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ASSESSMENT OF STIMULUS GENERALIZATION GRADIENTS IN THE TREATMENT OF SELF-INJURIOUS BEHAVIOR

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Descriptive and experimental analyses suggested that the self-injurious behavior (SIB) of a 10-year-old girl with severe mental retardation was maintained by attention. Additional analyses identified physical contact as the type of attention maintaining SIB; therefore, we hypothesized that physical proximity of an adult was a discriminative stimulus for SIB. Based on these findings, we systematically varied the distance between the participant and a therapist to assess stimulus generalization. Results showed that rates of SIB varied relative to the distance between the participant and therapist; the highest percentage of SIB occurred with the therapist positioned less than 0.5 m from the participant. Treatment consisted of placing the therapist at a specified distance (9.0 m) from the participant (during low-attention situations), noncontingent reinforcement, and extinction.

DESCRIPTORS: noncontingent reinforcement, self-injury, stimulus generalization gradients

Stimulus generalization refers to the spread of the effects of reinforcement to stimuli not previously correlated with reinforcement. That is, reinforcing a response in the presence of a specific stimulus (i.e., a discriminative stimulus; S^D) may result in responding in the presence of other stimuli that share a common feature with the S^D. Changes in response rate corresponding to changes in a specified dimension of the S^D constitute a generalization gradient. For example, Thomas and Switalski (1966) trained pigeons to peck in the presence of a keylight of 550 μm using variable-ratio (VR) or variable-interval reinforcement schedules. They then presented various wavelengths under conditions of extinction to test for generalization. Results showed that response rates were highest at the training wavelength value and progressively lower along the wavelength continuum. Similar results were found with 3 children with severe mental retardation and visual impairments who were trained to respond to a specific intensity of an auditory stimulus (Lane & Curran, 1963). That is, the probability of the children's responding decreased the greater the intensity of a tone was from the training stimulus. The purposes of the present study were to assess stimulus generalization gradients related to self-injurious behavior (SIB) and to use the information obtained in the design of treatment.

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METHOD

Participant and Setting

Val was a 10-year-old girl with severe mental retardation and hearing loss. When she was admitted to a hospital unit for treatment of SIB, she was wearing a helmet throughout the day (except during bathing

and sleeping) due to the intensity and location (directed to her eyes, nose, and ears) of her SIB. All sessions were conducted in a treatment room (6.0 m by 10.0 m).

Dependent Measure and Data Collection

SIB was defined as the contact of a closed fist with any area of Val's face. Observers used a computerized data collection procedure to record each occurrence of SIB and to calculate interobserver agreement. Interobserver agreement was collected on an average of 33% of the sessions, balanced across conditions. Occurrence agreement averaged 92% (range, 86% to 100%). Sessions during the functional analysis and treatment evaluation were 10 min, with four to five sessions conducted 5 days per week. Following the functional analysis and prior to treatment, nine 25-min sessions of the stimulus generalization assessment were conducted, with one session conducted 5 days per week.

Procedure and Experimental Design

Functional analysis. A descriptive analysis showed that SIB occurred at high rates during play situations when an adult was sitting next to Val without making physical contact (M = 28.3 per minute) compared to an adult's presence with physical contact (hands on Val's shoulders; M = 0.2 per minute). Therefore, we provided noncontingent physical contact on the shoulders during the control, escape, and materials conditions of the functional analysis.

Functional analysis conditions (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) were assessed in a multielement design. During test conditions, a therapist provided either attention, escape, or a toy following SIB on a VR 2 schedule (identified during the descriptive analysis). In the attention condition, the therapist provided Val with a toy and sat next to her at a table. The therapist responded to SIB by placing her arms around Val's shoulders for 10 s. During the escape condition (self-care), a therapist provided an instruction every 10 s using a three-step prompt hierarchy (gesture, model, physical guidance) and stopped instructions for 30 s contingent on SIB. The therapist provided 30-s access to a toy contingent on SIB in the materials condition. The duration of reinforcement during the attention, tasks, and materials conditions was arbitrarily determined. During the control condition, Val had noncontingent access to her toys and continuous physical contact; the therapist did not respond to SIB. In the alone condition, Val was observed without adults or toys present. The multielement assessment was followed by a 120-min alone session to observe SIB under extended conditions of low stimulation (Mace & Eckert, 1994).

