A COMPARISON OF BRIEF VERSUS EXTENDED PAIRED-CHOICE PREFERENCE ASSESSMENT OUTCOMES

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Thesis Prepared for the Degree of

MASTER OF SCIENCE

UNIVERSITY OF NORTH TEXAS

December 2005

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Cason, Caroline Adelaide., A comparison of brief versus extended paired-choice preference assessment outcomes. Master of Science (Behavior Analysis), December 2005, 52 pp., 10 tables, 10 figures, references, 29 titles.

Few studies have systematically evaluated whether preferences can reliably be identified using brief procedures. Typically, studies have used brief procedures to select potential reinforcers for use in intervention procedures. A total of 17 food and leisure paired-choice preference assessments were administered to 10 subjects in order to evaluate the extent to which the results of a brief (i.e., single-session) assessment correspond with those from more extended procedures (i.e., 5 sessions). Eleven out of the 17 brief and extended assessments identified the same stimulus as the most preferred (highest rank). Outcomes suggest that a brief assessment can be useful when a single, potent reinforcing stimulus is desired, and an extended assessment should be conducted when a larger number of preferred stimuli is desired.

ACKNOWLEDGMENTS

First and foremost, I would like to thank my mentor Dr. Richard Smith, without whom this project would not have been possible. Rick has instilled confidence in me as a practitioner, facilitated my academic growth exponentially over the past three years, given me countless hours of advice and feedback, helped me achieve my goals, and treated me as an equal. I will always appreciate my time as his student. In addition, I would like to thank Drs. Shahla Ala'i-Rosales and Cloyd Hyten for serving as committee members, but also for shaping my skills during my time at UNT. I continue to learn from you both every day, and I am grateful for the ability to have worked with you. I would also like to thank my colleagues at the BARC (past and present); I have learned something from each of you. I would especially like to thank Amanda McAllister, Katy Atcheson, and Donald Staff for assistance with data collection and their endless dedication to this project, as well as Carla Smith for her encouragement and boundless energy. In addition, I would like to thank the Denton State School Psychology Department, for accepting me as an equal and allowing me to apply my freshly learned skills as a unit behavior analyst.

My parents provided a terrific support system and I thank them for always encouraging me to pursue my dreams with no regrets. They supported all of my educational endeavors while sacrificing to make them happen. Finally, to Jim, thanks for your love, your ability to instill confidence in me, and always making sure I realize that I can do anything that I set my mind to.

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LIST OF TRADEMARKED PRODUCT NAMES

Type	*Product Name*	*Owner*
Prescription Drugs	Depakote®	Abbott Laboratories, http://www.abbott.com
	Geodon® Navane®	Pfizer, Inc. http://www.pfizer.com
	Lexapro®	Forest Pharmaceuticals, Inc., http://www.frx.com
	Paxil®	GlaxoSmithKline, http://us.gsk.com
	Risperdal®	Janssen, L.P., http://www.janssen.com
	Topamax®	Ortho-McNeil Neurologics, Inc., http://www.ortho-mcneilneurologics.com
	Zyprexa®	Eli Lilly and Company, http://www.lilly.com
Drinks	Dr Pepper® SUNKIST®	Dr Pepper/Seven Up, Inc. http://www.dpsu.com
	Diet V8 Splash®	Campbell Soup Company, http://www.v8juice.com
	Minute Maid Light™	The Coca-Cola Company, http://www.minutemaid.com
Snack Foods	Cheetos® Doritos® Fritos® Lays®	Frito-Lay Company, http://www.fritolay.com
	Cheez-It®	Kellogg Company, http://www.kelloggs.com
	M&M'S®	Mars, Inc., http://www.mms.com
	Chips Ahoy!® Fig Newtons® Oreo® Ritz® Bits Teddy Graham®	Nabisco, http://www.nabiscoworld.com
Toys	Lego®	Lego Group, http://www.lego.com
	Shrek®	DreamWorks SKG, http://www.dreamworksanimation.com

INTRODUCTION

One of the most utilized and rudimentary principles of behavior is positive reinforcement. Heron (1987) described a positive reinforcer as a contingently delivered stimulus that follows a behavior and thus increases the future occurrence of that behavior. Examples of such stimuli include, but are not limited to verbal statements, and materials such as edibles and leisure items. However, sensitivities to stimuli as reinforcement are idiosyncratic to each individual across time and contexts. Thus, a sizeable amount of research has been conducted over recent years in an attempt to develop “preference assessment” procedures for practitioners to determine stimuli that will potentially function as reinforcers for their clients.

Various types of preferences assessments have been evaluated in the recent literature. Verbal preference assessments (e.g. asking individuals what their preferences are), are the most elementary form of preference assessment (Heron 1987). The advantages of the verbal preference assessment are the speed at which the assessment can be conducted as well as the simplicity of the procedure. However, a disadvantage of this type of assessment is that individuals may not be able to accurately predict stimuli that will function as reinforcers. In other words, although an individual may state a preference for certain stimuli, those stimuli may not support effortful behavior. Another disadvantage is that this assessment is not very useful for individuals with limited verbal repertoires (e.g., persons with developmental disabilities) (Barrett, 1962; Heron, 1987).

The extent to which caregiver opinion (i.e., caregiver assessment questionnaires) can identify preferences also has been evaluated (Favell & Canon, 1976; Green, Reid,

Canipe, & Gardner, 1991; Green, Reid, White, Halford, Brittain, & Gardner, 1988; Parsons & Reid, 1990). Caregiver opinions were often used prior to the development of formal preference assessments because it was believed that individuals with limited repertoires needed caregivers to identify their preferences for them. However, it has since been found that individuals with profound mental retardation can typically make meaningful choices using certain assessment procedures (e.g., single-stimulus and paired-choice preference assessments). Also, the inability of caregiver opinion to predict reliable consumer preferences has been repeatedly demonstrated when compared to more formal systematic preference assessments (Favell & Canon, 1976; Green, Reid, Canipe, & Gardner, 1991; Green, Reid, White, Halford, Brittain, & Gardner, 1988; Parsons & Reid, 1990).

Another form of preference assessment is the free operant preference assessment (Favell & Canon, 1976; Quilitch, Christopherson, & Risley, 1977). Participants are given free access to a pool of stimuli, and periodic observations are made to identify the items that are most frequently manipulated by the individual. The number of stimuli assessed, duration of observation, and other procedures have varied across studies. For instance, Favell & Canon (1976) made 1- to 2-s observations to determine if their participants were “appropriately” manipulating any of the 20 stimuli available to them. Another study utilized 25 leisure stimuli and observations were made to determine whether any of the participants were engaging with any of the stimuli (Quilitch et al., 1977). Observations were made every 5 min and the participants had free access to the toys for several hours each day; however, the participants were required to let the observers know when they were interacting with the items (by

checking out the item). An advantage of the free operant preference assessments is that they are quite straightforward and easy to conduct.

Pace, Ivancic, Edwards, Iwata, & Page (1985) conducted a single-stimulus preference assessment in an attempt to develop a formal, more systematic procedure for identifying reinforcers in profoundly retarded individuals. Preferences among stimuli were assessed by measuring approach responses to each stimulus. Trials consisted of placing a stimulus in front of a participant; if the stimulus was approached within 5 s the participant received access to that stimulus for 5 s. If the stimulus was not approached, the participant was given a prompt to sample the stimulus. If the participant approached the stimulus they were given 5 s of access to it; however, if he/she did not approach the stimulus, it was removed from the table and the next trial was initiated. This study demonstrated individualized preference patterns and differentiation of approach responses to stimuli within participants. A second phase was carried out in which a reinforcer assessment was conducted, and it was determined that stimuli identified as preferred functioned as reinforcing stimuli for the participants. The investigators pointed out advantages of the single-stimulus preference assessment, such as the ability to be conducted quickly and with little effort, since the pool of stimuli could be derived from items on hand. Other advantages include the ability to teach persons with different educational backgrounds how to conduct this assessment. Disadvantages include the possibility of false negatives, as potential reinforcers may be “over identified” by this assessment (Roscoe, Iwata, & Kahng, 1999). That is, because no competing activities or items are concurrently available, participants may make approach responses toward stimuli whose reinforcing effectiveness may be limited. Another disadvantage is that if

novel items are included in the pool of stimuli, participants may approach the novel stimuli based solely on their novelty and, thus, the assessment may not yield accurate results.

Another procedure for identifying preferences is the forced-choice method, also known as the paired-choice preference assessment (Mason, McGee, Farmer-Dougan, & Risley, 1989). Fisher, Piazza, Bowman, Hagopian, Owens, & Slevin (1992) compared the paired-choice method to the single-stimulus assessment in an attempt to determine which procedure would most accurately identify potential reinforcers. In the paired-choice procedure, 16 stimuli were presented in 120 randomized stimulus-pairs to each participant. If the participant approached one of the stimuli within 5 s, he/she was given access to the stimulus. However, if he/she did not approach one of the stimuli within 5 s, the participant was given a prompt to sample the stimuli for 5 s each. Then the stimulus pair was again presented for 5 s and, if an approach was made, 5 s access to the chosen stimulus was provided. If the participant did not approach the stimuli pair at this time, the trial was terminated, the stimuli were removed, and a new trial began. Nine stimuli were identified as high preference for both assessments and 36 were identified as high preference for the single-stimulus assessment. Thus, disagreement was observed between the two assessments in that stimuli that the single-stimulus assessment identified as highly preferred were identified as only low-to-moderately preferred in the paired-choice assessment. In a second phase of the study, the reinforcing effectiveness of stimuli that produced a large amount of agreement between the paired-choice and the single-stimulus assessments was evaluated relative to stimuli that were identified as highly preferred during the single-stimulus assessment but less

preferred during the paired-choice assessment. Concurrent schedules of reinforcement using low preference versus high preference stimuli were arranged for work requirements. Using a unique arrangement, participant choices were defined as movement of any portion of the body inside a 0.7 m by 0.7 m square drawn on the floor. Different schedules and stimuli were associated with each square. It was determined that the participants most frequently chose the task associated with the high preference stimuli. Only 9 of the 36 stimuli that were identified as high preference in the single-stimulus assessment were also identified as high preference in the paired-choice method. Thus, the paired-choice method appeared to be more sensitive, identifying more powerfully reinforcing stimuli, relative to the single-stimulus assessment.

Roscoe, Iwata, & Kahng (1999) extended this line of investigation by adding a single schedule reinforcement component, where the low preference stimuli were evaluated for their ability to function as reinforcers. It was found that, for most subjects, although high preference stimuli (i.e., those identified as preferred in both assessments) were most frequently accessed in the context of a concurrent schedule of reinforcement, the low preference stimuli functioned as reinforcers in the single schedule. Thus, although the single-stimulus assessment identified stimuli that had reinforcing properties, the paired-choice assessment was able to identify relatively more effective reinforcers through use of the concurrent schedules paradigm (Fisher & Mazur, 1997). A related advantage is that the paired-choice preference assessment tends to result in more differentiation among preferences, and therefore more accurate predictions of relative reinforcing efficacy (Fisher et al., 1992; Windsor, Piché, & Locke, 1994). Disadvantages of the paired-choice assessment are that it may be time

consuming and not very cost efficient, it may also be too difficult for those individuals with especially low levels of functioning (profound mental retardation) to make “reliable choice responses” (Fisher et al., 1992; Roscoe et al., 1999).

