

*EFFECTS OF REINFORCER CHOICE
MEASURED IN SINGLE-OPERANT AND
CONCURRENT-SCHEDULE PROCEDURES*

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The effects of choice and no choice of reinforcer on the response rates of 3 children with autism were compared across single-operant and concurrent-schedule procedures. No consistent differences in responding between choice and no-choice components emerged during single-operant phases. During the concurrent-schedule phases, however, all participants had substantially higher rates of responding to the button that led to a choice among reinforcers than to the button that did not lead to choice.

DESCRIPTORS: reinforcement, choice, developmental disabilities

Studies examining the effects of choice of reinforcer have typically compared participant choice with caregiver selection of consequences. Although some studies reported that allowing choice had beneficial effects (e.g., Graff, Libby, & Green, 1998), studies using single-operant procedures to examine the effects of reinforcer choice typically reported no differences in responding between choice and no-choice conditions (e.g., Lerman et al., 1997). On the other hand, in studies using concurrent-schedule procedures, participants demonstrated a preference for choice versus no-choice conditions (e.g., Fisher, Thomson, Piazza, Crosland, & Gotjen, 1997; Graff & Libby, 1999). It is likely that concurrent schedules permit a more sensitive assessment of the effects of reinforcer choice than a single-operant arrangement. The present study compared participant choice and no-choice conditions

in both single-operant and concurrent-schedule procedures.

METHOD

Three individuals enrolled in a residential school for students with developmental disabilities participated. Ben and John, age 10, had been diagnosed with autism. Seth, age 9, had diagnoses of autism and attention deficit hyperactivity disorder (ADHD). All sessions took place in an empty room at the school. For Ben and John, session length was 10 min; for Seth, sessions lasted 5 min. Up to two sessions occurred daily, and sessions occurred 4 or 5 days a week.

Prior to the start of the study, participants were exposed to a stimulus preference assessment based on the procedures described by Pace, Ivancic, Edwards, Iwata, and Page (1985) for Ben and the stimulus choice procedure described by Fisher et al. (1992) for Seth and John. The three items approached on the highest percentage of trials were used in the study (Ben: soda, chips, plain chocolate candy; John: sour candy, chocolate candy bar, and soda; Seth: soda, pretzels, and fruit snacks). The dependent variable was the frequency of button pressing tallied with

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automatic counters. For all participants, the initial reinforcement schedule was a fixed-ratio (FR) 1, which was gradually thinned until the following schedules were achieved: John, FR 20; Seth, FR 30; and Ben, FR 30. These schedules were in place by the first session following baseline for John and Seth and the ninth session for Ben.

For each reinforcer delivery, the experimenter presented the participant with a tray that held three small plastic cups with either an array of three different stimuli (choice) or three of the same stimuli (no choice). During the choice condition, when the response requirement was met, the participant was allowed to take one of the cups. During the no-choice condition, when the response requirement was met, the experimenter selected one of the cups and handed it to the participant. In the no-choice condition, the three items were presented in a random order across reinforcer opportunities so that each stimulus was presented approximately 33% of the time.

An ABCBC arrangement was used to compare response rates during choice and no-choice reinforcer conditions within both single-operant (B) and concurrent-schedule (C) phases. Baseline (A) consisted of sessions in which presses to a yellow button resulted in no contingently delivered stimuli. During single-operant phases, only one button was present during each session. A red button was associated with the choice condition, and a blue button was associated with the no-choice condition. Choice and no-choice conditions were alternated in a quasirandom order, with no condition occurring more than two times consecutively. During concurrent phases, both the red and blue buttons were available simultaneously. At the start of each session the positions of the buttons were randomly determined, and midway through each session the positions of the buttons were reversed to control for position preferences.

During the initial phases of the study, the colors of the buttons and backgrounds on the table were associated with different conditions, but reinforcers were not in view until response requirements had been met. Then, in an attempt to make the conditions more discriminable, an array of the three items available was placed directly behind each response button, corresponding to what was available for pressing each button. This procedural change was made during the latter part of the second concurrent phase for John and Ben.

At the end of each session, the experimenter recorded the number of button presses indicated on the counters. An independent observer recorded these data on 92% of all sessions. Percentage agreement was determined by dividing the smaller number by the larger number, and averaged 99.9% (range, 99% to 100%).

RESULTS AND DISCUSSION

Figure 1 shows the results for Ben, John, and Seth. There were no differences between choice and no-choice conditions for Ben during either single-operant phase. Response rates were higher in the choice condition of both concurrent phases. In the second concurrent phase, the increase in responding occurred after the stimuli were made visible.

For John, there were no substantial differences between choice and no-choice conditions during the single-operant phases. Response rates were higher in the choice condition of both concurrent phases. This effect was more apparent in the second concurrent phase after the reinforcers were made visible.

