JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1987, 20, 279–284 NUMBER 3 (FALL 1987)

RESPONSE INTERRUPTION AND DRL FOR THE REDUCTION OF RAPID EATING

DAVID B. LENNOX
MONROE DEVELOPMENTAL CENTER

RAYMOND G. MILTENBERGER
NORTH DAKOTA STATE UNIVERSITY

DAVID R. DONNELLY
MONROE DEVELOPMENTAL CENTER

We assessed the efficacy of several procedures for reducing the rate of eating responses during mealtime by three institutionalized mentally retarded clients. A time-based (15 s) response interruption procedure was implemented which resulted in little change in eating responses for 2 of 3 subjects. A spaced-responding DRL 15-s procedure resulted in decreases in eating responses to target levels only after a prompting procedure was added. Procedures were evaluated using a multiple baseline across subjects design with assessment of generalization to nontreated meals. A change in eating behavior during breakfast occurred only after direct training in the breakfast setting. Maintenance data were collected at 1- and 5-month follow-up periods.

DESCRIPTORS: response interruption, eating rate, fixed-interval schedules, differential reinforcement

Rapid eating is a problem commonly seen in the institutionalized mentally retarded. It is a difficult problem to treat, however, because of the variables maintaining its occurrence. The terminal component of the eating response chain is food ingestion—an automatically reinforcing event (Ferster, Nurnberger, & Levitt, 1962; Henriksen & Doughty, 1967; O'Brien, Bugle, & Azrin, 1972). Furthermore, the response chain is so intact that more rapid response emission directly results in more rapid reinforcement. Thus, the natural effect of the contingency is likely to be an increase in the rate of responding (i.e., food intake) limited only by inherent physical constraints. In addition, depending on the eating environment, less rapid eating may be punished by the loss of food, for instance, by client theft (Barton, Guess, Garcia, & Baer, 1970; Hamilton & Allen, 1967; Henriksen & Doughty, 1967).

Few procedures have been implemented for the treatment of rapid eating in the mentally retarded. Favell, McGimsey, and Jones (1980) reported a successful treatment approach involving therapist prompting of pauses in eating rate, therapist-mediated food reinforcement for pauses, prompt fading, gradual increase in the pause duration required for reinforcement, and fading the food reinforcement. A procedure which has yet to be used but seems especially suited for reducing the rate of eating responses is differential reinforcement of low rate (DRL) responding. A spaced-responding DRL procedure is designed to directly reinforce a response only if it is separated from a previous response by a specified time interval, thereby reinforcing only low-rate responding (Deitz, 1977; Singh, Dawson, & Manning, 1981). If a response occurs before the interval has elapsed, it is not reinforced (and in the case of eating behavior, interrupted) and the time

Portions of this manuscript were presented at the Thirteenth Annual Convention for the Association for Behavior Analysis, Nashville, Tennessee, May 1987.

We thank Rick Tomaselli for assisting in data collection and procedural considerations, R. Wayne Fuqua for his assistance in conceptualizing procedural characteristics, Lori Dalba, Cynthia Haynes, Dianne Johnson, and Deb Havens for their participation in the implementation of the study, Mary Lou Lennox for her assistance with data collection system development, and Sylvester Zielinski for his research support.

Requests for reprints should be submitted to David Lennox, Behavior Therapy Unit, Monroe Developmental Center, 620 Westfall Rd., Rochester, New York 14620.

interval is "reset." (For a review of other variations of DRL procedures, see Deitz, 1977.)

The following experiment assessed the efficacy of several procedures for reducing the rate of eating responses by three institutionalized mentally retarded clients. A time-based (15 s) response interruption procedure was tried first because of its simplicity and appeal to staff members. A spaced-responding DRL 15 s procedure and a DRL with prompts were also evaluated, followed by generalization and maintenance procedures.

METHOD

Subjects

Three profoundly retarded clients with high-rate eating behaviors participated in the investigation. Subject 1 was a 32-year-old female, Subject 2 a 44-year-old male, and Subject 3 a 28-year-old male. All subjects lived in a residential unit designed to provide intensive behavioral and rehabilitative programming for residents with severe behavior problems. All subjects had independent eating skills, and all were receiving anticonvulsive and antipsychotic medications for control of seizures and severe behavior problems.

