

*EXAMINATION OF RELATIVE REINFORCEMENT  
EFFECTS OF STIMULI IDENTIFIED THROUGH  
PRETREATMENT AND DAILY BRIEF  
PREFERENCE ASSESSMENTS*

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Several brief preference assessments have recently been developed to identify reinforcers for individuals with developmental disabilities. One purported advantage of brief assessments is that they can be administered frequently, thus accommodating shifts in preference and presumably enhancing reinforcement effects. In this study, we initially conducted lengthy paired-choice preference assessments and identified a hierarchy of preferred items for 5 individuals with developmental disabilities. Subsequently, brief multiple-stimulus-without-replacement assessments using the same items were completed each day prior to work sessions. On days when results of the daily brief assessment differed from the one-time lengthy assessment, the relative reinforcing effects of the top items from each assessment were compared in a concurrent-schedule arrangement. The results revealed that when the two assessments differed, participants generally allocated more responses to the task associated with the daily top-ranked item.

DESCRIPTORS: developmental disabilities, preference assessment, reinforcer assessment

Several procedures have been developed for identifying the stimulus preferences of individuals with developmental disabilities (Fisher et al., 1992; Matson et al., 1999; Pace, Ivancic, Edwards, Iwata, & Page, 1985; Windsor, Piche, & Locke, 1994). These assessments are often used to select reinforcers for treatment programs. Typically, a preference assessment is conducted to identify one or two highly ranked items, and these items are then used consistently as reinforcers for adaptive behavior.

Several of the more recently developed methods have emphasized rapid identification of preferences through brief assessment

(e.g., DeLeon & Iwata, 1996; Roane, Vollmer, Ringdahl, & Marcus, 1998; Windsor et al., 1994). Brief assessments may have substantial practical advantages over longer versions. First, preference assessment methods can be effortful for caregivers (Matson et al., 1999). By shortening the procedures, it is possible that caregivers may be more likely to administer the assessment and that the individuals being assessed will not become fatigued or otherwise have to endure extensive assessment sessions. Brief assessment may also be highly useful when therapy or assessment is limited by brief visitation times (Roane et al., 1998).

Perhaps the most promising use of brief assessment is to accommodate momentary fluctuations in preference. Several studies have demonstrated that preferences can shift across time such that stimuli selected as highly preferred at one point in time may not be preferred at a later time (e.g., Dyer, 1987; Kennedy & Haring, 1993; Roane et

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al., 1998). If stimulus preferences are highly dynamic, frequent preference assessment (especially when conducted just before training sessions) may ensure that the stimuli used in treatment are, in fact, the most highly preferred (Kennedy & Haring, 1993; Lohrman-O'Rourke & Browder, 1998). Brief procedures can facilitate frequent assessment by minimizing the time and effort required for identifying highly preferred stimuli.

To date, several studies have examined the effects of conducting brief preference assessments just prior to training or reinforcer assessment sessions. For example, Roane *et al.* (1998) demonstrated that stimuli identified as highly preferred during brief assessments functioned more effectively as reinforcers than stimuli identified as nonpreferred during the same assessment. Others have demonstrated that stimuli selected using pre-session assessments produced superior results relative to stimuli selected by teachers based on informal observations of students (Mason, McGee, Farmer-Dougan, & Risley, 1989) or stimuli selected from standardized lists of reinforcers (Dyer, 1987). However, no studies have directly compared the outcomes of brief and frequent versus lengthy and infrequent assessments using systematic preference assessment methods. That is, these previous investigations did not compare multiple brief assessments with a single lengthier assessment to directly determine the necessity of assessing preferences frequently.

In the present study, we initially conducted paired-choice preference assessments (Fisher *et al.*, 1992) to identify a hierarchy of preferred stimuli for 5 individuals with mental retardation. We then conducted daily brief assessments in a fashion similar to that described by DeLeon and Iwata (1996). On days when the item selected first during the brief assessment differed from the top-ranked item from the paired-choice assessment, a concurrent-operant reinforcer assess-

ment was conducted to determine the relative strength of the two stimuli. Our purposes were to determine whether shifts in the most preferred stimulus occurred across days, and, when shifts did occur, to determine if more task responding was allocated to the tasks associated with that day's top-ranked stimulus than to tasks associated with the original top-ranked stimulus.

