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NEGATIVE SIDE EFFECTS OF NONCONTINGENT REINFORCEMENT

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Noncontingent reinforcement (NCR) has emerged as a treatment package for severe behavior problems. Although concerns about potential side effects (such as incidental reinforcement) have been raised, there have been few reported negative side effects in published studies to date. In this article, we report an NCR treatment evaluation for severe aggression that produced (a) an extinction burst and (b) incidental reinforcement. These side effects were evaluated by examining within-session response patterns and response distributions. As a solution, a brief omission contingency was added to the reinforcement schedule. The omission contingency resulted in decreased aggression rates.

DESCRIPTORS: noncontingent reinforcement, incidental reinforcement, differential reinforcement, aggression

Noncontingent reinforcement (NCR) has emerged as a viable treatment procedure based on the results of a functional analysis of behavior (e.g., Hagopian, Fisher, & Legacy, 1994; Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). Typically, NCR has been used as a treatment package that includes fixed-time (FT) schedules of reinforcement (attention, tangible items, or escape, depending on the operant function of the target behavior), extinction, and schedule fading. NCR has proven to be relatively easy to implement and has several advantages over differential reinforcement (e.g., ease of implementation, high rates of reinforcement; Vollmer et al., 1993). One concern in using NCR schedules as a treatment procedure is that reinforcer presentation may coincidentally follow aberrant behavior and, hence, reinforce its occurrence. To date, there have been no published reports of incidental reinforcement using the NCR package (presumably because the contingent relationship between aberrant behavior and the maintaining consequences is eliminated). A second potential concern with NCR is that extinction bursts could occur when an instance of aberrant behavior is not reinforced. If an extinction-induced burst of responding culminates with access to reinforcement, the result may be to accidentally maintain aberrant behavior. In this article, we report an NCR treatment evaluation for aggression that produced (a) an extinction burst and (b) incidental reinforcement of aggression. These side effects were evaluated by examining within-session response patterns and response distributions. Finally, we present data on a brief omission contingency that may be used to avoid incidental reinforcement effects.

METHOD

Emily, a 13-year-old girl with severe mental retardation, was referred by her parents and teachers to our clinical research team for severe aggression. Results of an interview and descriptive analysis revealed that aggression occurred when preferred items (e.g., magazines) were removed from her possession. Often, her aggression resulted in the

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return of the items (i.e., to appease her or to calm her down). A functional analysis based on the procedures of Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) confirmed that her aggression was differentially responsive to tangible positive reinforcement (results available from authors upon request). Next, an NCR treatment evaluation was conducted 5 days per week with two to four sessions per day in an empty classroom at Emily's school. Sessions usually lasted 10 min, but one session (Session 20) was terminated due to increased severity and frequency of dangerous aggression. Aggression was defined as slapping, punching, grabbing, or pinching the therapist. Observers recorded data from behind a one-way observation window using hand-held computers. Interobserver agreement was assessed by having a second independent observer record data simultaneously during 37.5% of the sessions. Using calculation methods consistent with those of Vollmer et al. (1993), agreement scores averaged 96.3% (range, 76% to 100%).

During baseline sessions, a therapist and Emily engaged in a series of "turn-taking" trials in which Emily had access to magazines to begin a session; next, the therapist said, "my turn," and took the magazines until aggression occurred. If aggression occurred, the magazines were returned to Emily immediately for approximately 20 s. This baseline condition simulated the contingencies in effect when peers or adults took items from or shared items with Emily. Also, the baseline sessions were identical to a tangible reinforcement condition in the functional analysis. The next condition was continuous NCR to establish that aggression did not occur when Emily had free and continuous access to magazines. Following a brief reversal to baseline, NCR was reestablished with a schedule-fading component. The schedule-fading component was based on procedures described by Vollmer et al. (1993) and first involved continuous access to magazines (Session 14) and then withholding access to magazines for 10 s out of every minute (Session 15), 20 s out of every minute (Session 16), and 30 s out of every minute (Session 17). During Sessions 18 through 20, the schedule became FT 1 min, with 20 s of reinforcer access per minute (i.e., 40 s out of every minute without access to magazines). Initially, fading was designed to extend the reinforcer delivery to FT 5 min, but negative side effects of NCR precluded schedule escalation beyond FT 1 min. Because NCR with schedule fading was unsuccessful, a final condition was added that included momentary differential reinforcement of other behavior (MDRO; Repp, Barton, & Brulle, 1983). MDRO was identical to NCR except that a programmed reinforcer delivery was aborted if aggression occurred within 10 s prior to the scheduled delivery; that is, aggression influenced reinforcer delivery only if it occurred just prior to the scheduled reinforcer delivery. During MDRO, the reinforcer delivery schedule started at 20 s and progressed to 1 min. When a stable, low rate of behavior was obtained, the MDRO schedule escalated gradually to 5 min (see Figure 1).

