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EVALUATION OF A BRIEF STIMULUS PREFERENCE ASSESSMENT

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We evaluated the utility of a brief (5-min) stimulus preference assessment for individuals with developmental disabilities. Participants had noncontingent (free) access to an array of stimuli and could interact with any of the stimuli at any time. Stimuli were never withdrawn or withheld from the participants during a 5-min session. In Experiment 1, the brief preference assessment was conducted for 10 participants to identify differentially preferred stimuli, and reinforcer assessments were conducted to test the reinforcing efficacy of those stimuli identified as highly preferred. In Experiment 2, a comparison was conducted between the brief preference assessment and a commonly used paired-stimulus preference assessment. Collectively, results demonstrated that the brief preference assessment identified stimuli that functioned as reinforcers for a simple operant response, identified preferred stimuli that were differentially effective as reinforcers compared to nonpreferred stimuli, was associated with fewer problem behaviors, and required less time to complete than a commonly used paired-stimulus preference assessment.

DESCRIPTORS: reinforcer, preference, concurrent operants, developmental disabilities

Positive reinforcement is used in most behavioral acquisition and reduction procedures for individuals with severe disabilities. However, the identification of reinforcers for this population may be difficult at times because of developmental or physical disabilities, limited verbal repertoires, or a number of other factors (Ivancic & Bailey, 1996; Pace, Ivancic, Edwards, Iwata, & Page, 1985; Rotatori, Fox, & Switzky, 1979). Because there are potential difficulties in identifying reinforcers for individuals with developmental disabilities, several researchers have developed assessment methodologies for this purpose. These methods include (a) personal nomination (e.g., Clements & McKee, 1968; Daley, 1969); (b) reinforcer surveys (e.g., Fox & DeShaw, 1993; Rotatori et al., 1979); (c) single-stimulus (SS) presentation (e.g., approach/no approach; Green et al., 1988; Pace et al., 1985); (d) paired-stimulus (PS) presentation (e.g., Dattilo, 1986; Fisher et al., 1992); and (e) multiple-stimulus (MS) preference assessments (e.g., DeLeon & Iwata, 1996; Windsor, Piché, & Locke, 1994).

Despite the range of preference assessment methods, each type of assessment may

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have limitations. For example, personal nomination and reinforcer surveys may be limited by insufficient verbal skills of the client (Pace et al., 1985; Rotatori et al., 1979) or inability of care providers to predict preferred stimuli (when care providers are the primary source of information; Green et al., 1988; Windsor et al., 1994). Single-stimulus methods may be limited because some people approach virtually all presented stimuli (Fisher et al., 1992; Mazaleski, Iwata, Vollmer, Zarcone, & Smith, 1993; Paclawskyj & Vollmer, 1995). Paired-stimulus methods may be limited by the length of time to complete preference assessments (DeLeon & Iwata, 1996; Windsor et al., 1994). Finally, DeLeon and Iwata (1996) noted that some MS assessments may be limited by their inability to identify a ranking of stimulus preferences. DeLeon and Iwata went on to develop an MS assessment that effectively identified a ranking of stimulus preferences.

Fisher et al. (1992) developed a PS assessment in which stimuli were presented concurrently. Sixteen stimuli were presented in pairs and a choice was made between the presented stimuli. Participants were given 5 s to emit a choice response (e.g., reaching toward an item). When a choice was made, participants were given approximately 5 s of access to the item they chose. Preferred stimuli were evaluated as reinforcers through the use of a concurrent-operants design in which highly preferred stimuli (as identified in the PS assessment) were compared to stimuli chosen as highly preferred in an SS preference assessment (Pace et al., 1985). Results demonstrated that the PS assessment more accurately distinguished between higher and lower preference stimuli than did the SS assessment. Recent research has further validated the PS assessment. For example, Vollmer, Marcus, and LeBlanc (1994) used stimuli identified as preferred in the PS procedure as one component of environmental enrichment designed to reduce self-injury in 3 preschool-aged children. Paclawskyj and Vollmer (1995) showed that the PS procedure was more effective than an SS procedure in identifying reinforcers for students with visual impairments.

Multiple-stimulus presentation formats have recently been investigated. Windsor et al. (1994) developed an MS assessment in which six stimuli were presented concurrently and participants were able to choose (grasp) one item during a given trial. Each assessment consisted of 10 20-s trials. The items chosen in the greatest number of trials were identified as the most preferred. Windsor et al. also compared the average length of the MS procedure to the average length of the PS procedure; results demonstrated that the MS procedure required less time to complete than did the PS procedure.

DeLeon and Iwata (1996) extended the MS assessment developed by Windsor et al. (1994) by combining it with features of the PS assessment. DeLeon and Iwata noted that although the MS assessment required less time to complete than the PS assessment, the MS assessment did not produce a discrete ranking of stimulus preferences. That is, in the MS procedure, an individual could select the same item in all trials. In an attempt to address this limitation, DeLeon and Iwata used the basic stimulus presentation format developed by Windsor et al. but did not replace the stimuli chosen in previous trials. In this multiple-stimulus without replacement procedure (MSWO), preference trials were conducted between stimuli previously not selected, which resulted in a discrete ranking of stimulus preferences. Stimuli chosen as preferred in the MSWO were evaluated as reinforcers using reversal designs. Results indicated that the MSWO procedure was effective at identifying stimuli that functioned as positive reinforcers for arbitrary responses (e.g., pressing a microswitch, dropping blocks into a bucket).

Ringdahl, Vollmer, Marcus, and Roane

(1997) developed an MS preference assessment that evaluated individuals' preferences for various stimuli relative to preferences for engaging in self-injurious behavior (SIB). Three preferred stimuli (as identified in a PS procedure) were presented concurrently in a free-operant format. Observers scored the percentage of 10-s intervals in which any stimuli were interacted with or in which SIB occurred during a 10-min session. Results demonstrated that the procedure was effective in identifying preferences for various stimuli relative to SIB.

