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A comparison of reinforcing effects and preference assessment techniques

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A COMPARISON OF REINFORCING EFFECTS AND PREFERENCE ASSESSMENT TECHNIQUES

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Abstract

A challenge faced by many educators of individuals with developmental delays is the identification of potentially reinforcing stimuli. Reinforcing stimuli are an essential component in the education of those with special needs. Researchers in the field of applied behavior analysis have developed several methods to identify potentially reinforcing stimuli. Research on brief preference assessment has demonstrated this to be a reliable means of identifying potentially reinforcing stimuli. The present study is an attempt to replicate DeLeon et al. (2001) demonstrating that daily brief assessments may be useful in capturing daily shifts in preference. Results of the present study support DeLeon suggesting the brief assessment as a reliable means of identifying highly preferred stimuli and as a useful agent to capture a shift in preference in one of the three participants.

A Comparison of Reinforcing Effects and Preference Assessment Techniques

Reinforcement is a basic element of behavior and has been used across a multitude of species. Therefore, the identification of reinforcing stimuli is of particular interest to researchers, special educators, teachers and parents of children with developmental disabilities (Green, Reid, Canipe & Gardner, 1991). Once identified, reinforcing stimuli can be used to decrease problem behavior and increase appropriate behavior such as skill acquisition. Reinforcement based procedures can produce results that are durable, efficient, and generalize across environments and exemplars.

In an attempt to access a particular reinforcer some individuals engage in an array of problem behavior. Problem behavior can manifest itself as either verbal or physical behavior and is used to either terminate or delay an aversive event,or to gain access to a tangible or social praise (Cooper, Heron & Heward, 1987; Iwata, Dorsey, Slifer, Bauman & Zarcone, 1982; 1994). Additionally, some individuals engage in problem behavior to access or avoid sensory stimulation (Iwata et al. 1982). In situations such as these isolating the reinforcer can be very challenging and treatment can be time consuming (Iwata et al., 1994b).

Punishment procedures rely on the presentation of an aversive stimulus or the removal of a reinforcing stimulus contingent on the response decreasing the future occurrence of that response (Cooper, Heron & Heward, 1987). Punishment procedures should only be used when there is a clear necessity to do so. Reasons for using punishment could be if a behavior persists following the application of multiple treatments, or by not using punishment, a potentially therapeutic treatment is being

withheld (Heron, 1987, chap. 19). However punishment alone does not teach a response and should be used a treatment of last resort.

Reinforcement based procedures provide a wide array of treatment options and come without the ethical concerns associated with punishment. For instance, there are several differential reinforcement procedures available to therapists and special educators. Differential reinforcement procedures are commonly used in individuals who engage in problem behavior. By no longer reinforcing a response within a particular class and reinforcing another response within this class, response differentiation occurs (Heron, 1987 chap. 14). Differential reinforcement schedules can deliver reinforcement for the nonoccurrence of a response (DRO) or for the occurrence of a functionally dissimilar response (DRA), as well as, high (DRH) and low (DRL) rates of response emission (Vollmer & Iwata, 1992).

Noncontingent reinforcement (NCR) is another option and has been effective in suppressing problem behavior (Fisher, Iwata, & Mazaleski, 1997; Van Camp, Lerman, Kelley, Contrucci & Vorndran, 2000). NCR is applied using a fixed time (FT) or variable time (VT) schedule of reinforcement in which a stimulus determined to be a functional reinforcer is delivered independent of any response (D. Gould., personal communication, 9/22/2005). Furthermore, when reinforcement schedules are used in conjunction with systematic preference assessment results can be highly effective.

Items systematically identified as highly preferred (Pace et al., 1985; Fisher et al., 1992; Windsor, Piche & Locke 1994; DeLeon & Iwata, 1996; DeLeon et al., 2001) have been demonstrated to reduce the frequency of problem behavior (Fisher, O'Connor, Kurtz, DeLeon & Gotjen, 2000) or help to teach new skills when delivered contingent on

a response (Goh, Iwata & DeLeon, 2000). Fisher and colleagues (2000) assessed the extent to which alterative stimuli would compete with attention maintained destructive behavior without the use of extinction. A method originally developed by Piazza et al. (1998) was used to determine preference. The items identified as high and low preference were delivered noncontigently in separate conditions without extinction. Destructive behavior was at zero levels throughout the high preference condition. These findings are relevant because the assessment of stimulus quality could enhance the use of NCR with alternative stimuli (Fisher et al.).

A multiple stimulus without replacement (MSWO) (DeLeon & Iwata, 1996) preference assessment was used by Goh and colleagues (2000) to determine a preferred item for a participant whose behavior was maintained by access to tangibles. The item was then used in a DRA program to increase the frequency of mands in a study assessing overlapping reinforcement schedules (Goh et al., 2000). Once an event is identified as a reinforcer it can be used with programs to teach new skills.