Windsor, Piché, & Locke (1994) compared paired-choice preference assessments to a multiple stimulus with replacement (MSW) preference assessment. The paired-choice preference assessment was conducted as described above. The MSW involved placing six stimuli in front of the participant in a row. The participant was asked to choose one stimulus from the array, and after an item was selected it was replaced (if food items were consumed, an identical item was replaced; if leisure items were selected, they were simply placed back into the array after a period of manipulation by the participant). The positions of the stimuli were randomized and the next trial began. No response was scored if the participant did not choose a stimulus after 20 s or if they pushed the stimuli away. This sequence continued for a total of 10 trials per session, across 5 sessions. Outcomes were evaluated for identified preferences, staff rankings of predicted preferences, and time to conduct the assessments. The paired-choice procedure showed more consistency in preferences across sessions than did the MSW, but the MSW was completed more rapidly. However, because all stimuli were available during each trial, the MSW produced less differentiation, as a few very highly preferred stimuli were repeatedly selected across trials. Staff rankings were able to predict the most highly preferred stimuli from the formal assessments; however, they did not predict the formal assessment outcomes for the remaining stimuli.

DeLeon & Iwata (1996) developed a multiple stimulus without replacement procedure (MSWO) in an attempt to integrate the best features of the paired-choice method (more differentiation in the rankings) and the MSW (ability to conduct the assessment rapidly). The investigators compared the results of MSW, MSWO, and paired-choice preference assessment formats. As with the MSW, the MSWO involved placing an array of stimuli (seven) in front of the participants and asking them to choose one stimulus. However, after selections were made, the items were not replaced in the stimulus array; instead, the positions of the remaining stimuli were randomized and re-presented. This continued until all of the stimuli were chosen or the participant stopped responding (i.e., no choice response was emitted within 30 s). The MSW and paired-choice procedures were conducted as described above. Results showed that all three assessment types revealed a common "most preferred" stimulus. However, like the paired-choice format, the MSWO produced more differentiation and more consistent rankings across sessions. Like the MSW, the MSWO could be conducted faster than the paired-choice assessment. One disadvantage is that, as the pool of stimuli becomes smaller, the likelihood that any choice results in identification of effective reinforcers also decreases (i.e., choices may be among non-reinforcing stimuli). Another potential disadvantage is that participants with profound developmental delays may not exhibit the skills necessary to make meaningful choices among a large array of options, thus rendering the results of MSWO invalid.

Despite advances in methods to identify preferred stimuli, there is a need for more efficient and effective procedures to rapidly and easily identify preferences. Many of the aforementioned preference assessment formats are too time consuming to

conduct in selecting likely reinforcers within a treatment program. Mason, McGee, Farmer-Dougan, & Risley (1989) compared the results of extended single-stimulus preference assessment (Pace et al., 1985) to a pre-session mini-assessment. The pre-session mini-assessment was conducted daily and consisted of presenting previously identified "preferred" items from the comprehensive assessment one time each. The investigators determined that the pre-session mini-assessments were an efficient way to identify potent reinforcers for participants. However, the mini-assessments conducted in this study were conducted with pre-determined "high preference" stimuli, and results of a subsequent investigation indicated that any stimuli selected from among those identified using extended assessment procedures would function as reinforcers (i.e., the initial extended assessment, rather than the mini-assessment, was responsible for identifying reinforcing stimuli) (Smith, Iwata, Goh, & Shore, 1995). Thus, it was not determined if a brief (e.g. single-session) assessment is sufficient to identify preferred stimuli.

Although few studies have systematically evaluated whether preferences can reliably be identified using brief procedures, the extent of assessment procedures appears to vary widely. Some studies have used brief, single-session preference assessment procedures (e.g., Fernandez, Dorey, & Rosales-Ruiz, 2004; DeLeon, Fisher, Rodriguez-Catter, Maglieri, Herman, & Marhefka, 2001). These studies often use daily brief procedures to identify a single, highly-preferred stimulus to present as reinforcement during an upcoming training session. For example, Fernandez and colleagues utilized brief paired-choice preference assessments prior to training procedures with five cotton-top tamarins. Several studies have utilized extended

procedures comprised of multiple lengths (3-7 sessions for MSWO and 3-10 sessions for paired-choice) to select potential reinforcers for use in intervention procedures (Carr, Nicolson, & Higbee, 2000; DeLeon & Iwata, 1996; DeLeon, Iwata, & Roscoe, 1997; Graff & Ciccone, 2002; Hagopian, Rush, Lewin, & Long, 2001; Parsons & Reid, 1990; Patel, Carr, Kim, Robles, & Eastridge, 2000). Several studies have not specified the extent of their assessments or have merely noted that they used the same procedures as Fisher et al. (1992) (paired-choice) or DeLeon & Iwata (1996) (MSWO) (Bojak & Carr, 1999; DeLeon, Fisher, Rodriguez-Catter, Maglieri, Herman, & Marhefka, 2001; Graff & Libby, 1999; Roscoe, Iwata, & Kahng, 1999).

Few studies have systematically evaluated whether stable preferences can be identified using brief procedures. Two investigations examined the utility of a brief (3 sessions) MSWO preference assessment (Carr, Nicolson, & Higbee, 2000; Higbee, Carr, & Harrison, 2000). Both investigations conducted brief assessments prior to reinforcer assessments, and determined that the brief assessment was sufficient in predicting potential reinforcers. However, neither investigation compared the results of brief and extended assessments to determine whether corresponding preference hierarchies were produced by both assessments. Carr et al. (2000) evaluated correlations between brief assessment (3 sessions) and the first session of the assessment, finding moderate support for conducting a brief MSWO assessment consisting of only one session.

Graff & Ciccone (2002) extended the findings of Carr et al. (2000) by conducting extended MSWO preference assessments with 15 participants (7 sessions, 7 trials). The investigators conducted three post hoc analyses; they examined correspondence

between the most preferred (“highest ranking”) stimulus from a single session versus when 5 and 3 sessions were administered. For 22 of the 27 data sets examined (5 sessions) and 19 of the 27 data sets examined (3 sessions), the same stimulus was identified as most preferred; for 21 of the 27 data sets examined (5 sessions) and 13 of the 27 data sets examined (3 sessions) the same two stimuli were identified as the top two most preferred stimuli. The investigators also compared the most preferred stimuli identified in extended assessment versus when only the first 3 trials of each session in the extended assessment were analyzed. For 25 of the 27 data sets examined, the most preferred stimulus was determined in the first three trials. Finally, the authors compared most preferred stimuli when fewer sessions and fewer trials were analyzed (5 sessions, 3 trials), showing that 22 of the 27 data sets identified the same stimulus as most preferred in both the brief assessment (5 sessions, 3 trials) and the extended assessment (7 sessions, 7 trials). The investigators determined that “more preferred” items could indeed be identified for the majority of participants when brief assessments were conducted as well as when the number of trials per assessment were reduced.

Previous studies have provided a preliminary basis for describing the extent to which the results of brief MSWO preference assessment correspond with those from more extended procedures. The purpose of the current study was to extend the preference assessment literature by evaluating the extent to which the results of brief (i.e., single-session) paired-choice preference assessments correspond with those from more extended procedures (i.e., 5 sessions).

METHOD

Participants, Settings, and Materials

Ten adults with developmental disabilities participated in the study. All lived at a large, state operated residential facility for adults with developmental disabilities. Seven of the participants were recruited, and three were referred for treatment unrelated to the current study (treatment of aberrant behaviors). Victoria, a 44 year-old female with a limited verbal repertoire, was diagnosed with severe mental retardation and mild obsessive compulsive disorder. She was recruited as a participant, and at the time of the study Victoria was taking Paxil. Madeline, a verbal 47 year-old female, was diagnosed with severe mental retardation and was recruited as a participant. Paula, a 43 year-old female with a limited expressive repertoire, was diagnosed with profound mental retardation; she was referred for treatment of self-injurious behavior in the form of chest hitting. Rebecca, a verbal 50 year-old female, was diagnosed with severe mental retardation. Jeffrey, a 34 year-old male with extensive expressive and receptive verbal repertoires, was diagnosed with severe mental retardation, mental disorder not otherwise specified (NOS) secondary to chronic encephalopathy, impulse control disorder not otherwise specified (NOS), and pica. At the time of the study Jeffrey was taking Navane and was referred for treatment of physical aggression to others. Lloyd, a 58 year-old nonverbal male, was diagnosed with profound mental retardation, mental disorder, NOS secondary to chronic encephalopathy (congenital) with a history of cerebral palsy and spastic quadriplegia, and obsessive compulsive disorder. Lloyd was referred for treatment of self-injurious behavior in the form of skin picking and was taking Risperdal and Lexapro at the time of the study. Beth, a verbal 45 year-old

female, was diagnosed with severe mental retardation, mental disorder NOS secondary to chronic encephalopathy with mixed seizure disorder and hyperactivity. She was recruited as a participant, and at the time of the study Beth was taking Zyprexa and Depakote. Terri, a 47 year-old female with a limited verbal repertoire, was diagnosed with profound mental retardation and clinical syndromes. She was recruited as a participant for this study. Mandy, a 39 year-old nonverbal female with limited hearing abilities, was diagnosed with severe mental retardation, mental disorder NOS secondary to meningitis, and stereotypic movement disorder with self-injurious behavior. Mandy was recruited as a participant and at the time of the study Mandy was taking Geodon, Topamax, and Lexapro. Adelaide, a 48 year-old verbal female who exhibited periodic echolalia, was diagnosed with mild mental retardation, obsessive-compulsive disorder with poor insight, as well as rule out Cyclothymic disorder with psychotic features. Adelaide as recruited as a participant and at the time of the study she was taking Zoloft.

Assessments for Victoria, Paula, Rebecca, Jeffrey, Lloyd, Beth, Terri, and Adelaide were carried out in a room that was 2.74 m X 3.41 m. The room contained a table, 3 to 4 chairs, and a bench, where items were held. Participants sat at the table across from the therapist, and data collectors sat in the room. Assessments for Madeline and Mandy were conducted in the dining areas of each participant's apartment. Madeline's dining area was the kitchen, which contained a rectangular dining table, and 8 chairs. The therapist sat across the table from Madeline and data collectors were present. Assessments for Mandy were conducted in the dining room of

her apartment. The dining room contained two large oval shaped tables, each containing 6 chairs. Mandy sat across the table from the therapist and data collectors.

For 7 of the 10 participants separate paired-choice assessments were conducted for leisure items (e.g., balls and music) and food items (e.g., pudding and applesauce). Only food assessments were conducted with the remaining three participants. Stimuli included in the edible preference assessments were based on staff and guardian recommendations, as constrained by dietary restrictions. Stimuli included in the leisure preference assessments were based on staff and guardian recommendations and the participant's level of functioning. The stimuli used with each participant are presented in the Tables displaying the outcomes of each participant's assessments.

Response Measurement and Reliability

Assessments were conducted with a total of either 5 stimuli or 10 stimuli. The number of stimuli used for each participant was chosen individually, based on the dietary restrictions and participants' functioning level. Presentation of a pair of items constituted a trial. For the 5 stimuli assessments there were a total of 10 trials per session and 10 stimuli assessments contained a total of 45 trials. Choice responses were individually defined (i.e. pointing to an item, picking up an item, etc.) according to each participant's ability to communicate preference and were scored on data sheets after each trial. There were two data collectors present at each assessment (the therapist functioned as the second data collector during some sessions). Agreements were defined as both data collectors having recorded the same selection or no selection

for a given trial. Interobserver agreement (IOA) was calculated by dividing agreements by agreements plus disagreements and multiplying by 100. IOA was calculated for each session and average agreement across sessions was calculated after all 5 sessions were completed. Agreement averaged 94% (range = 80% - 100%) for Victoria's edible preference assessment and 98% (range = 90% -100%) for her leisure preference assessment; 100% for both Madeline's edible and leisure preference assessments; 99.56% (range = 97.78% - 100%) for Paula's edible preference assessment (no leisure preference assessment was completed for Paula); 100% for Rebecca's edible preference assessment and 98.67% (range = 95.56% - 100%) for her leisure preference assessment; 100% for both Jeffrey's edible and leisure preference assessments; 96% (range = 90% - 100%) for Lloyd's edible preference assessment (no leisure assessment was completed for Lloyd); 99.11% (range = 97.78% - 100%) for Beth's edible preference assessment and 100% for her leisure preference assessment; 98% (range = 90% - 100%) for Terri's edible preference assessment and 100% for her leisure preference assessment; 98% (range = 90% - 100%) for Mandy's preference edible assessment (no leisure preference assessment was completed for Mandy); and 100% for Adelaide's edible preference assessment and 98% (range = 90% - 100%) for her leisure preference assessment.

