NCR). Figure 3 (left) shows results for three of the four subjects (Arlene, Kerry, and Kevin) whose data revealed a reinforcement effect (increased stereotypy when supplementary reinforcement was introduced). However, when supplementary reinforcement was removed, stereotypy decreased to levels similar to those observed during the initial baseline (these results were replicated in subsequent supplementary reinforcement and baseline phases with Kevin). Figure 3 (right) shows results for three of the five subjects (Harriet, Cal, and Alec) whose behavior was unaffected by supplementary reinforcement. Harriet engaged in moderate levels of stereotypy across all conditions. Cal engaged in relatively low levels of stereotypy in baseline. Although several sessions of his reinforcement condition showed increases in stereotypy, most data points were

![Figure 3](image-url)
within the ranges observed during baseline. Alec engaged in high levels of stereotypy during baseline and supplementary reinforcement phases. Due to Alec’s high levels of stereotypy in baseline, it was not possible to show a reinforcement effect.

Figure 4 shows results for the remaining three subjects who also experienced the NCR intervention. Orville and Ray were the fourth and fifth subjects who did not show a supplementary reinforcement effect. Orville’s stereotypy (tapping) actually decreased when supplementary reinforcement was delivered contingent on this response (relative to levels observed during his first and second baselines). When NCR (free access to preferred leisure items) was implemented, he engaged in low levels of tapping and high levels of item interaction. These effects were replicated during subsequent baseline and NCR conditions. Ray’s stereotypy (card lining) occurred at moderate and variable levels across his initial baseline, supplementary reinforcement, and baseline phases. When NCR was implemented, responding showed somewhat of a delayed effect, but eventually his stereotypy decreased greatly, whereas his activity engagement increased to very high (although somewhat variable) levels. Finally, Eric was the fourth subject whose stereotypy showed an initial reinforcement effect. He engaged in variable levels of stereotypy (straw flicking) in baseline and nearly continuous stereotypy when the supplementary reinforcement condition was implemented. His stereotypy showed an initial decrease below its original baseline level when supplementary reinforcement was withdrawn but subsequently became both cyclical and variable, such that the overall level was similar to that observed in his initial baseline. When NCR was implemented, stereotypy decreased to near-zero levels and was replaced by high levels of activity engagement (this effect was replicated in subsequent baseline and NCR phases). In summary, Orville and Ray, whose stereotypy did not show an effect when supplementary reinforcement was delivered contingent on this response, and Eric, whose behavior did show an effect, all responded similarly when NCR was implemented.

DISCUSSION

The notion that behavior that already exists at some baseline rate may be increased via explicit supplementary reinforcement and then extinguished when that reinforcement is subsequently withdrawn has been suggested in several studies on the treatment of stereotypy. Findings have been inconsistent, however, because rates of problem behavior often (a) did not clearly increase when the new contingency was implemented (Foxx & McMorrow, 1983; Neisworth et al., 1985; Sidener et al., 2005) or (b) did not decrease below original baseline levels when the contingency was withdrawn (Neisworth et al., 1985; Sidener et al., 2005). We evaluated this supplementary reinforcement strategy by incorporating several methodological refinements to increase the likelihood that (a) problem behavior was maintained by automatic reinforcement, (b) stimuli selected as consequences had previously been shown to have a reinforcing effect, and (c) exposure to the new supplementary reinforcement contingency occurred over a relatively large number of sessions. Nevertheless, results obtained for nine subjects consistently failed to show a general therapeutic effect.