The purpose of the current study was to extend research on the MS presentation preference format by developing a brief (5-min) assessment in which individuals had noncontingent (free) access to an array of stimuli. The utility of the brief assessment was evaluated in two experiments. First, the brief assessment was evaluated for its ability to identify differentially preferred stimuli that functioned as reinforcers; further, the effectiveness of differentially preferred stimuli was evaluated by comparing rates of a given response following contingent presentation of either highly preferred or less preferred stimuli. Finally, the brief assessment was compared to a PS preference assessment along the following dimensions: (a) outcome of each assessment, (b) duration of each assessment, and (c) occurrence of inappropriate behaviors associated with each assessment.

This study may extend current work on reinforcer assessments for the following reasons: (a) If validated, a very brief preference assessment would be useful for frequent evaluations (e.g., daily or weekly) of stimulus preferences, (b) preferred stimuli are never withdrawn or withheld during the course of the assessment (as in the SS, PS, MS and MSWO assessments), which may prevent the occurrence of aberrant behaviors following stimulus withdrawal or when access is restricted, and (c) the assessment incorporates a free-operant format in which participants' behavior is not influenced by experimenters' behavior on a trial-by-trial basis (e.g., presentation of only two stimuli per trial, opportunity to choose only one item per trial).

GENERAL METHOD

Participants and Settings

Twenty individuals with severe developmental disabilities participated in this study. Participants were recruited from local schools, preschools, or state-operated adult developmental centers. All participants were ambulatory and communicated through idiosyncratic gestures or vocalizations. Participants were chosen based on referral for treatment of aberrant behaviors, for preference assessments to identify potential stimuli to be used as components of behavior treatment programs, or both.

All sessions were conducted in classrooms or therapy rooms at the participants' schools or day programs. The rooms consisted of one or more tables, several chairs, and various other pieces of furniture (e.g., couch, cabinets). The participants' behavior was recorded by trained observers seated in unobtrusive positions within the rooms. Observers had been previously trained in behavioral observation.

Response Measurement and Reliability

During the free-operant preference assessment, observers scored item manipulations using a 10-s partial-interval recording procedure. A manipulation was defined as any participant contact with an item using his or her hand. Manipulations were converted to a percentage-of-intervals measure to serve as an index of relative preference, so that manipulation measures could be compared across stimuli.

In the initial reinforcer assessment (Assessment A) of Experiment 1, observers

scored whether each participant entered either of two squares using a 10-s partial-interval recording system. In-square behavior was defined as the participant having his or her body in any part of a square at any time during a 10-s interval.

The primary dependent measures for the second reinforcer assessment (Assessment B) in Experiment 1 were the amount of time spent at either a preferred-stimulus or nonpreferred-stimulus work station (scored as percentage of 10-s intervals) and rate of the task-related behaviors. Task-related behaviors were defined as rate of compliance to instructions (following a verbal or gestural prompt and calculated by dividing the number of responses at a given station by the total session time) added to the rate of independently emitted compliant behaviors (i.e., appropriate work behavior that occurred outside the prompting interval).

Experiment 2 consisted of a comparison between the free-operant preference assessment and a commonly used PS preference assessment. In Experiment 2, four dependent measures were recorded by observers: (a) outcome of each preference assessment, (b) duration of each preference assessment, (c) occurrences of inappropriate behaviors (defined individually), and (d) attempted escape from each assessment. Item selections in the PS assessment were defined as reaching responses directed toward an item. The measure was the number of times an item was chosen (through the reaching response) divided by the number presentations of that item. Occurrences of inappropriate behavior and escape were recorded using a 10-s partial-interval recording procedure which was converted to a percentage-of-intervals measure. Examples of inappropriate behaviors included self-injury (e.g., hand biting, head hitting), aggression, stereotypy (e.g., hand flapping, mouthing), disruption (e.g., throwing objects), and tantrums. Throughout the assessments, experimenters ignored all instances of inappropriate behavior. Escape was defined as the participants' buttocks leaving the seat of his or her chair or the participant walking away from the assessment area (i.e., area that contained stimuli) without an item. During the assessments, experimenters responded to escape behaviors by redirecting the participants back to their chairs or to the assessment area.

Throughout this study, interobserver agreement for percentage-of-intervals measures was calculated by dividing each session into 10-s intervals and dividing the total number of intervals with agreement (on either the occurrence or the nonoccurrence of a behavior) by the sum of the intervals with agreements plus disagreements. Interobserver agreement for rate measures was calculated by dividing the smaller number of observed behaviors by the larger number of observed behaviors within each 10-s interval, and averaging the percentage within each interval across the 10-min session. In Experiment 2, interobserver agreement for the duration of each assessment was calculated by dividing the smaller duration (in seconds) by the larger duration and multiplying by 100%. Interobserver agreement for selections in the PS assessment was calculated by dividing the smaller number of combined item choices and presentations by the larger number of combined item choices and presentations and multiplying by 100%. A second observer independently collected data on the dependent variables during 53.2% of all sessions. Throughout this study, interobserver agreement for all dependent measures averaged 91.1% (range, 73.2% to 100%). For item manipulation in the free-operant assessment, occurrence agreement was 83.9% and nonoccurrence agreement was 98.9%. Interobserver agreement for item manipulation in the PS assessment was 96.3%. Interobserver agreement for the occurrence and nonoccurrence of in-square behavior in Reinforcer Assessment A was

100%. In Reinforcer Assessment B, occurrence and nonoccurrence agreement coefficients for time spent at either work station averaged 73.2% and 83.9%, respectively. Interobserver agreement for task-related behavior in Reinforcer Assessment B was 98.0%. In Experiment 2, interobserver agreement for duration of each preference assessment was 99.8%. During Experiment 2, occurrence and nonoccurrence agreement coefficients for problem behavior averaged 77.7% and 90.2%, respectively.