RESULTS AND DISCUSSION

The upper panel of Figure 1 shows the overall effects of each condition on aggressive behavior. Aggression occurred an average of 1.4 responses per minute during baseline (range, 0.4 to 1.8). The first NCR condition eliminated aggression ($M = 0$ responses per minute), presumably because the magazines were never withdrawn from Emily's possession. During a brief reversal to baseline, aggression occurred at a rate similar to that observed in the initial baseline. During the second NCR condition, in which magazine possession time was reduced (because the reinforcer–reinforcer interval was

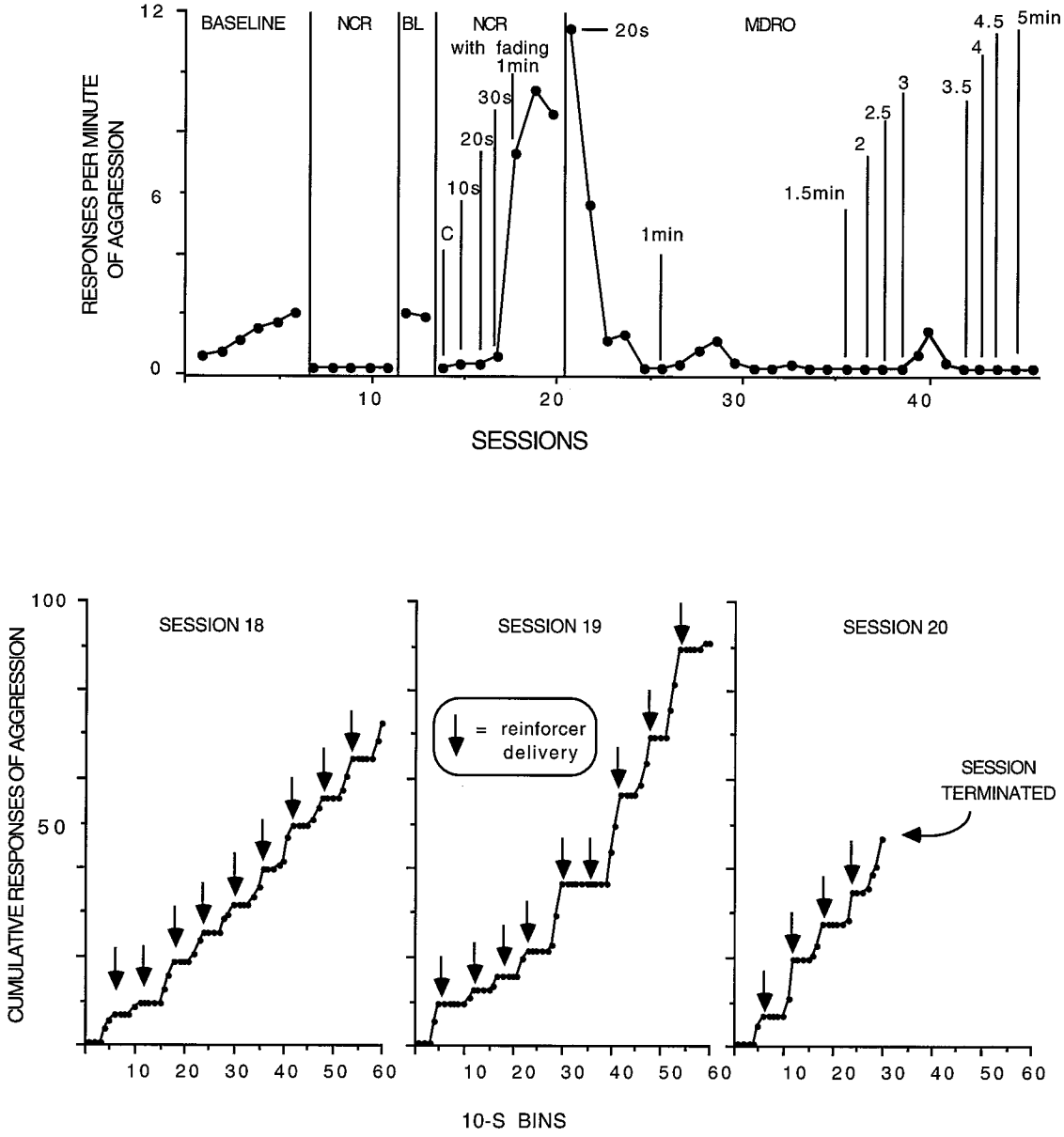

Figure 1. The upper panel shows aggression rates during baseline, continuous NCR, NCR with fading, and MDRO conditions (values for MDRO are shown in minutes). The fading steps are indicated by the lines and reinforcer delivery schedule values. The lower panel shows cumulative records of aggression during Sessions 18 through 20. Arrows indicate when reinforcers were presented.

gradually increased), aggression increased (M = 3.7 responses per minute; range, 0.1 to 9.2). Finally, after an initial burst of aggression, MDRO gradually reduced instances of aggression (M for the final 10 sessions = 0.25 responses per minute; range, 0 to 1.6).

It is possible that the escalation of behavior during Sessions 18 through 20 would have been reduced over time had the NCR condition continued (such as with an extinction burst). However, an evaluation of the within-session response patterns showed that aggres-

sion was probably being reinforced. The lower panels of Figure 1 show cumulative records of aggression for Sessions 18 through 20. Each data point represents the cumulative frequency of responding within 10-s bins. Session 20 had only 30 such bins because the session was terminated due to severe aggression. The cumulative records show that (a) aggression occurred most frequently as the scheduled reinforcer delivery approached, and (b) the overall frequency of responding was increasing within and across sessions during the 10-s bins that preceded reinforcer delivery. For these three sessions, aggression occurred in 76% of the 10-s bins that immediately preceded reinforcement, did not occur during reinforcement, and occurred in only 16% of the 10-s bins that immediately followed reinforcement. The frequency of aggression during the 10-s bins that preceded reinforcer delivery averaged 1.6 during the first 5 min of Session 18 and steadily increased to 5.8 in the 10-s bins that preceded reinforcer delivery during Session 20.