## METHOD

### *Participants and Setting*

Five individuals with developmental disabilities participated in the study. All participants had been referred to an inpatient unit for the assessment and treatment of severe behavior disorders. Bridget, an 8-year-old girl who had been diagnosed with mild mental retardation, had been referred for the treatment of self-injury and pica. Isiah was a 9-year-old boy who had been diagnosed with pervasive development disorder. He had been referred for the treatment of aggression. Gracey, an 11-year-old girl who had been diagnosed with moderate mental retardation and autism, had been referred for the assessment and treatment of aggression, disruption, and self-injury. Loretta was a 14-year-old girl who had been diagnosed with mild mental retardation and Prader-Willi syndrome. She had been admitted for the treatment of aggression, noncompliance, and food stealing. Finally, Carla was a 25-year-old woman who had been diagnosed with severe mental retardation and mood disturbances and had been admitted for the treatment of self-injury. All participants could understand simple instructions and could, at minimum, communicate using two- to three-word utterances.

### *Procedure*

*Phase 1: Stimulus identification and paired-choice assessment.* Each participant's primary caregiver was asked to list potential reinforc-

ers using the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Piazza, Bowman, & Amari, 1996). Seven to nine items identified on the RAISD were then used in conducting the paired-choice preference assessment for each child. During the paired-choice assessment, a therapist placed pairs of items in front of each participant, one pair per trial, and the participant was asked to choose one item by pointing to or otherwise approaching an item with a hand. Choosing an item resulted in 5-s access to that item. After the trial, the item was removed, and the next pair was presented. This procedure continued until each item had been paired once with each other item. Data were collected on item selection and consumption. Following the assessment, the items were ranked based on the number of times the item was selected divided by the number of times the item was presented. The item with the highest percentage was designated as the lengthy paired-choice (lengthy-PC) item.

*Phase 2: Daily brief assessment and reinforcer assessment.* A task was selected for each participant. The task was one that the participant could readily complete. These included tasks listed on the participant's individual educational program that had already been mastered or work activities that the participant had successfully completed in a vocational setting. The tasks selected were folding towels for Bridget, reading words printed on cards for Isiah and Gracey, completing single-digit addition problems for Loretta, and envelope stuffing for Carla.

The participants were first taught to earn reinforcers for task completion. Training for Bridget and Loretta consisted of a verbal explanation of the session contingencies. Following the explanation, each child was asked to repeat the session contingencies. The therapist then supplied the child with hypothetical scenarios to test for comprehension of the session contingencies (e.g.,

"What will you get if you fold the middle towel?"). Both children were able to answer correctly each time they were asked.

Training sessions for Isiah, Gracey, and Carla consisted of 10 trials. During each trial, three sets of task materials were placed in front of the participant (e.g., three piles of paper and unstuffed envelopes). Stimuli selected from the paired-choice assessment were placed behind two of the sets. The participant could earn 1 min of access to the item behind each task set by completing one task from that set. After the 1-min access period, the item was removed and the next trial began. If the participant completed a task from the set without an item behind it, no stimulus was delivered and the therapist waited 1 min before presenting the next trial.

During training sessions, the participant was prompted to "Work for what you want." The positions of the two available stimuli were randomly alternated after each 1-min reinforcement period. Data were collected on the position of the task (left, middle, or right) the participant chose on each trial and on whether or not there was a stimulus behind the task completed. This was done to ensure that (a) the participant did not consistently complete tasks from only one position across trials (i.e., did not display a position bias), and (b) the participant did not complete tasks from sets associated with no reinforcement (the control task). A single 10-trial session was conducted with Isiah and Gracey because they displayed no evidence of position bias in the first session and never completed the control task. Carla also displayed no evidence of a position bias and ceased completing the control task during her third 10-trial session.