General Procedure

Initial selection of stimuli. A pool of 10 or more stimuli was chosen based upon staff and care provider reports of potential reinforcing items (Dyer, 1987), and an attempt was made to include items from general categories of stimuli in each assessment. Stimuli included food (e.g., candy, fruit, crackers), drinks (e.g., water, cola), leisure and play items (e.g., magazines, balls), tactile stimuli (e.g., Koosh® ball, vibrators), auditory stimuli (e.g., music box, radio), and social attention (e.g., praise, hugs). Social attention was presented by a therapist seated beside the stimulus array. In most assessments, 10 stimuli were presented; however, some assessments consisted of 11 items. Throughout an assessment, food and drinks were replenished if they had been consumed.

Free-operant assessment. The preference assessment was a brief (5-min) free-operant assessment. Items were arranged in a circle on a table, and the participants were free to manipulate the items of their choice. At all times, the participant could manipulate any item or none at all, and no items were withdrawn from the participant during the 5-min session. Based on the partial-interval recording system, it was possible for participants to manipulate multiple stimuli during a given interval. Prior to a session, a therapist led the participant around the table to ensure they came in contact with (or sampled) and located each stimulus. During initial sampling, a therapist placed the participant's hand on the items or modeled appropriate item manipulation. After each item had been sampled, the participant was moved approximately 0.6 m from the assessment area, the therapist withdrew from the assessment area, and the assessment began. During the assessment, observers scored the percentage of intervals spent manipulating each item using a 10-s partial-interval recording procedure. One assessment was conducted for each participant, with the exception of those individuals who participated in the second reinforcer assessment of Experiment 1.

EXPERIMENT 1: REINFORCER ASSESSMENTS

Procedure

Participants. Nine males and 1 female, ages 3 to 37 (M = 18.8 years) with levels of mental retardation ranging from moderate to profound, participated in Experiment 1. Two participants had seizure disorders, 1 had severe brain injury, 1 had been diagnosed with pervasive developmental disorder, and another had Down syndrome.

Free-operant preference assessment. Each day of sessions began with a free-operant assessment as previously described. Although multiple validation sessions may have been conducted in 1 day (see Reinforcer Assessment B), only one free-operant assessment was conducted each day. The purpose of the daily free-operant assessment was to identify each participant's preferred stimuli for that day. All free-operant preference assessments lasted 5 min, with the exception of Monty's, whose preference assessment lasted 2 min (because of rapid ingestion of food).

Reinforcer Assessment A. Six individuals participated in this phase. Following the daily free-operant assessment, the reinforcing efficacy of the stimuli chosen as preferred

was tested in a concurrent-operants paradigm (Fisher et al., 1992), in which the stimulus chosen as preferred (highest number of intervals with an interaction) in the free-operant assessment was presented as a consequence when the participant engaged in a simple operant behavior (in square). That is, two responses (squares) were concurrently available to the participant, and the participant could change from one response (square) to the other at any given time. Two contiguous squares (1.2 m by 1.2 m) were demarcated based on the edges of a table and a wall. The table was 0.6 m by 0.9 m and was positioned in the middle of the two squares so that half of the table (0.6 m by 0.45 m) was in each square. One participant's square was delineated by dividing the therapy room into two equal halves. Each square consisted of a part of the table that contained either the preferred stimulus (preferred-stimulus square) or no stimulus (control square). In the preferred-stimulus square, in-square behavior resulted in continuous access to the preferred item. If the participant left the preferred-stimulus square, the preferred item was immediately replaced in the square. Although the participant was allowed to move into either square at any time, a therapist was near the squares at all times to ensure that the preferred item was never carried from the preferred-stimulus square to the control square. This validation procedure was selected because the target behavior (i.e., in square) required no shaping. Although a complex operant response (e.g., sorting items) may be more socially valid, these responses generally require more time for initial acquisition when compared to a simple operant response (Piazza, Fisher, Hagopian, Bowman, & Toole, 1996).

Prior to the reinforcer validation, each individual participated in a brief training condition, in which the participant was introduced to the contingencies in effect for each square. During the training, the therapist modeled the response for the client while saying, "When you're here, you can get this," while displaying the stimulus available in that area ("this" was nothing in the control square). The participant then was provided access to each square for 15 s (order of presentation was randomized). Training ended when each participant emitted the desired response and the consequence for that response was delivered by the therapist.

With one exception, all validation sessions lasted 10 min (Monty's session lasted 3 min due to rapid ingestion of food). One session was conducted for each participant. At the beginning of each session, the preferred item was placed in one of the two squares, and the therapist told the participant, "You can go either there or there," while gesturing toward each square. Prior to each session, the participant was standing away from and equidistant to either square. The squares were placed in front and to the sides of the participant. After 5 min, the participant was removed from the area he or she was in and was returned to the beginning point. At this time, the squares were reversed (to control for position preferences). The experimenter repeated the original instruction, and the participant was then given access to the squares.

Reinforcer Assessment B. Four individuals participated in this phase. Reinforcer assessment sessions followed one 5-min free-operant assessment conducted at the beginning of each day of sessions. The number of free-operant preference assessments conducted for each participant are as follows: Barry, three assessments; Robert, one assessment; Marty, five assessments; and Kyle, three assessments. For each day, the most preferred item from the free-operant assessment (most selected) was directly compared to a nonpreferred item (never or rarely selected). These items are shown in Table 1. This comparison was accomplished by placing the two items at separate work stations (clearly visible to

Table 1
Preferred and Nonpreferred Stimuli Used in Reinforcer Assessment B of Experiment 1

