

*EFFECTS OF SPACED RESPONDING DRL ON
THE STEREOTYPED BEHAVIOR OF
PROFOUNDLY RETARDED PERSONS*

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Stereotypic responding and social behaviors of three profoundly retarded children were measured before and during application of a DRL contingency for stereotypic responding. A variant of the standard DRL procedure, spaced responding DRL, was used, in which reinforcement is delivered following a response if that response has been separated from the previous response by at least a fixed minimum time interval. Three children were treated by using a reversal design. Results showed that: (a) during baseline sessions, the children engaged in high rates of stereotypic responding and very low rates of appropriate social behavior; and (b) during DRL sessions, appropriate behavior increased markedly as stereotypic responding was reduced. The data suggest that spaced responding DRL may be effective in increasing appropriate social behavior as well as in reducing stereotypic responding.

DESCRIPTORS: stereotypic responding, spaced responding DRL, social behavior, retarded children

Stereotypic responding is a pervasive problem in mentally retarded populations. It can be defined as "any repetitious, topographically invariant motor behavior or action sequence in which reinforcement is not specified or is noncontingent and the performance of which is regarded as pathological" (Baumeister & Forehand, 1973). Examples of stereotypic responding include body rocking, head rolling, complex hand movements, digit sucking, and the various forms of self-injurious behaviors.

The most successful treatments for stereotypic

responding have made use of behavioral procedures such as overcorrection, punishment, timeout, and differential reinforcement of other behavior (Forehand & Baumeister, 1976). Another behavioral technique, the differential reinforcement of low rates of responding (DRL), has not been used to reduce stereotyped responding, although it has been found to be very useful in controlling inappropriate child behaviors in the classroom (see Deitz, 1977, for a review).

Deitz (1977) proposed three methods for programming DRL schedules, which he has labeled 'spaced responding,' 'interval,' and 'full session' DRL. In the spaced responding DRL procedure, reinforcement is delivered following a response if that response has been separated from the previous response by at least a fixed minimum time interval, known as the inter-response time (IRT). In the only published study using spaced responding DRL in an applied setting, Deitz (Exp. 1) sought to reduce the frequency of inappropriate questioning in three children. The interval DRL technique is similar to the spaced responding technique except that it prescribes

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an average, rather than a discrete, IRT (Deitz, 1977, Exp. 2; Deitz, Slack, Scharzmueller, Willander, Weatherly, & Hilliard, 1978). In full-session DRL, reinforcement is delivered if n or fewer responses occur over an entire session (Deitz, 1977, Exp. 3; Deitz & Repp, 1973).

Although the full-session and interval DRL schedules have been shown to have some usefulness in applied settings, the general usefulness of spaced responding DRL has yet to be explored. The only existing study using this particular variant (Deitz, 1977, Exp. 1) was presented as an example of the use of this schedule rather than as an experimental study. The present study was designed to provide an initial controlled evaluation of spaced responding DRL in the reduction of stereotypic responding in three profoundly retarded persons.

METHOD

Participants and Setting

Three girls living in a state institution for the mentally retarded were chosen to participate in the study because they exhibited extremely high rates of stereotypic behaviors. Although they had no expressive language, they were able to understand simple commands. All were ambulatory and could toilet, dress, and feed themselves with minimal assistance.

Subject 1 was an 18-yr-old female who was profoundly retarded (of unknown etiology) and had been institutionalized for 13 yr. Her Vineland Social Quotient was 13 with an equivalent age assessment of 1.4 yr. Subject 2 was a 17-yr-old female who had been institutionalized for 11 yr. She was diagnosed as profoundly retarded due to haemophilus influenza at birth. Her Vineland Social Quotient was 16 with an equivalent age assessment of 1.6 yr. Subject 3 was a 15-yr-old female who was profoundly retarded (of unknown etiology) and had been institutionalized for 10 yr. Her Vineland Social Quotient was 24 with an equivalent age assessment of 1.47 yr.

