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ENURESIS CONTROL THROUGH FADING, ESCAPE, AND AVOIDANCE TRAINING

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A twin-signal device that provides both escape and avoidance conditioning in enuresis control is described involving a procedure documented by two case studies. In addition, a technique of fading as an adjunct to the process is utilized with one subject. The results indicate that a combination of operant and respondent conditioning involving escape and avoidance training may be an improvement over the more traditional conditioning procedure.

DESCRIPTORS: enuresis, fading, escape, avoidance training, children

To those who are more familiar with the work of Mowrer and Mowrer (1938) in incontinence training, the utilization of both respondent and operant conditioning may at first appear to be strange bedfellows. The addition of escape and avoidance conditioning as part of the procedure brings operant conditioning into play and may provide a more successful method to follow in enuresis control. Tough, Hawkins, McArthur, and Van Ravenswaay (1971) utilized a Mowrer type apparatus but modified the procedure by having the mother, following the sounding of the buzzer, take the child to the bathroom and place him immediately in a bathtub of cold water. This procedure can be interpreted as an operant-punishment procedure in which the contingency can be avoided by having a dry night. A similar interpretation can be given to Lovibond's (1964) procedure involving an instrument that emits two signals, one when the child first voids and a second, more intense signal after an interval of time has elapsed. Sphincter contraction was interpreted as a response providing an escape from an aversive stimulus. The data collected using the device demonstrate it to be more rapid in action than the Mowrer approach. In both of the above examples, the subject's response is essentially passive, and the escape from the aversive situation appears to be involuntary with no active participation on the part of the enuretic.

The traditional position regarding enuresis training with the Mowrer-type apparatus is that bladder pressure for the enuretic is originally not an adequate stimulus to awaken the sleeper (i.e., a neutral stimulus). Through repeated pairing of a signal (i.e., an unconditioned stimulus) set off by micturation, the bladder pressure becomes a conditioned stimulus that elicits the detrussor muscle response and prevents voiding.

Tough et al. (1971), however, have suggested that the Mowrer procedure is essentially a punishment technique that weakens the micturation response. In such a case, the punishing stimulus suppresses the micturation response which it follows and leads to an operant rather than a respondent interpretation. Operant conditioning has been employed in enuresis training before (e.g., Benjamin, Serdahely, & Geppert, 1971: Samaan, 1972) although the operant procedures typically do not involve the apparatus and usually are in the form of praise or other more concrete rewards for a dry night.

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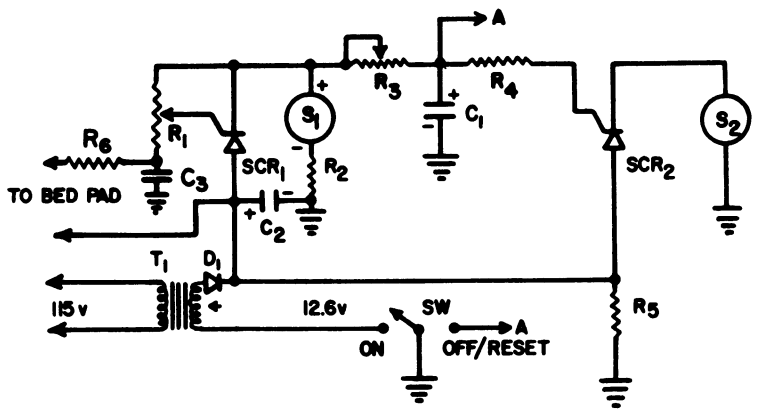

Fig. 1. Schematic of enuresis control circuit; component identifications are as follows: R_1, 10K variable control; R_2, 1500-ohm .25-w resistor; R3, 500K variable control; R_4 and R_6, 100K-ohm resistor; R_5, 1K-ohm .25-w resistor; C_1, 22-mfd 35-v capacitor; C_2, 100-mfd 50-v capacitor; C_3, 1-mfd 50-v capacitor; D_1, 3-amp 50-v diode; SCR_1 and SCR_2, 30-v sensitive gate; S_1, 3500-Hz Mallory Sonalert; S_2, 12-v buzzer; S_w, spst toggle switch; T_1, 12.6-v @ 1.2-amp transformer. Bed pads available from Sears, Roebuck & Co., Catalog No. 8G 1172.