When training was completed, daily preference assessments were initiated. One assessment session was conducted per day. The assessment was completed in a manner similar to the multiple-stimulus-without-replacement (MSWO) procedure described by DeLeon

and Iwata (1996), with the exception that the entire stimulus array was presented only once. At the start of the MSWO assessment, all items used in the paired-choice preference assessment were presented concurrently. The participant was instructed to choose an item. Upon selection, the participant was given access to the item for 20 s. The item was then removed, and the participant was instructed to choose one of the remaining items. Sessions were terminated when all of the items were chosen or if the participant did not respond within 30 s. The first item chosen during the MSWO assessment was designated as that day's daily-MSWO item.

On days when the daily-MSWO item differed from the lengthy-PC item, a reinforcer assessment session was conducted to compare the relative effects of the two stimuli on task responding using a concurrent-operants arrangement. Three identical task sets were placed in front of the participant. For example, three identical sets of addition problems were placed on the table in front of Loretta. At the beginning of the session, each item was placed behind one of the tasks and the participant was instructed to "work for what you want." The space behind the third task set was empty. Item placement was rotated after each reinforcement interval. Completion of a task was associated with one of three outcomes, depending on which task was completed: 30 s of access to the lengthy-PC item, 30 s of access to the daily-MSWO item, or a 30-s interval with no access to either item (a control task). The stimuli were delivered on a fixed-ratio (FR) 1 schedule for Bridget, on an FR 2 schedule for Carla, and on FR 3 schedules for Isiah, Gracey, and Loretta. Following the reinforcement interval, the item was placed behind the corresponding task and the participant was again prompted to "work for what you want." Data were collected on the number of tasks completed for each item and duration of work time. Sessions were ter-

minated when the participant had worked for a total of 5 min (corrected for reinforcement intervals) or did not respond within 30 s of the work prompt.

Interobserver agreement data were collected on selections during 100% of the paired-choice assessments and 89% of the MSWO sessions and on responding during 94% of the reinforcer assessment sessions. Interobserver agreement during the paired-choice and MSWO assessments was calculated by dividing the number of trials on which the observers agreed which stimulus was chosen by the total number of trials and multiplying by 100%. This resulted in mean agreement coefficients of 100% and 99.4% for the paired-choice and MSWO assessments, respectively. Exact agreement coefficients were calculated for reinforcer assessment sessions by dividing sessions into 10-s intervals, then dividing the number of intervals with exact agreements (each observer recording exactly the same number of responses in an interval) by the total number of intervals and multiplying the result by 100%. The mean exact agreement coefficient was 98.8%.

## RESULTS

Figure 1 depicts the percentage of MSWO assessments in which each item was selected first (i.e., the daily-MSWO item). For each participant, the items are ordered from left (highest) to right (lowest) according to their ranks from the lengthy-PC assessment. Across participants, the daily-MSWO item matched the lengthy-PC item in 30% of MSWO assessments. Half of these matches were accounted for by Carla, who chose soda during the initial paired-choice assessment and during all but two of her daily MSWO assessments. By contrast, none of the remaining participants chose the lengthy-PC item in more than half of the daily MSWO assessments. This result was most pronounced for Bridget, whose