General Procedures

Participants sampled each item individually before each session unless multiple sessions were run in one day, in which case items were sampled before the first session of the day. The therapist verbally labeled each stimulus before the participants

sampled it. Each stimulus was assigned a number prior to the start of the assessment and the stimuli were presented to the participants according to a predetermined sequence so that each stimulus was paired with every other stimulus and the right-left location assignments were equal for all stimuli. Stimuli were arranged about 0.15 m apart and when the participant was ready (e.g., making eye contact, previous food item was completely consumed, etc.) the stimuli were placed in front of her/him. At this point the therapist instructed the participant to “Pick one”, and waited for 5 s. If the participant chose a stimulus, the data collectors circled the number assigned to that stimulus on the data sheet. If the participant attempted to choose both items (e.g., reached for both items simultaneously), the response was blocked and the instruction was repeated. If the participant did not choose either stimulus within 5 s of the instruction, the instruction was repeated. If no choice was made after an additional 5 s, the instruction was repeated a third time. If there was no choice after the third instruction, the therapist removed the stimuli, no choice (NC) was recorded on the data sheet, and the next trial was presented after approximately 10 s. If the participant chose an edible item but did not consume it within 30 s, no eat (NE) was scored and the next trial was started. If the participant chose a leisure item but did not interact with the stimulus within 30 s, no play (NP) was scored and the next trial was started. Sessions were terminated after 5 consecutive trials with NC, NE, or NP. Multiple sessions were conducted in one day as long as participants were willing to participate. For assessments containing 5 stimuli, 1 - 5 sessions were completed per day (average = 3). For assessments containing 10 stimuli, 1 session was completed per day. If a termination criterion was met the session

was stopped and repeated again during the next session, in order to complete the entire session in one sitting.

RESULTS

The results for each participant are shown in the Tables 1-10 and Figures 1-10. Rank orders and mean selection percentages for extended and brief assessments, session-by-session selection percentages, and standard deviations are displayed in Tables 1-10. Percentages of selection for the brief assessments were calculated by summing the number of times a stimulus was selected during the first session, dividing that sum by the number of opportunities to select that stimulus (4 opportunities in the 5-stimulus assessments and 9 opportunities in the 10-stimulus assessments) and multiplying the result by 100. Percentages of selection for the extended assessments were calculated by averaging the selection percentages across sessions. Standard deviations were calculated based on session-by-session percentage scores during the extended assessment. Figures 1 – 10 present graphic displays of selection percentages by stimulus in a histogram format. For all graphs, the X axis displays mean selection percentages per stimulus, and the Y axis displays each individual stimulus, arrayed from top to bottom according to rankings from the extended assessment; therefore, stimulus 1 (presented at the top of the graphs) was the most preferred stimulus from the extended assessment and stimulus 5 or 10 (presented at the bottom of the graphs) were the least preferred stimuli from the 5 stimulus preference assessments and 10 stimulus preference assessments, respectively. If stimuli tied for rank-orders during the extended assessment, the results (relative rankings) of the brief assessment were used to determine order of presentation on the graphs. This graphing convention results in a display of extended assessment results in which a “top-to-bottom” pattern of shorter bars is seen, representing successively smaller percentages

for stimuli appearing lower on the graph. "Matching" results between extended and brief assessments are seen when a similar pattern is apparent in the data from brief assessments, which are presented directly below the extended assessment graphs.

Rank order correspondence between assessments was evaluated using Spearman's rho, and by comparing stimulus-by-stimulus correspondence between brief and extended assessments. In order to determine rank order correspondence in cases of ties, means were calculated for the ranks that would otherwise have been occupied by those stimuli (e.g. if three stimuli tied for second rank, those stimuli would have occupied ranks 2, 3, and 4; thus, a rank of 3—the mean of 2, 3, and 4—was assigned to each of the three stimuli).

Victoria's outcomes are depicted in Table 1 and Figure 1. Five stimuli were used for Victoria due to dietary restrictions; the number of stimuli used in the food-only and leisure-only assessments was kept equivalent to facilitate within-participant comparisons (this is true of all participants). The outcomes of Victoria's extended assessment show that lite strawberry applesauce was most frequently selected, followed by light berry juice, lite applesauce, light apple juice, and Diet V8 Splash® drink, respectively. Outcomes of her brief assessment showed that lite strawberry applesauce was most frequently selected, followed by a three-way tie between light berry juice, lite applesauce, and diet V8 Splash, followed by light apple juice, respectively. These outcomes demonstrate moderate correspondence between brief and extended assessments (Spearman's rho = .671). Rank order correspondence was observed for lite strawberry applesauce and lite applesauce. Non-correspondence was observed for light berry juice (ranked #2 in the extended assessment and #3 in the brief

assessment), light apple juice (ranked #4 in the extended assessment and #5 in the brief assessment), and Diet V8 Splash (ranked #5 in the extended assessment and #3 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 1. The outcomes of Victoria's extended assessment (leisure – only) show that light up ball was most frequently selected, followed by hand bells, Lego® toys, magnetic board/letters, and magazine respectively. Outcomes of her brief assessment showed that light up ball and hand bells were most frequently selected (two-way tie), followed by magnetic board/letters, and a two-way tie between Legos and magazine, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .791), although perfect correspondence was not observed for any specific stimulus. Non-correspondence was observed for light up ball (ranked #1 in the extended assessment and #1.5 in the brief assessment), hand bells (ranked #2 in the extended assessment and #1.5 in the brief assessment), Legos (ranked #3 in the extended assessment and #4.5 in the brief assessment), magnetic board/letters (ranked #4 in the extended assessment and #3 in the brief assessment), and magazine (ranked #5 in the extended assessment and #4.5 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 1.

Madeline's outcomes are depicted in Table 2 and Figure 2. Five stimuli were used for Madeline due to dietary restrictions. The outcomes of Madeline's extended food-only assessment show that Cheez-It® crackers was most frequently selected, followed by candy corn, Lays® potato chips, light root beer, and animal crackers, respectively. Outcomes of her brief assessment showed that Cheez-It crackers were

most frequently selected, followed by a three-way tie between candy corn, Lays potato chips, and light root beer, followed by animal crackers, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .894). Rank order correspondence was observed for Cheez-It crackers, Lays potato chips, and animal crackers. Non-correspondence was observed for candy corn (ranked #2 in the extended assessment and #3 in the brief assessment), and light root beer (ranked #4 in the extended assessment and #3 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 2. The outcomes of Madeline's extended assessment (leisure – only) show that 3 Stooges movie was most frequently selected, followed by Johnny Cash DVD, fun dough, mini wizard, and Cinderella book, respectively. Outcomes of her brief assessment showed that fun dough was most frequently selected followed by a three-way tie between 3 Stooges movie, Johnny Cash DVD, and mini wizard, followed by Cinderella book, respectively. These outcomes demonstrate moderate correspondence between brief and extended assessments (Spearman's rho = .447). Rank order correspondence was observed for Cinderella book. Non-correspondence was observed for 3 Stooges movie (ranked #1 in the extended assessment and #3 in the brief assessment), Johnny Cash DVD (ranked #2 In the extended assessment and #3 In the brief assessment), fun dough (ranked #3 in the extended assessment and #1 in the brief assessment), and mini wizard (ranked #4 in the extended assessment and #3 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 2.

Paula's outcomes are depicted in Table 3 and Figure 3. Ten stimuli were used for Paula due to the absence of dietary restrictions. The outcomes of Paula's extended food-only assessment show that fruit snack was most frequently selected, followed by M&M'S® candy, oatmeal round, Cheetos® snacks, diet root beer, chocolate Teddy Graham® crackers, Cheez-It crackers, shortbread cookie, frosted flakes, and Minute Maid Light™ mango tropical juice, respectively. Outcomes of her brief assessment showed that M&M'S candy was most frequently selected, followed by a two-way tie between fruit snack and oatmeal round, followed by a two-way tie between Cheetos snacks and frosted flakes, followed by a two-way tie between diet root beer and chocolate Teddy Graham crackers, followed by shortbread cookie, Cheez-It snacks, and Minute Maid Light mango tropical juice, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .813). Rank order correspondence was observed for shortbread cookie and Minute Maid Light mango tropical juice. Non-correspondence was observed for fruit snack (ranked #1 in the extended assessment and #2.5 in the brief assessment), M&M'S candy (ranked #2 in the extended assessment and #1 in the brief assessment), oatmeal round (ranked #3 in the extended assessment and #2.5 in the brief assessment), Cheetos snacks (ranked #4 in the extended assessment and #4.5 in the brief assessment), diet root beer (ranked #5 in the extended assessment and #6.5 in the brief assessment), chocolateTeddy Graham crackers (ranked #6 in the extended assessment and #6.5 in the brief assessment), Cheez-It crackers (ranked #7 in the extended assessment and #9 in the brief assessment), and frosted flakes (ranked #9 in

the extended assessment and #4.5 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 3.

Rebecca's outcomes are depicted in Table 4 and Figure 4. Ten stimuli were used for Paula. The outcomes of Rebecca's extended food-only assessment show that shortbread cookie was most frequently selected, followed by ginger snaps, Teddy Graham crackers, red jelly bean, diet root beer, diet Sunkist® soda, Doritos™ tortilla chips, apple, Minute Maid Light mango tropical juice, and corn pops, respectively. Outcomes of her brief assessment showed that shortbread cookie was most frequently selected, followed by Teddy Graham crackers, followed by a two-way tie between red jelly bean and diet Sunkist, followed by a three-way tie between ginger snap, diet root beer, and apple, followed by a three-way tie between Doritos chips, Minute Maid Light mango tropical juice, and corn pops, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .792). Rank order correspondence was observed for shortbread cookie and Minute Maid Light mango tropical juice. Non-correspondence was observed for ginger snap (ranked #2 in the extended assessment and #6 in the brief assessment), Teddy Graham crackers (ranked #3 in the extended assessment and #2 in the brief assessment), red jelly bean (ranked #4 in the extended assessment and #3.5 in the brief assessment), diet root beer (ranked #5 in the extended assessment and #6 in the brief assessment), diet Sunkist (ranked #6 in the extended assessment and #3.5 in the brief assessment), Doritos chips (ranked #7 in the extended assessment and #9 in the brief assessment), apple (ranked #8 in the extended assessment and #6 in the brief assessment), and corn pops (ranked #10 in the extended assessment and #9 in the brief assessment).

