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PRELIMINARY COMPARISON OF TWO NEGATIVE REINFORCEMENT SCHEDULES TO REDUCE SELF-INJURY

Maura L. Roberts, F. Charles Mace, and Julie A. Daggett
Arizona State University, The University of Pennsylvania, and The University of Kansas

This study compared the effectiveness of differential negative reinforcement of other behavior (DNRO) and alternative behavior (DNRA) for reducing self-injurious tantrums maintained by escape from demands in a 4-year-old girl with severe retardation. Both DNRA and DNRO reduced self-injury and increased independent performance of two tasks (tooth brushing and bathing); however, improvement on both measures was greater with the DNRA intervention.

DESCRIPTORS: negative reinforcement, differential negative reinforcement, self-injury, escape-maintained behavior

Negative reinforcement technologies are in the early stages of development and evaluation (Iwata, 1987). Individuals whose behavior problems are maintained by negative reinforcement may be good candidates for negative reinforcement intervention because escape already serves to maintain their behavior. Like intervention by differential positive reinforcement, differential negative reinforcement (DNR) discontinues reinforcement (escape or avoidance) for the target response and arranges escape contingent on another behavior. For example, Marcus and Vollmer (1995) reduced escape-maintained disruption by discontinuing escape for disruption and permitting escape from tasks contingent on either mands or compliance.

DNR interventions can take a variety of forms including differential negative reinforcement of alternative behavior (DNRA) and differential negative reinforcement of other behavior (DNRO). DNRA reinforces a specific response with escape, whereas DNRO arranges escape for the elapse of an interval without problem behavior. Their counterpart positive reinforcement procedures, DRA and DRO, have both proven to be effective in reducing behavior problems; however, direct comparisons of the two procedures showed DRA to have more rapid, but not larger, effects than DRO (Tarpley & Schroeder, 1979). The present study compared the effectiveness of DNRA and DNRO for reducing escape-maintained self-injury and increasing task compliance. Unlike DRA, DNRA reinforces contact with the stimulus that establishes escape as a reinforcer. This characteristic of the procedure may affect its efficacy.

METHOD: Mary was a 4-year-old severely retarded female who was hospitalized for treatment of self-injurious behavior (SIB). Her SIB consisted of head hitting, buttocks slamming, and face slapping. All sessions were conducted in a bathroom (5 m by 3.5 m) equipped with a large bathtub, sink, and mirror.

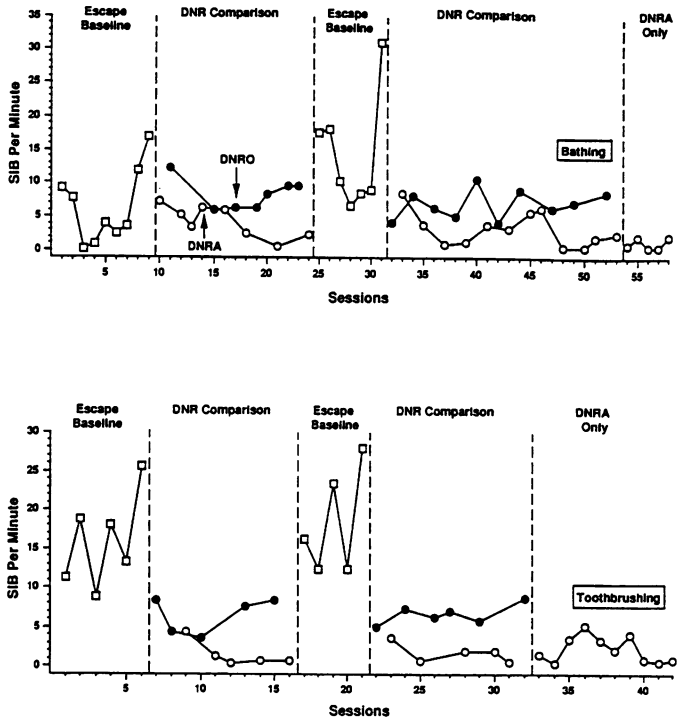
Two independent observers measured SIB, independent performance of task steps, task escape, and instructional prompts using a continuous count within 10-s intervals. The rate of SIB for each condition was calculated by dividing its frequency by the total duration of the session in which demands were in effect (i.e., break time was not included). Mean interobserver agreement, calculated on a point-by-point basis, was 89% or higher for SIB and task performance. Integrity data indicated that 98% of the bathing task (28 steps) and 99% of the tooth-brushing task (14 steps) were implemented correctly across all experimental phases.