However, it is not uncommon that reinforcer identification is often taken for granted (Pace et al., 1985). Therefore, it is of utmost importance to assess potentially reinforcing stimuli that will maximize the effectiveness of programmed reinforcement schedules enhancing skill acquisition (Repp, Barton & Brulle, 1983). High preference does not necessarily indicate that the stimulus functions as a reinforcer. A reinforcer is a stimulus that has been demonstrated to increase a response when delivered contingent on that response. A preferred stimulus is a stimulus that is preferred dependent upon other stimuli present and is not yet demonstrated to increase a response when delivered contingent on a response. However, preference has been demonstrated to be variable

across individuals (DeLeon et al., 2001). With that said, previous research demonstrated the benefits of varying reinforcers and continuous reinforcer sampling to capture a shift in preference (DeLeon et al., 2001).

The identification of potential reinforcers can be done either by survey (Fisher, Piazza, Bowman, & Amari, 1996) or systematic assessment (Pace et al., 1985; Fisher et al., 1992; Windsor, Piche & Locke 1994; DeLeon & Iwata, 1996; Hanley, Iwata, Lindberg & Connres 2003). Research suggests systematic assessment to be a more efficient means of preference identification (Green et al., 1988).

Prior to the use of systematic assessment methods, the identification of potential reinforcers was left to caregiver opinion and staff reports. Staff members who work in treatment facilities can have trouble reliably identifying items that can function as reinforcers for their clientele (Lavie & Sturmey, 2002). These informal methods of assessment have been demonstrated to be unreliable (Green, Reid, White, Halford, Brittain, & Gardner, 1988, Green, Reid, Canipe, & Gardner, 1991). However, service providers may choose to use a survey such as the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD) (Fisher et al., 1996). Structured surveys such as the RAISD were developed to be more effective than open ended questions such as "What does this child like?" The RAISD aimed to be more comprehensive than previous interviews. This was done by specifically asking under what environmental conditions an item is most likely is to serve as a reinforcer (Fisher et al., 1996). But interviews such as the RAISD do not take into consideration the practicality of items when used in dense reinforcement schedules with a necessity for immediate delivery of reinforcement (Fisher et al., 1996). That is to say, most behavior analytic treatment programs, day treatment, or

residential, could not grant a client access to a live snake every time they functionally request a "snake."

Formal preference assessments provide behavior therapists with a tool to establish a top ranked stimulus across a multitude of stimuli. The stimuli assessed are typically already in the participant's environment and can easily be delivered in conjunction with a dense schedule of reinforcement. A therapist's selection of a particular assessment may be a function of that assessment's dependent measure. The Dependent measures used in formal preference assessments vary widely. Some assessments use duration of item interaction (Quilitch, 1977) or, frequency of selection (DeLeon & Iwata, 1996; Fisher et al., 1992; Windsor et al., 1994) or, a combination of both (Hanley et al., 2003). However, the basic premise remains the same, expose an individual to a number of different stimuli and objectively and systematically assess what is observed.

The assessment of individual preference discloses a hierarchical arrangement of stimuli typically of the same class. This alone does not suggest the efficacy of an evaluation. If a preference assessment is to be determined valid additional assessment is needed. Subsequent review of stimulus function is established if a highly preferred stimulus will function as a reinforcer when delivered contingent on a response. A concurrent operant reinforcer assessment allows for simultaneous measurement of two stimuli (Fisher et al., 1992).

In the first study to systematically assess preference Pace and colleagues (1985) constructed an assessment capturing the absolute value of client preference. Pace and colleagues used an approach response as the dependent measure across eight sessions consisting of 20 trials as piece (Pace et al., 1985). All stimuli were counterbalanced

across the eight sessions. Preference was calculated by dividing the number of trials where the participant approached an item by the number of trials in which the item was made available (Pace et al., 1985). Data were then displayed as a percentage. Subsequent tests of reinforcement consisted of a preferred and a non-preferred condition. The data displayed differentially higher response rates during the preferred condition when compared to the non-preferred condition (Pace et al., 1985). A potential limitation of this assessment is the prevalence of false positive results. In some instances individuals with developmental disabilities may approach most or all stimuli that are presented (Fisher et al., 1992). This highlighted a limitation associated with a single stimulus preference assessment. However, some individuals can not reliably make a reliable choice when displayed presented with more than one stimulus. In instances such as these a single stimulus preference assessment would be beneficial.

