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EFFECTS OF REINFORCEMENT CHOICE ON TASK RESPONDING IN INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES

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The effects of reinforcement choice on task performance were examined with 6 individuals who had been diagnosed with severe to profound mental retardation. Five highly preferred items were identified for each participant via stimulus preference assessments. Participants then were exposed to choice and no-choice conditions that were alternated within reversal and multielement designs. During choice sessions, participants were permitted to select between two preferred stimuli contingent on responding. During no-choice sessions, the therapist delivered a single item contingent on responding. Preference for the stimuli was held constant across conditions by yoking the items delivered during no-choice sessions to those selected during the immediately preceding choice sessions. All participants exhibited similar rates of responding across choice and no-choice conditions. These findings indicate that for individuals with severe disabilities, access to choice may not improve task performance when highly preferred items are already incorporated into instructional programs.

DESCRIPTORS: reinforcement choice, developmental disabilities, free-operant responding

The opportunity for choice making appears to be a beneficial component of instructional technologies for individuals with developmental disabilities. Results of previous studies have shown that individuals with autism or severe to profound retardation engaged in more on-task behavior and less inappropriate behavior when they were provided with self-selected rather than experimenter- or teacher-selected tasks (Bambara, Ager, & Koger, 1994; Parsons, Reid, Reynolds, & Bumgardner, 1990), leisure activities (Dattilo & Rusch, 1985; Kennedy & Haring, 1993), and reinforcers (Dyer, 1987; Mason, McGee, Farmer-Dougan, & Risley, 1989).

In a study by Dyer, Dunlap, and Winterling (1990), for example, 3 individuals with severe mental retardation could select from among various classroom tasks and response-contingent reinforcers during choice sessions, whereas the teacher selected the tasks and reinforcers during no-choice sessions. Results showed that, although similar levels of correct responding were observed during both conditions, problem behavior occurred less often during choice sessions than during

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no-choice sessions. Kennedy and Haring (1993) examined the effects of choice on participation in leisure activities and observed higher levels of participation when individuals with profound multiple handicaps could choose from among available activities than when peers or experimenters selected the activities. Similar outcomes have been found with developmentally normal children (e.g., Cosden, Gannon, & Haring, 1995; Dunlap et al., 1994; Dunlap, Kern-Dunlap, Clarke, & Robbins, 1991; Harding, Wacker, Cooper, Millard, & Jensen-Kovalan, 1994).

These findings suggest that choice-making opportunities can improve the efficacy of programs aimed at behavioral acquisition or reduction. Thus, permitting individuals with developmental disabilities to select their own tasks, activities, and reinforcers is valuable not only because it enhances personal dignity and self-determination, as suggested by numerous authors (e.g., Bannerman, Sheldon, Sherman, & Harchik, 1990; Guess, Benson, & Siegel-Causey, 1985; Shevin & Klein, 1984), but also because such opportunities can function as a useful clinical tool.

Nevertheless, the processes that are responsible for the effects of choice on behavior are unclear. Including opportunities for choice in treatment programs may be beneficial because this strategy insures that highly preferred items are incorporated into programs (Lancioni, O'Reilly, & Emerson, 1996). Data from a number of studies suggest that participants' preference for the activities and reinforcers used in programs can alter treatment effectiveness (Foster-Johnson, Ferro, & Dunlap, 1994; Koegel, Dyer, & Bell, 1987; Piazza, Fisher, Hagopian, Bowman, & Toole, 1996), and choice making is often used to identify individual preferences (Fisher et al., 1992; Parsons & Reid, 1990).

In many studies on choice, participant-selected items probably were more preferred than those selected by the teacher or experimenter (e.g., Dyer, 1987; Dyer et al., 1990; Mason et al., 1989; Peck, 1985). For example, Dyer et al. (1990) compared the tasks and reinforcers selected by each participant during the choice condition to those selected by the teacher during the no-choice condition. Although all participants demonstrated clear preferences for particular items (i.e., when given choices, participants tended to select certain items more often than other items), items chosen most often by the participants were not always chosen most often by the teacher. Thus, because the choice condition included more highly preferred tasks and reinforcers than the no-choice condition, choice-making opportunities may simply have been an efficient tool for identifying individual preferences.