Response Definitions, Measurement Procedures, and Settings

The target behavior for all 3 subjects was an eating response defined as any contact of the hand or eating utensil to the food on the subject's plate. This response was chosen for measurement because actual food insertion into the mouth was blocked in some phases of the study and because systematic observation prior to the study showed that this behavior was a reliable component of the response chain resulting in food insertion.

Prior to all observation and training sessions, staff members cut all solid foods into bite-sized pieces. Data were not collected on liquid consumption given different response characteristics, so liquids (soups and beverages) were withheld until after the observation procedures were terminated. The observer sat adjacent to the subject, holding a clipboard and listening, via earphone, to a battery-powered tape recording (regularly calibrated) of a second-by-second count up to 20 min.

All eating responses were recorded on a data sheet containing the numbers 1–60 listed in succession 20 times. For each eating response, the observer slashed through the number which corresponded to the last "second" heard from the tape. Permitted bites were circled to allow analysis of response patterns and to monitor the accuracy with which scheduled bites were permitted. Mean interresponse times (IRT) were computed by dividing the total number of seconds in the session after the first response by the total number of responses minus one. When less than a spoonful of food remained on the plate and in the bowl, the observation session was terminated, and any liquids were placed on the subject's tray for consumption.

Daily observation and training sessions occurred during lunch in the facility's main cafeteria. Weekly probes and training sessions to facilitate generalization to breakfast occurred in the residential unit for 2 of the subjects.

Reliability

During 20% of the lunch sessions (a minimum of two sessions per phase) and the last follow-up observation, a second trained observer independently recorded eating responses. The two observers sat approximately 3 feet apart. When the two observers recorded a response not more than 1 s apart, it was scored as an agreement. A single disagreement was scored if one observer recorded a response and the second did not. Interobserver agreement on the occurrence of the behavior was computed by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100, which yielded an overall average agreement of 89% across sessions with a range of 73% to 100%.

Validation Measures

Target response rates were obtained via a normative-based selection procedure outlined by Van Houten (1979). Two clients considered to be "so-

cially appropriate eaters" were identified for assessment by interdisciplinary treatment team members. Observations during three consecutive lunches resulted in an average IRT of approximately 15 s, which then served as the target IRT value for the 3 subjects.

Design

All subjects were exposed to treatment conditions in a multiple baseline across subjects design with an A-B-A-C-D treatment presentation.

Procedure

Baseline. During baseline conditions, no contingencies were in effect. Clients were permitted to take bites of food without interference by staff members.

Fixed-interval/response interruption (FI/RI). During this condition, a variation of a fixed-interval (FI) 15-s reinforcement schedule was implemented with an accompanying response interruption procedure for any responses attempted before the end of the interval. Any eating responses that occurred before 15 s had elapsed were prevented by guiding the subject's hand to the table and then releasing it. At the end of each consecutive 15-s interval an eating response was permitted. This procedure was implemented both because of its ease (relative to more complex procedures) and to attempt to validate it, because staff were currently using it to deal with the problem.

Differential reinforcement of low rate (DRL). During this condition, a variation of a spaced-responding DRL (Deitz, 1977) procedure was implemented, in which any eating response before the end of the 15-s interval was interrupted *and* the interval was "reset." In other words, the absence of an attempted bite for an entire 15-s interval was required before an eating response was permitted. In the event that the subject failed to successfully complete the contingency for 5 consecutive minutes, the session was terminated, the food tray removed for 2 minutes, and the client permitted to eat freely after the tray was returned.

To permit a valid comparison between this procedure and the FI procedure, the DRL interval was set at 15 s even though a gradual increase in the interval of a differential schedule is recommended (Repp, Barton, & Brulle, 1983).