Experimental sessions were conducted in a

large research room (5 m by 4 m) adjacent to the participants' residential unit. It was carpeted and furnished with three tables holding various play equipment. There was a one-way mirror along one wall which permitted independent observation from an adjoining room.

Response Definitions and Data Collection

Prebaseline observations indicated that all three participants exhibited a number of stereotyped behaviors and minimal social behavior. The frequency, beginning and termination points, and duration of each class of stereotyped behavior (e.g., rocking, mouthing, complex movements) were found to be extremely variable. Consequently, an all-inclusive stereotypic response category was used rather than specific categories comprised of individual types of stereotyped behavior.

The following behavioral categories were used:

1. Stereotypic responding, defined as the participant engaging in complex finger movements, repetitive body movements, rocking, or mouthing body parts and objects.
2. Appropriate behavior, defined as the participant engaging in behavior appropriate to the situation. Examples include smiling, communicating, or laughing in response to a resident or staff member talking to or playing with the participant, and playing with toys in an appropriate manner.

Data were collected from behind a one-way mirror in a room adjacent to the experimental room. Sessions were of 30-min duration. An interval-recording technique was used in which each experimental session was divided into 180 10-sec observational intervals. Only one instance of each response type could be recorded during one interval. A target behavior was scored for an interval if it had occurred for 6 of the 10 sec of an interval.

Reliability

Each participant was observed at least twice

during each phase by two observers simultaneously to establish reliability. Baseline observations began when interobserver reliability reached at least 90% for the two target responses across participants. Reliability scores were computed by dividing the number of agreements on the occurrence of each target behavior per participant, on an interval-by-interval basis, by the number of agreements plus disagreements and multiplying by 100. An agreement was defined as both observers recording an occurrence of the same target response during the same interval. A disagreement was defined as only one observer recording an occurrence of a target response during a given 10-sec interval.

Mean interobserver reliabilities (with ranges in parentheses) for stereotyped responding and appropriate behavior for Subject 1 were 97% (95-100) and 98% (94-100). For Subject 2 the scores were 94% (91-97) and 95% (93-98), and for Subject 3 the scores were 95% (93-96), and 98% (96-100).

Procedure

The study used a reversal design (Baer, Wolf, & Risley, 1968) to assess the efficacy of the spaced responding DRL procedure.

Baseline 1. The target behaviors were observed and recorded for 10 consecutive days during individual daily sessions for each participant. No programmed contingencies were in effect for the target behaviors during this phase.

Spaced Responding DRL. During the first 5-day treatment phase, a spaced responding DRL 12 sec (IRT 12 sec) contingency for stereotypic responding was in effect. The participant was provided with descriptive praise following a stereotypic response if the IRT had been reached or surpassed. If she emitted a stereotypic response before the preset IRT interval had elapsed, the interval was immediately terminated and the next one commenced. The participants were not informed of the DRL contingency. The experimenter, who monitored the interval changeovers during the DRL conditions, signaled the therapist when reinforcement was

to be delivered through a system of automated cued lights.

The same procedure was used during the next three phases except that the IRT interval was increased to 30 sec, 60 sec, and 180 sec. Each phase was scheduled for 5 days.

Baseline II. A 5-day reversal was in effect in this phase. The withdrawal of treatment variant of the reversal procedure was used where the conditions in effect during baseline were reinstated.

Spaced Responding DRL. In this phase, the DRL contingency for stereotypic responding was reinstated with an IRT of 180 sec.

RESULTS

The percentage of intervals of stereotypic responding and appropriate behavior for the individual participants are presented in Figure 1, and the results for all participants are summarized by treatment condition in Table 1. As Figure 1 shows, the three participants typically exhibited very high rates of stereotypic responding and minimal rates of appropriate behavior during baseline. Subject 1 engaged in stereotypic responding constantly in eight of the 10 observation sessions.