On the other hand, some authors have suggested that choice per se may function as a reinforcer (e.g., Dunlap et al., 1994; Dyer et al., 1990). That is, changes in behavior associated with choice may not be attributable solely to the effects of preference. In most studies on choice, however, participants' preference for the items (e.g., tasks, reinforcers) was not held constant across choice and no-choice conditions, and in studies that contained a control for the effects of preference in the no-choice condition (i.e., by insuring that the no-choice condition produced access to the same stimuli available in the choice condition), choice did not influence responding (Parsons et al., 1990; Smith, Iwata, & Shore, 1995) or produced inconsistent outcomes (Bambara et al., 1994; Kennedy & Haring, 1993; Vaughn & Horner, 1997).

Parsons et al. (1990), for example, observed similar levels of on-task behavior when individuals with severe to moderate mental retardation could choose between high- and low-preference tasks (choice condition) and when they were assigned a high-preference task (no-choice condition). Preference was nearly equivalent in the choice and no-choice conditions because the partic-

ipants generally selected the high-preference items during choice sessions. Bambara et al. (1994) replicated these results and observed no differences in on-task behavior during choice and no-choice conditions for 3 of 4 participants. Kennedy and Haring (1993) also obtained inconsistent findings when leisure activities provided during no-choice sessions were identical (i.e., yoked) to those selected by participants during choice sessions. Results showed that for 2 of 4 participants, levels of engagement with activities were similar in the choice and no-choice conditions.

In light of these inconclusive findings, further research is needed to clarify the effects of choice on the behavior of individuals with severe to profound retardation. Information about the benefits of choice, independent of the effects of preference, could be important when establishing guidelines for program development. In particular, results of additional research may help to elucidate the conditions under which choice making would or would not be expected to enhance performance. For example, if the opportunity to choose per se has little influence on treatment efficacy, strategies should focus on identifying individual preferences because choice making probably will not be beneficial unless the items offered include preferred stimuli. Further, methods used to identify and quantify preferences should be refined for individuals with severe handicaps (e.g., Green, Reid, Canipe, & Gardner, 1991). Alternatively, if choice making itself can enhance program effectiveness, treatments should incorporate strategies to optimize the availability of choices, and future research should focus on methods to teach individuals with profound disabilities how to indicate choices.

Although previous studies that contained a control for preference in the no-choice condition permitted individuals to choose from among tasks or leisure activities (e.g., Kennedy & Haring, 1993; Parsons et al., 1990; Vaughn & Horner, 1997), only one study has examined the effects of reinforcement choice on task performance, and results indicated that choice-making opportunities did not improve responding. Smith et al. (1995) first identified four highly preferred stimuli for each participant via stimulus preference assessments. Participants were then exposed to choice and no-choice sessions, alternated within a multielement design. During the choice condition, participants chose between two preferred items prior to each session, and the experimenter delivered the selected item contingent on responding (e.g., placing blocks in a bucket). During no-choice sessions, the experimenter randomly selected one of the participants' four preferred items and provided the stimulus for responding. Thus, only highly preferred reinforcers were delivered during both choice and no-choice conditions, and results showed similar levels of responding across conditions for all participants. However, the effects of choice may have been relatively weak due to the delay between the choice-making opportunity and subsequent delivery of the reinforcer. (The item provided for responding during the session was selected by the participant prior to the session.) If choice functions as a reinforcer, its effects on responding may not be apparent unless choice making is available immediately following the response.

In this study, we attempted to make the effects of reinforcement choice on task response rates more salient by providing choice-making opportunities contingent on responding. Individuals diagnosed with severe to profound mental retardation were given frequent opportunities to choose reinforcers for working on a task, and items delivered during subsequent no-choice sessions were yoked to those selected during choice sessions.