Name	Day	Sessions	Perferred stimulus	Nonpreferred stimulus
Barry	1	1	Clacker	Koosh® ball
	2	2–3	Hat	Music
	3	4	Clacker	Doll
Robert	1	1–2	Rubber bands	Doll
Marty	1	1–2	Colors	Farm animals
	2	3–4	Colors	Airplane
	3	5–6	Book	Toy cars
	4	7–8	Farm animals	Etch-a-sketch®
	5	9–10	Colors	Toy cars
Kyle	1	1–2	Colors	Doll
	2	3–4	Zoo toy	Airplane
	3	5–6	Colors	Noise stick

the participant). Work stations were placed to the left and right of the participant, and the side of the preferred stimulus was randomized. The participant was allowed to orient (e.g., walk, crawl) toward the station of his choice. Upon reaching one of the stations, the participant was presented with a task that varied depending on skill level, but the task was the same at both work stations. Tasks for each participant were as follows: Barry, touching the therapist's hand; Robert, stacking plastic rings on a cylinder; Marty, placing plastic blocks in a bucket; Kyle, stacking rings and blocks. Instructions were presented using a three-prompt sequence (Horner & Keilitz, 1975) on a fixed-time 30-s schedule. First, a verbal prompt was presented (e.g., "Touch my hand"), and the participant was given 5 s to respond. If compliance did not occur, a touch prompt or modeled prompt was presented (e.g., touching the participant while repeating the instruction or modeling the behavior). If another 5 s elapsed without compliance, the participant was physically guided to complete the task. Stimulus items were presented contingent upon the participant's compliance to instructions within the first two prompts or contingent upon any unprompted independent response. Items were delivered after the first occurrence of physical guidance to allow the participant to gain initial access to the item, but that response was not scored as a task-related response. During reinforcement, access to preferred or nonpreferred stimuli was provided for approximately 15 s. The number of reinforcer validation sessions conducted for each participant are as follows: Barry, four sessions; Robert, two sessions; Marty, 10 sessions; and Kyle, six sessions. All validation sessions lasted 10 min. Two reinforcer validation sessions were conducted per day, with the exception of Barry (one to two sessions conducted per day). The purpose of this reinforcer assessment was to examine the effectiveness of differentially preferred stimuli by comparing responding following contingent presentation of preferred or nonpreferred stimuli.

Results and Discussion

Reinforcer Assessment A. Figure 1 shows the outcomes of the free-operant preference assessment and the data from each participant's validation probe during the initial reinforcer assessment. For all 6 participants, the free-operant assessment differentially identified one or more preferred stimuli (using the percentage of intervals with interaction, relative to other items, as the index of preference). In addition, those stimuli identified as most preferred varied across stimulus domains. For example, tactile stimulation (i.e., vibrator), food, social attention, and auditory stimulation (i.e., radio) were among the stimuli chosen as preferred by these participants.

Five of the 6 participants (83.3%) spent more time in the preferred-stimulus square, and none of the participants entered the control square. One participant (Sharon) never entered either square.

Because of possible limitations of Reinforcer Assessment A (i.e., one data point per

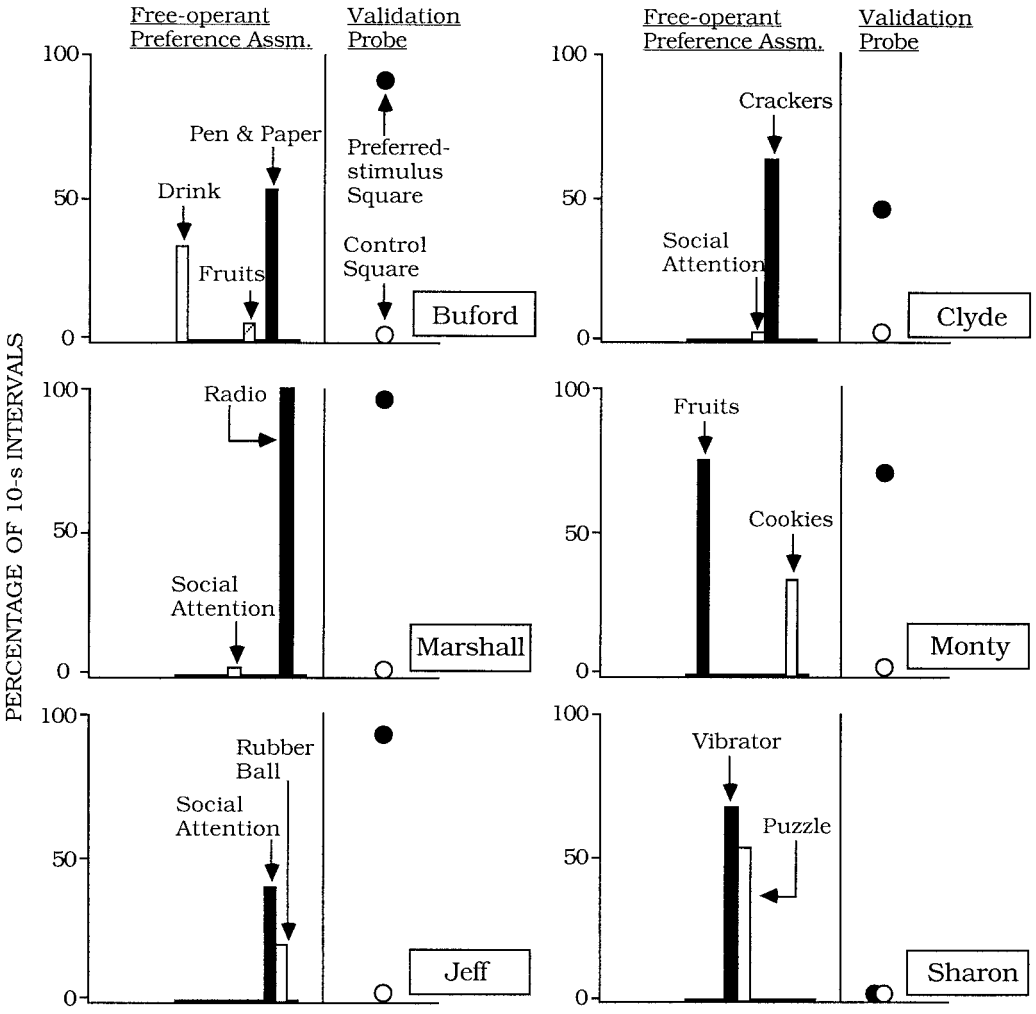

Figure 1. The percentages of 10-s intervals of item manipulation and in-square behavior during the free-operant preference assessments and validation probes of Reinforcer Assessment A of Experiment 1.

participant, preferred stimuli vs. no stimuli), a second reinforcer assessment was conducted for 4 additional participants. In the second reinforcer assessment, preferred stimuli were compared to nonpreferred stimuli in a concurrent-operants paradigm. The purpose of the second reinforcer assessment was to evaluate the differential effectiveness of preferred and nonpreferred stimuli as reinforcers.