Specific percentage selection scores for each stimulus are listed in Table 4. The outcomes of Rebecca's extended assessment (leisure-only) show that drawing was most frequently selected, followed by a two-way tie between dinosaur puppet and maracas, followed by light up ball, followed by a two-way tie between cash register and massager, followed by kaleidoscope, followed by a two-way tie between green fun dough and mini wizard, followed by baby doll, respectively. Outcomes of her brief assessment showed that drawing was most frequently selected, followed by a two-way tie between dinosaur puppet and maracas, followed by light up ball, followed by a two-way tie between cash register and massager, followed by kaleidoscope, followed by a two-way tie between green fun dough and mini wizard, followed by baby doll, respectively. These outcomes demonstrate moderate correspondence between brief and extended assessments (Spearman's rho = .644). Rank order correspondence was observed for drawing. Non-correspondence was observed for dinosaur puppet (ranked #2 in the extended assessment and #2.5 in the brief assessment), light up ball (ranked #3 in the extended assessment and #4 in the brief assessment), green fun dough (ranked #4 in the extended assessment and #8.5 in the brief assessment), maracas (ranked #5 in the extended assessment and #2.5 in the brief assessment), baby doll (ranked #6 in the extended assessment and #10 in the brief assessment), cash register (ranked #7.5 in the extended assessment and #5.5 in the brief assessment), massager (ranked #7.5 in the extended assessment and #5.5 in the brief assessment), kaleidoscope (ranked #9 in the extended assessment and #7 in the brief assessment), and mini wizard (ranked #10 in the extended assessment and #8.5 in the brief

assessment). Specific percentage selection scores for each stimulus are listed in Table 4.

Jeffrey's outcomes are depicted in Table 5 and Figure 5. Five stimuli were used for Jeffrey due to dietary restrictions. The outcomes of Jeffrey's extended food-only assessment show that M&M'S candy was most frequently selected, followed by Fritos chips, animal cracker, mini Chips Ahoy! cookie, and iced tea, respectively. Outcomes of his brief assessment showed that M&M'S candy was most frequently selected, followed by a three-way tie between Fritos chips, animal cracker, and mini Chips Ahoy! cookie, followed by iced tea, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .894). Rank order correspondence was observed for M&M'S candy, animal cracker, and iced tea. Non-correspondence was observed for Fritos chips (ranked #2 in the extended assessment and #3 in the brief assessment) and mini Chips Ahoy! cookie (ranked #4 in the extended assessment and #3 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 5. The outcomes of Jeffrey's extended assessment (leisure – only) show that light up ball was most frequently selected, followed by fun dough, glow ball, squish ball, and bells, respectively. Outcomes of his brief assessment showed that fun dough was most frequently selected, followed by light up ball, glow ball, squish ball, and bells, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .900). Rank order correspondence was observed for glow ball, squish ball, and bells. Non-correspondence was observed for light up ball (ranked #1 in the extended assessment and #2 in the brief assessment) and fun dough (ranked #2 in

the extended assessment and #1 in the brief assessment. Specific percentage selection scores for each stimulus are listed in Table 5.

Lloyd's outcomes are depicted in Table 6 and Figure 6. Five stimuli were used for Lloyd due to dietary restrictions. The outcomes of Lloyd's extended assessment show that chocolate pudding was most frequently selected, followed by applesauce, Diet V8 Splash, vanilla pudding, and light lemonade, respectively. Outcomes of his brief assessment showed that chocolate pudding was most frequently selected, followed by a two-way tie between Diet V8 Splash and vanilla pudding, followed by a two-way tie between applesauce and light lemonade, respectively. These outcomes demonstrate moderate correspondence between brief and extended assessments (Spearman's rho = .527). Rank order correspondence was observed for chocolate pudding. Non-correspondence was observed for applesauce (ranked #2 in the extended assessment and #4.5 in the brief assessment), Diet V8 Splash (ranked #3 in the extended assessment and #2.5 in the brief assessment), vanilla pudding (ranked #4 in the extended assessment and #2.5 in the brief assessment), and light lemonade (ranked #5 in the extended assessment and #4.5 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 6.

Beth's outcomes are depicted in Table 7 and Figure 7. Ten stimuli were used for Beth. The outcomes of Beth's extended food-only assessment show that Cheez-It cracker was most frequently selected, followed by Fig Newtons, Fritos chips, Ritz Bits (Smores), Doritos, diet root beer, diet Dr Pepper, diet Sunkist, chocolate chip Teddy Grahams, and animal crackers, respectively. Outcomes of her brief assessment showed that Fig Newtons was most frequently selected, followed by a two-way tie

between Cheez-It crackers and Fritos chips, followed by a two-way tie between Ritz Bits (Smores) and diet Dr Pepper, followed by a two-way tie between Doritos and diet root beer, followed by a two-way tie between diet Sunkist and animal crackers, followed by chocolate chip Teddy Grahams, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .902). Rank order correspondence was not observed for any specific stimulus. Non-correspondence was observed for Cheez-It (ranked #1 in the extended assessment and #2.5 in the brief assessment), Fig Newtons (ranked #2 in the extended assessment and #1 in the brief assessment), Fritos (ranked #3 in the extended assessment and #2.5 in the brief assessment), Ritz Bitz (Smores) (ranked #4 in the extended assessment and #4.5 in the brief assessment), Doritos (ranked #5 in the extended assessment and #6.5 in the brief assessment), diet root beer (ranked #6 in the extended assessment and #6.5 in the brief assessment), diet Dr Pepper (ranked #7 in the extended assessment and #4.5 in the brief assessment), diet Sunkist (ranked #8 in the extended assessment and #8.5 in the brief assessment), chocolate chip Teddy Grahams (ranked #9 in the extended assessment and #10 in the brief assessment), and animal crackers (ranked #10 in the extended assessment and #8.5 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 7. The outcomes of Beth's extended assessment (leisure-only) show that massager was most frequently selected, followed by fun dough, kaleidoscope, Ray Charles CD, coloring, ball, Shrek doll, Sting CD, magazine, and Better Than Ezra CD, respectively. Outcomes of her brief assessment showed that play doh was most frequently selected, followed by kaleidoscope, followed by a four-way tie between massager, coloring, ball, and Sting

CD, followed by Shrek doll, magazine, Ray Charles CD, and Better Than Ezra CD, respectively. These outcomes demonstrate moderate correspondence between brief and extended assessments (Spearman's rho = .657). Rank order correspondence was observed for Shrek doll and Better Than Ezra CD. Non-correspondence was observed for massager (ranked #1 in the extended assessment and #5.5 in the brief assessment), fun dough (ranked #2 in the extended assessment and #1 in the brief assessment), kaleidoscope (ranked #3 in the extended assessment and #2 in the brief assessment), Ray Charles CD (ranked #4 in the extended assessment and #9 in the brief assessment), coloring (ranked #5 in the extended assessment and #5.5 in the brief assessment), ball (ranked #6 in the extended assessment and #5.5 in the brief assessment), Sting CD (ranked #8 in the extended assessment and #5.5 in the brief assessment), and magazine (ranked #9 in the extended assessment and #8 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 7.

Terri's outcomes are depicted in Table 8 and Figure 8. Five stimuli were used for Terri due to dietary restrictions. The outcomes of Terri's extended food-only assessment show that sugar free chocolate pudding was most frequently selected, followed by sugar free vanilla pudding, lite strawberry applesauce, lite orange mango applesauce, and lite applesauce, respectively. Outcomes of her brief assessment showed that sugar free chocolate pudding was most frequently selected, followed by sugar free vanilla pudding, lite orange mango applesauce, lite strawberry applesauce, and lite applesauce, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .900).

Rank order correspondence was observed for sugar free chocolate pudding, sugar free vanilla pudding, and lite applesauce. Non-correspondence was observed for lite strawberry applesauce (ranked #3 in the extended assessment and #4 in the brief assessment) and lite orange mango applesauce (ranked #4 in the extended assessment and #3 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 8. The outcomes of Terri's extended assessment (leisure – only) show that puzzle was most frequently selected, followed by music, ball, fun dough, and bear, respectively. Outcomes of her brief assessment showed that puzzle and music were most frequently selected (two-way tie), followed by ball, and a two-way tie between fun dough and bear, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .949). Rank order correspondence was observed for ball. Non-correspondence was observed for puzzle (ranked #1 in the extended assessment and #1.5 in the brief assessment), music (ranked #2 in the extended assessment and #1.5 in the brief assessment), fun dough (ranked #4 in the extended assessment and #4.5 in the brief assessment), and bear (ranked #5 in the extended assessment and #4.5 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 8.

Mandy's outcomes are depicted in Table 9 and Figure 9. Five stimuli were used for Mandy due to lack of stimuli identified as potential reinforcers. The outcomes of Mandy's extended assessment show that Oreos® cookies was most frequently selected, followed by chocolate Teddy Grahams, baked Lays chips, shortbread cookies, and chocolate milk, respectively. Outcomes of her brief assessment showed that

chocolate Teddy Grahams was most frequently selected, followed by Oreos, shortbread cookies, baked Lays, and chocolate milk, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .800). Rank order correspondence was observed for chocolate milk. Non-correspondence was observed for Oreos (ranked #1 in the extended assessment and #2 in the brief assessment), chocolate Teddy Grahams (ranked #2 in the extended assessment and #1 in the brief assessment), baked Lays (ranked #3 in the extended assessment and #4 in the brief assessment), and shortbread cookies (ranked #4 in the extended assessment and #3 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 9.

Adelaide's outcomes are depicted in Table 10 and Figure 10. Five stimuli were used for Adelaide due to dietary restrictions. The outcomes of Adelaide's extended food-only assessment show that lite applesauce was most frequently selected, followed by a two-way tie between pudding and strawberry applesauce, followed by diet Sunkist, and diet root beer, respectively. Outcomes of her brief assessment showed that lite applesauce, pudding, and strawberry applesauce were most frequently selected (three-way tie), followed by diet Sunkist and diet root beer, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .918). Rank order correspondence was observed for diet Sunkist and diet root beer. Non-correspondence was observed for light applesauce (ranked #1 in the extended assessment and #2 in the brief assessment), pudding (ranked #2.5 in the extended assessment and #2 in the brief assessment) and strawberry applesauce (ranked #2.5 in the extended assessment and #2 in the brief assessment). Specific

percentage selection scores for each stimulus are listed in Table 10. The outcomes of Adelaide's extended assessment (leisure – only) show that coloring was most frequently selected, followed by ball, music, fun dough, and sketch toy, respectively. Outcomes of her brief assessment showed that coloring was most frequently selected, followed by ball, music, sketch toy, and fun dough, respectively. These outcomes demonstrate substantial correspondence between brief and extended assessments (Spearman's rho = .900). Rank order correspondence was observed for coloring, ball, and music. Non-correspondence was observed for fun dough (ranked #4 in the extended assessment and #5 in the brief assessment) and sketch toy (ranked #5 in the extended assessment and #4 in the brief assessment). Specific percentage selection scores for each stimulus are listed in Table 10.

DISCUSSION

This study was designed to extend the current paired-choice preference assessment literature by evaluating the extent to which brief paired-choice preference assessments identify preferences in individuals with developmental disabilities that are consistent with the outcomes of extended paired-choice assessments.

Seventeen paired-choice preference assessments were conducted. Overall, 7 out of the 17 (41.2%) brief assessments identified the same stimulus as the most preferred (highest rank) as was identified in extended assessment. Rank order correspondence was observed for the two top-ranked stimuli in 2 out of 17 (11.8%) assessments and 9 of 17 (52.9%) assessments identified the same stimulus as the least preferred (lowest rank). Overall rank order coefficients showed a moderate to high level of correspondence between methods (range = 0.45 - 0.95; median = 0.81, mean = 0.79).

The present conclusions are consistent with the findings of previous research (e.g., Graff & Ciccone, 2002) showing that brief assessments can identify the most highly preferred items effectively. Whereas previous research has focused on MSWO assessments, the present study compared the outcomes of brief versus extended paired-choice assessments. Outcomes showing stability in rank order across assessments for the most highly preferred stimuli but substantial variability in rank-order among less-preferred stimuli replicate the results of research on MSWO assessments to paired-choice procedures.