METHOD

Participants, Settings, and Materials

Six individuals who had been diagnosed with severe to profound mental retardation participated. Participants included 4 children (Adam, Frank, Jim, and Brad) and 2 adults (Carl and Sue), who ranged in age from 4 to 39 years. All participants had been referred to specialized programs (residential day treatment, hospital-based inpatient, and hospital-based outpatient) for assessment and treatment of behavior disorders (e.g., self-injury, aggression). At the time of the study, treatment for problem behavior was either ongoing or had been completed, and none of the individuals exhibited responses that interfered with the conduct of experimental sessions. None of the participants had visual or auditory impairments, and 1 participant used a wheelchair. Sessions were conducted in therapy rooms at the treatment centers, which contained a table and chairs as well as training materials and preferred stimuli necessary to implement the sessions. Training materials included paper, a date stamp, the Connect Four® game (plastic grid with poker chips), and a microswitch (5 in. by 8 in.) attached to a counter.

Response Measurement and Reliability

A free-operant response that was similar to the target behaviors included in the participants' individual habilitation plans was selected for each participant. The responses were pressing a microswitch (Adam, Frank, Jim, and Brad), stamping the date on paper (Carl), and placing chips in a Connect Four® game (Sue). Data on the frequency of these responses were collected for all individuals and were calculated as responses per minute. For the 4 participants whose target response was switch pressing, response frequency was automatically recorded by an electronic counter. The counter was tested prior to each session, and no calibration errors occurred. Following each session, the therapist read the counter and recorded the frequency. An assistant independently read the counter and recorded the frequency for at least 25% of the sessions. Interrecorder agreement averaged 99% (range, 96% to 100%). For the other 2 participants, trained observers used hand-held computers to record the frequency of the target responses during experimental sessions. A second observer independently collected data during 25% of the sessions, and interobserver agreement was calculated on an interval-by-interval basis. The smaller number of responses in each 10-s interval was divided by the larger number of responses; these fractions were summed across all intervals, divided by the total number of intervals in the session, and multiplied by 100%. Interobserver agreement averaged 95% (range, 86% to 100%). Observers also recorded the reinforcers selected by participants during choice sessions. A second observer recorded these items during at least 25% of sessions for all participants, and average interobserver agreement was 99%.

Procedure

Two to four sessions were conducted per day, 1 to 5 days per week. Prior to the study, five preferred items were identified for each individual via both single-presentation (Pace, Ivancic, Edwards, Iwata, & Page, 1985) and paired-stimulus (Fisher et al., 1992) preference assessments. Items approached on at least 80% of the trials during the single-presentation assessment, on at least 50% of the trials during the paired-stimulus assessment, or both, were identified as preferred stimuli; of these items, the five stimuli with the highest percentages of approach responses were included in the study. The items identified for each participant are presented in Table 1.

Baseline. At the start of each session, the participant was prompted to sit at a table in front of the training materials. No other

Table 1
Preferred Stimuli Identified for Each Participant (in Random Order)

Carl	Sue	Adam	Frank	Jim	Brad
Cookie	Cookie	Pudding	Yogurt	Pretzel	Computer
Pretzel	Pretzel	Oatmeal	Spin toy	M&M®	Puzzle
Juice	M&M®	See & Say®	Car	Potato chip	Book
Music box	Juice	Stoplight toy	Massager	Cheese	Music
Massager	Music box	Massager	See & Say®	Corn chip	Sega® game

prompts were delivered during the session, and the therapist provided no consequences for responding.

Choice. When the participant exhibited the target response during choice sessions, the therapist presented two preferred stimuli (randomly selected from the pool of five items) and permitted the individual to select one item. The participant chose one of the two items by exhibiting an approach response that had been identified during the stimulus preference assessment (e.g., pointing to or reaching for the item). Each of the five items was randomly paired with every other item during the session. Although most participants exhibited an approach response within 1 s to 2 s of the stimulus presentation, Adam required 10 s to 15 s to select an item because of physical disabilities; thus, session time was stopped when the stimuli were presented to Adam, and time resumed when he exhibited an approach response. Participants received 15- or 30-s access to nonedible items. Reinforcers were delivered on a continuous (fixed-ratio [FR] 1) schedule, except for Brad, who was exposed to intermittent reinforcement schedules (FR 5 and FR 10) because his baseline response rates were somewhat high and variable. Fixed-ratio schedules were selected due to their ease of implementation. Sessions lasted 10 min for all participants except Frank, whose sessions lasted 5 min.