DRL plus prompting (DRL/P). In addition to the DRL contingencies described above, a competing response was prompted using a graduated-guidance procedure following each eating response (whether permitted or interrupted). During the first three sessions of this condition for each subject, each response was immediately followed by a verbal prompt "down" and physical guidance in placing the utensil on the food tray and the hand in the subject's lap. This prompting component required between 1 and 2 s to complete. During the fourth and subsequent sessions, the trainer used the least amount of guidance necessary to ensure the occurrence of the competing response, omitting the vocal prompt when possible. As less guidance was required, the trainer began moving farther from the client to allow for more independent responding.

For Subject 3, a time-out component was combined with the DRL/P procedures because of frequent aggression and food throwing during implementation. Upon the occurrence of an eating response prior to the interval expiration, a 15-s time-out was instituted in which the trainer removed the food tray from the vision of the subject. At the end of the 15-s time-out, the tray was replaced and the 15-s interval reset, requiring the passage of an additional 15 s prior to a permitted response. The time which elapsed during the time-out was excluded from analysis.

Generalization, maintenance, and follow-up. Once independent responding occurred for Subjects 1 and 2 during lunch training sessions in the cafeteria, generalization training sessions began during breakfast in the subjects' residential units (Stokes & Baer, 1977). Staff members were trained to conduct training sessions identical to DRL/P conditions. Liquids were introduced into the breakfast sessions during the generalization phase. However, because the subject consumed the entire amount of liquid at once, time spent drinking had no effect on other eating responses. Two follow-up obser-