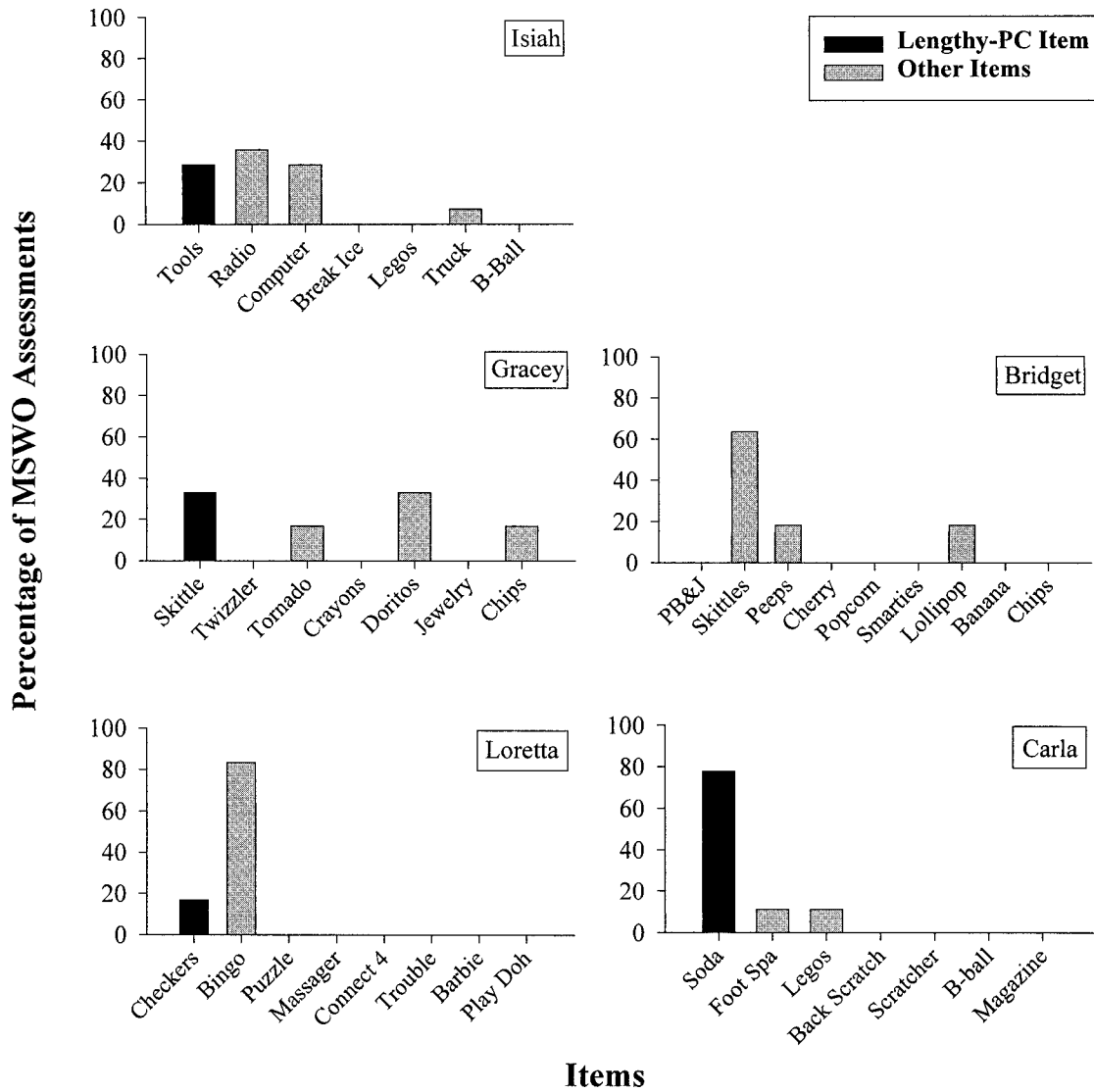


Figure 1. Percentage of MSWO assessments in which each item was selected first for each participant. Items are ordered from left (highest) to right (lowest) based on their ranks during the lengthy-PC assessment.

lengthy-PC item (peanut butter and jelly sandwich) was never selected first during the daily MSWO assessment. Across participants, there was some consistency regarding the item that displaced the lengthy-PC item on days when this latter item was not selected first during the daily MSWO assessments. Loretta selected only one other item first during her MSWO assessments, whereas Carla chose only two others. Isiah, Gracey, and Bridget distributed their first selec-

tions among only three other items but, surprisingly, sometimes selected first an item that was ranked relatively low during the lengthy-PC assessment.