No choice. During no-choice sessions, the therapist presented a single preferred item contingent on responding. However, the specific items, as well as the order in which they were presented, were identical to those delivered (i.e., selected) during the immediately preceding choice session. The session ended when the individual received all the items delivered in the preceding choice session. All other procedures were similar to those in the choice sessions.

Several participants (Adam, Frank, Jim, and Brad) did not engage in the target response during the final baseline sessions. For these individuals, the therapist used a three-step prompting procedure (i.e., verbal, gestural, and physical prompts) during the initial choice and no-choice sessions to promote response acquisition. The therapist prompted the individual to engage in the target response when no responses occurred for 30 s, and reinforcement was delivered following both prompted and unprompted responses. The prompting procedure was discontinued when the individual received five or fewer prompts for two consecutive sessions.

Experimental Design

The effects of reinforcement on free-operant response rates were examined in a multiple baseline across subjects design. For all participants, choice and no-choice sessions were alternated within a multielement design. Different therapists were associated with the two reinforcement conditions. Three participants were also exposed to choice and no-choice sessions within a reversal design. During reversal phases, partic-

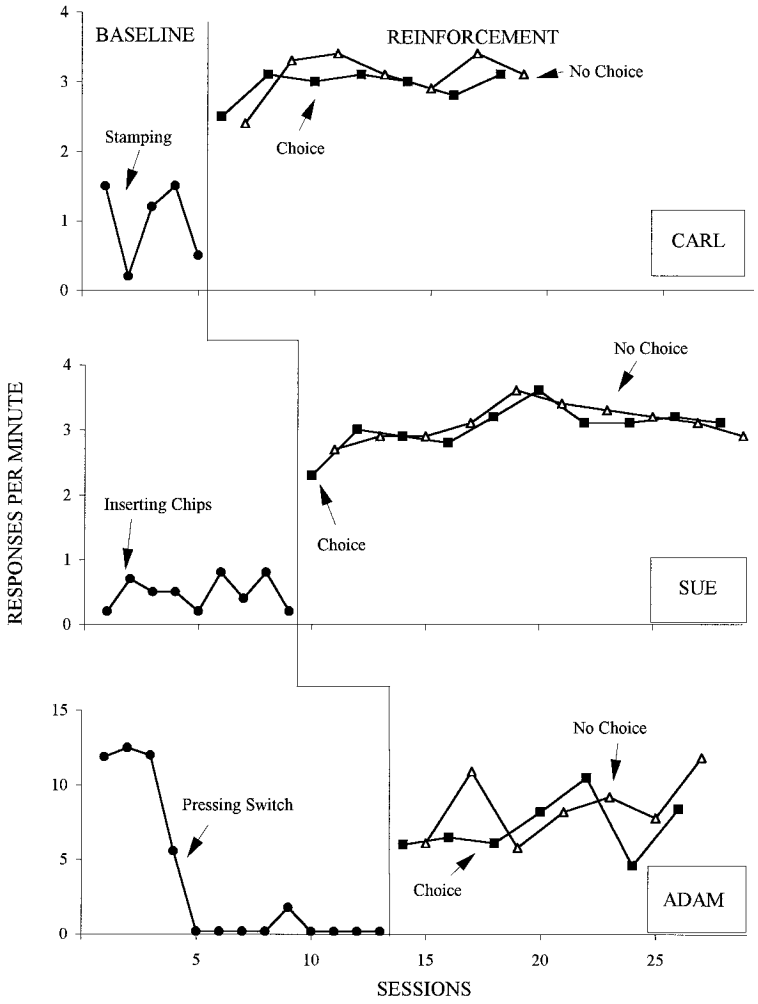

Figure 1. Number of responses per minute on a free-operant task during conditions with no reinforcement (baseline), reinforcement choice, and no reinforcement choice for Carl, Sue, and Adam.

ipants were exposed to several consecutive choice sessions that were followed by yoked no-choice sessions (i.e., the first session of the no-choice phase was yoked to the first session of the choice phase, etc.).