Stimulus generalization assessment. Because the functional analysis showed that SIB was maintained by attention, we hypothesized that the presence of an adult was a discriminative stimulus for SIB. Therefore, we selected the distance between an adult and Val as the target stimulus dimension to vary during the generalization assessment. Seven distances were assessed: less than 0.5 m, 1.5 m, 3.0 m, 4.5 m, 6.0 m, 7.5 m, and 9.0 m. Sessions started with 10 min of contingent attention as in the functional analysis attention condition. The therapist then moved to a randomly selected distance for 2 min. No programmed reactions to SIB occurred during the generalization assessment.

Baseline. The initial baseline data were those obtained during the attention condition of the functional analysis. Procedures in the second baseline phase were similar to those used in the attention condition of the function analysis.

Noncontingent reinforcement (NCR) plus extinction. During treatment, the therapist sat 9.0 m from Val and initially provided noncontingent physical contact (NCR) on a fixed-time (FT) 60-s schedule. The FT schedule was gradually increased by 60-s in-

tervals until it reached 300 s. No attention was provided within 10 s of SIB. Following treatment, we trained Val's mother to use the treatment procedures, starting with an FT 60-s schedule and progressing to an FT 300-s schedule.

RESULTS AND DISCUSSION

The functional analysis showed that SIB occurred at high rates during the attention condition (M = 17 per minute) and rarely in the escape (M = 0.2 per minute) or materials (M = 0.1 per minute) conditions. SIB did not occur in the control condition. SIB averaged 2.8 per minute in the alone condition; however, this may have been influenced by deprivation of adult attention, because Val followed the therapist to the door as she walked out of the room. A minute-by-minute analysis of SIB during the extended alone session showed that SIB decreased to zero by Minute 100 and remained at zero for 5 min until a therapist went into the room and sat next to Val (for 10 s). At that point, SIB averaged five per minute (for 1 min) and quickly returned to zero after the therapist left the room. After 5 consecutive minutes without SIB, the therapist returned to the room (for 10 s) and SIB averaged 1.7 and 3.3 per minute, respectively, for the next 2 min. There was no SIB in the next 5 min; therefore, the therapist reentered the room (for 10 s). SIB averaged 1.5 and 4.2 per minute, respectively, for the next 2 min. The session ended with no SIB for 12 consecutive minutes. Viewed collectively, these findings suggested that SIB was maintained by attention and that the presence of an adult was correlated with SIB.

Results of the stimulus generalization assessment (upper panel of Figure 1) show that more than 65% of all SIB occurred at either the first (<0.5 m) or the second (1.5 m from an adult) value along the continuum. The remainder of the generalization gradient shows a progressive decrease in SIB until rates reached zero (9.0 m). Rates of SIB depicted in the upper panel of Figure 1 reflect responding during the generalization assessment only (rates during the 10 min of contingent attention are not included).

We observed an immediate reduction in rates of SIB (M = 16.9 per minute) following the introduction of treatment (M = 2.1 per minute). The withdrawal of treatment resulted in rates of SIB that were higher than those in the initial baseline (M = 32.1 per minute); however, rates of SIB quickly decreased with the reintroduction of treatment (M = 0.6 per minute). Parent training data show initial high rates of SIB that eventually decreased and remained low throughout parent training (M = 1.8 per minute).

This study contributes to the literature in two ways. First, our findings are consistent with previous basic research on stimulus generalization gradients (Thomas & Switalski, 1966). Our findings suggested that the probability of SIB varied along a dimension of the discriminative stimulus, that is, the distance between Val and an adult. More than 65% of all SIB occurred at the training value or at the first value along the continuum (i.e., <0.5 m to 1.5 m from an adult). The remainder of the generalization gradient showed progressively lower rates of SIB, suggesting that the effect of reinforcement lessened progressively across the other distances. Second, our findings extend previous work on stimulus generalization (Lane & Curran, 1963; Thomas & Switalski, 1966) to the assessment of SIB. Based on the stimulus generalization assessment, we identified the distance (correlated with zero rates of SIB) needed to position Val's mother (9.0 m) when she was unable to provide physical contact during low-attention situations during treatment. Interestingly, during treatment we observed rates of SIB that were higher than those observed during the