Reinforcer Assessment B. The bar graphs on the left side of Figure 2 show the outcome of each individual's initial free-operant preference assessment. As before, the free-operant preference assessment was effective at identifying preferred stimuli for all 4 participants. Table 1 lists the preferred and nonpreferred stimuli (as identified in the free-operant preference assessment) and the corresponding session numbers for each day of the second reinforcer assessment of Experiment 1. It should be noted that preferences for individual stimuli varied across days. As a result, a stimulus that was presented as a nonpreferred reinforcer on 1 day may have been presented as the preferred reinforcer on another day.

The line graphs on the right side of Figure

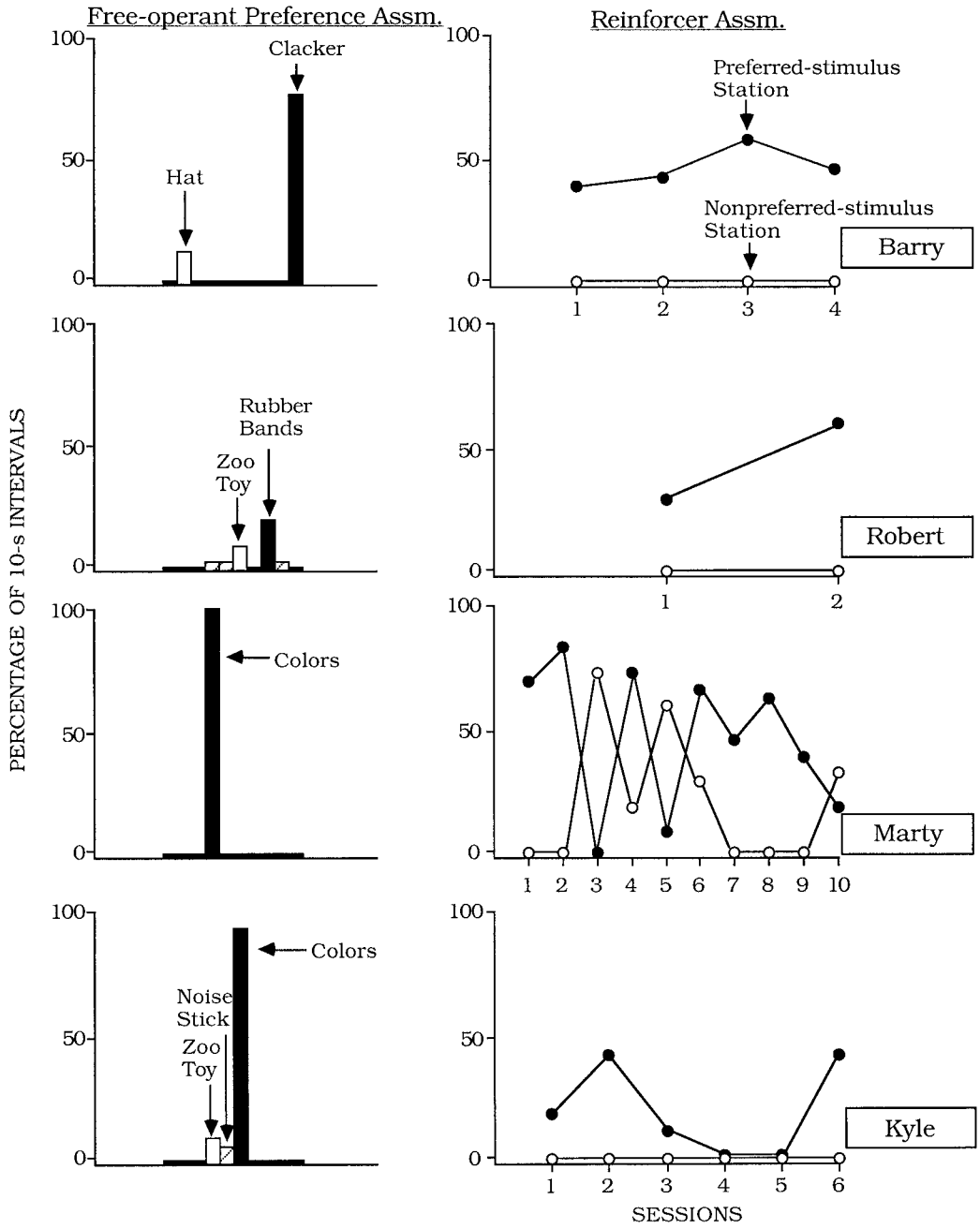

Figure 2. The percentages of 10-s intervals of item manipulation in each participant's initial free-operant preference assessment and the percentage of 10-s intervals spent at the preferred or nonpreferred station in Reinforcer Assessment B of Experiment 1.

2 show the data from each participant's validation sessions during the second reinforcer assessment. Three of the 4 participants allocated all responding toward the preferred station, and 1 participant (Marty) shifted his responding from one station to the other. Data were also collected on the occurrence of task-related behavior emitted at either sta-

tion. The means for each participant's target behavior were: Barry, $M = 0.5$ responses per minute at preferred (range, 0.1 to 0.8), $M = 0$ responses per minute at nonpreferred; Robert, $M = 1.3$ responses per minute at preferred (range, 1.2 to 1.4), $M = 0$ responses per minute at nonpreferred; Marty, $M = 1.2$ responses per minute at preferred (range, 0 to 2.0), $M = 0.5$ responses per minute at nonpreferred (range, 0 to 1.6); Kyle, $M = 0.3$ responses per minute at preferred (range, 0 to 0.4), $M = 0$ responses per minute at nonpreferred.

