

USING A SELF-CONTROL TRAINING  
PROCEDURE TO INCREASE  
APPROPRIATE BEHAVIOR

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TRINITY SERVICES

The present study evaluated a technique for teaching self-control and increasing desirable behaviors among adults with developmental disabilities. Results showed that when participants were initially given the choice between an immediate smaller reinforcer and a larger delayed reinforcer, all participants repeatedly chose the smaller reinforcer. Concurrent fixed-duration/progressive-duration reinforcement schedules then were introduced in which initially both the smaller and larger reinforcers were available immediately. Thereafter, progressively increasing delays were introduced for the schedule associated with the larger reinforcer only. When initial short-duration requirements for access to the larger reinforcer were gradually increased, participants repeatedly selected the larger reinforcer, thereby demonstrating increased self-control.

DESCRIPTORS: self-control, impulsivity, choice, developmental disabilities, humans

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Self-control is defined as behavior that results in access to a larger reinforcer after a longer delay, rather than impulsive behavior that results in a small reinforcer after a shorter or no delay (Ainslie, 1974; Rachlin & Green, 1972; Schweitzer & Sulzer-Azaroff, 1988). The use of the term *self-control* in no way implies that the variables that control responding are internal. Rather, it has arisen out of a colloquial vocabulary in which its specific meaning in operant research is the response of choosing a delayed larger reinforcer over an immediate smaller reinforcer.

Studies using both nonhuman and human participants in the operant laboratory have demonstrated that an important variable

that influences an organism's "choice" of a larger reinforcer is the amount of time that must pass before its delivery (Davison & McCarthy, 1988). With shorter delays imposed on the larger reinforcer, choices are more often made for access to that reinforcer, whereas with longer delays, choices are more often made for access to the smaller reinforcer (Hyten, Madden, & Field, 1994; Mazur, 1987). Nonhumans and children have often been found to behave impulsively in experimental situations (Logue & Peña-Correal, 1984; Mazur & Logue, 1978), whereas adult humans often exhibit more self-control (Logue, Peña-Correal, Rodriguez, & Kabela, 1986). It has been suggested that adult humans' increased preference for delayed larger reinforcers may somehow be related to their advanced verbal abilities (Logue et al., 1986; Schweitzer & Sulzer-Azaroff, 1988).

In addition to the role that verbal behav-

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ior may play in preference for delayed reinforcement, specific histories of reinforcement may influence choices made between immediate and delayed alternatives. For example, Ferster (1953) demonstrated that when pigeons, responding on a variable-interval schedule, were exposed to a contingency change in which long delays between responses and reinforcement were suddenly imposed, response rates on those schedules declined. Yet, if the delays were initially short and then increased gradually, the birds showed no reduction in response rates. Mazur and Logue (1978) also demonstrated that reinforcement history was an important variable for increasing self-control. They showed that when pigeons that were initially exposed to both large and small reinforcers of equal delays were exposed to gradually decreasing delays to the smaller reinforcer (until zero delay), the birds chose the larger reinforcer more often than did a control group that had been exposed only to a choice between the small immediate and the large delayed reinforcer. A study with humans employing a progressive delay procedure similar to that of Ferster (1953) was conducted by Schweitzer and Sulzer-Azaroff (1988). Results showed that an increase in self-control developed in impulsive children by initially delivering both small and large reinforcers immediately, and then gradually increasing the delay to delivery of the larger reinforcer.

Although self-control may be strengthened by gradually increasing the delay to the larger reinforcer, as those delays become considerably longer, impulsive behavior may begin to recur (Ragotzy, Blakely, & Poling, 1988). A method used to postpone or prevent this recurrence of impulsivity has been to require the participant to perform distracting activities such as talking or singing (Mischel, Ebbesen, & Zeiss, 1972). Similar results were also obtained in the basic laboratory by Grosch and Neuringer (1981), who required pigeons to peck on a disk at

the back of the experimental chamber during delay periods. The pigeons continued the distracting activity (pecking the disk in the back of the chamber) even when it was placed on extinction, suggesting that the activity in some way helped the subjects better tolerate the delay associated with the larger reinforcer.