The current outcomes also showed increased variability in rank-ordering among moderately or less-preferred stimuli across brief and extended paired-choice

assessments, relative to most-preferred stimuli. This outcome is also consistent with previous research on MSWO procedures (e.g., Carr, Nicolson, & Higbee, 2000; Graff & Ciccone, 2002). The combined outcomes of the current and previous studies suggest that brief assessments—either paired-choice or MSWO—might be most useful if an extremely potent stimulus is immediately needed; brief assessment appears to be as effective as extended assessment in identifying a single, highly preferred stimulus whose effectiveness as a reinforcer is likely to be "reliable" across time.

Therapists and professionals working with individuals with severe to profound mental retardation who wish to identify a pool of strong reinforcers should conduct an extended preference assessment. Because novelty effects may occur during brief assessment, validity of the procedure may be compromised due to extensive sampling of new stimuli (leading to a potential overestimate of reinforcing effectiveness) or rejection of potentially reinforcing stimuli due to unfamiliarity (leading to a potential underestimate of reinforcing effectiveness). Extended assessment permits more exposure to each stimulus, allowing novelty effects to dissipate. Thus, extended assessment may provide a clearer and more accurate representation of preference hierarchies. Identification of a range of potentially reinforcing stimuli may be particularly important for therapists conducting teaching programs, as variation among both edible and leisure stimuli has been shown to increase correct task responding relative to the repeated presentation of a single potent stimulus (e.g., Egel, 1981; Rincover & Newsom, 1985). DeLeon & Iwata (1996) suggested that although a more brief assessment format may appear more cost efficient, a format that produces more reliable results may ultimately be preferred.

One possible limitation to the current study is that a reinforcer assessment was not conducted in order to determine the validity of rankings from the brief and extended assessments. Although no such validation was attempted in this study, a large body of previous research indicates that extended paired-choice procedures are useful to identify effective reinforcers. Therefore, it is reasonable to suggest that the stimuli identified as most preferred in both extended and brief assessments would likely have functioned as effective reinforcement for responses in addition to choice selections.

Because the current study did not evaluate relative reinforcing effectiveness across hierarchies, future research should compare the extent to which the hierarchies of preference identified in brief assessments are more consistent with reinforcing effectiveness at the time of assessment than the outcomes of extended assessment (when those outcomes differ). If correspondence was observed (i.e., if relative preferences corresponded with relative reinforcing efficacy) then the variation observed across sessions of assessment may reflect actual variation in reinforcing effectiveness. If so, then frequent brief assessment would be recommended for practitioners interested in identifying a pool of currently effective reinforcers. On the other hand, if greater correspondence in relative reinforcing efficacy was found for extended assessments, then the results of extended assessment would be recommended.

The current study may represent a promising format (i.e., brief vs. extended preference assessments) to examine variability within individuals as well as within and across populations. For example, a defining characteristic of autism is an unusual restriction of activities and interests. Therefore, it is possible that persons with developmental disabilities such as autism may show less variability in preference over

time, with few stimuli identified as highly preferred relative to typically developing persons. If such results were obtained, the current format would provide a platform for assessing the effects of interventions designed to increase variability in approach responses.

The results of the current study showed that brief and extended paired-choice assessments frequently identify the same stimulus as most preferred. However, less correspondence was observed in outcomes among moderately and less-preferred stimuli. These results complement and extend similar outcomes of studies investigating correspondence between brief and extended MSWO preference assessments. Future research might investigate other means of quickly and accurately identifying reinforcer hierarchies. For example, comparison of brief vs. extended assessments with duration based preference assessments, use of different response requirements (i.e. vocational tasks), and examination of motivating operations effects on the brief and extended preference assessments all may contribute toward the development of more efficient procedures for identifying reinforcing stimuli. The current study represents an incremental step in the development of such a technology.

Table 1

Victoria Assessments

Stimulus	Extended Rank	Extended (%)	Brief Rank	Brief %	Individual Session (%) 1	2	3	4	5	Standard Deviation
Food										
Lite Strawberry Applesauce™	1	65	1	75	75	75	50	75	50	13.69
Light Berry Juice	2	55	3	50	50	50	50	50	75	11.18
Lite Applesauce™	3	45	3	50	50	25	50	50	50	11.18
Light Apple Juice	4	45	5	25	25	50	75	50	25	20.92
Diet V8 Splash™	5	40	3	50	50	50	25	25	50	13.69
Leisure										
Light Up Ball	1	65	1.5	75	75	50	75	75	50	13.69
Hand Bells	2	60	1.5	75	75	75	25	50	75	22.36
Legos	3	45	4.5	25	25	50	50	50	50	11.18
Magnetic Board/Letters	4	40	3	50	50	25	50	25	50	13.69
Magazine	5	40	4.5	25	25	50	50	50	25	13.69

Table 2

Madeline Assessments

Stimulus	Extended Rank	Extended (%)	Brief Rank	Brief %	Individual Session (%) 1	2	3	4	5	Standard Deviation
Food										
Cheez-Its™	1	65	1	75	75	50	50	75	75	13.69
Candy Corn™	2	55	3	50	50	25	75	50	75	20.92
Lays Chips™	3	45	3	50	50	50	50	75	0	27.39
Light Root Beer	4	40	3	50	50	50	25	25	50	13.69
Animal Crackers	5	40	5	25	25	50	50	25	50	13.69
Leisure										
3 Stooges Movie	1	80	3	50	50	75	100	75	100	20.92
Johnny Cash DVD	2	55	3	50	50	50	50	75	50	11.18
Fun Dough	3	45	1	75	75	50	25	50	25	20.92
Mini Wizard	4	35	3	50	50	25	50	25	25	13.69
Cinderella Book	5	35	5	25	25	50	25	25	50	13.69

Table 3

Paula Assessments

Stimulus	Extended		Brief		Individual Session (%)					Standard
	Rank	(%)	Rank	%	1	2	3	4	5	Deviation
Food										
Fruit Snack	1	87	2.5	78	78	100	78	89	89	9.20
M&M® (Mixed)	2	80	1	89	89	67	56	89	100	18.07
Oatmeal Round	3	71	2.5	78	78	67	100	56	56	18.41
Cheetos®	4	69	4.5	56	56	67	56	89	78	14.34
Diet Root Beer	5	49	6.5	44	44	67	44	56	33	13.03
Chocolate Teddy Graham®	6	47	6.5	44	44	44	56	44	44	5.37
Cheez-It™	7	40	9	22	22	56	33	33	56	15.28
Shortbread Cookie	8	31	8	33	33	22	44	33	22	9.20
Frosted Flakes®	9	22	4.5	56	56	11	22	11	11	19.49
Light Minute Maid Mango Tropical™	10	0	10	0	0	0	0	0	0	0.00

Table 4

Rebecca Assessments

Stimulus	Extended		Brief		Individual Session (%)					Standard
	Rank	(%)	Rank	%	1	2	3	4	5	Deviation
Food										
Shortbread Cookie	1	84	1	89	89	100	89	89	56	16.68
Ginger Snap	2	71	6	44	44	56	78	89	89	20.32
Teddy Graham®	3	60	2	67	67	33	67	67	67	15.21
Red Jelly Bean	4	56	3.5	56	56	44	67	44	67	11.50
Diet Root Beer	5	51	6	44	44	44	44	33	89	21.88
Diet Sunkist®	6	47	3.5	56	56	44	33	56	44	9.69
Doritos™	7	42	9	33	33	44	67	33	33	14.76
Apple	8	31	6	44	44	44	22	33	11	14.34
Light Minute Maid Mango Tropical™	9	31	9	33	33	44	22	22	33	9.20
Corn Pops™	10	27	9	33	33	44	11	33	11	14.76
Leisure										
Draw/Color	1	98	1	100	100	100	100	89	100	4.92
Dinosaur Puppet	2	84	2.5	78	78	89	89	89	78	6.02
Light Up Ball	3	71	4	67	67	56	78	78	78	9.84
Green Fun Dough	4	53	8.5	22	22	67	33	78	67	24.38
Maracas	5	44	2.5	78	78	44	22	44	33	20.98
Baby Doll	6	44	10	11	11	33	67	44	67	23.81
Cash Register	7.5	29	5.5	44	44	33	11	11	33	14.76
Massager	7.5	29	5.5	44	44	22	33	33	11	12.54
Kaleidoscope	9	27	7	33	33	22	22	22	33	6.02
Mini Wizard	10	20	8.5	22	22	33	33	11	0	14.34

Table 5

Jeffrey Assessments

Stimulus	Extended		Brief		Individual Session (%)					Standard Deviation
	Rank	(%)	Rank	%	1	2	3	4	5	
Food										
M&M®	1	90	1	100	100	75	100	100	75	13.69
Fritos®	2	75	3	50	50	100	50	75	100	25.00
Animal Cracker	3	45	3	50	50	50	50	50	25	11.18
Mini Chips Ahoy Cookie™	4	40	3	50	50	25	50	25	50	13.69
Iced Tea	5	0	5	0	0	0	0	0	0	0.00
Leisure										
Light Up Ball	1	85	2	75	75	100	100	50	100	22.36
Fun Dough	2	75	1	100	100	75	75	50	75	17.68
Glow Ball	3	40	3	50	50	25	50	50	25	13.69
Squish Ball	4	35	4	25	25	50	25	25	50	13.69
Bells	5	5	5	0	0	0	0	25	0	11.18

Table 6

Lloyd Assessments

Stimulus	Extended		Brief		Individual Session (%)					Standard Deviation
	Rank	(%)	Rank	%	1	2	3	4	5	
Food										
Chocolate Pudding	1	100	1	100	100	100	100	100	100	0.00
Applesauce	2	45	4.5	25	25	50	50	75	25	20.92
Diet V8 Splash™	3	40	2.5	50	50	50	0	50	50	22.36
Vanilla Pudding	4	35	2.5	50	50	0	50	25	50	22.36
Light Lemonade	5	30	4.5	25	25	50	50	0	25	20.92

Table 7

Beth Assessments

Stimulus	Extended Rank	Extended (%)	Brief Rank	Brief %	Individual Session (%) 1	2	3	4	5	Standard Deviation
Food										
Cheez-its™	1	80	2.5	78	78	100	56	89	78	16.32
Fig Newtons™	2	69	1	89	89	67	44	67	78	16.69
Fritos™	3	69	2.5	78	78	56	44	67	100	21.45
Ritz Bitz (Smores)™	4	60	4.5	56	56	78	56	56	56	9.84
Doritos™	5	58	6.5	44	44	56	33	89	67	21.60
Diet Root Beer	6	42	6.5	44	44	56	22	44	44	12.33
Diet Dr. Pepper®	7	36	4.5	56	56	33	11	56	22	20.18
Diet Sunkist®	8	22	8.5	22	22	33	22	11	22	7.78
Chocolate Chip Teddy Grahams®	9	20	10	11	11	22	22	22	22	4.92
Animal Crackers	10	9	8.5	22	22	0	11	0	11	9.20
Leisure										
Massager	1	78	5.5	56	56	67	89	89	89	15.56
Play Doh	2	69	1	89	89	67	78	44	67	16.69
Kaleidoscope	3	56	2	78	78	44	67	56	33	17.87
Ray Charles	4	56	9	22	22	89	33	67	67	27.46
Coloring	5	51	5.5	56	56	11	56	89	44	28.03
Ball	6	47	5.5	56	56	33	56	44	44	9.69
Shrek	7	47	7	44	44	78	67	44	0	29.95
Sting	8	38	5.5	56	56	22	22	22	67	21.98
Magazine	9	33	8	33	33	44	22	33	33	7.78
Better Than Ezra	10	27	10	11	11	44	11	11	56	21.78