It is possible that task responses were maintained by negative reinforcement, in the form of avoiding an aversive stimulus (i.e., physical prompting), rather than by positive reinforcement. However, the participants were free to leave (escape) the work station at any time, and the same prompting sequence was in effect for both stations. The only difference between the work stations was the stimulus (preferred or nonpreferred) presented at each.

Results of Experiment 1 indicated that the brief free-operant assessment can identify preferred items that serve as differentially effective reinforcers. Contingent presentation of stimuli identified as preferred in the free-operant assessment usually resulted in increased time at the square or work station associated with the preferred stimulus and increased work exhibited in the work station associated with the preferred stimulus relative to squares or work stations that contained nonpreferred stimuli.

Experiment 1 indicated that the free-operant assessment was useful in identifying differentially effective reinforcers for a simple operant response. The purpose of Experiment 2 was to compare the free-operant assessment to a commonly used stimulus preference assessment (i.e., PS assessment) to illustrate potential advantages or disadvantages inherent in either assessment.

EXPERIMENT 2: COMPARISON OF STIMULUS PREFERENCE ASSESSMENTS

Procedure

Participants. Twelve males and 5 females, ages 3 to 31 ($M = 13.2$ years) with levels of mental retardation ranging from moderate to profound, participated in Experiment 2. Seven of these individuals had also participated in Experiment 1. Two participants had seizure disorders, 3 had been diagnosed with autism or pervasive developmental disorder, two had Cornelia de Lange syndrome, one had fragile X syndrome, and one had Down syndrome.

Preference assessments. Two stimulus preference assessments were conducted for each participant. Assessments were conducted either on consecutive days or contiguously (within 15 min of one another). All preference assessments consisted of 10 stimuli, with the exception of Megan's and Alvin's (eight and nine stimuli, respectively). The same pool of stimuli was used in both preference assessments for each participant.

Paired-stimulus assessment. A PS preference assessment (similar to Fisher et al., 1992) was conducted. Items were presented in pairs, one pair at a time. Participants chose between the items by engaging in a reaching response. When an item was chosen (i.e., touched) by the participant, the item was scored as selected. If an item was selected, the item was made available to the participant for 20 s. Participants were given 5 s to choose between the two items. If a choice was not made, the therapist verbally prompted the participant to make a choice. If another 5 s had elapsed without a choice, the items were removed, and both were scored as not selected. Items were eliminated when (a) they had not been chosen at least once out of the first five presentations or (b) they had been chosen on two or fewer of the first seven presentations. Items that were not

eliminated were presented a total of 10 times each. The number of times an item was chosen out of the 10 presentations was converted to a percentage, which served as an index of the participant's preference for that item.

Free-operant assessment. A brief (5-min) free-operant assessment was conducted (as described previously). Items were arranged around the room or on a table, and the participants were free to interact with the items of their choice. At all times, the participant could interact with any item or none at all, and the items were never removed from the participant during the 5-min session.

Results and Discussion

Figure 3 shows representative outcomes of the preference assessment comparisons. For 8 of the 17 participants (47.1%), assessment results matched for the most preferred item. The upper two bar graphs are examples of assessment outcomes that matched. For the remaining 9 participants (52.9%), preference assessment outcomes did not match. Examples of these results are presented in the lower two bar graphs of Figure 3. The number of preference assessment results that did not match is not surprising given that preferences for stimuli may change over time (Mason, McGee, Farmer-Dougan, & Risley, 1989).

Thirteen of the participants (76.5%) displayed some problem behavior (i.e., inappropriate or escape behavior) during the assessments. Figure 4 shows the occurrence of problem behaviors in each assessment. Of the 13 individuals who exhibited any problem behavior, 11 (84.6%) engaged in inappropriate behavior more frequently in the PS assessment.

For all participants, the duration of the PS assessment was longer than that of the free-operant assessment. The average length of the PS assessment was 21.67 min (range, 13.22 to 34.43 min), whereas the length of each free-operant assessment was 5 min.

Results of Experiment 2 show that for 8 of the 17 participants (47.1%), both assessments yielded similar preferences for a given stimulus; assessment results did not match for 52.9% of the participants. In addition, the free-operant preference assessment was completed more quickly and was associated with less problem behavior than the PS assessment. As a result, the brief free-operant procedure may be a viable form of preference assessment for practitioners.

A potential limitation of our data analysis from Experiment 2 is that a different technique was used for defining stimulus preferences in each assessment (i.e., percentage of trials chosen vs. percentage of intervals). As a result, stimuli identified as preferred in the free-operant assessment may not appear to be as preferred as those stimuli identified in the PS assessment (or vice versa). However, the goal of both assessments is to identify *relative* stimulus preferences.

GENERAL DISCUSSION

In Experiment 1, a brief (5-min) stimulus preference assessment was evaluated. Items chosen as preferred in the free-operant assessment were then shown to serve as reinforcers for a simple operant response (i.e., in-square behavior). Further, Experiment 1 demonstrated that the free-operant assessment was useful in identifying stimuli that functioned as differentially effective reinforcers. In Experiment 2, the brief free-operant assessment was compared to a commonly used PS preference assessment. Results of Experiment 2 indicated that, relative to the PS assessment, the free-operant method offered several advantages (i.e., less time, fewer problem behaviors).