The introduction of the spaced responding DRL contingency with an IRT of 12 sec immediately decreased the occurrence of stereotypic responding and increased the occurrence of social behavior when compared to baseline levels. Further decreases in stereotypic responding and increases in appropriate behavior across participants were evident as the criterion for reinforcement was changed. There appeared to be an almost uniform change in these behaviors as a result of a systematic increase in the IRT intervals. Both these behaviors approximated baseline levels across participants when the DRL contingency was withdrawn. However, stereotypic responding decreased and appropriate behavior increased across participants to prereversal levels when the DRL contingency was reinstated.

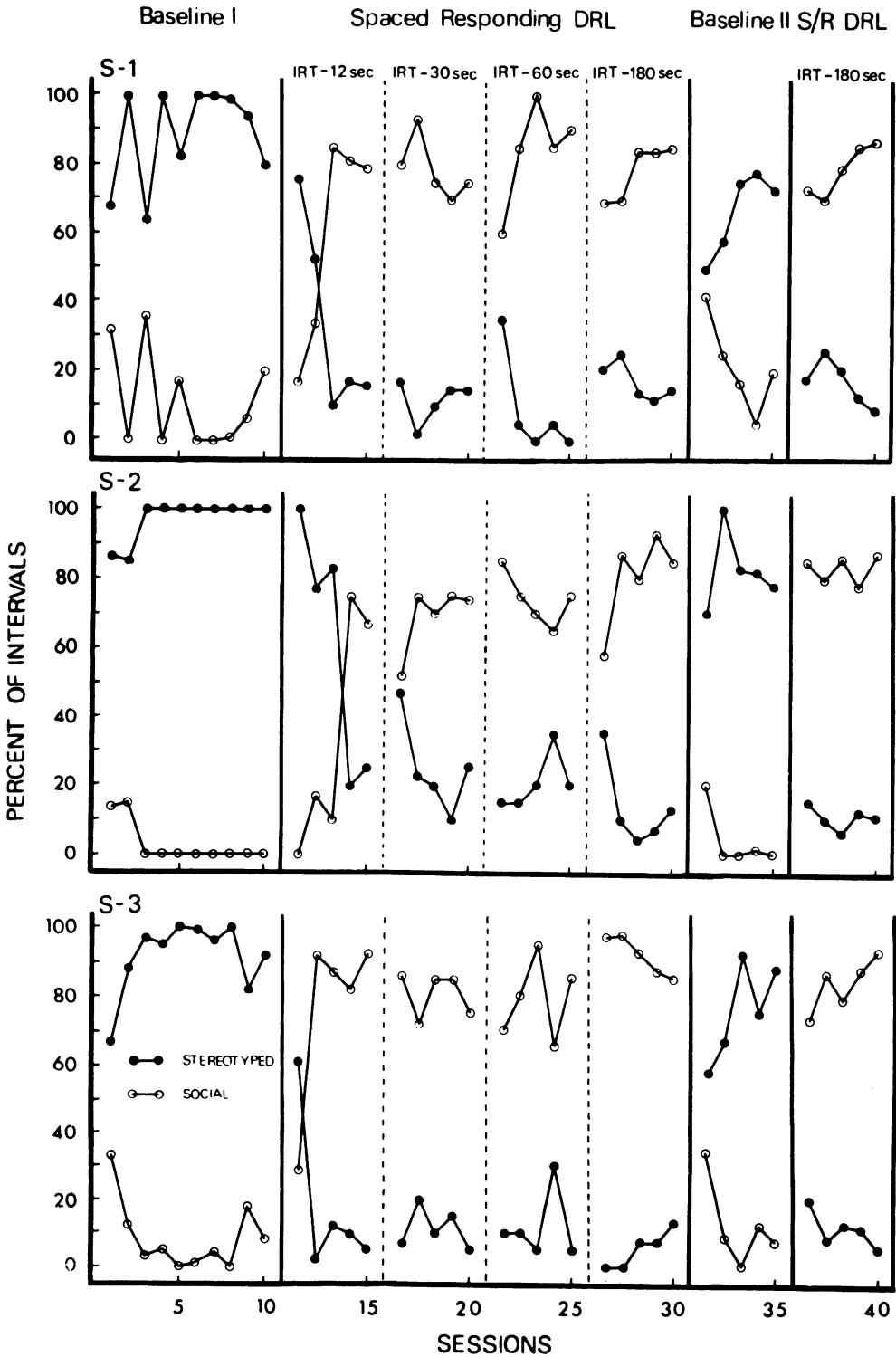


Fig. 1. Percentage of intervals of stereotypic responding and appropriate behavior across experimental conditions.

Table 1

Mean percentage of intervals of observed behaviors across subjects and experimental conditions.

Condition	Subject 1		Subject 2		Subject 3	
	Stereotypic responding	Social behavior	Stereotypic responding	Social behavior	Stereotypic responding	Social behavior
Baseline	88.8	11.2	97.1	2.9	91.6	8.4
Spaced Responding DRL						
IRT 12-sec	34.4	59.2	61.0	33.8	18.0	76.2
IRT 30-sec	11.8	78.6	25.2	69.2	11.4	80.4
IRT 60-sec	9.0	84.0	21.0	74.0	12.0	79.0
IRT 180-sec	17.4	78.4	13.8	80.6	5.4	92.0
Reversal	66.8	21.8	82.6	4.2	76.0	12.0
Spaced Responding DRL						
IRT 180-sec	17.4	78.8	10.8	83.2	11.0	83.6

DISCUSSION

Results showed clearly that stereotypic responding was reduced substantially across the three participants. Furthermore, there was a marked increase in spontaneous appropriate behavior when stereotypic responding was reduced. The reversal design used in this study permits the conclusion that the DRL contingency was the factor responsible for the decrease in stereotypic responding.

Previous studies using DRL schedules in applied settings (e.g., Deitz, 1977; Deitz et al., 1978) provided their subjects with explicit instructions about the schedules and verbal feedback on their behavior during the treatment periods. This procedure, however, adds an additional variable that obscures an analysis of the data by making it difficult to determine whether the behavior being studied is under instructional or schedule control. The present study differed in this respect by not providing any instructions to the participants. Human responding has been found to be maximally sensitive to reinforcement when instructions are minimized (Matthews, Shimoff, Catania, & Sagvolden, 1977).