We also examined the rankings of the lengthy-PC items across successive MSWO assessments (Figure 2). Most of the participants tended to select the lengthy-PC item within the first four selections during the MSWO assessment. Carla and Loretta made the most consistent selections. Carla chose

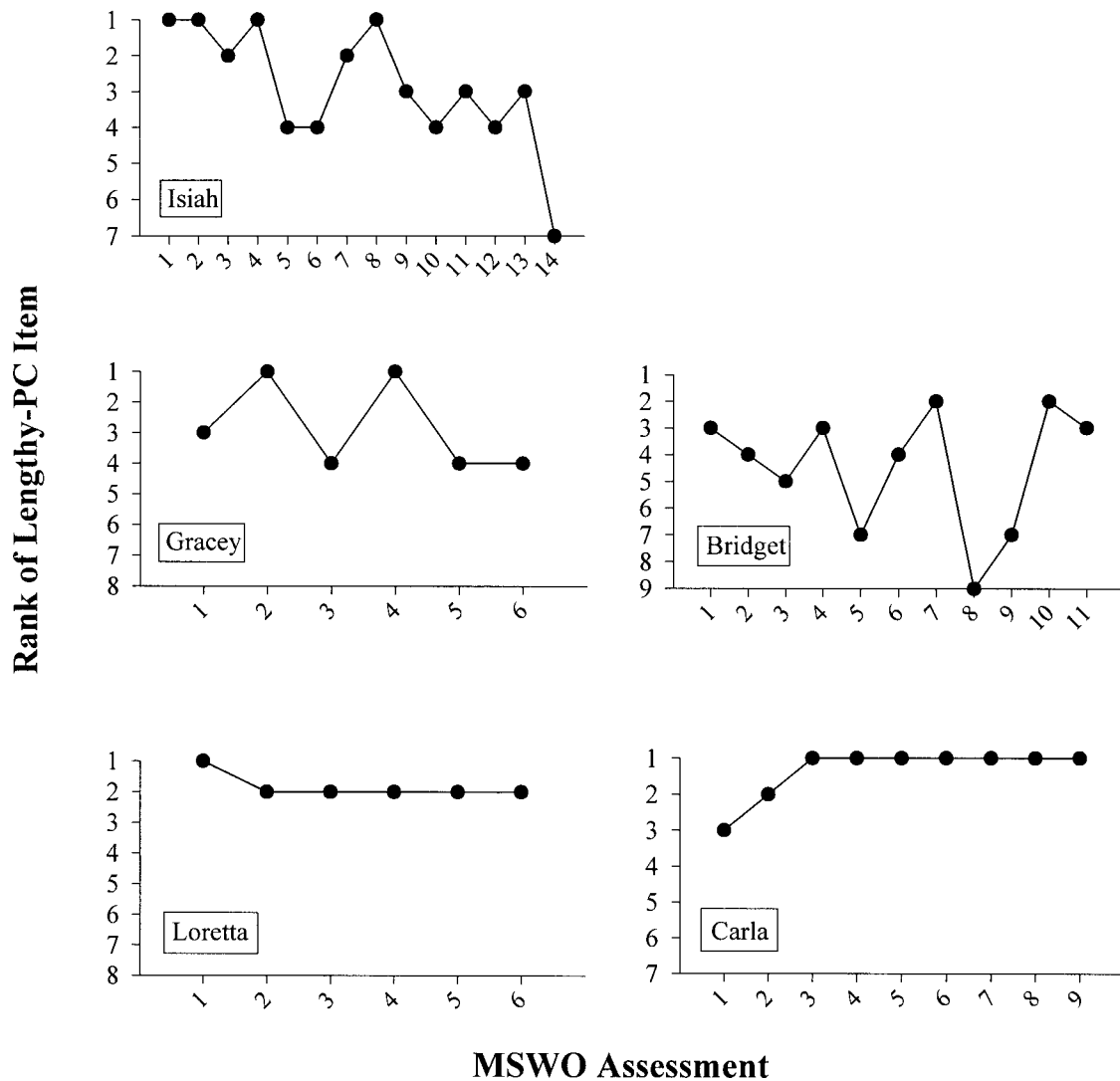


Figure 2. Ranks of the lengthy-PC item across successive MSWO assessments.

the lengthy-PC item third and second on the first and second MSWO assessments, respectively, then selected it first during each subsequent MSWO assessment. Loretta chose the lengthy-PC item on the second trial each time it was not selected first during daily MSWO assessments. Thus, the top item during daily MSWO assessments for Loretta was always one of two items, and the item that was not selected first was always selected second. Selection variability was more pronounced for the other participants.