In 1992 Fisher et al. presented two stimuli concurrently rather than each stimulus individually (Pace et al., 1985). All items assessed were rotated between left and right positions and were paired with all other items. This procedure was used with four participants and preference was measured across 16 stimuli each for a total of 120 trials (Fisher et al., 1992). When compared to the single stimulus assessment the paired stimulus assessment reduced false positive results and delivered a clear stimulus hierarchy (Fisher et al., 1992). Follow up tests of reinforcer effectiveness compared the most preferred stimuli identified by a paired stimulus assessment and a single stimulus assessment. Data suggest the paired stimulus preference assessment to be a better predictor of potentially reinforcing stimuli (Fisher et al.). The most frequently cited

limitation of the paired stimulus assessment is the amount of time needed to conduct the assessment (DeLeon & Iwata, 1996).

Windsor, Piche & Locke (1994) significantly reduced assessment duration by presenting all the items simultaneously. The reduction in assessment time could free therapists to spend time in more therapeutic events. A multiple stimulus (MS) assessment presented clients with six concurrently available stimuli over ten 20 second trials. The item selected most frequently was considered to be the most preferred following each MS assessment. In a 1994 comparison of preference assessment duration and efficacy Windsor, Piche, and Locke (1994) found the multiple stimulus presentation required less time to administer than a paired stimulus assessment. Plus, in subsequent tests of reinforcer effectiveness the MS most preferred item was comparable to that of the paired stimulus assessment (Windsor et al.). The MS is of benefit to special educators working with individuals that can reliably scan and select amongst a multiple stimulus array. A MS could also be of benefit to teachers or therapists who are in need of identifying preferred stimuli but do not significant time to dedicate to an assessment. A limitation of the MS is also one of the assessments best qualities. By presenting all items simultaneously and without restriction makes the construction of a clear preference hierarchy difficult. Individuals may repeatedly select a single stimulus throughout the majority or entirety of the assessment. This time saving advantage of the MS is also a remedy for false negative results (DeLeon et al., 2001). By identifying stimuli as not preferred it could cause a special educator to overlook stimuli that may potentially function as a reinforcer. Assessments that can differentially rank individual preference are particularly useful when satiation occurs or when confronted with preference shifts.

DeLeon and Iwata (1996) used a multiple stimulus assessment with stimulus restriction (MSWO). The MSWO combined the brevity of a MS and incorporated the stimulus restriction of the paired stimulus assessments. The MSWO was conducted using combination of seven leisure and edible items. All items were positioned in a straight line with approximately 5cm of space between each item. Following a selection that item was either removed from the environment entirely or placed out of sight (DeLeon & Iwata, 1996). The remaining items were then rotated one position to the therapist's right (DeLeon & Iwata, 1996). The stimulus selected first was considered the top ranked item (DeLeon & Iwata). Seven individuals participated and were exposed to three forms of preference assessment (DeLeon & Iwata). All participants took part in a paired stimulus assessment (Fisher et al., 1992), a MS (Windsor, Piche & Locke, 1994) and a MSWO (DeLeon & Iwata). Following each selection that item was restricted for the remaining duration of the assessment. When compared to the paired stimulus assessment the MSWO was found to correlate with the paired stimulus assessment with respect to high and moderately ranked stimuli (DeLeon & Iwata). The MSWO and the MS took substantially less time to administer then did the paired stimulus assessment (DeLeon & Iwata). However, some developmentally delayed individuals can not reliably scan a stimulus array. It should also be noted that the MSWO allows for only a single sampling of each stimulus during each assessment. Lastly, the paired stimulus assessment albeit lengthier allows for repeated pairings of a single stimulus with all other stimuli. The paired stimulus assessment also, presents stimuli in smaller field size while rotating items across stimulus pairs. This could better control for the effects of side bias and preference with respect to stimulus selection.

Previous research has suggested the necessity for brief and frequent stimulus preference assessment. If environmental determinants affect the stability of preference such as satiation and the pairing of preferred with less preferred stimuli it could be beneficial to determine when these shifts are present and how compensate for them. Previous research has used a combination of preference weakening and strengthening conditions to assess what environmental determinants may cause preference shifts (Hanley, Iwata, & Roscoe, 2006). The preference weakening conditions consisted of repeated exposure to a highly preferred stimulus and the preference strengthening condition paired highly preferred items with low preference items (Hanley et al.2006). In a 2006 study by Hanley, Iwata, and Roscoe used preference strengthening and preference weakening conditions for ten participants and conducted continuous preference assessments for two of the ten participants (Hanley et al.2006). Results of the preference assessments demonstrated that preference strengthening and weakening manipulations can systematically alter preference (Hanley et al.2006). These results also suggest repeated exposure to a highly preferred stimulus (preference weakening) can weaken an individual's preference over time. Just as pairing a highly preferred stimulus with a moderately or low preference item (preference strengthening) can increase an individuals preference for an item. Therefore, preference stability can be rather delicate and should be approached as such. Magnanimous portions and durations, or repeated exposure to a stimulus, can impact an individuals learning by altering a motivating operation or by the pairing of preferred and non preferred stimuli. Therapists and healthcare providers should be observant to trends such as these, because they can impact behavior in many situations.