This study showed that NCR potentially can result in bursts of responding that may culminate coincidentally with reinforcement; when such incidental reinforcement occurs, a brief omission contingency may be useful. This is the first reported case of negative side effects with NCR. Conclusions about MDRO remain tentative because its effects were not replicated. In addition, aggression may have been extinguished eventually with the NCR schedule only; however, continued exposure to NCR was not supported by the analysis of response patterns during Sessions 18 through 20. During those sessions, coincidental pairings of aggression and time-based reinforcement increased aggression (i.e., incidental reinforcement). Because of the similarities of the two schedules, the benefits of NCR schedules (e.g., implementation ease, high rate of reinforcement) should also occur with MDRO schedules, except perhaps during an extinction burst. During a burst, the rate of reinforcer delivery would decrease substantially with an MDRO schedule (relative to an NCR schedule), but this decrement would circumvent the negative side effect of incidental reinforcement.

Given that NCR is known to be a relatively effective and efficient procedure under some conditions, we are not suggesting that the procedure should be avoided based on the results of one treatment evaluation; rather, just as with all behavioral interventions, careful analysis of response patterns should be a critical feature of the treatment selection process. In previous applications of NCR, reinforcer deliveries often occurred when no response had been emitted (thus, the response–reinforcer contingency was disrupted); in this application of NCR, few reinforcer deliveries occurred in the absence of aggression and several reinforcer deliveries immediately followed instances of aggression. Future work could address the necessary and sufficient conditions to establish contingencies of reinforcement that support aberrant behavior.

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