Gracey selected the lengthy-PC item no lower than fourth in all of her six MSWO assessments. With a single exception, the same was true of Isiah during his 14 MSWO assessments. Bridget displayed the greatest amount of variability. She selected the lengthy-PC item second, third, or fourth in 7 of her 11 MSWO assessments. Selection during the remaining sessions included a fifth rank and two seventh ranks; in one session the lengthy-PC item was selected last.

Results of the concurrent-operants assess-

ment for all participants are shown in Figure 3. When the top-ranked items differed, 4 of the 5 participants usually completed more of the tasks associated with that day's daily-MSWO item than the task associated with the lengthy-PC item. This effect was most clearly visible with Gracey and Loretta. With the exception of Session 3 for Gracey, both allocated their responses exclusively to the task associated with the daily-MSWO item. By contrast, both Isiah and Bridget had sessions in which higher rates of responding were allocated to the lengthy-PC item than the daily-MSWO item. However, this occurred in only 3 of 10 sessions for Isiah and 2 of 11 sessions for Bridget. Finally, Carla deviated from this general pattern by completing more tasks associated with the lengthy-PC item during each reinforcer assessment. We should note, however, that only two sessions were conducted with Carla because she selected the lengthy-PC item first during her last seven MSWO assessments. Across participants, more responses were allocated to the daily-MSWO item during 78% of reinforcer assessment sessions.

## DISCUSSION

Results of this study revealed that brief daily preference assessments often resulted in different top-ranked items than the more extensive paired-choice preference assessment conducted at the beginning of the analysis. On days when the top-ranked items differed, reinforcer assessments revealed that more responding was usually allocated to the task associated with the item identified as most preferred that day than the item identified as most preferred during the initial assessment. Thus, results of the present study suggest that, for many individuals, preferences can change from day to day and that these changes in stimulus preference are generally associated with corresponding changes in

relative response allocation when examined within a concurrent-operants paradigm.

The results of the study also concur with previous studies showing that preferences can change fairly rapidly over time both within and across sessions (e.g., Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997; Kennedy & Haring, 1993; Roane et al., 1998). Only 2 of the participants, Loretta and Carla, displayed fairly consistent selections across days. Loretta restricted her first selections to two items, and, although Carla distributed her selections among three items, she selected the lengthy-PC item during the last seven daily assessments. For these participants, preferences appeared to remain fairly stable. The remaining individuals distributed their top selections among three or more items, and the rank of the lengthy-PC item varied widely across days. Gracey never selected the same item first on two consecutive sessions (data not shown). Thus, the data suggest that preferences can be highly dynamic for some individuals and that practitioners should consider this when selecting reinforcers for treatment programs.

A common criticism of recent studies on stimulus preference and reinforcer assessment methods is that the dependent measures involved simple free-operant responses that were not socially meaningful and required little effort (e.g., switch pressing; Fisher & Mazur, 1997; Tustin, 1994). The current results show that preferences identified via a structured interview (the RAISD) and a simple choice response (naming or touching one stimulus from an array) identified stimuli that maintained responding on vocational (envelope stuffing, towel folding) and academic (reading, solving addition problems) tasks. In addition, results suggest that the combination of the RAISD (which takes 20 min or less to complete) and the brief daily MSWO assessment (which takes 1 or 2 min to complete) can provide a highly