Schmid (1986) observed an increase in problem behavior with four of six subjects when supplementary reinforcers were delivered. By contrast, two of the subjects in the Schmid study, as well as both subjects in the Neisworth et al. (1985) study and in the Sidener et al. (2005) study, failed to show a clear reinforcement effect. Despite evidence in the present study that the stimuli used as consequences were both highly preferred (based on results of the preference assessments) and effective reinforcers for some response (based on results of the reinforcer tests), we observed a reinforcement effect for stereotypy with only four of nine subjects. It is unclear why
Figure 4. Levels of stereotypy during baseline (BL), supplementary reinforcement (SR), and noncontingent reinforcement (NCR) for the remaining three subjects who experienced the NCR intervention.
the other five subjects’ stereotypy did not increase. One possibility is that, because stereotypy occurred at relatively high levels during baseline, subjects did not have to increase their rates of stereotypy to receive frequent supplementary reinforcers. Orville’s stereotypy actually decreased from its baseline rate during the reinforcement condition, perhaps because the presence of food may have interrupted his natural pattern of responding, although it is unclear whether this correlation is more than an artifact. We should note that the use of a partial-interval measure for some subjects may have limited detection of small changes in the occurrence of stereotypy either when supplemental reinforcement was introduced or when it was withdrawn. However, the purpose of this study was to determine whether therapeutic effects (i.e., large changes in stereotypy) could be observed.

Regardless of whether stereotypy increased during the supplementary reinforcement condition, the same result was observed when supplementary reinforcement was withdrawn; in no case did stereotypy decrease and remain below its original baseline rate. It is not entirely surprising that an extinction-like effect was not observed with subjects for whom there was no initial evidence of a reinforcement effect (i.e., an increase in responding above the original baseline). In other words, given that those subjects’ stereotypy showed no initial sensitivity to the supplementary reinforcers, there was little basis to suspect that withdrawal of those reinforcers would have any influence on stereotypy. The more interesting question is why an extinction effect was not observed with those subjects for whom a supplementary reinforcement effect was observed. The most likely explanation is that removal of the superimposed social contingency resulted in an extinction-like effect only with respect to the new supplementary reinforcer. However, the removal of supplementary consequences for stereotypy did not supplant or disrupt subjects’ histories of sensory consequences, which presumably maintained responding in the absence of social consequences.

Another possibility is that subjects were not exposed to the supplementary reinforcement condition long enough for a transfer of reinforcement function to occur. The extent to which problem behavior that has one function will acquire a new one is not well known. One of the few reports of this phenomenon was a study by Lerman, Iwata, Smith, Zarccone, and Vollmer (1994), who observed that the self-injurious behavior of three subjects who relapsed following successful treatment had acquired at least one additional function. However, the time between the subjects’ initial and subsequent assessments ranged from 2 months to 2 years, and the intervening conditions to which subjects had been exposed were unknown. Thus, the optimal arrangement for transferring the function of problem behavior from one reinforcer to another one remains a question for future research. Furthermore, if extended histories of supplementary reinforcement are necessary, the efficiency of intervention would be compromised.

In summary, results of this study revealed no clinical benefits associated with the practice of explicit supplementary reinforcement (followed by attempted extinction) of stereotypy. Although evaluation of NCR was not the primary focus of this study, we included it as a condition with three subjects to compare its effects with the explicit reinforcement extinction procedure. In all three cases, NCR was associated with rapid and large reductions in stereotypy and high levels of engagement with leisure activities. Although NCR was evaluated with only three of the nine subjects, the data show that for these subjects, the ineffectiveness of the supplementary reinforcement procedure was not because stereotypy was extremely resistant to environmental manipulation. In fact, the use of a relatively simple, function-based intervention such as NCR to reduce problem behavior with these subjects supports the continued use and study of function-based interventions to decrease automatically reinforced problem behavior. That is, interventions that involve (a) altering the motivating operation (e.g., providing.
highly preferred items or activities under conditions of low stimulation, providing items or activities that compete with or substitute for the specific automatic reinforcer that maintains the occurrence of the problem behavior), (b) breaking the response–reinforcer relation (e.g., response blocking), or (c) differentially reinforcing appropriate replacement behavior (e.g., differential reinforcement of toy play) continue to have the most support for the treatment of automatically reinforced problem behavior.

REFERENCES


Received February 12, 2012
Final acceptance August 20, 2012
Action Editor, Wayne Fisher