On the basis of the present findings, spaced responding DRL appears to be an effective procedure for the reduction of stereotypic behavior in mentally retarded persons. Although more

drastic techniques such as the contingent application of aversive stimulation tend to produce a more predictable and rapid suppression of stereotyped and self-stimulatory behavior (particularly of the self-injurious kind), a relatively innocuous procedure such as DRL appears to be useful because it meets the criteria of both effectiveness and social acceptability. Furthermore, this procedure is more acceptable than aversive techniques because it follows the least restrictive treatment model and answers all current ethical concerns (May, Risley, Twardosz, Friedman, Bijou, Wexler, et al., 1975). However, this procedure only *reduces* maladaptive behaviors to very low levels, but does not necessarily eliminate it. As Deitz (1977) has suggested, it may be necessary to convert the DRL to a DRO (differential reinforcement of other behaviors) schedule in the final treatment phase to achieve complete response suppression.

In the present study, the aim was only to achieve a low rate of stereotypic responding so that social skills programming could be instituted. The complete suppression of stereotypic behaviors which mentally retarded persons may find reinforcing is often very difficult in institutionalized populations. In any case, the complete suppression of such behaviors in institutionalized mentally retarded populations who have access only to minimal positive environmental

stimulation just does not seem clinically justifiable.

In summary, this study showed that stereotypic responding can be controlled in an experimental context in retarded persons through the use of spaced responding DRL schedules. Furthermore, it showed that increases in appropriate behavior may be a likely by-product of the response suppression. Further research is needed to examine the effects of this procedure in more naturalistic environments and the conditions that govern the generalization of observed behavior change.

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