Pretreatment descriptive and experimental analyses of Mary's SIB were conducted during the first 3 weeks of her hospitalization (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). During analogue experimental conditions (escape, attention, tangible, and play), SIB occurred most frequently in the escape condition (M = 1.7 per minute) and was not observed during the play condition. Various tasks were assessed during the escape condition of the functional analysis, although the highest rates of SIB were observed during bathing and tooth brushing, the tasks that were subsequently used to evaluate the DNR procedures.

Escape-maintained SIB was treated using differential negative reinforcement of alternative behavior (DNRA) and differential negative reinforcement of other behavior (DNRO) during alternating bathing and tooth-brushing sessions. Baseline procedures were identical to the functional analysis escape condition (Iwata et al., 1982/1994), as were DNR procedures, except that during DNRA and DNRO (a) SIB no longer produced escape from the task, and (b) physical guidance was used contingent on noncompliance to vocal prompts after 3 s. Effects of the two DNR procedures were evaluated using a combined reversal and multielement design and a final phase in which the most effective procedure was implemented during all sessions. The treatments were first evaluated during bathing and then were replicated during tooth brushing. Sessions lasted from 15 to 25 min and were terminated when all steps were completed.

DNRA treatment sessions began with the first experimenter providing a vocal prompt to engage in the first step of the bathing task. If compliance to the experimenter's request did not occur within 3 s, Mary was physically guided to complete the step. Compliance within 3 s resulted in a 15-s period of escape from instruction (i.e., negative reinforcement of compliance). Physical guidance was avoided if Mary continued to complete task steps independently as requested by the experimenter. If Mary attempted to comply with the verbal request but was unsuccessful, she was not physically guided. However, after three consecutive unsuccessful attempts to complete the step, the experimenter provided physical guidance. DNRO sessions were initially implemented by the second experimenter. Procedures were identical to DNRA except that (a) a 15-s period of escape from task demands occurred contingent on 20 continuous seconds without SIB, and (b) compliance produced praise but not escape. After the 15-s escape period, instruction resumed until another 20 s elapsed without SIB. The DNRO reinforcement interval was set at 20 s (approximately twice the duration of the mean SIB interresponse time during the initial baseline). During both DNR conditions, the only activity or stimuli available during break intervals were the task materials (e.g., water, soap, toothbrush, washcloth).

RESULTS AND DISCUSSION: The figure shows Mary's SIB across the escape baseline and DNR treatment conditions during both tasks. During bathing, SIB averaged 6.3 per minute and 14.5 per minute in the first and second baseline phases, respectively,



with 0% compliance in both. Mary was ill during the third and fourth sessions of the first bathing baseline, which may have resulted in lower rates of SIB. The first and second phases of DNRO resulted in a mean of 8.3 SIB per minute and 8.7% compliance and 6.9 SIB per minute and 10.2% compliance, respectively. DNRA was comparatively more effective, reducing SIB to a mean of 4.2 per minute in the first phase and 3.2 per minute in the second phase. Compliance in both phases averaged 47.5% and 54.6%. DNRA used by both experimenters in the final phase reduced SIB to a mean of 1.2 per minute with 65.1% compliance.

Baseline SIB during tooth brushing averaged 16.0 per minute in the first phase and 18.4 in the second phase, with 0% compliance in both. DNRO reduced SIB to an average of 6.4 per minute with 35.4% compliance in the first treatment phase and 6.6 per minute with 21.1% compliance in the second phase. DNRA was again comparatively more effective; SIB was first reduced to a mean of 1.4 per minute with 77.7% compliance and then to 1.7 per minute with 78.8% compliance.

These findings suggest that DNR treatment of escape-maintained behavior problems may be more effective when escape is provided for task compliance rather than after an interval without target behaviors. These effects for DNR differ from those reported for DRO and DRA in which positive reinforcement is used (Cowdery, Iwata, & Pace, 1990). We speculate that negative reinforcement of task compliance may further weaken the maintaining response–escape contingency and contribute to the effectiveness of the treatment. Alternatively, DNRA may have been more effective than DNRO in the present study because the density of reinforcement was somewhat greater in the DNRA intervention. Future research should attempt to hold constant the reinforcer densities for the two procedures.

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Address correspondence and reprint requests to Maura L. Roberts, Division of Psychology in Education, Arizona State University, Box 870611, Tempe, Arizona 85287. Received June 3, 1995; final acceptance September 21, 1995; Action Editor, Wayne Fisher.