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THE EFFECTS OF DIFFERENTIAL NEGATIVE REINFORCEMENT OF OTHER BEHAVIOR AND NONCONTINGENT ESCAPE ON COMPLIANCE

TIFFANY KODAK, RAYMOND G. MILTENBERGER, AND CATHRYN ROMANIUK

NORTH DAKOTA STATE UNIVERSITY

The present study evaluated the effects of noncontingent escape and differential negative reinforcement of other behavior in reducing problem behaviors and increasing compliance in 2 children with disabilities. Results showed that both methods reduced problem behavior and increased compliance for both children.

DESCRIPTORS: differential reinforcement of other behavior, noncontingent reinforcement, compliance, problem behavior, negative reinforcement

Noncontingent reinforcement (NCR) and differential reinforcement of other behavior (DRO) are treatment procedures in which reinforcement is delivered independent of the problem behavior (NCR) or contingent on the absence of the problem behavior (DRO) in intervals of time. In the case of problem behavior maintained by escape from instructional activities, the reinforcer delivered in a DRO or NCR procedure could involve brief escape from the task. Although a few studies have demonstrated the effectiveness of differential negative reinforcement of other behavior (DNRO) or noncontingent escape (NCE) procedures for decreasing escape-maintained problem behavior occurring in instructional contexts (e.g., Coleman & Holmes, 1998; Vollmer, Marcus, & Ringdahl, 1995), little is known about the effects of NCE or DNRO on compliance with instructional activities. Coleman and Holmes measured compliance as well as problem behavior when evaluating NCE and showed that compliance increased as problem behaviors decreased. Similarly, Roane, Fisher, and Sgro (2001) demonstrated covariation between compliance and problem behavior when NCR was implemented in an instructional setting, although that investigation involved the application of positive reinforcement. The purpose of the present study was to evaluate changes in compliance resulting from the use of NCE and DNRO procedures for problem behavior maintained by escape.

METHOD

Participants and Setting

Participants were 2 children who engaged in problem behavior during instructional activities. Andy was a 4-year-old boy who had been diagnosed with autism and had deficits in a number of areas including language skills. John was a 4-year-old boy who had been diagnosed with autism and who did not have any identified cognitive deficits. Baseline and treatment sessions were conducted in a quiet, private room in the children's homes with only the researchers and the child present. The room contained various session materials, a table and chair, and a videocamera for recording the sessions. Andy's task materials included cards with pictures, words, or letters on them. Two cards were placed on a table and Andy was

This study was conducted as a thesis by the first author. Tiffany Kodak is now at Louisiana State University.

Address correspondence to Raymond G. Miltenberger, Department of Psychology, North Dakota State University, Fargo, North Dakota 58105 (e-mail: ray.miltenberger@ndsu.nodak.edu).

asked to point to one of the cards. John's task materials included a marker and paper with words written on it in large letters. John was asked to trace each letter of the words on the paper.

Target Behaviors and Data Collection

Disruptive behavior included pounding, grabbing, throwing, or pushing task materials, scribbling on the materials with a pen, pounding or pushing the table, saying or shaking his head no, resisting physical prompts, throwing the pen, and hitting the pen in the therapist's hand. Compliance was measured as the number of trials in which the child initiated the task following the therapist's initial demand but before an additional prompt was delivered, divided by the number of trials. Each session was videotaped. The onset and offset of problem behavior was recorded using the VCR timer. Interobserver reliability was conducted by having a second observer independently score 25% of the baseline and treatment sessions for both participants. A reliability percentage was calculated by dividing the seconds of agreement on the occurrence and nonoccurrence of the target behavior by the total seconds in the observation period. Agreement between the observers on the onset and offset of the target behavior was recorded when the raters were within 1 s of each other. Mean agreements on problem behavior for Andy and John, respectively, were 92.7% (range, 89% to 99%) and 94% (range, 85.6% to 98.4%). Mean agreements on compliance for Andy and John, respectively, were 94.6% (range, 90.7% to 100%) and 97.2% (range, 91% to 100%).

Treatment Acceptability

The parents rated the acceptability of NCE and DNRO using the Treatment Evaluation Inventory—Short Form (TEI-SF; Kelley, Heffer, Gresham, & Elliot, 1989). The TEI-SF has nine questions rated on a 5-point Likert scale (5 = *strongly agree,* 1 = *strongly disagree*) for a maximum acceptability score of 45 and a minimum score of 9.

Procedure and Experimental Design

We evaluated NCE and DNRO using an alternating treatments design embedded in a nonconcurrent multiple baseline design across subjects. In baseline and treatment sessions, the child worked on an instructional task. We praised each correct answer and used a three-prompt sequence (vocal, modeled, and physical prompt) when the child did not engage in the task upon request. If the child got out of his chair during a session, we guided him back to the chair. Each baseline and treatment session lasted 15 min. We conducted two to four sessions each day, 3 to 6 days per week. Two therapists (first and third authors) conducted alternating baseline sessions each day so that the subject was exposed to the two therapists who eventually conducted the NCE and DNRO conditions.

Baseline. The therapist instructed the child to engage in the educational task and, if the problem behavior occurred, the therapist removed the task materials and turned away from the child for 10 s, providing a brief escape from the task. Prior assessments showed that problem behavior was most probable during task situations when it was followed by escape from the task.

