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EVALUATING THE SEPARATE AND COMBINED EFFECTS OF POSITIVE AND NEGATIVE REINFORCEMENT ON TASK COMPLIANCE

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Positive and negative reinforcement are effective for treating escape-maintained destructive behavior. The current study evaluated the separate and combined effects of these contingencies to increase task compliance. Results showed that a combination of positive and negative reinforcement was most effective for increasing compliance.

Key words: compliance, negative reinforcement, positive reinforcement

Teachers consider compliance to be a critical skill for success in a classroom (Walker, 1986). Lack of consistent compliance (i.e., noncompliance) can lead to significant deficits in skill development (e.g., self-help skills), negatively affect family life and parental stress levels (Wierson & Forehand, 1994), and lead to more severe behavior problems (e.g., delinquency, aggression; Merchant, Young, & West, 2004). Given the potential adverse impact of noncompliance, interventions for increasing compliance are warranted.

Positive reinforcement alone (DeLeon, Neidert, Anders, & Rodriguez-Catter, 2001; Lalli et al., 1999) or in combination with negative reinforcement (Kodak, Lerman, Volkert, & Trosclair, 2007; Piazza et al., 1997) has been demonstrated to be effective for increasing compliance while resulting in reduced levels of destructive behavior. However, little research has evaluated the effects of negative and positive reinforcement on compliance independent of treating destructive behavior. In addition, the existing research has not evaluated the relative effects of positive and negative reinforcement alone versus in combination. Thus, the current study evaluated the separate and combined effects of positive and negative reinforcement on task compliance.

METHOD

Participant and Setting

Nate, a 14-year-old boy who had been diagnosed with Down syndrome, displayed noncompliance with caregiver demands (e.g., self-help skills, academic tasks, daily chores). All sessions were conducted in a room (4 m by 4 m) that contained a CD player (during those conditions in which the positive reinforcement contingency was in place) and instructional materials. The instructional materials consisted of five to 10 separate pieces of paper that were each formed into a ball (hereafter referred to as trash) and a trash can.

Response Measurement and Interobserver Agreement

Throwing away trash was selected as the target task for this evaluation based on a review of Nate's existing self-help goals and because the response could be physically guided. Compliance was defined as completion of the task within 5 s of a vocal or modeled prompt and prior to a physical prompt. Task presentation

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was scored at the initiation of a prompting hierarchy, not the initiation of each separate prompt. Observers collected data on the frequency of task compliance and task presentation using a computer-based data-collection program. Percentage of compliance was calculated by dividing the frequency of task compliance by the frequency of tasks presentations and multiplying by 100%.

Interobserver agreement data were collected for 34% of sessions. To calculate interobserver agreement, a computer program partitioned each session into successive 10-s intervals. Exact agreement coefficients were calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. An agreement was defined as both observers scoring the same frequency of a response during the same 10-s interval. Agreement averaged 95% (range, 68% to 100%) for task compliance and 94% (range, 67% to 100%) for task presentations.

Procedure

Throughout all conditions, trash was dumped on the ground next to the trash can and the can was placed within arm's reach of the participant each time the trash was emptied. When Nate placed all of the trash into the can, the therapist subsequently dumped out the can such that the target response was continuously available throughout the session. Tasks were presented using a graduated prompting hierarchy that consisted of sequential vocal, modeled, and physical prompts in which the vocal prompt was presented immediately following the preceding task (or at the beginning of the session; i.e., a 0-s delay to vocal prompts). Following the vocal prompt, the subsequent prompts were delivered every 5 s unless Nate complied with the task or was in the process of completing the task. The consequences arranged for compliance varied across conditions, and Nate was provided with rules prior to each session regarding the consequence in place for compliance. All sessions were 10 min in length, with the exception of the combined (break plus music) sessions conducted in the second analysis, in which session length was increased due to yoking the number of tasks presented during sessions (described below). Session length in the yoked combined condition ranged from 8 min to about 33 min.

During baseline of the initial analysis, the experimenter provided brief praise for compliance (e.g., "nice job, Nate") and presented tasks continuously using the prompting hierarchy described above (i.e., there were no breaks for compliance). Following baseline, we compared a break condition, a music condition, and a combined contingency (break plus music). During the break condition, compliance resulted in brief praise and 60-s break from task presentations (i.e., task materials were removed for 60 s). During the music condition, compliance resulted in brief praise and 60-s access to music (identified as preferred in a preference assessment; Roane, Vollmer, Ringdahl, & Marcus, 1998) while task presentation continued using the prompting procedure. In the combined condition, compliance resulted in brief praise and a break from task presentations with simultaneous access to music for 60 s. The initial analysis was conducted in a reversal (ABCBCDCDC) design.