In an applied setting, the selection of beneficial distracter activities that occur in conjunction with a gradually increasing delay to a larger, more advantageous reinforcer may potentially increase both tolerance for longer delays and appropriate responding of other sorts. It is often the case that in training facilities for individuals with developmental disabilities, many individuals choose not to emit the programmed desired responses (e.g., participation in group activity, cooking a meal) but rather will emit less desirable, alternative responses (e.g., self-stimulation, escape from a demanding situation). Although these alternative responses may be less desirable to staff, these responses may be preferred by an individual with disabilities because they produce more immediate reinforcement than the target response does (e.g., immediate self-stimulation vs. a paycheck at the end of the week).

Two potential strategies from the self-control literature that may increase the likelihood that individuals with developmental disabilities will choose to emit the appropriate target response are (a) to correlate it with an immediate large reinforcer initially and then gradually fade in a delay interval (e.g., Mazur & Logue, 1978; Schweitzer & Sulzer-Azaroff, 1988) and (b) to require the individual to perform a distracting activity during the delay interval (e.g., Grosch & Neuringer, 1981; Mischel *et al.*, 1972).

The present study examined the effects of concurrent fixed-duration/progressive-duration schedules of reinforcement to teach self-control and increase targeted behaviors of 3 adults with developmental disabilities. First,

naturalistic baseline data were recorded to measure the strength of the target response in the absence of a programmed competing source of reinforcement. Second, a choice baseline was conducted to measure target response strength when that target response produced a large, delayed reinforcer that was in competition with a smaller, immediate reinforcer. Third, a self-control training procedure was implemented for the purpose of teaching individuals to tolerate delayed reinforcement so that they (a) displayed the appropriate target response and (b) received the larger reinforcer.

## METHOD

### *Participants, Target Behaviors, and Settings*

*Duke.* Duke was a 43-year-old man with mild mental retardation. He was verbal, had no motor impairments, had diagnoses of seizure disorder and developmental language disorder, and was on Felbatal (600 mg/day), Zolofit (50 mg/day), and Depakate (500 mg/day) medications. Duke was selected because he frequently left his seat and did not complete the day's activity. Therefore, his target behavior was to functionally manipulate the materials of the day's activity. Sessions were conducted in the natural environment of his day-training facility room, which contained a table and two different amounts of crossword puzzles (one and three). Crossword puzzles were selected as reinforcers for Duke based on staff interview of preferred items. Six individuals with developmental disabilities were also present in the room.

*Betty.* Betty was a 29-year-old woman with profound mental retardation. She had a verbal repertoire of approximately 75 American sign language signs, no motor impairments, and medical diagnoses of atypical organic brain syndrome, bipolar disorder, and epilepsy. She was on Risperidol (5 mg) and Tegretol (1,200 mg) medications. Betty

was selected because of her inconsistent performance on the targeted behavior (specified in her treatment plan) of sitting in her seat constantly for 5 min. Sessions were conducted in the natural environment of her day-training facility room, which contained a table and two different amounts of soda (small cup and large cup). Soda was the selected reinforcer for Betty based on staff interview. Six individuals with developmental disabilities were also present in the room.

*Joan.* Joan was a 27-year-old woman with mild mental retardation. She was verbal, had a minor motor impairment in her legs that required the use of arm crutches, and was not on any medication. Joan was selected because of her inconsistent performance on the targeted behavior (specified in her treatment plan) of continually exercising with arm bands. Sessions were conducted in the natural environment of her bedroom, which contained a bed, table and chair, and two different cards (3 in. by 5 in.) (one with the number 1 written on it and the other with the number 5). These cards represented the number of minutes of one-on-one attention that would be made available to Joan as reinforcement for her behavior. Due to Joan's high level of verbal ability, the relation between the cards and the consequences of each choice behavior was verbally described to her. One-to-one attention was the selected reinforcer for Joan based on staff interview.