The present research involves a modification of the Lovibond (1964) two-signal instrument which provides the opportunity for the enuretic to emit an active operant response that both terminates a low-intensity aversive stimulus and avoids a high-intensity stimulus.

Apparatus

A twin-signal device, based on Lovibond's (1964) research and consisting of solid-state elements, an isolation transformer to prevent shock, and two signaling devices, was designed by the author (Figure 1). The first signal, activated by the child's urine, emits a 3500-cycle tone at 70 db that, provided the child does not awaken and turn off a switch, is followed within 7 sec by a 380-cycle tone of 95 db—a tone that was aversive yet within tolerable, safe limits (Glass & Singer, 1972). A wire was connected between the device and two metal pads (see parts lists in Figure 1 caption) that were separated by a gauze pad (provided by the manufacturer) plus a piece of fiber-glass screening to prevent the shorting that this type of pad is prone to develop. A sensitivity control (R_1) is designed into the circuit so that conditions such as variations in humidity level may be controlled for. The control is adjusted by moving it to the least sensitive position that will trigger the alarm with the bed pad terminals shorted together. The device differs from that proffered by Lovibond in its use of solid-state, sensitivity and interval adjustment controls, and the incorporation of the subject as an active part of the procedure.[1]

CASE I

Subject

Subject was a 9-yr 8-mo-old boy with a history of chronic nocturnal incontinence. The child was normal in all other respects and expressed the desire to stop his bedwetting. A complete and thorough medical examination had been performed with no indication of any uropathology. Imipramine was administered for a 30-day period but resulted in only a few sporadic dry nights.

Under the supervision of the author, a Mowrer-type apparatus had also been utilized unsuccessfully for a period of several months, during which was found that the subject micturated two or three times a night. (Wickes, 1958, in a large-scale study, found such children the most refractory to conditioning treatment.) The parents reported that they never expressed disapproval for wetting and that, in addition to the above-mentioned procedures, they had futilely rewarded the child with praise and/or the plastic models that he dearly loved to construct for dry nights.

[1]The unit without the bed pads is available from the author. Reprint of schematic and parts list will be sent on request.

Experimental Design

A standard AB experimental design was employed which included: (a) a 30-day baseline measure of incontinence during which the child was wet each and every night, followed by (b) introducing the apparatus for 42 days, followed by removal of the apparatus on Day 43.

Procedure

The pad was laid on top of the bottom sheet in the position where the child would be most likely to void himself. (The child wore both top and bottom of light-weight pajamas.) The unit was placed on a chair approximately 4 ft. from the bed so that the child would have to get out of bed to turn it off. A 7½-w night-light burned continuously in the room. The child was instructed to perform the following functions when the alarm sounded: (a) get out of bed and turn off unit, (b) go to the bathroom, and (c) put on dry pajamas. The parents were instructed to: (a) go to the child's room when the unit sounded, (b) wait until the child turned off the unit, (c) change sheet and pad, (d) turn unit back on, and (e) keep a daily log in terms of wetting and whether or not both signals occurred. The parents did not express disapproval for wet nights and gave strong verbal praise for both using the equipment properly (turning the appropriate switch off) and proceeding to the bathroom to finish voiding plus copious praise for dry nights. The procedure was clearly explained to the child, and his cooperation was easily obtained. An intercom system was connected between the child's and parent's bedrooms so that the procedure could be monitored. No restrictions were placed on liquid intake.

Results

The first 3 nights, both signals went off. The child turned off the second signal and complained about its loudness but otherwise did as directed. The fourth and fifth nights he was dry, with wetting and both signals resuming for the sixth through the eighth night. After that and for all remaining sessions, only the first signal sounded, with the child rising to shut off the switch before the second signal, thus escaping the first signal and avoiding the second. The child wet 9 times out of the next 16 nights and then was dry for a period of 18 days, at which time he said he was not going to wet any more and so the apparatus and pads were removed.

The next 3 nights, he was again wet, which greatly disappointed him. The unit was again hooked up and no more bedwetting occurred. It was decided to try a fading procedure so that after 30 consecutive dry nights, the top pad was removed; 5 days later, the bottom pad was removed; and 2 nights later, the control unit was removed.

The subject was dry for several months, but regressed to enuresis on five or six occasions during the summer while the family was on vacation. Reapplication of the device for a period of 2 weeks removed the problem, and the child has now been dry for over 1 year. The results are depicted in Figure 2.