After the initial comparison of the various contingencies, we conducted a second analysis to evaluate whether the number of task presentations altered the effectiveness of the different reinforcement contingencies. That is, it was possible that the observed increase in compliance during the combined condition relative to the music condition was due to the overall lower amount of task presentations in the former condition. During the second analysis, the baseline, break, and music conditions were conducted in a manner identical to that described in the initial analysis. The yoked combined condition included the same contingencies as described above (i.e., brief praise, 60-s break from task presentations with access to

music); however, the number of tasks presented during this condition was yoked to match the number of tasks presented in the first two phases of the music condition of the second analysis. Specifically, the total number of tasks presented in each session of the initial music phase (e.g., 61 and 54; $M = 57$ tasks presented per music session) was recorded, and each total was randomly assigned to a session in the yoked combined condition (some totals were used across multiple sessions due the different number of sessions conducted in the music and combined conditions; $M = 56.1$ tasks presented per yoked combined session). The baseline, break, music, and yoked combined conditions were compared in a reversal (ABCBCDCD) design.

RESULTS AND DISCUSSION

The results of the initial analysis are shown in Figure 1 (top). During baseline, compliance was low ($M = 9.1\%$). Levels of compliance decreased when the break contingency was implemented alone ($M = 2.3\%$). Compliance was higher when the music contingency was implemented alone ($M = 46.9\%$). When the contingencies were combined, levels of compliance were highest ($M = 86.4\%$) and most stable, with 100% compliance for the last five sessions. Figure 1 (bottom) depicts the results of the second analysis in which low levels of compliance were observed during baseline ($M = 9.7\%$) and break alone (compliance was not observed). Compliance increased slightly in the music condition ($M = 26.2\%$). Initially, compliance was low in the yoked combined condition but increased to near 100% toward the end of this condition ($M = 67.8\%$).

In sum, the combined contingency was most effective for increasing task compliance. When implemented alone, neither contingency increased compliance above 50%; however, the music contingency implemented alone was generally more effective than the break contingency implemented alone. It is possible that carryover effects between the combined condition and music condition may have altered levels of compliance in the music condition of the initial analysis. In other words, Nate first experienced access to music for compliance in the combined condition, which might have affected levels of compliance in the subsequent music condition. Different levels of compliance may have been observed if the music condition directly followed the break condition. This possibility was addressed in the second analysis by implementing the music and break conditions in this order; levels of compliance during the music condition of the second analysis ($M = 26.2\%$) were lower than those observed in the initial analysis ($M = 46.9\%$).

The purpose of the second analysis was to address the possibility that the number of tasks presented during each session influenced the differences in compliance observed between the initial music and the combined conditions. During the first analysis, all sessions were 10 min in length. Therefore, more tasks were presented throughout the session when the music contingency was implemented alone ($M = 34.9$ tasks presented during the music conditions of the initial analysis) than when the negative reinforcement contingency was also in effect ($M = 9.8$ tasks presented during the combined conditions of the initial analysis). Although compliance was more variable in the yoked combined condition (relative to the combined condition of the initial analysis), the overall results were consistent across all exposures to the combined condition. That is, the results of the second analysis suggested that the increase in compliance observed under the combined contingency (relative to music alone) in the first analysis was not a function of the number of tasks presented.

Results of the current study suggest that a combination of both positive and negative reinforcement was most effective for increasing one participant's compliance to simple tasks. One possible explanation for these results is that