### *Interobserver Agreement*

A second observer was present during 10% of all sessions for each participant. Choice behavior was recorded by either checking the column on a data sheet for "smaller reinforcer" or another column for "larger reinforcer." An agreement was recorded if both observers checked the same column. Whole-interval recording was used for response duration; observers recorded the duration of the target response using handheld timers, watches, or clocks. A duration

agreement was recorded if both observers agreed that the participant was still engaged in the target behavior at the end of the pre-specified interval. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements of both observers and multiplying by 100%. Resulting percentages for both participant choice behavior and response duration were 100%.

### *Experimental Design*

A multiple baseline across participants design was used in which all sessions were conducted by direct service staff members under training of one of the authors. First, a naturalistic baseline was introduced as the relevant control condition for determining whether treatment resulted in increases in engagement. Second, a choice baseline was introduced as the relevant control condition for determining whether treatment resulted in increases in self-control. Third, a self-control training treatment condition was introduced in an attempt to increase tolerance for larger, more delayed reinforcers.

### *Procedure*

*Naturalistic baseline.* Sessions began when the staff member verbally prompted the participant to engage in the target behavior. The staff member observed and recorded the duration of the target behavior for each client for approximately 20 sessions. No additional prompts, instructions, feedback, or reinforcements were delivered to the participant during these sessions to control for the effects of prompts on target behavior emission. Each session ended after (a) 1 min following the initial prompt if the target behavior was not emitted, (b) a greater than 30-s period during which the target behavior was absent, or (c) the completion of the specified duration requirement for the target behavior.

*Choice baseline.* Sessions began when the

staff member verbally instructed each participant to make a choice between the smaller amount of the reinforcer delivered immediately or the larger amount of the reinforcer delivered contingent on the desired duration of the specific target behavior. This was done by presenting the two quantities of the reinforcer (Duke and Betty) or the two cards representing the reinforcer (Joan) directly in front of the individual in random position, and then asking, "Do you want X (small reinforcer) now (with no target behavior required), or do you want Y (large reinforcer) after doing Z (the target behavior for the desired duration)?" One choice trial was given once per session for five to seven sessions. No other instructions, prompts, or feedback were given to the participant regarding the choice that he or she had made. If the larger reinforcer was chosen and the target behavior was not engaged in for the required length of time, the participant received neither reinforcer, and the session was terminated. Sessions ended after the participant's consumption of the reinforcer (Betty) or after the delivery of the reinforcer (Duke and Joan). As before, each session would also have ended after (a) 1 min following the initial prompt if the target behavior was not emitted, (b) a greater than 30-s period during which the target behavior was absent, or (c) the completion of the specified duration requirement for the target behavior.

*Self-control training.* Each session began by instructing the participant to make a choice of receiving either the small or the large reinforcer with no work requirement for either item. When it was established that the large reinforcer was consistently chosen, a gradual progressive-duration contingency was introduced on the larger reinforcer. The staff member instructed the participant by saying, "Do you want X now, or do you want Y after doing Z for a little while?" When the participant chose to engage in the target behavior for a desired duration to gain

access to the larger reinforcer for at least two of the last three sessions, the required duration criterion was gradually increased. If the participant chose the smaller reinforcer during the first session following an increment in duration, that increment was reduced by half during the next session. Duration increments were specifically made in small amounts to prevent participants from discriminating that any increments had been made. Staff members were given some leniency as to the criteria for duration increments or decrements (when necessary) in order to tailor the intervention to the specific participant. No additional prompts, instructions, feedback, or reinforcements were delivered to the participant during these sessions. As before, each session would also have ended after (a) 1 min following the initial prompt if the target behavior was not emitted, (b) a greater than 30-s period during which the target behavior was absent, or (c) the completion of the specified duration requirement for the target behavior. The duration requirement of the target behavior continued to be increased until the initial desired level of performance had been attained by each participant.