The free-operant assessment should be practically useful because preferences may be evaluated frequently because of assessment brevity. Thus, the free-operant assessment may prove beneficial in situations in which

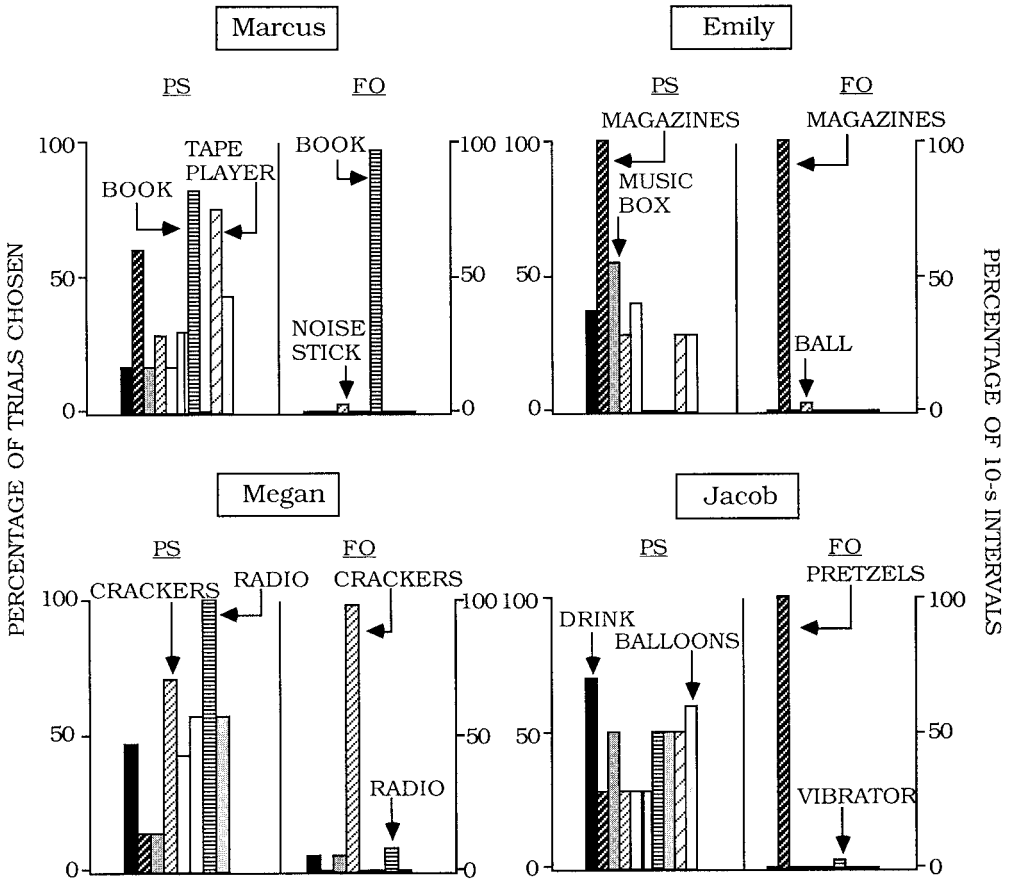

Figure 3. The percentage of trials in which each stimulus was selected during the paired-stimulus (PS) assessment (left side of each bar graph) and the percentage of 10-s intervals of item manipulation during the free-operant (FO) assessment (right side of each bar graph).

a client has limited visitation times (e.g., a clinic), preferences should be frequently evaluated (e.g., in a token economy or enriched environment), or reinforcers are otherwise frequently varied (Egel, 1981; Mason et al., 1989). Daily updates of stimulus preferences may reveal shifts in preferences among stimuli. For example, in Reinforcer Assessment B, stimuli that had previously been identified as nonpreferred for 1 participant (Marty) were later identified as preferred. Such changes in stimulus preferences may have implications for reinforcement-based programs in which preferred stimuli are presented contingent upon a target response. Correct identification of preferred stimuli (as well as changes in preferences) may increase the utility of such programs by ensuring that stimuli presented contingently are preferred.

It should be noted that, in addition to conducting the preference assessment, reinforcer identification may involve several steps (e.g., interviewing staff and caregivers, setting up the stimulus array, allowing the participants to sample each stimulus, summarizing the data obtained from the preference assessment, completing the reinforcer assessment). Thus, the free-operant preference assessment may reduce the duration of only a small component of the entire reinforcer identification process. Nonetheless, re-