RESULTS

Participants' response rates during choice and no-choice conditions are displayed in Figures 1 and 2. Data on problem behaviors are not presented because the participants engaged in low levels of problem behavior across all sessions. Figure 1 shows the results for the first 3 participants, who were exposed to the multielement assessment only. During baseline, Carl engaged in low levels of stamping (M = 0.9 responses per minute). Responding increased when stamping was reinforced, and Carl exhibited similar levels of stamping in both choice (M = 2.9 responses per minute) and no-choice (M = 3.1 responses per minute) sessions. Sue inserted few chips into the game during baseline (M = 0.4 responses per minute). When Sue received reinforcement for inserting

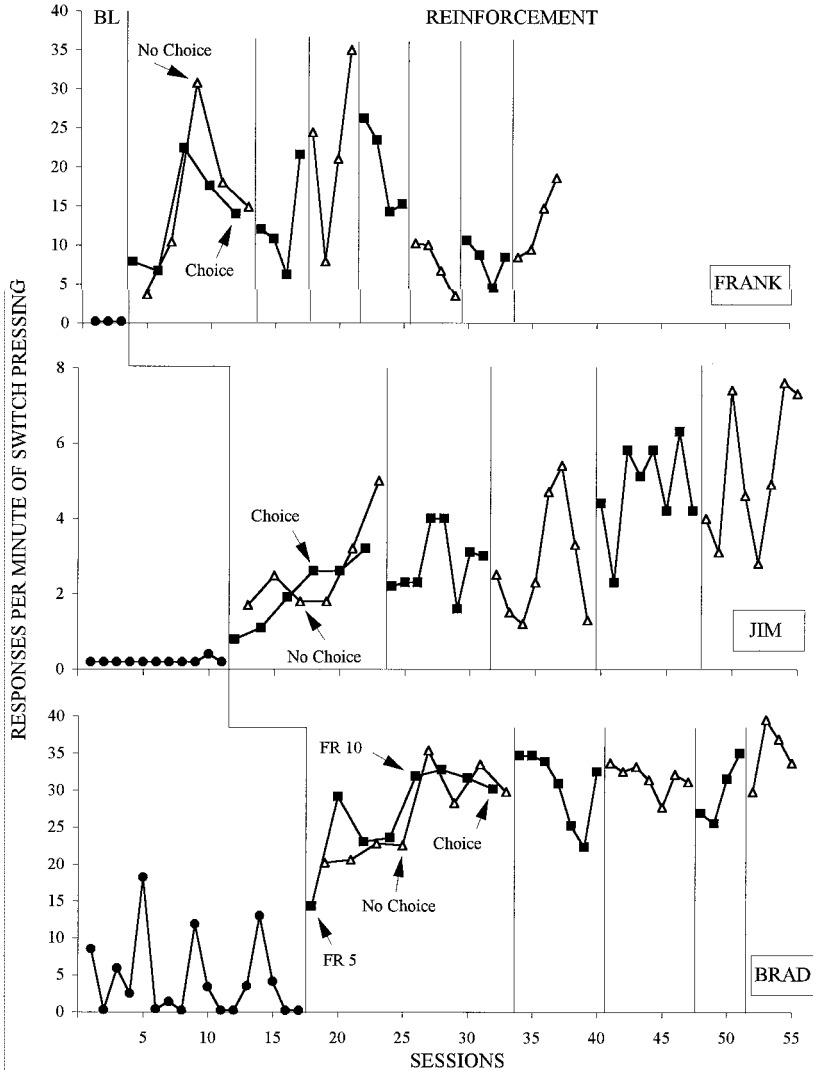

Figure 2. Number of responses per minute of switch pressing during conditions with no reinforcement (baseline), reinforcement choice, and no reinforcement choice for Frank, Jim, and Brad.

chips, levels of responding immediately increased above baseline levels and were similar during choice ($M = 3$ responses per minute) and no-choice ($M = 3.1$ responses per minute) sessions. During baseline, Adam's levels of switch pressing were initially high and then decreased to zero. Initially high rates during baseline could have been due to a number of factors, including task novelty, previous training on similar tasks, or instruction-following behavior that was not maintained in the absence of reinforcement. When Adam received prompts and reinforcement for pressing the switch, responding immediately increased and remained high after prompts were discontinued in the third session. Rates of switch pressing were similar during both choice ($M = 7.2$ responses per minute) and no-choice ($M = 8.5$ responses per minute) sessions.