Table 8

Terri Assessments

Stimulus	Extended Rank	Extended (%)	Brief Rank	Brief %	Individual Session (%) 1	2	3	4	5	Standard Deviation
Food										
Sugar Free Chocolate Pudding	1	75	1	100	100	100	75	75	25	30.62
Sugar Free Vanilla Pudding	2	75	2	75	75	25	100	75	100	30.62
Lite Strawberry Applesauce™	3	40	4	25	25	75	25	50	75	25.00
Lite Orange Mango Applesauce™	4	35	3	50	50	25	0	25	75	28.50
Lite Applesauce™	5	25	5	0	0	25	50	25	25	17.68
Leisure										
Puzzle	1	80	1.5	75	75	75	100	75	75	11.18
Music	2	60	1.5	75	75	50	75	50	50	13.69
Ball	3	50	3	50	50	75	25	50	50	17.68
Play Doh	4	50	4.5	25	25	50	50	50	75	17.68
Bear	5	10	4.5	25	25	0	0	25	0	13.69

Table 9

Mandy Assessments

Stimulus	Extended Rank	Extended (%)	Brief Rank	Brief %	Individual Session (%) 1	2	3	4	5	Standard Deviation
Food										
Oreos™	1	80	2	75	75	50	100	100	75	20.92
Chocolate Teddy Grahams®	2	75	1	100	100	100	25	75	75	30.62
Baked Lays™	3	45	4	25	25	75	50	25	50	20.92
Shortbread Cookies	4	40	3	50	50	25	25	50	50	13.69
Chocolate Milk	5	10	5	0	0	0	50	0	0	22.36

Table 10

Adelaide Assessments

Stimulus	Extended Rank	Extended (%)	Brief Rank	Brief %	Individual Session (%) 1	2	3	4	5	Standard Deviation
Food										
Lite Applesauce™	1	80	2	75	75	75	75	75	100	11.18
Pudding/Strawberry Applesauce	2.5	65	2	75	75	75	75	50	50	13.69
Strawberry Applesauce/Pudding	2.5	65	2	75	75	75	75	50	50	13.69
Diet Sunkist®	4	25	4	25	25	0	25	50	25	17.68
Diet Root Beer	5	15	5	0	0	25	0	25	25	13.69
Leisure										
Coloring	1	95	1	100	100	100	100	75	100	11.18
Ball	2	60	2	75	75	75	50	50	50	13.69
Music/CD	3	50	3	50	50	50	50	50	50	0.00
Play Dough	4	25	5	0	0	25	25	50	25	17.68
Etch-A-Sketch	5	20	4	25	25	0	25	25	25	11.18

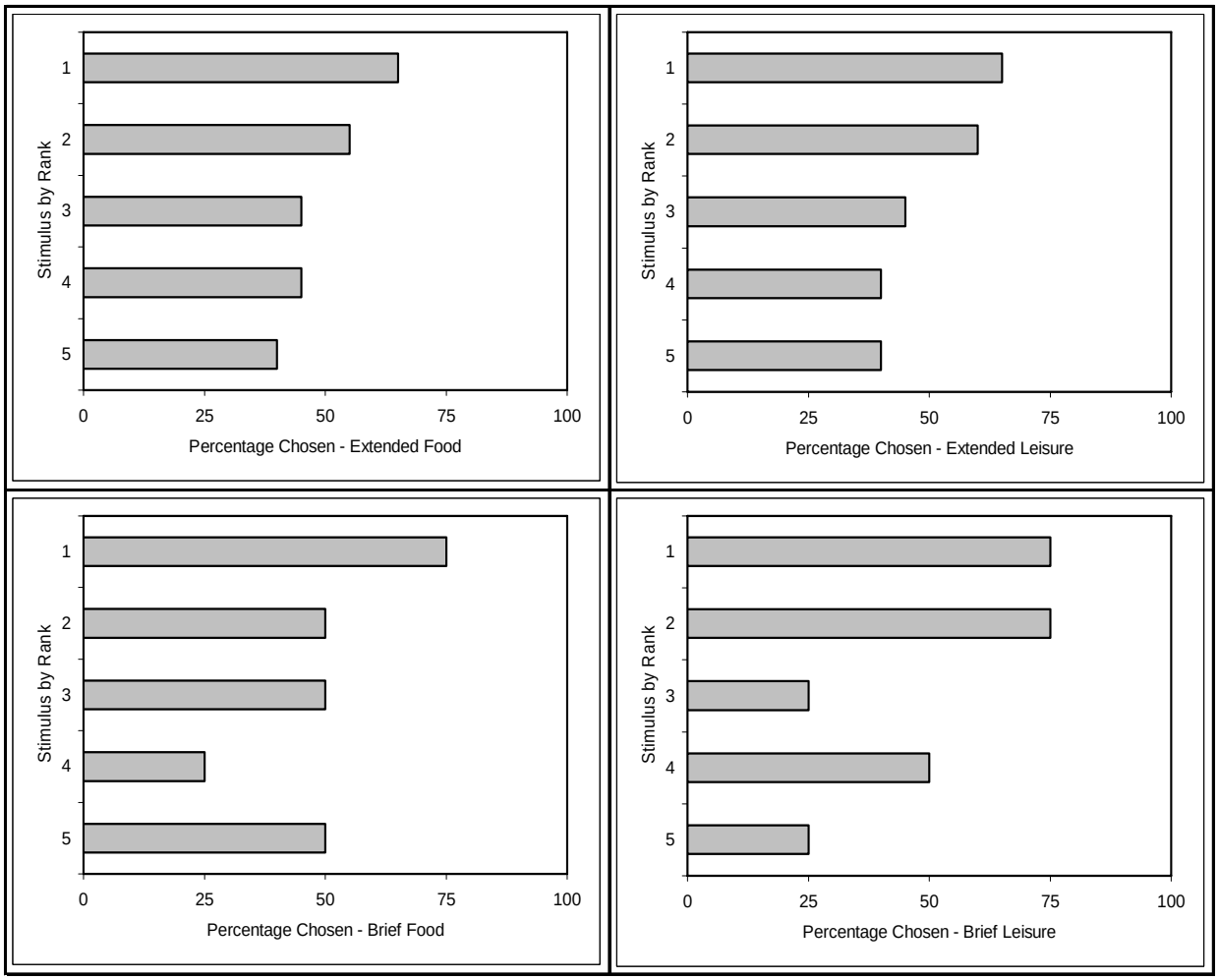

Figure 1. Victoria assessments.

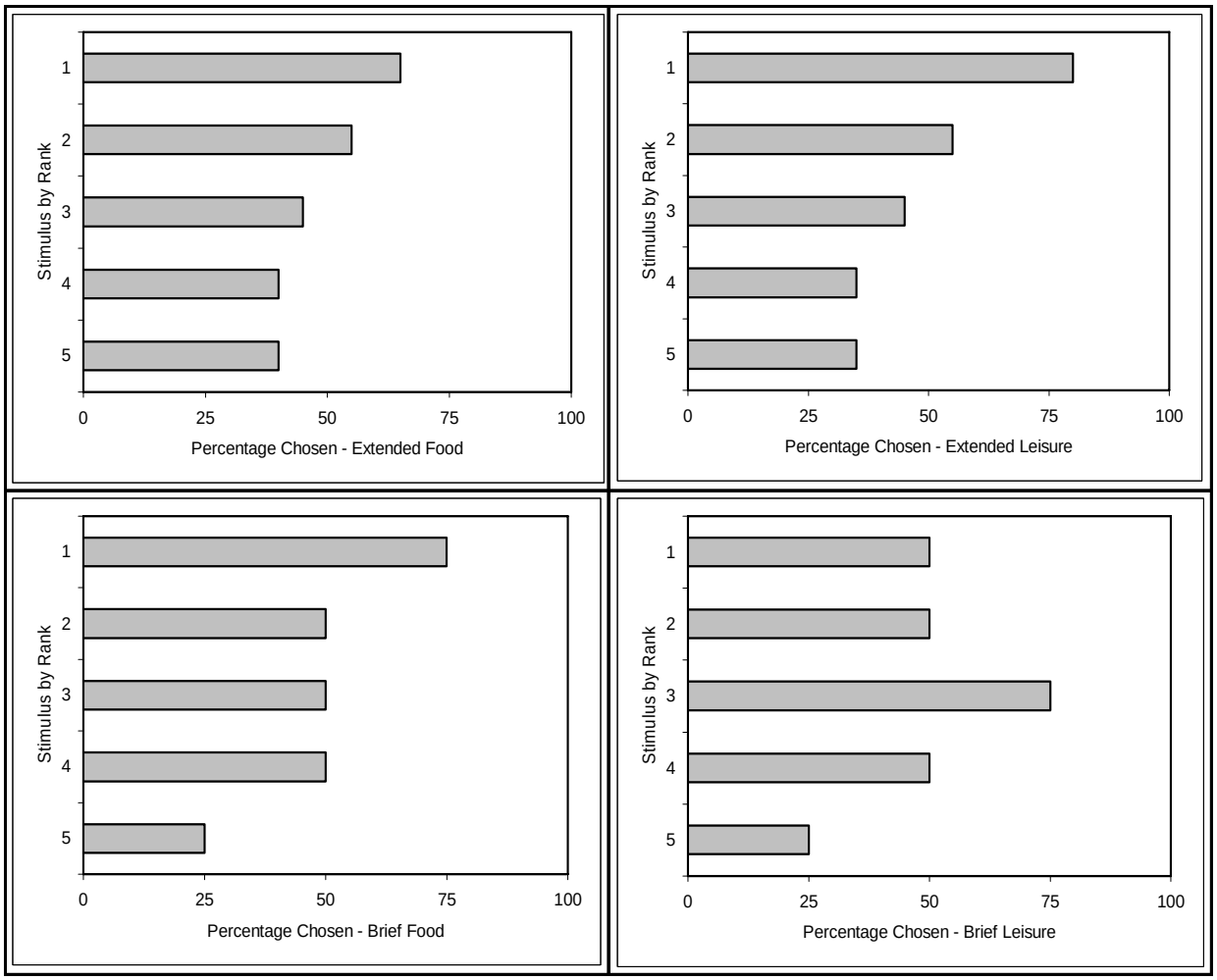

Figure 2. Madeline assessments.

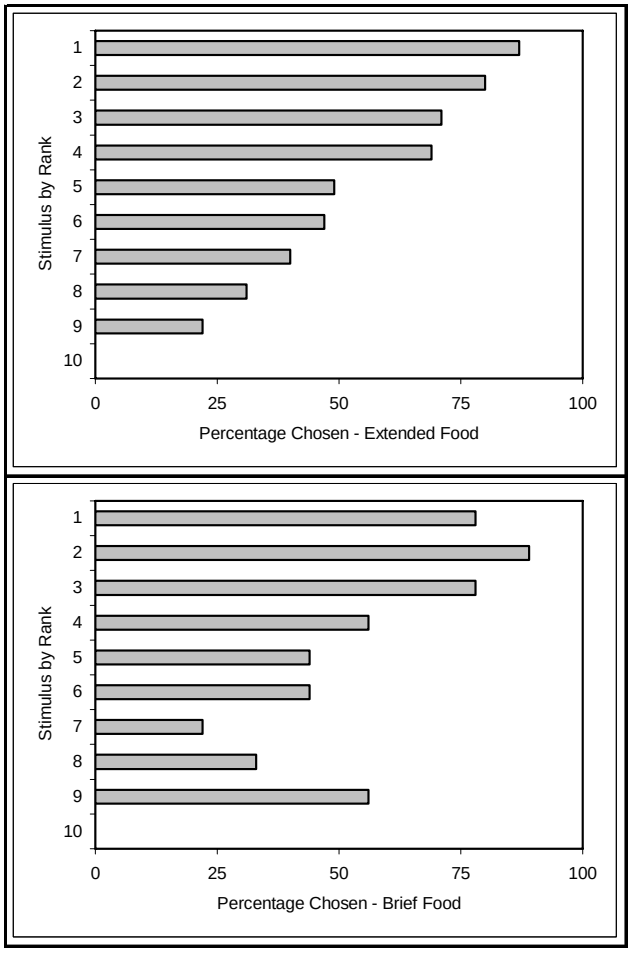

Figure 3. Paula assessments.