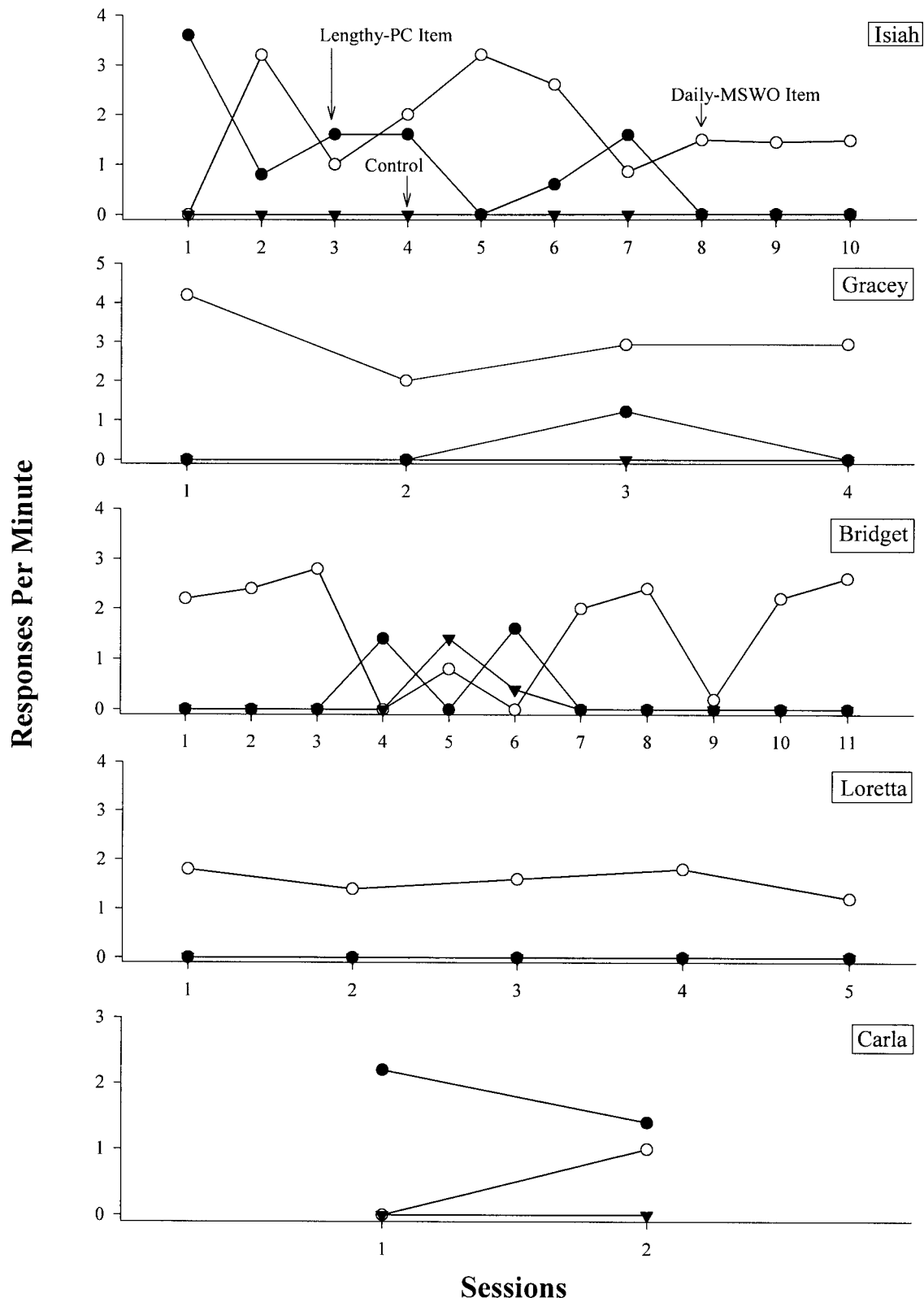


Figure 3. Rates of task completion for tasks associated with the lengthy-PC item, the daily-MSWO item, and the control tasks.



efficient method for identifying effective reinforcers.