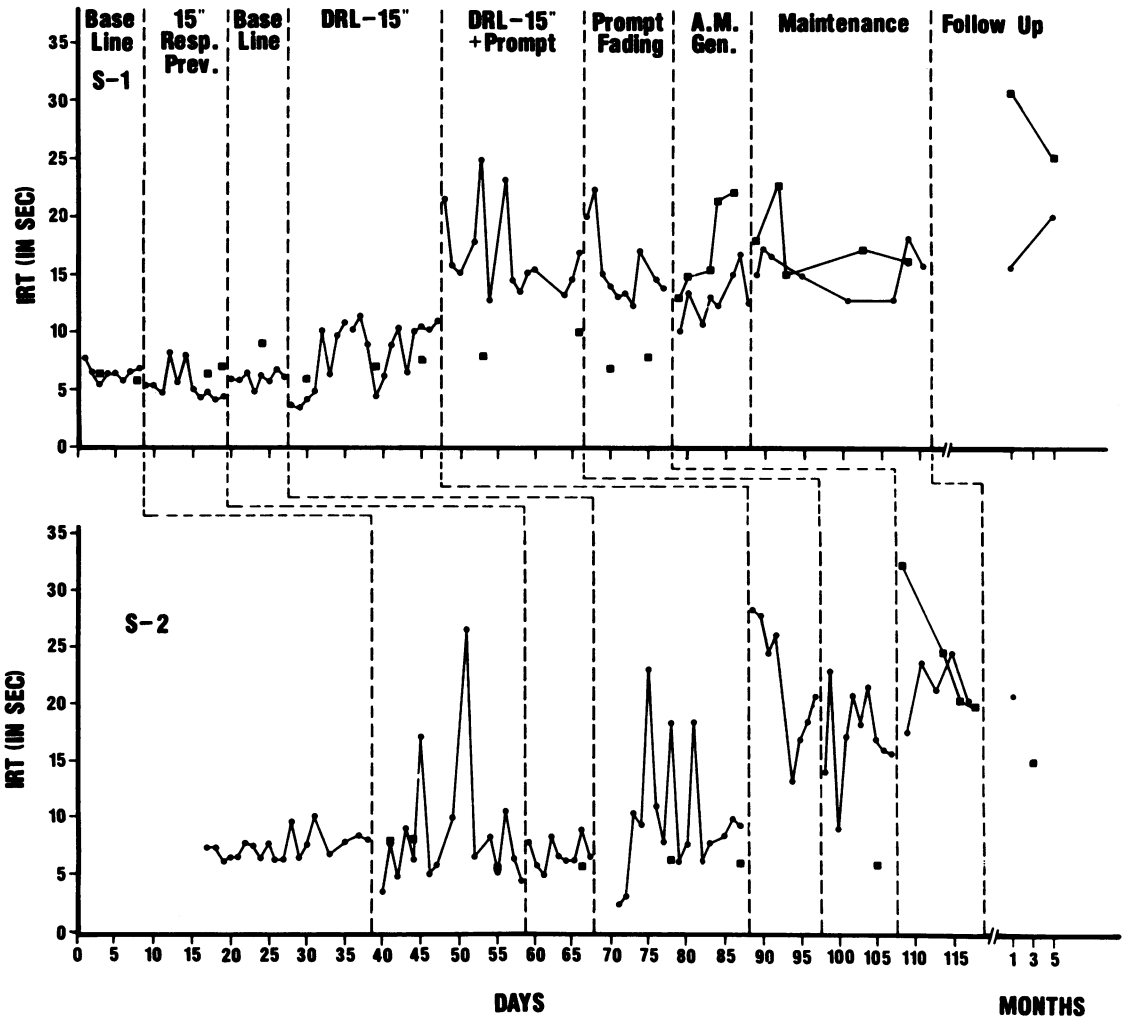

Figure 1. Mean eating interresponse times (in seconds) for both breakfast (square points) and lunch sessions (round points) for Subjects 1 and 2.

vation sessions were conducted during lunch and/or breakfast for Subjects 1 (at 1 and 5 months) and 2 (at 1 and 3 months).

RESULTS

Figure 1 presents the mean IRT (in seconds) of eating responses for each session through all experimental conditions for Subjects 1 and 2, and Figure 2 presents performance for Subject 3. During baseline, eating rate was high with mean IRTs of 6.0 s, 7.3 s, and 4.9 s, respectively. For Subjects 1 and 3, response interruption procedures resulted in shorter IRTs of 5.0 s and 3.4 s, respectively. Subject 2 showed a slight increase in mean IRT to 8.4 s.

The introduction of the DRL condition after a second baseline increased the mean IRTs for Subjects 1, 2, and 3 to 7.7 s, 9.5 s, and 9.4 s, respectively, but did not reach the 15-s target level. However, when the prompt was introduced for Subjects 1 and 2, IRTs increased to 16.5 s and 21.9 s, respectively. These changes were maintained through prompt fading, generalization, maintenance, and follow-up conditions for Subjects 1 and 2. Performance for Subject 3 during DRL/P (plus

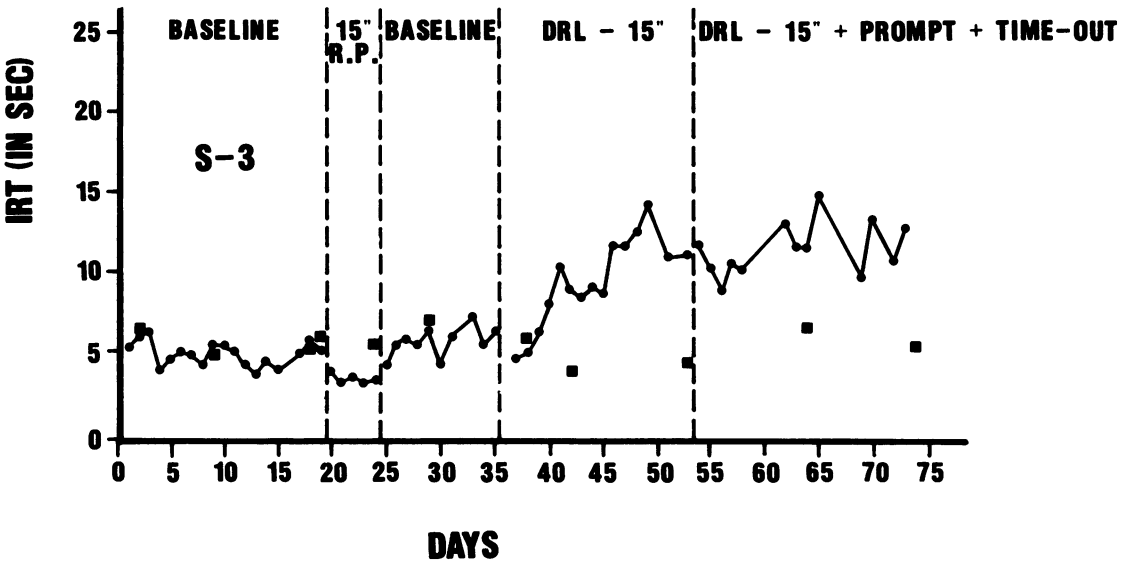

Figure 2. Mean eating interresponse times (in seconds) for both breakfast (square points) and lunch sessions (round points) for Subject 3.