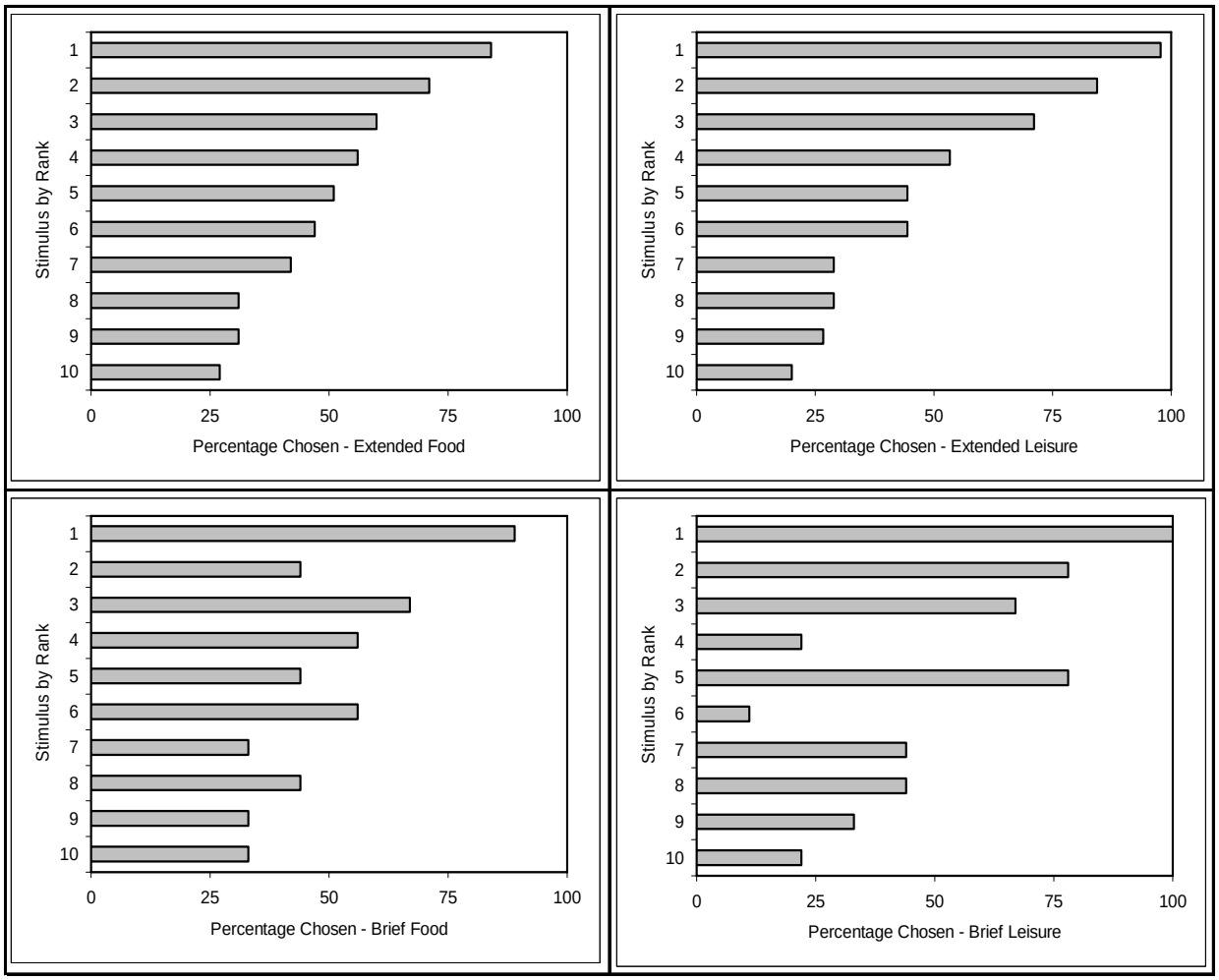

Figure 4. Rebecca assessments.

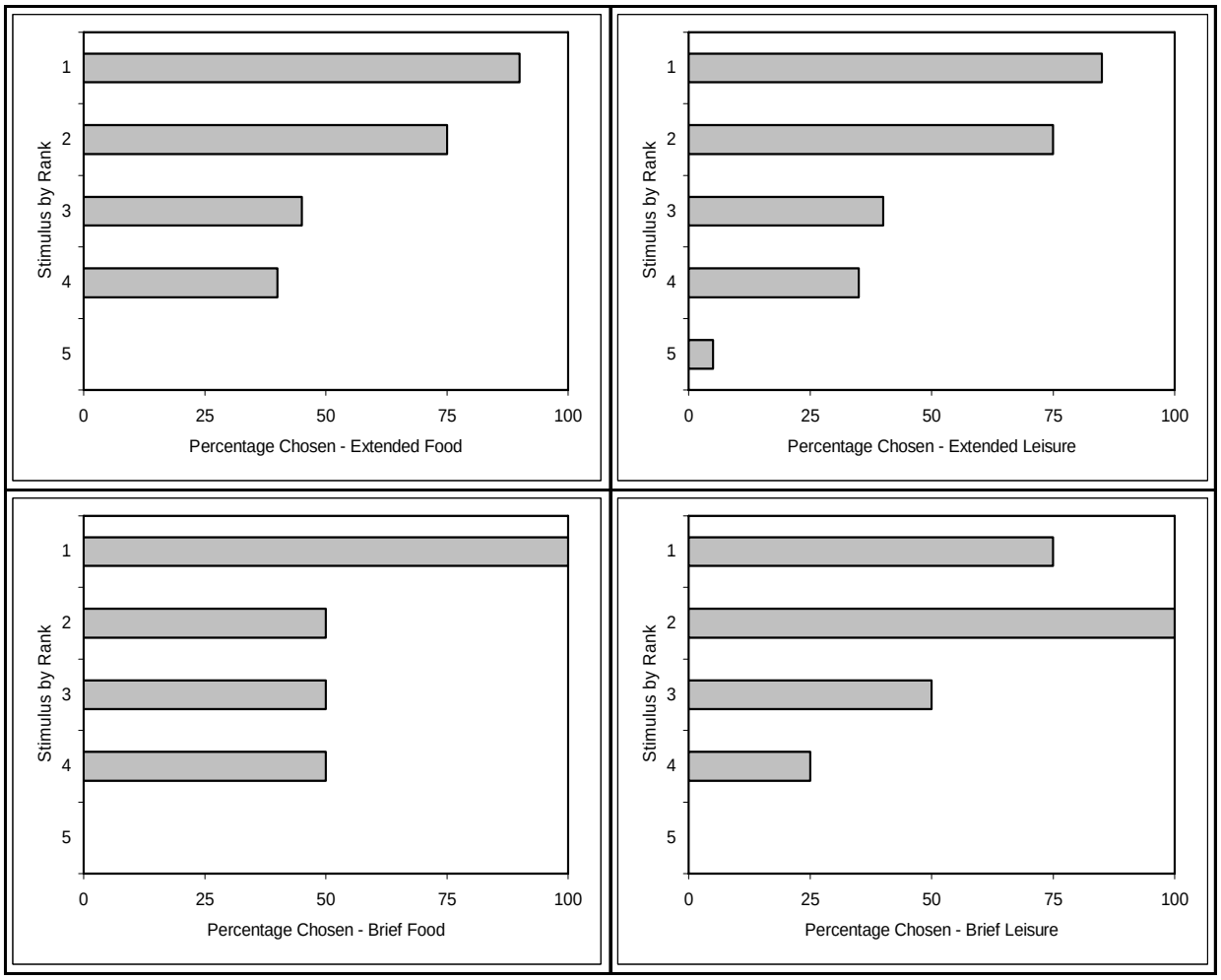

Figure 5. Jeffrey assessments.

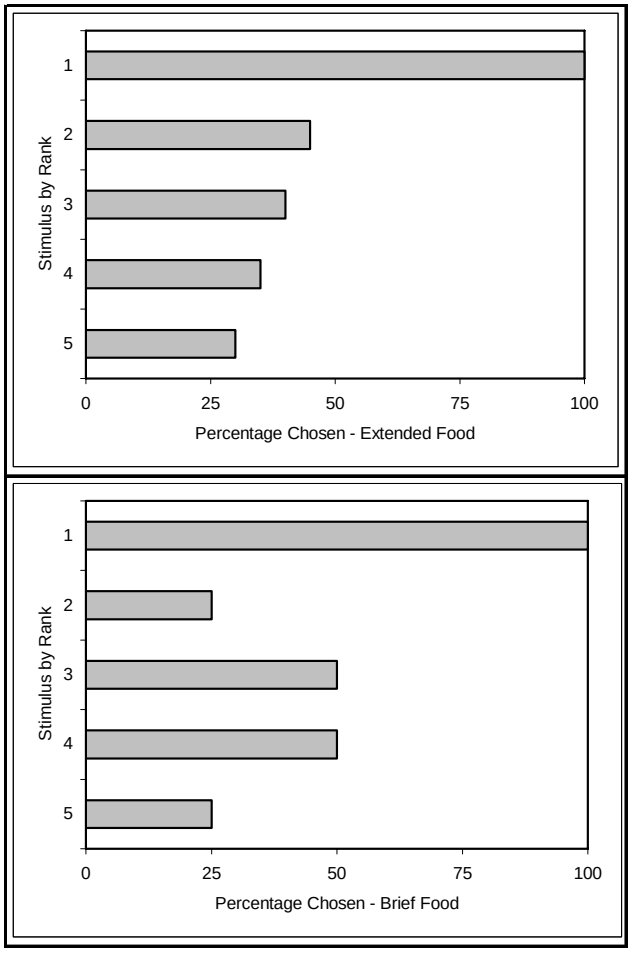

Figure 6. Lloyd assessments.