## RESULTS

Figure 1 shows performance during the naturalistic baseline, choice baseline, and self-control training conditions for all participants. All participants' targeted behaviors stayed at or below baseline levels during the choice baseline condition. They consistently chose a small, immediate reinforcer rather than engage in the target behavior for the full desired duration for access to the large reinforcer. When conditions were changed such that both consequences were available immediately, all participants chose the larger reinforcer. During the self-control training condition, number of minutes engaged in the target behavior increased above natural-

istic baseline for all participants, and they continued to choose the larger, more delayed reinforcer. No participant ever chose the larger reinforcer and subsequently failed to engage in the required duration of the target behavior. Betty, although she showed a duration increase, did not reach the desired target behavior duration (5 min).

## DISCUSSION

These results show that by establishing a history in which participants are gradually exposed to increasingly longer delays to delivery of a larger reinforcer and are required to engage in a target behavior during that delay, both self-control and engagement in a target behavior may be increased. These findings further support those of Ferster (1953), Mazur and Logue (1978), and Schweitzer and Sulzer-Azaroff (1988), who demonstrated that gradual changes in contingencies may increase self-control in both human and nonhuman subjects. The present study's participants were similarly exposed to gradually changing contingencies in the progressive delay condition. In this condition, very slight increases in both delay and response requirement were necessary to produce the larger, more advantageous reinforcer.

The present study differed from previous studies (Mazur & Logue, 1978; Schweitzer & Sulzer-Azaroff, 1988) in that, rather than requiring participants to wait to gain access to the larger reinforcer, they were required to engage in a target behavior during the delay. This engagement may have prevented a resurgence of impulsive behavior as the delays became longer, as reported by Mischel et al. (1972) and Grosch and Neuringer (1981). A future study might use an alternating treatments design during the progressive delay condition to determine whether such activities are directly responsible for increased choices for delayed reinforcement. In