time-out) contingencies was less affected, resulting in a mean IRT of 11.5 s, which still constituted a 100% increase over baseline.

Although desirable changes in IRT were achieved by Subject 3 during DRL and DRL/P conditions, they were accompanied by assaultive, disruptive, and occasional severe self-injurious behavior; thus, interventions for Subject 3 were terminated.

Residential generalization probes (square data points in the figures) fail to reflect generalization to breakfast meals. Once the DRL/P contingencies were implemented in the residential setting, however, immediate increases in IRTs occurred and were maintained through the remainder of the study.

DISCUSSION

Results of this study indicate the effectiveness of a spaced-responding DRL and prompting procedure for decreasing eating rate (increasing IRT) in 3 mentally retarded subjects after response interruption and DRL did not produce the desired changes. For the 2 subjects who completed the study, IRTs were increased to the 15-s target level with the DRL and prompt procedures. These changes were maintained at follow-up; however, no generalization to breakfasts occurred until the procedures were carried out at those meals.

It is not too surprising that the response interruption procedure was ineffective, because rapid attempts to eat did not influence the timing of allowable bites. Bites were allowed every 15 s regardless of the rate of attempted bites. The results were somewhat unexpected for the DRL procedure, however, because every bite attempt delayed the allowable bite by 15 s. It is unclear why this procedure was only marginally effective given the immediate contingency for rapid eating attempts. Perhaps the target interval of 15 s might have been obtained had the recommended strategy of gradually lengthening the interval been followed (Repp et al., 1983).

It is clear that the prompt procedure had a beneficial effect for 2 subjects when combined with the DRL schedule. In this procedure the subjects were prompted to engage in a competing response to eating; putting down their forks and placing their hands in their laps. In all likelihood this response helped mediate the delay required between responses in the DRL schedule. The literature on nonhuman subjects indicates that pigeons will often engage in mediating behavior during delays in time-

based schedules (Laties, Weiss, Clark, & Reynolds, 1965). The applied literature also demonstrates the effectiveness of a competing response for suppressing high-rate behaviors such as tics in nonretarded persons (Miltenberger, Fuqua, & McKinley, 1985) and stereotypies (Foxx & Azrin, 1973) in retarded individuals.

Initially, the DRL/P procedure required significant staff involvement because of the subjects' rapid response rates and the frequent prompting required during the earlier sessions of the condition. However, staff reported the amount of time and effort required to implement the DRL/P procedure was significantly less than that needed to safely manage mealtime behavior prior to the study. As eating behavior came under control of the contingencies and more independent responding occurred, prompts were faded to no more than an occasional tap on the subject's shoulder; this was usually required only during the first few trials of the session, if at all.

There are two issues raised in this study that need clarification. First, our design did not rule out the possibility of sequence effects with the DRL/P procedure because there was not an intervening baseline. It is unlikely that this is a problem, however, because the DRL/P was simply a modification of the preceding DRL procedure. Second, in the use of the DRL procedure the interval was not gradually increased as suggested in the literature. Researchers using a spaced-responding DRL procedure should be aware of this shortcoming and implement the procedure as described by Deitz (1977) for best results. Although these results demonstrate that a DRL with prompts procedure was effective, additional research should investigate the use of DRL without prompts but with a gradually increasing interval to determine its effectiveness.

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Received October 27, 1986
Initial editorial decision January 21, 1987
Revision received April 16, 1987
Final acceptance May 20, 1987
Action Editor, Ron Van Houten