Results for the other 3 participants are presented in Figure 2. For these individuals, the two reinforcement conditions were compared using both multielement and reversal

designs. During baseline, Frank rarely pressed the switch (M = 0.03 responses per minute). When the two reinforcement conditions were alternated in a multielement design, Frank's responding increased to high levels, and prompts were discontinued after the fourth session. High rates of switch pressing occurred during both choice (M = 18 responses per minute) and no-choice (M = 21 responses per minute) sessions. Several consecutive choice sessions, followed by yoked no-choice sessions, were then implemented, and levels of switch pressing were similar during the two reinforcement conditions. To replicate this finding, two additional choice and no-choice phases were implemented using the reversal design. Although levels of responding appeared to decrease during the second no-choice phase relative to the immediately preceding choice phase, responding remained low when choice sessions were reimplemented. Furthermore, responding began to increase across no-choice sessions in the final phase. Thus, no consistent differences in responding were observed during choice and no-choice conditions.

Jim engaged in few switch presses during baseline (M = 0.04 responses per minute), and responding immediately increased when he began to receive prompts and reinforcement for pressing the switch. In the first comparison phase, choice and no-choice sessions were alternated within a multielement design. Prompts were discontinued after the fifth session, and similar levels of responding were observed in choice (M = 2 responses per minute) and no-choice (M = 2.6 responses per minute) conditions when reinforcement only was in effect. During subsequent comparison conditions, conducted in a reversal design, similar response rates were again observed across choice (M = 3.8 responses per minute) and no-choice (M = 4 responses per minute) sessions.

During baseline, Brad engaged in high but variable rates of responding (M = 4.3 responses per minute). Because Brad responded so frequently across an extended baseline condition (17 sessions), an intermittent schedule was implemented for the reinforcement comparison. An FR 5 schedule was used during the first seven sessions, and an FR 10 schedule was used during the remaining sessions. Brad required just one prompt to press the switch during the first two reinforcement sessions, after which prompts were discontinued. When the two reinforcement conditions were alternated in a multielement design, his responding increased to similar levels during choice (M = 27 responses per minute) and no-choice (M = 26.6 responses per minute) sessions. This finding was replicated when a reversal design was used to compare the conditions (M = 30 responses per minute during choice sessions; M = 33 responses per minute during no-choice sessions).

DISCUSSION

For 6 individuals with severe to profound mental retardation, response-contingent access to choice did not increase response rates above those observed in a no-choice condition when preference was held constant across conditions. These findings, which replicated those reported by Smith et al. (1995), suggest that access to choice may not improve performance when highly preferred items are already incorporated into instructional programs.

Choice may have enhanced responding if participants had been more likely to receive preferred items in the choice condition than in the no-choice condition. In previous studies (e.g., Dyer, 1987; Mason et al., 1989), choice-making opportunities improved responding when individuals' preference for available tasks or reinforcers was not held constant across choice- and no-choice conditions (i.e., when the no-choice

condition did not produce access to the same stimuli provided in the choice condition). In contrast, choice did not influence responding (e.g., Parsons et al., 1990; Smith et al., 1995) or produced inconsistent outcomes (Bambara et al., 1994; Kennedy & Haring, 1993; Vaughn & Horner, 1997) in studies that contained a control for preference in the no-choice condition. Thus, access to preferred stimuli rather than to choice-making opportunities per se may be most critical when establishing high rates of task performance in some individuals with severe to profound retardation.