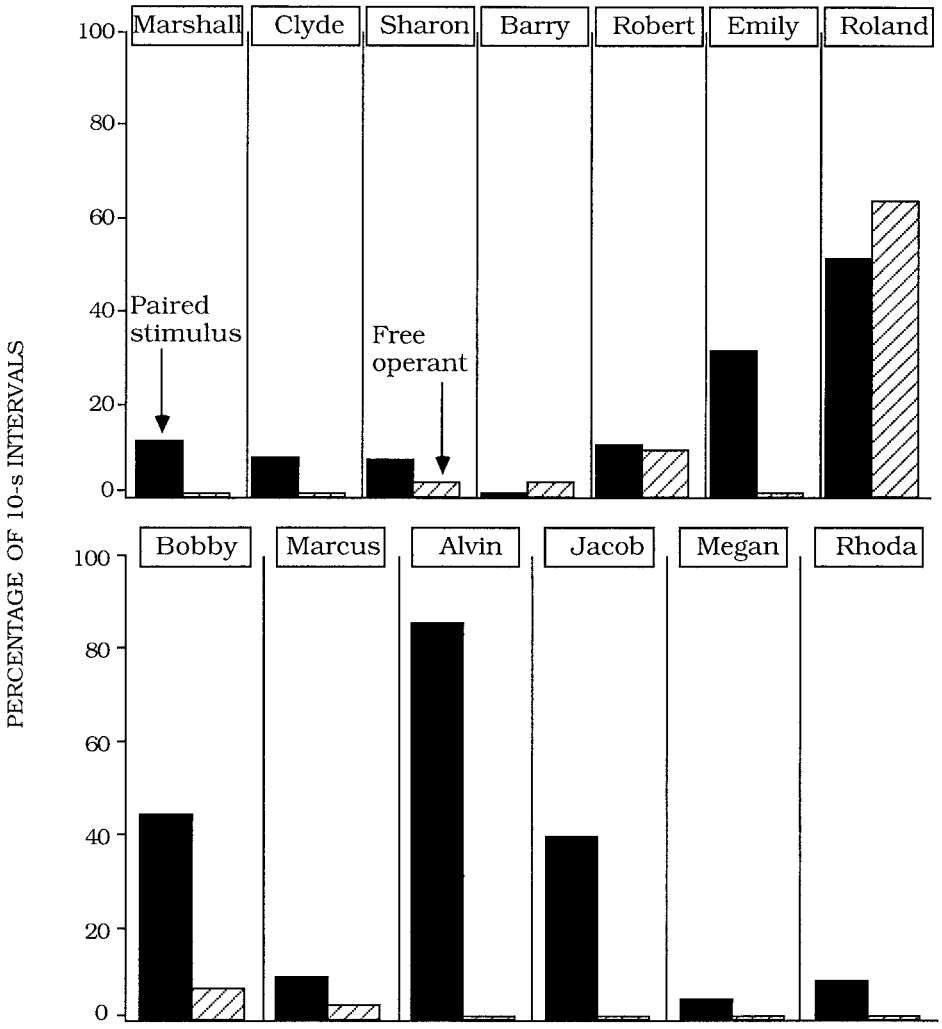

Figure 4. The percentage of 10-s intervals of combined problem behavior in paired-stimulus and free-operant preference assessments.

duction in a portion of the reinforcer identification process, especially during periods of direct client contact, may allow greater time to be allocated toward other clinical duties (e.g., functional analysis, treatment development).

Results of Experiment 2 indicated that the free-operant assessment was associated with fewer problem behaviors than was the PS assessment. There may be several reasons for this finding. First, in the free-operant assessment, preferred stimuli were not withdrawn from the client, so aberrant behavior evoked by stimulus withdrawal was less likely to occur. This assumption would be particularly true for those individuals whose aberrant responding is maintained by access to preferred stimuli. For those individuals whose behavior was maintained by negative reinforcement, it is plausible that the presentation of choices in the PS assessment is sufficiently similar to the presentation of instructional demands; thus, higher rates of aberrant responding may be observed in this assessment given its similarity to demand settings. Conversely, if an individual's behav-

ior is maintained by attention, it is possible that higher rates of aberrant behavior in the PS assessment may be related to an extinction burst. That is, a burst of behavior may occur because (a) no attention is provided for the aberrant behavior and (b) the levels of noncontingent attention provided do not successfully attenuate the behavior. Further, the continuous presentation of alternative stimuli may be sufficient to suppress the behavior in the free-operant assessment. Recent research (e.g., Fischer, Iwata, & Mazaleski, 1997; Hanley, Piazza, & Fisher, 1997) has suggested that continuous presentation of preferred stimuli may reduce extinction-related behavior maintained by attention. Finally, the continuous access to stimuli in the free-operant assessment may compete with potential automatic sources of reinforcement more effectively than sporadic access to preferred stimuli in the PS assessment. That is, the free-operant assessment may be more similar to an enriched environment. Enriched environments have been shown to reduce rates of aberrant behavior (Ringdahl et al., 1997).

The free-operant methodology presented here differs appreciably from existing multiple-stimulus preference assessments (e.g., DeLeon & Iwata, 1996; Windsor et al., 1994). In the free-operant format, behavior is not influenced by experimental constraints related to trial presentations. However, in the MS and MSWO assessments, responding is limited to only two responses per trial (i.e., selecting one item or selecting nothing). Thus, the MS and MSWO assessments represent a series of discrete trials in which only certain behaviors can occur (because of procedural constraints). Also, in the free-operant assessment, preferred stimuli are never removed from the assessment, whereas in the MSWO, MS, and SS assessments, preferred stimuli are removed from the assessment following trials in which they are selected.

The free-operant assessment, however, does not identify a discrete ranking of preferred stimuli as does the MSWO assessment. Although the inability to identify discrete rankings has been cited as a limitation of MS assessment (DeLeon & Iwata, 1996), the free-operant assessment may circumvent this problem by permitting frequent updates of stimulus preferences. If the purpose of identifying more than one reinforcer is to protect against satiation, frequent assessment also meets that purpose.

A potential limitation of the free-operant methodology is that continuous access to preferred stimuli during assessment may result in satiation effects during ensuing reinforcement conditions (Vollmer & Iwata, 1991). It may be necessary to wait for a period of time following assessment before beginning sessions using identified reinforcers.

Future research could compare the clinical applicability and acceptability of the free-operant preference assessment to other types of preference assessments (e.g., DeLeon & Iwata, 1996; Pace et al., 1985). Future research might also examine within-session patterns of stimulus interaction to evaluate the optimal session duration required to identify clear stimulus preferences. Finally, future research should further examine the occurrence of aberrant responding in preference assessments. For example, functional analysis results could be examined in relation to the occurrence of aberrant behavior in a preference assessment. Such data may yield information regarding the operant mechanisms that are responsible for differences in aberrant responding across the two assessments.

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STUDY QUESTIONS

1. According to the authors, what are the limitations of the preference assessments based on (a) personal nomination, (b) reinforcer surveys, (c) single-stimulus presentation, (d) paired-stimulus presentation, and (e) multiple-stimulus presentation?

2. What are the potential advantages of the authors' assessment procedure?

3. Describe the methods used to calculate reliability and the types of data to which they were applied.

4. Describe the free-operant preference assessment.

5. How did the results of the preference assessments compare with those of the reinforcer assessments in Experiment 1?

6. How did the two preference assessments used during Experiment 2 differ, and how did the results of these assessments compare?

7. Why might the free-operant assessment be less likely than the paired-stimulus assessment to occasion aberrant behavior?

8. How could differences in the dependent measure affect correspondence between results of preference assessments based on stimulus selection and those based on duration of stimulus manipulation?

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