The use of daily MSWO assessments may also help to accommodate shifts in preference that occur over time, as often happened for the current participants. Thus, a reasonable approach to ongoing reinforcer assessment may be to identify a pool of potential reinforcers using the RAISD periodically (once a year or when decrements in reinforcer efficacy are clinically apparent) and then to conduct MSWO assessments prior to training activities. For individuals who show frequent shifts in preference, it may also be useful to provide within-session choices each time the criterion for reinforcement is met (Fisher et al., 1997; Graff & Libby, 1999).

Providing pre-session or within-session choices (or both in combination) may help to increase or sustain responding through three mechanisms. First, as we have noted, providing such choices may accommodate shifts in preferences that occur over time. Second, in most cases, providing pre-session or within-session choices increases reinforcer variation, which can reduce or prevent satiation (e.g., Bowman, Piazza, Fisher, Hagoian, & Kogan, 1996; Egel, 1981). Third, providing choices may be reinforcing, which can add to the reinforcement value of the selected item (Catania & Sagvolden, 1980; Fisher et al., 1997).

Some limitations of the study should be noted. First, because the two types of preference assessments were never conducted at the same time, we cannot rule out the possibility that differences in the highest ranked item occurred as a function of the type of assessment rather than changes in preference across time. This potential confounding effect could be further investigated by repeating each type of assessment across time. If both the lengthy and brief assessments consistently identified the same item as highly preferred, even when that item differed from

the initial lengthy assessment, then the changes that we observed could be attributed to preference changes rather than to assessment type.

Findings from Loretta, Carla, and Gracey point to a potential limitation of our data and, more generally, of preference assessments. As noted above, Carla selected the same stimulus first during the last seven daily assessments. Loretta also chose the same stimulus first during her last few assessments. In both cases, however, the stimuli selected first during the last few sessions differed from those selected during the first one or two sessions. These results call into question the reliability of initial administrations of the brief assessment. Perhaps brief assessment results become increasingly reliable after repeated administrations during which individuals gradually learn the proper discriminations. Furthermore, the item selected first by Loretta during the last five brief assessments never matched the lengthy-PC item. This result was even more pronounced for Gracey, who never chose the lengthy-PC item after its initial identification. These results call into question the validity of a single administration of the stimulus preference assessment. Again, by repeating preference assessments both within sessions and across days, future studies can begin to separate the variability that is perhaps inherent in the measurement system from actual changes in preference that occur across time.

Finally, the clinical utility of conducting brief daily assessments remains uncertain. Concurrent arrangements may be so sensitive to relative reinforcement effects as to magnify small differences in reinforcer efficacy that are clinically unimportant. Although our data suggest that caregivers may not be using the most preferred item when they repeatedly and exclusively deliver the highest ranked item identified during a pre-treatment assessment, it is unclear that identifying and using temporarily more preferred

items on a regular basis would produce clinically meaningful improvements under typical training conditions. For example, Roscoe, Iwata, and Kahng (1999) demonstrated that, although a greater proportion of responses were allocated towards higher preference items than lower preference items during concurrent-operant tasks, the higher preference item rarely produced higher absolute response rates during single-operant tasks. Similar results may apply to items identified during pretreatment assessments versus daily preference assessments, in that top-ranked items may produce indistinguishable absolute response rates regardless of when they were identified as most preferred. Future research can explore this possibility by comparing the effects of items identified during lengthy pretreatment assessments to those identified during daily assessments on single-operant tasks using clinically relevant dependent measures (e.g., speed of acquisition, accuracy of responding, etc.).

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*STUDY QUESTIONS*

1. What are some practical advantages of brief preference assessments?
2. Briefly describe the paired stimulus and multiple stimulus assessments used in the study.
3. Under what conditions were reinforcer assessments conducted, and how were they implemented?
4. What do the data in Figure 1 suggest about the stability of participants' preferences?
5. Summarize the results of the reinforcer assessments.
6. How might frequent assessment of reinforcer preferences enhance performance?
7. What procedural limitation may have affected the comparability of results from the paired stimulus and the multiple stimulus assessments?
8. Explain what the authors meant when they noted that "the clinical utility of conducting brief daily assessments remains uncertain."

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