No differences in responding were noted across conditions in the first single-operant phase for Seth. In the second single-operant phase and both concurrent phases, Seth

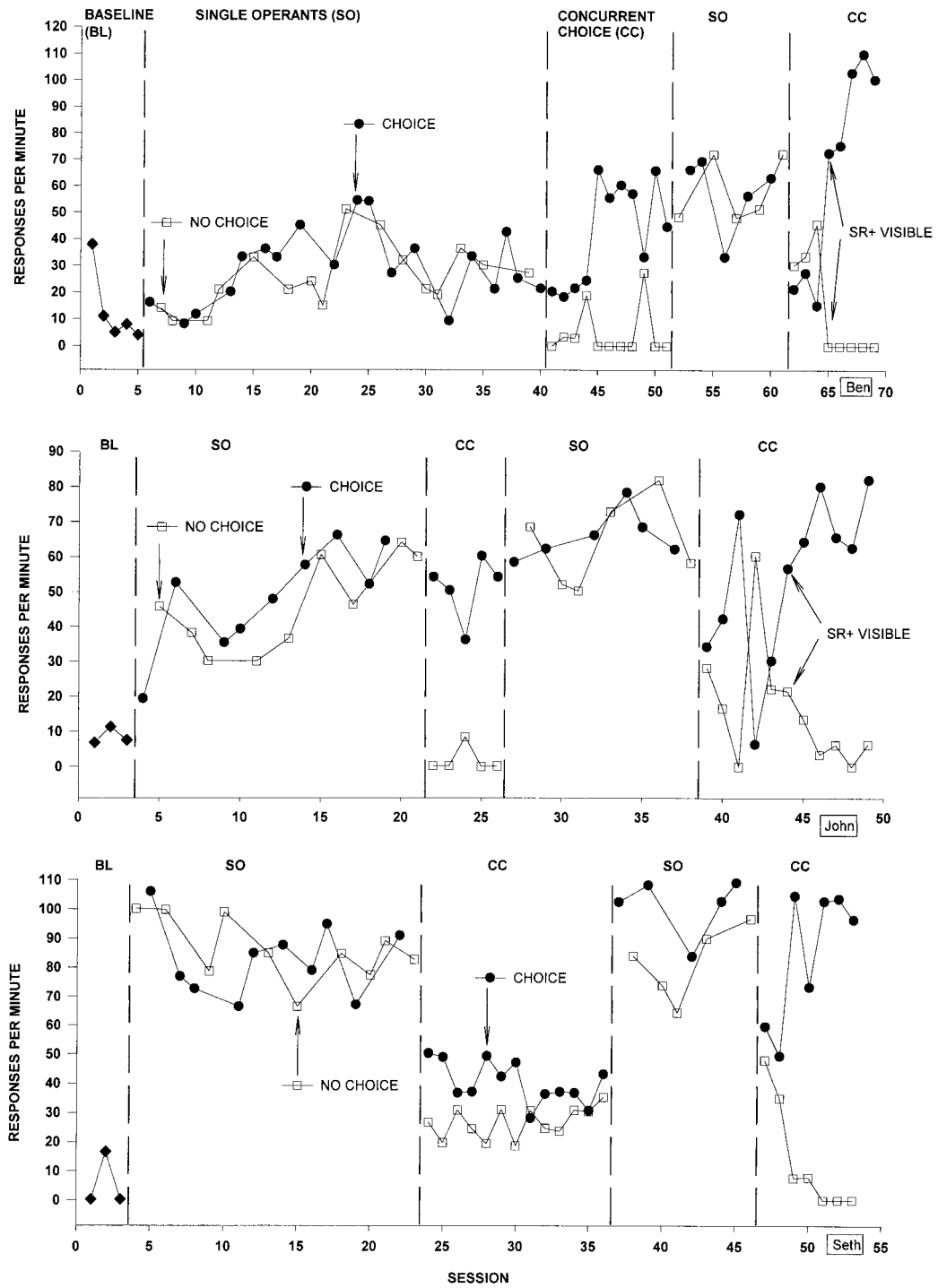


Figure 1. Number of responses per minute for each participant.

made more responses to the button associated with choice.

The differences found in the concurrent phases suggest that allowing choice of reinforcers may have a clear impact on responding that may be obscured when a single-operant procedure is used, which replicates previous studies using concurrent procedures (e.g., Fisher *et al.*, 1997; Graff & Libby, 1999). Once highly preferred stimuli had been identified using a preference assessment, the condition in which participants chose among those stimuli resulted in higher levels of responding than the condition in which the experimenter chose a reinforcer. This suggests that the information provided by systematic preference assessments may be best used by providing choices among highly preferred stimuli at each reinforcement opportunity. That is, even though highly preferred stimuli were used in both conditions, participants in the choice condition accessed more highly preferred stimuli than in the no-choice condition. These results do not provide information about the mechanism of this effect, because this study did not isolate the reinforcing effects of choice. It is possible that the choice procedure allowed access to the stimulus that was most preferred at any given moment. If the influential dimension of choice is related to the momentary value of a reinforcer, it is likely that the momentary value would best be assessed at each reinforcement opportunity rather than at some more distant point in time, such as prior to a teaching session or in a prior preference assessment. Another possibility is that the choice procedure is reinforcing in itself regardless of the stimuli it made available. In order to test this, the stimuli delivered in the no-choice condition could be provided in the same ratio as (e.g., yoked to) the stimuli selected in the choice condition. Regardless of the mechanism, the present study provides additional evidence that al-

lowing individuals with disabilities access to choices can be beneficial.

Choice effects might have been observed in the single-operant phases of this study if the reinforcers were visible behind each button as they were in the second concurrent phase for Ben and John. Placing the reinforcers behind their corresponding buttons during the interreinforcement intervals in the latter part of the second concurrent phase was done to make the contingencies in effect more salient. Such a procedural detail may be more important in a concurrent arrangement than in a single-operant arrangement because multiple reinforcers and responses are simultaneously present, with their relative positions (right vs. left) varying within a session. Nevertheless, it is possible, though unlikely, that placing the reinforcers in view in the single-operant phase would have resulted in differential response rates between the choice and no-choice conditions. Future investigators should consider this procedural detail when comparing the effects of single-operant and concurrent-schedule arrangements and should hold the procedure used constant throughout the experiment.

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