NCE. In the first treatment session, the child received a continuous break. Next, a 10-s break was provided every 10 s. When two consecutive sessions were completed with problem behavior below the criterion level (85% reduction from baseline mean), the NCE interval was increased from 10 s, to 20 s, to 30 s, to 1 min, to 1.5 min, and finally to 2 min. John's criterion level for increasing the NCE interval was 0.66 responses per minute or less. Andy's criterion level was 0.33 responses per minute or less. John's reinforcement schedule was increased to 50

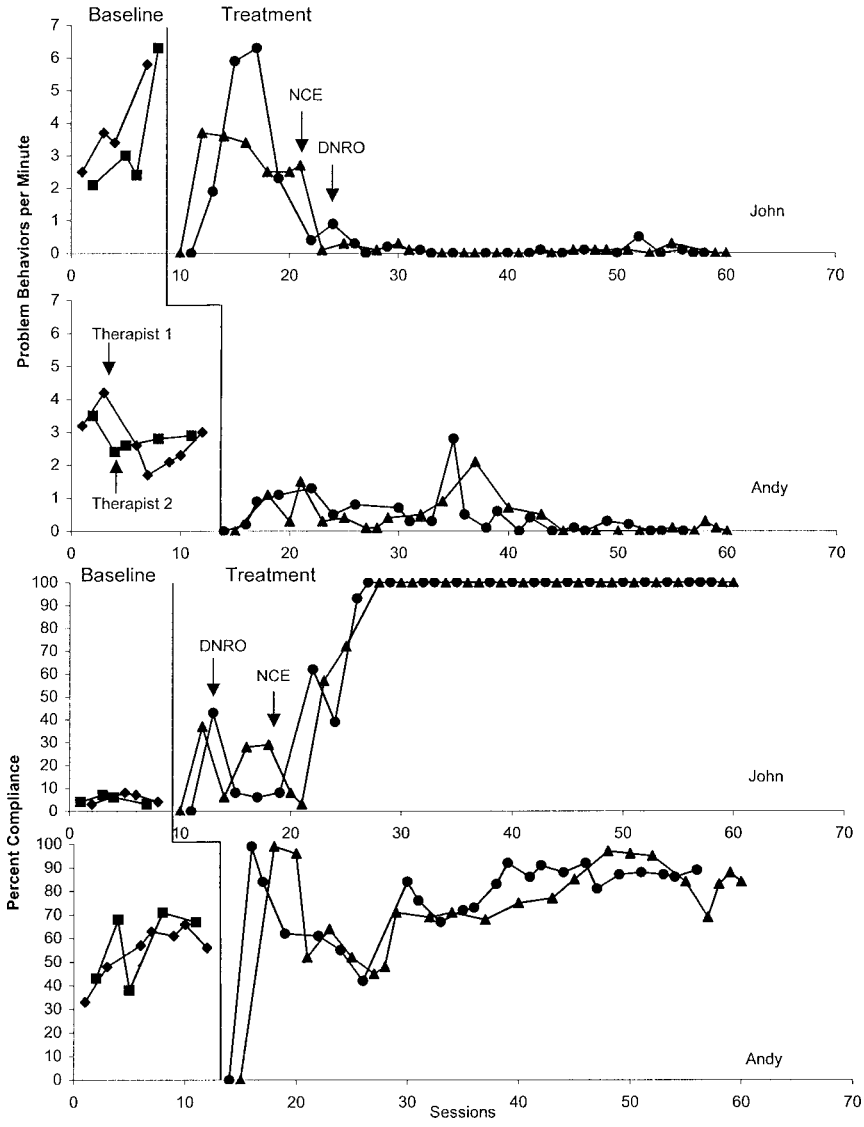

Figure 1. The top two panels show the rate of problem behavior across baseline and treatment conditions for John and Andy. The bottom two panels show the percentage of compliance across baseline and treatment conditions for John and Andy.

s of break delivered every 10 s in the NCE sessions.

DNRO. In the first treatment session, we provided a continuous break. In the second treatment session, the DNRO interval was 10 s. If the child did not engage in problem behaviors in the interval, a 10-s break was provided. If the problem behavior occurred within the time period, the clock was reset and the break was given after 10 s without any problem behavior. As sessions proceeded, the DNRO interval was increased from 10 s, to 20 s, to 30 s, to 1 min, to 1.5 min, and ended at 2 min. The DNRO intervals were increased only if the rate of the problem behavior was equal to or less than the individual criterion level. During DNRO, John's reinforcement schedule increased in a manner identical to that in the NCE condition.

Treatment Integrity

Treatment integrity was evaluated in 24% of sessions by recording the percentage of opportunities that escape from the task was given when it should be (within 2 s) according to the interval in effect during NCE and DNRO. Overall, breaks from the task were provided at the correct point in the session for both procedures 94% to 99% of the time.

RESULTS AND DISCUSSION

Both NCE and DNRO produced large decreases in problem behavior for John and Andy (see Figure 1), although problem behavior did not decrease for John until the reinforcement schedules were modified after the seventh treatment session. This led to a rapid reduction in problem behavior that was maintained throughout the remainder of treatment as the reinforcement schedule was thinned. For John, compliance increased from less than 10% in baseline to 100% with both NCE and DNRO. For Andy, compliance increased from 56% in baseline to 83% in treatment, with equivalent results for DNRO and NCE. The mothers of both children provided a TEI-SF rating of 43 for NCE and DNRO after watching videotapes of treatment sessions near the end of the treatment phase.

The current study found both DNRO and NCE to be effective treatments for increasing compliance and decreasing problem behavior. This finding extends the work of Coleman and Holmes (1998) showing that NCE can have a positive effect on compliance to instructional activities. It is not clear why NCE or DNRO led to increases in compliance given that these procedures do not provide any contingency for compliance. A few explanations are plausible: (a) Compliance was adventitiously reinforced, (b) frequent breaks made the demands less aversive, thus reducing the establishing operation for escape, or (c) praise became an effective reinforcer for compliance only after NCE and DNRO reduced escape behavior. Further research is needed to investigate these and perhaps other possible explanations for the effects of NCE and DNRO on compliance.

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