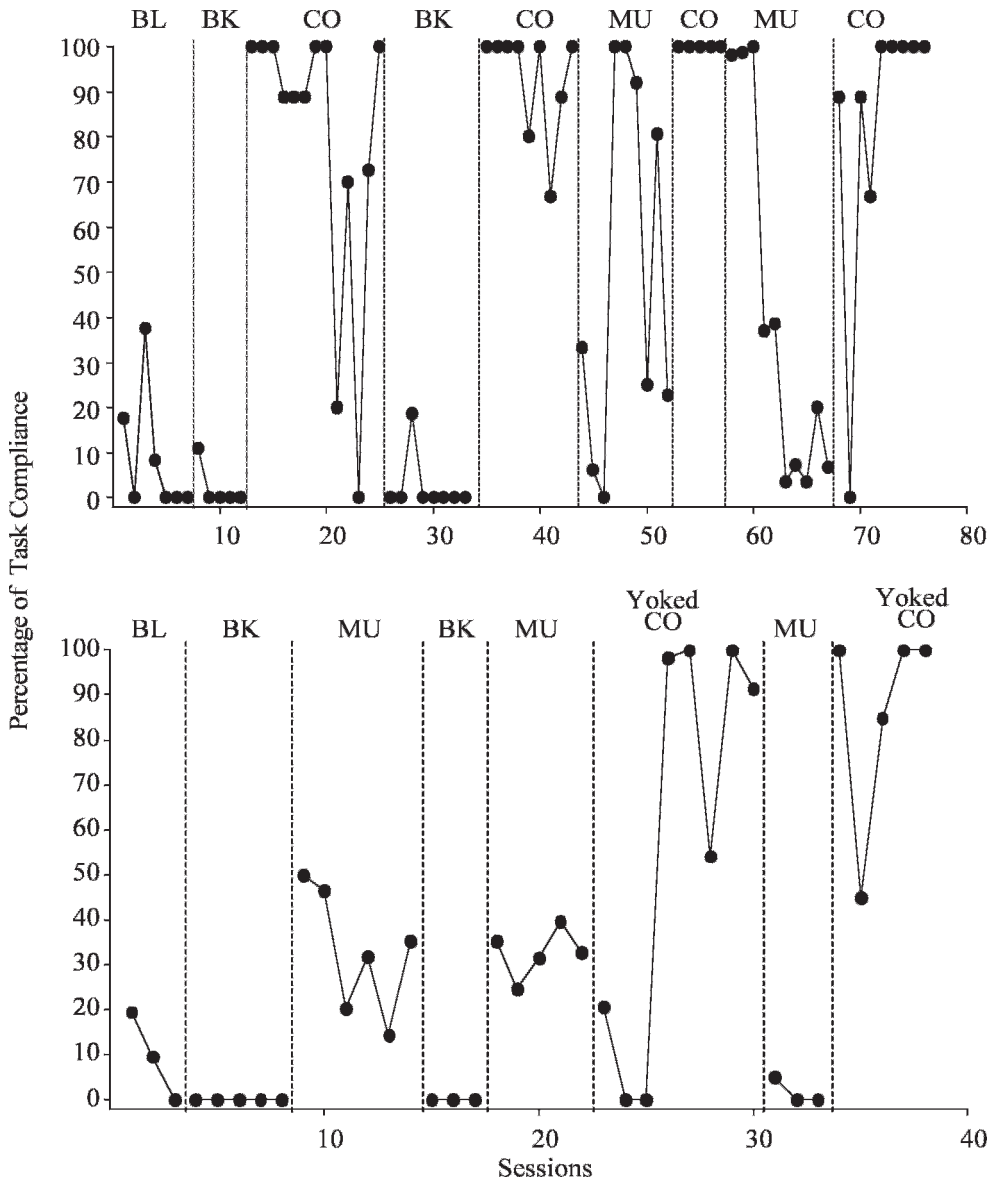

Figure 1. Nate's percentage of task compliance across the baseline (BL), break (BK), music (MU), and combined (CO) conditions of the first analysis (top) and second analysis (bottom).

the combination of both contingencies increased the individual value of each reinforcer. This may also resemble naturally occurring consequences that maintain noncompliance. For instance, when a child is noncompliant following a parent instruction and the parent allows escape from that instruction, the child likely has access to preferred items rather than sitting without engaging in any activity (as arranged in the break condition). These results are consistent with previous research in which a combination of positive and negative reinforcement was most effective for reaching treatment goals (e.g., DeLeon et al., 2001; Kodak et al., 2007; Lalli et al., 1999; Piazza et al., 1997). However, the current study is noteworthy in that previous research evaluated these contingencies for affecting levels of escape-maintained

problem behavior, whereas the current investigation examined the effects of these contingencies on compliance.

Nonetheless, results are limited by the inclusion of only one task. Future studies would benefit from the assessment of a variety of tasks across a variety of settings with less intrusive stimuli (e.g., music delivered via headphones). Likewise, noncontingent (e.g., continuous) access to positive reinforcement might increase compliance by functioning as an abolishing operation (cf. Lomas, Fisher, & Kelley, 2010). It is also possible that the participant encountered more physical prompting in the conditions associated with lower levels of compliance. To the extent that physical guidance may be an aversive stimulus, it is possible that the greater likelihood of physical prompting produced an overall suppression of behavior in these conditions (i.e., a generalized punishment effect). Thus, future research might evaluate these potential influences on interventions for increasing compliance.

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