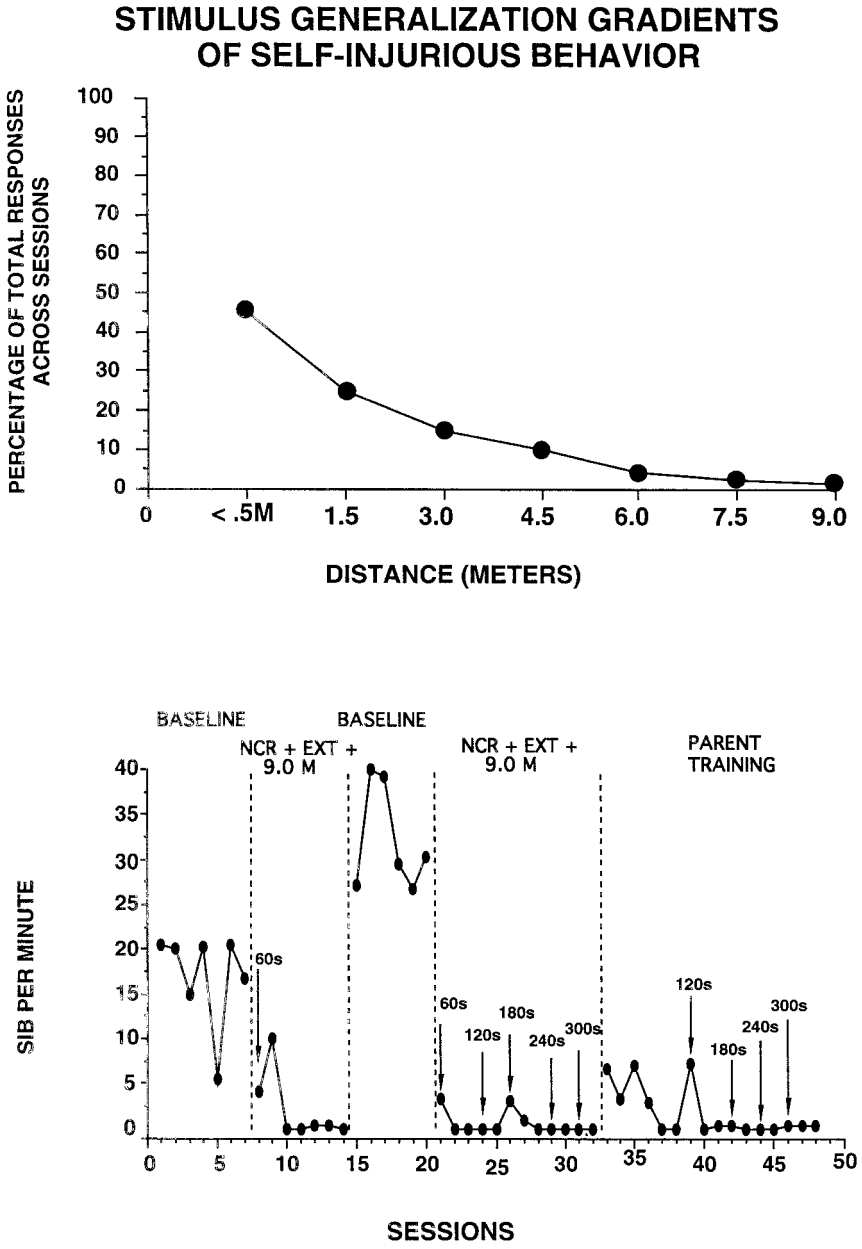

Figure 1. The percentage of total responses across sessions at a given distance during generalization tests (upper panel) and the rate of SIB across conditions (lower panel) with changes in the FT schedule marked by arrows. <0.5, 1.5, 3.0, 4.5, 6.0, 7.5, and 9.0 in the upper panel refer to the distance (in meters) between the therapist and the participant. NCR refers to noncontingent reinforcement, EXT refers to extinction, and 9.0 m refers to the distance between the participant and the therapist.

stimulus generalization assessment at 9.0 m. However, within-session patterns of responding showed that SIB typically occurred upon the termination of social interaction. NCR was included in the treatment to insure scheduled periods of interaction during low-attention situations (Val was 1 of 15 children).

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