CASE II

Subject

Subject was an 8-year-old girl referred to the author by a urologist who had been treating her for a chonic urinary infection that had persisted intermittently since she was 2 years old. A consultation with the physician indicated chronic nocturnal enuresis that persisted even when no infection was present.

Apparatus and Procedure

The same apparatus and procedure was utilized as in Case I, with the additional reinforcer of a promised trip to Ireland if she had stopped wetting prior to the start of summer.

Results

The first night, she was dry. The second night, only the first signal was elicited by wetting, then both signals for the next 6 nights, followed by 4 dry nights. She was wet 11 of the next 22

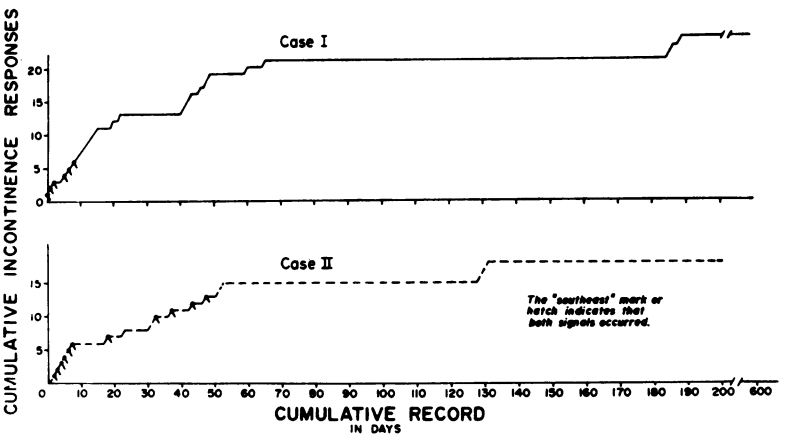

Fig. 2. Number of bedwetting responses per night, with Case I and Case II graphed separately.

nights with, both signals occurring 5 times. Of the next 122 nights, she was wet only 3 times, which correlated with a recurrence of the chronic urinary tract infection. After 159 days and without utilizing the fading technique used in Case I, the parents terminated the procedure due to the advent of the earned trip to Ireland. The sudden removal of the apparatus did not precipitate a recurrence of incontinence in this case. Data was collected for a period of 200 days and is displayed in Figure 2.

DISCUSSION

The results support the twin-signal approach as effective with refractory or difficult to train enuretics. The degree of success brought about by the traditional conditioned response method of treatment might be increased through the twin-signal operant conditioning procedure that utilizes both escape and avoidance training. The fact that the response of throwing a switch is reinforced by the termination of an aversive stimulus (the first signal) and the avoidance of the second signal brings operant conditioning into play extensively. The approach of Tough et al. (1971) is similar; however, in that procedure, the subject plays a much more passive part, and mother's role as the provider of the aversive stimulus (the cold bath) might make her a conditioned aversive stimulus.

Based on the results of Case I , the potential benefits of stimulus control through fading should be examined. Benjamin, Serdahely, and Geppert (1971) stated that a switch away from diapers might be a discriminative stimulus exerting stimulus control over bedwetting. Thus, one might assume that the absence of the conditioning equipment might likewise be such a stimulus exerting the same stimulus control. The process of removing pieces of the equipment over a period of several days may help prevent the recurrence of incontinence. In Case II, there were brief periods of wetting after intervals of 8 months and 13 months. Both relapses correlated with infection, and a brief reintroduction of the conditioning process along with medication terminated the incontinence. The parents were instructed to employ the same procedures in the future if the child's uropathology again precipitated incontinence.

In both cases, the procedure (including the background theory) was thoroughly explained to the parents and children. To alleviate any fear of the apparatus, the author demonstrated how the unit could be triggered by touching the terminals to his tongue. Both demonstrations took place in the children's homes with the full cooperation of the parents, and the total time involved was less than 1 hour each. In Case I, a problem occurred with false alarms due to static electricity triggering the first SCR. This problem was resolved by incorporating C_3 and R_6 in the circuit to bleed off the transient voltage (see Figure 1). In Case II, the parents reported that their daughter would jump out of bed at the signal

and attempt to turn off her radio or alarm clock, and in general appeared confused. After a few days, she adapted to the situation and performed as desired. A phone call to the parents at 30-day intervals indicated no other problems.

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