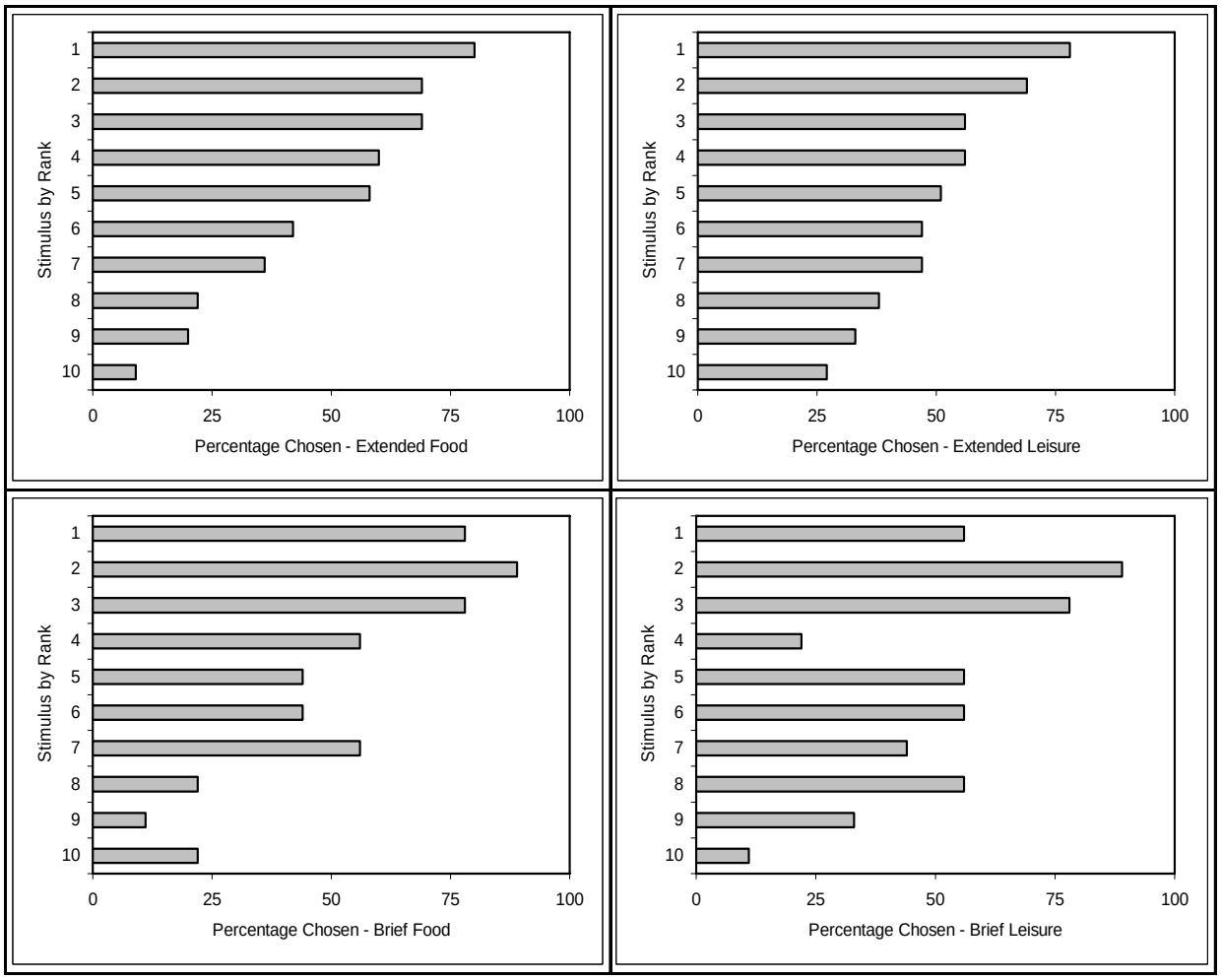

Figure 7. Beth assessments.

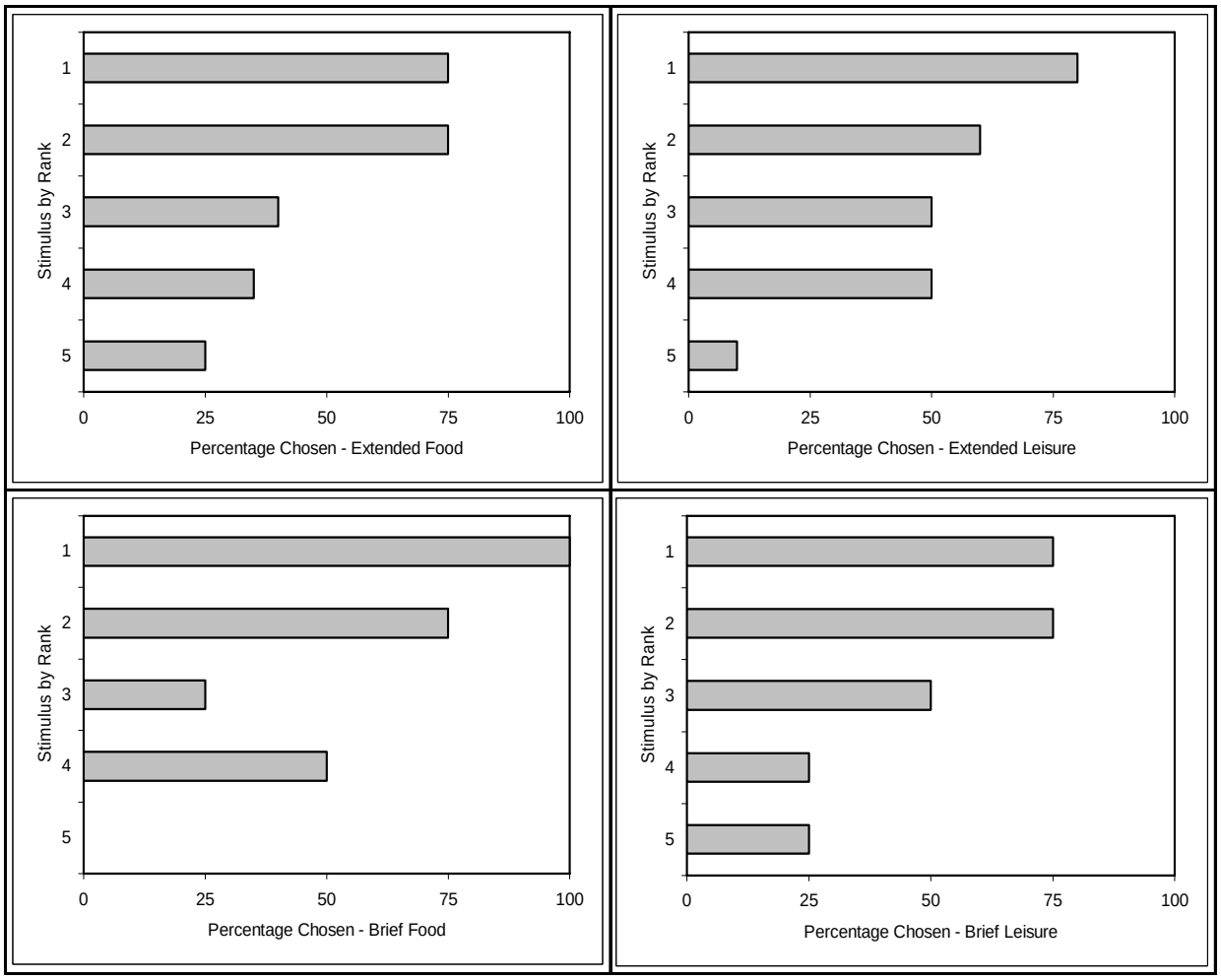

Figure 8. Terri assessments.

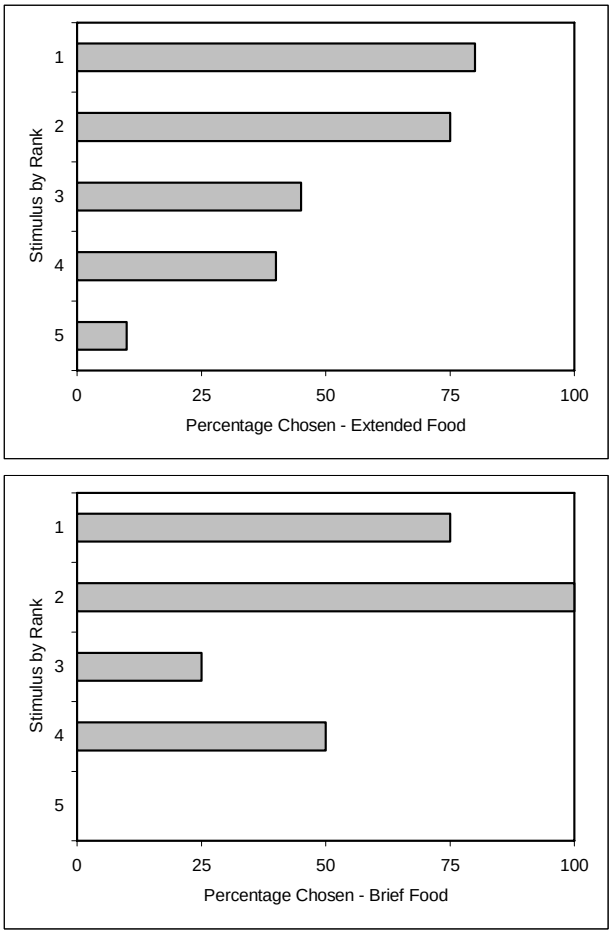

Figure 9. Mandy assessments.

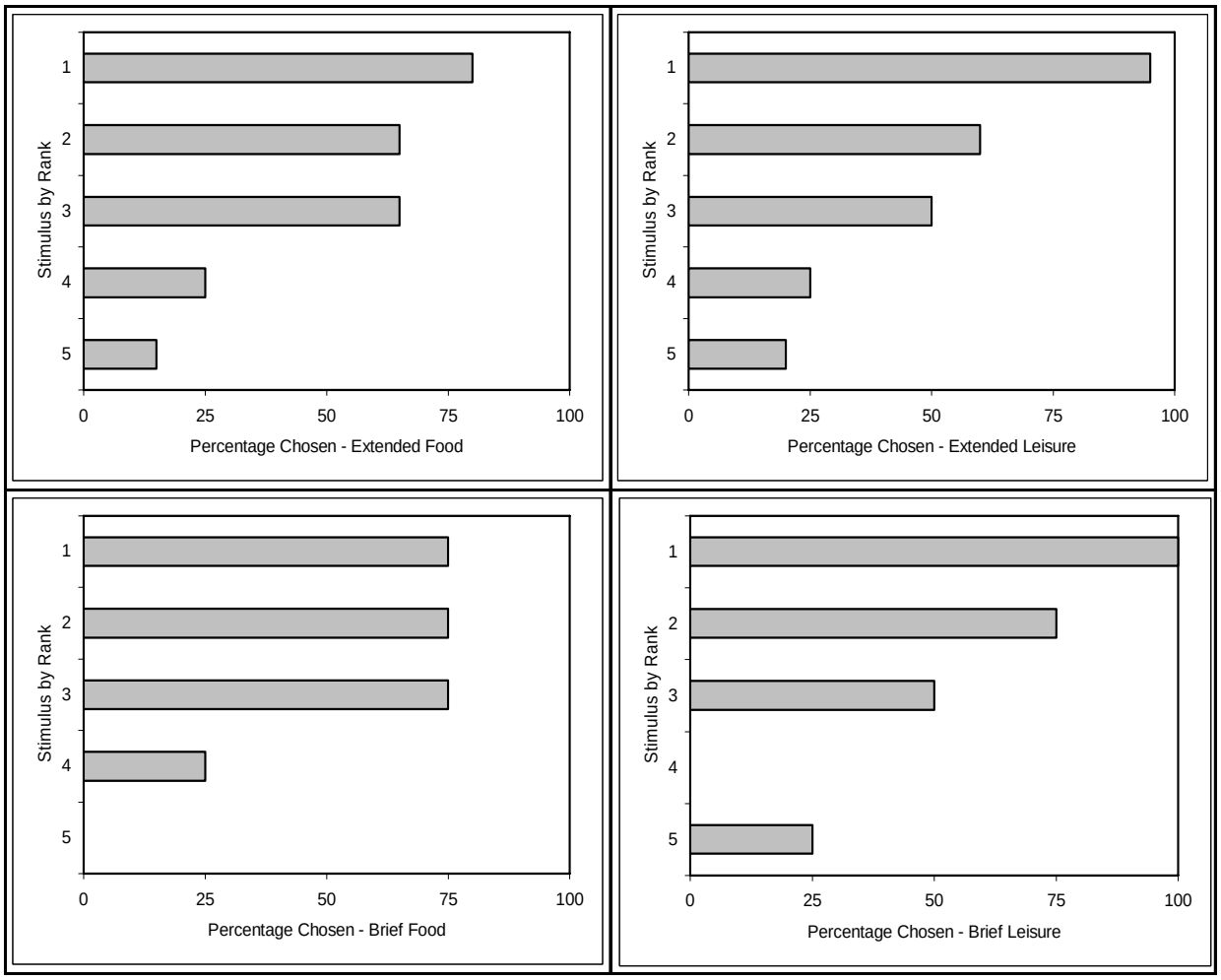

Figure 10. Adelaide assessments.

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