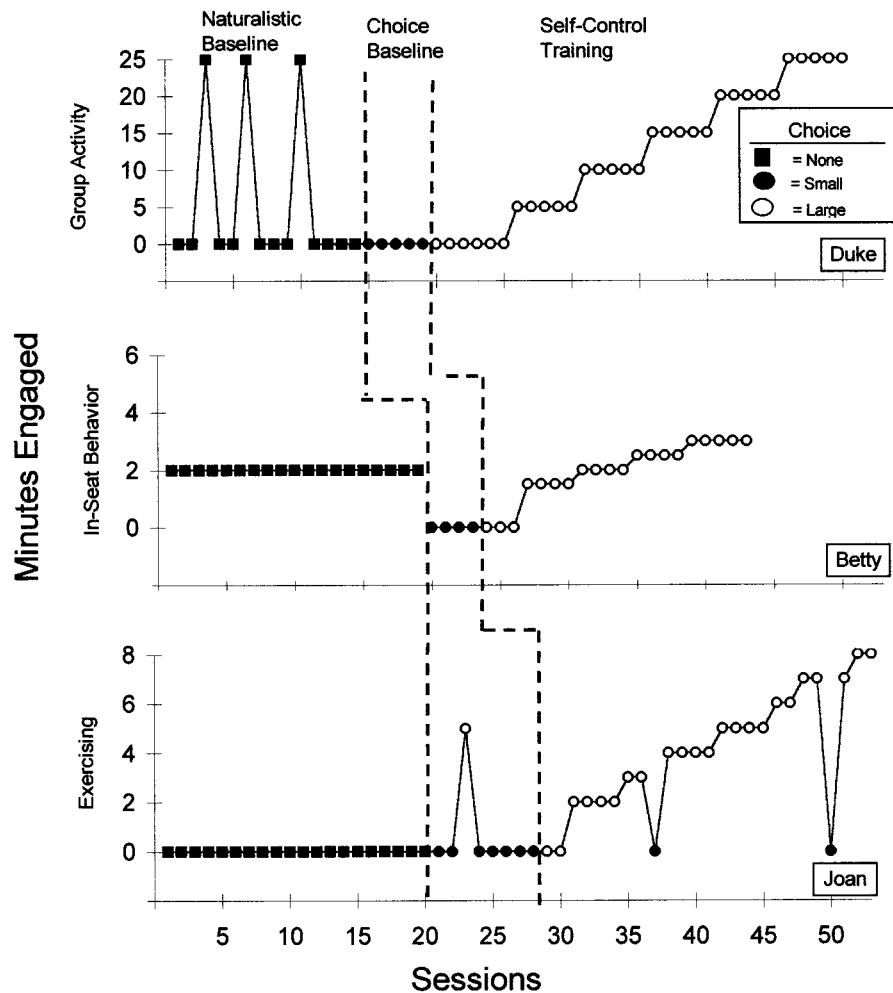


Figure 1. Session minutes engaged in the target behavior during naturalistic baseline, choice baseline, and self-control training conditions across all participants. The square data points in the naturalistic baseline phase show the level of engagement when there were no programmed consequences for the target response. The circular data points show the level of engagement during the choice baseline and self-control training conditions; solid circles indicate that the smaller, immediate reinforcer was chosen; open circles indicate that the large, delayed reinforcer was selected.

such a study, one treatment would be identical to that of the present study, in which a target behavior was required to be emitted during the delay, whereas the other treatment would not impose a response requirement during the delay.

Differences in treatment success between Betty and the other 2 participants may have been due to the severity of her disability, her limited verbal abilities, or both. Because the most dramatic effects of the present inter-

vention were seen in the more verbal participants, the findings may support claims that verbal abilities are in part responsible for increases in self-control (Logue *et al.*, 1986; Schweitzer & Sulzer-Azaroff, 1988). Future researchers may wish to investigate this issue by implementing the present procedure with both verbal and nonverbal participants.

Although the goal of the present study was two-fold, namely to increase self-control and engagement in a target behavior, each

goal separately may have been accomplished more rapidly. When the choice baseline condition was introduced, delays for access to the smaller reinforcer were reduced to zero rather than to naturalistic baseline levels. The availability of the smaller reinforcer decreased engagement for Betty and possibly for Duke. If the primary goal had been to increase engagement, it might have been better to remove the choice paradigm and to increase response requirements gradually to gain access to a large reinforcer. Conversely, if the primary goal was to increase self-control, it might have been better to require a higher probability response during the delay interval (e.g., a leisure or play activity rather than work). In addition, the manipulation of other reinforcer dimensions, such as rate or quality as suggested by Neef, Mace, and Shade (1993), may have produced similar increases in self-control.

In conclusion, a concurrent fixed-duration/progressive-duration schedule of reinforcement may be an effective technique to teach self-control and increase target behaviors of individuals with developmental disabilities. In addition, by allowing the individual to choose whether to engage in a desired behavior, staff members are facilitating that person's decision making. As service providers strive to provide more inclusive environments for persons with disabilities, such an intervention promotes client self-determination while also strengthening life-enhancing behaviors.

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*STUDY QUESTIONS*

1. Describe two complementary strategies that might be used to increase tolerance (preference) for delayed reinforcement.
2. What were the target behaviors and reinforcers for each participant?
3. Describe the naturalistic baseline and choice baseline conditions.
4. Aside from immediacy of reinforcement, what other contingency was in effect during the choice baseline that favored selecting the small reinforcer?
5. Describe the procedures involved in self-control training.
6. What results were obtained during the choice baseline and self-control training for each participant?
7. Duke's and Betty's data showed a decrease in their target behaviors during the choice baseline. How might the authors have prevented this?
8. According to the authors, how might they have increased self-control and increased engagement in the target behavior more effectively?

Questions prepared by Jana Lindberg and April Worsdell, The University of Florida