This study was designed to clarify previous research findings on choice by eliminating the potentially confounding effects of preference. Results also extend previous findings by identifying a condition under which the effects of choice are not likely to be observed. The instructional procedures examined in this study (prompting and delivery of preferred stimuli following correct responding on a simple free-operant task) were selected because they are commonly used to teach basic skills to individuals with severe to profound mental retardation. Nevertheless, these findings do not suggest that choice is always unimportant for these individuals. For example, frequent choice-making opportunities may increase the likelihood that the most preferred tasks, reinforcers, and activities are available, and such opportunities may be extremely helpful when thorough preference assessments cannot be conducted prior to program implementation or when an individual's preferences change frequently over time.

Choice may also be a more potent source of reinforcement in other situations, and further studies should attempt to identify the variables that influence the reinforcing effects of choice. For example, the value of choice may be enhanced when individuals choose from among several items (e.g., four preferred stimuli) instead of just two items as in the current study. Choice making may also be beneficial when only nonpreferred items (e.g., academic tasks) are available to the individual. Although previous findings in this area have been mixed (e.g., Bambara et al., 1994; Parsons et al., 1990; Vaughn & Horner, 1997), it is possible that the reinforcing value of choice is relatively weak when selections are made from among highly preferred stimuli. In this study, for example, the preferred stimuli may have produced a type of ceiling effect on participants' response rates, such that task performance could not be further enhanced by providing choices. In fact, other types of instructional arrangements may be more sensitive to the effects of choice on behavior. For example, in two studies in which a concurrent-operants arrangement was used to examine the effects of reinforcement choice, subjects consistently allocated more of their responses to the choice option than to the no-choice option (Brigham & Sherman, 1973; Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997), suggesting that subjects preferred choices per se.

Additional research on choice should also examine the effects of prompting on response acquisition and maintenance under choice and no-choice situations. The three-step prompting procedure that was used with 4 participants to promote initial skill acquisition may have influenced behavior even after the prompts were discontinued, obscuring any differences in responding under the two reinforcement conditions. A reversal to baseline would have insured that programmed consequences (rather than other components of the training procedure) were responsible for behavioral maintenance. Although such a reversal was not conducted in this study, the use of prompts cannot completely account for the findings because 2 participants did not receive prompts during training.

Further research is also needed to deter-

mine whether these results will generalize to other populations. Some have suggested that choice making is more likely to alter the motivation of individuals with less severe disabilities because choice gives them a sense of control over their environment (e.g., Lancioni et al., 1996). However, the reinforcing value of control (or choices) may be established when choice-making opportunities differentially produce access to the most preferred items (i.e., when individuals are more likely to receive highly preferred items during choice situations than during no-choice situations). Although this situation probably occurs frequently in the natural environment for developmentally normal children, many individuals with severe to profound disabilities may receive few opportunities to make choices, thereby rarely experiencing conditions that may be responsible for establishing choice as a reinforcer.

Finally, further studies should determine how to establish choice as a reinforcer for individuals whose behavior appears to be unaffected by choice-making opportunities. For example, choice may acquire reinforcing properties after individuals are repeatedly exposed to both choice and no-choice situations in the following manner: When choice is available, the individual can obtain highly preferred items; when choice is absent, the individual can obtain only nonpreferred items. If choice can be established as a reinforcer, teachers and clinicians may have an additional treatment strategy for individuals with severe to profound disabilities. In addition, such research findings would highlight the importance of providing individuals with frequent opportunities to make choices.

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STUDY QUESTIONS

1. Why is it beneficial to assess preference for a choice condition independent of the differential consequences associated with choice?

2. How did the authors propose to replicate and extend the study by Smith et al. (1995)?

3. How did the authors identify preferred stimuli to be used as reinforcers? What criteria were used to define *preferred*?

4. Describe the choice and no-choice conditions.

5. List the experimental designs used during the study. Although not explained by the authors, why do you suppose they included the reversal design?

6. What results were obtained during the choice and no-choice conditions of the study?

7. Assuming that choice per se is a reinforcer, how might its effects have been obscured in the present study?

8. How might choice be established as a reinforcer?

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