In 2001 DeLeon and colleagues compared a MSWO and the lengthier paired stimulus assessment. DeLeon et al. (2001) looked at shifts in preference over time and if previous methods used to assess preference would reliably identify a highly preferred stimulus across time. Five participants took part and preference was originally assessed using paired stimulus assessment prior to analysis. This was the standard by which all comparisons were made. All subsequent preference assessments were conducted using a briefer MSWO. A shift in preference shift was defined as a difference between the paired stimulus top ranked item and that of the daily brief assessment. On days in which the results of the two assessments were different a reinforcer assessment was conducted. Results of the reinforcer assessments suggest the item identified by the daily brief assessment to function as a reinforcer for four of the five participants (DeLeon et al., 2001). Nevertheless, preference was demonstrated to be a idiosyncratic quality. Preference was more variable for four of the five participants when compared toe the fifth participant but the fifth participant's preference could have been more variable than another participant's had there been another. These data highlight the idiosyncratic nature of preference and the necessity for frequent assessment.

With that said, frequent testing of preference should be done if nothing more than to reinforce what might be already known about an individual's preference. However, there is no way to detect when a preference might occur because almost every individual will become sated with an item at a different time than someone else. The only way to reliably acknowledge this is to frequently assess preference.

It has long been assumed the most basic way to inquire what is preferred and what is not is to simply ask. But some individuals can not express what is preferred and what

is not. Therefore, a method that is brief and reliable could be useful. The purpose of the present study is to replicate the work of DeLeon et al. (2001) and demonstrate the value of brief assessment techniques as a reliable means to identify reinforcing stimuli.

Method

Participants and Setting

All sessions took place in a day school for children with autism and other related developmental disabilities. Three male participants took part in the study. Michael was 12 years old and diagnosed with autism and cerebral palsy. Brian and Tommy were 10 and 8 years old, respectively, and were diagnosed with autism. All sessions were conducted in each participant's classroom.

Response Measurement and Interobserver Agreement

During the paired stimulus and daily brief preference assessments stimulus selection was scored and defined as any instance in which a participant attempted to access an item either by grabbing, picking up, or pointing to an item within 5 s of trial onset. A no response was scored when there was no attempt to access an item within 5 s of trial onset. Upon the completion of the paired stimulus preference assessment, the stimuli were ranked from most preferred to least preferred based on percentage of selection which was calculated for each stimulus by dividing the number of trials in which a stimulus was selected by the total number of trials the stimulus was presented and multiplying the resulting number by 100.

During the reinforcer assessment, each participant engaged in a specific task. Tommy pointed to either a photo of the stimulus identified by the paired stimulus preference assessment or the daily brief preference assessment and Michael pointed to a

red or green cutout. A finger point was defined as any instance in which the index finger was extended with all other fingers bent at the middle knuckle. Brian matched red and green colored squares to red and green templates. A match was defined as any instance in which Brian correctly matched a colored square to the square's corresponding anagram. Responses were recorded as a frequency count and then converted into responses per minute (rate) by dividing the number of responses emitted in a session by the total number of minutes per session.

Interobserver agreement (IOA) was collected on 33% of the total number of trials during the paired stimulus preference assessments and 33% of each participant's daily brief preference assessments by having a second observer simultaneously and independently record data on stimulus selections. IOA for the paired stimulus and daily brief preference assessments was calculated by dividing the number of trials in which both observers agreed upon the stimulus selected by the total number of trials and then multiplying the result by 100. The mean agreement for the paired stimulus and daily brief preference assessments was 100% and 100%, respectively, across participants. IOA was also collected on 30% of all reinforcer assessments conducted by having a second independent observer record data on the number of times the participant pointed to the target stimulus or correctly matched the color stimuli. IOA was calculated by dividing the number of agreements by the total number of agreements and disagreements and multiplying the resulting number by 100. The mean agreement for the reinforcer assessments was 95% (range, 90%-100%) across participants.

Procedural Integrity

Measures of procedural integrity were collected during 30% of all reinforcer assessments. This was done to insure the therapist delivered the correct stimulus within 1 s of a correct response. Measures of procedural integrity were determined by dividing the number of reinforcement opportunities during which the correct stimulus was delivered within the appropriate amount of time by the total number of reinforcement opportunities and dividing by 100. The mean level of procedural integrity was 94% (range, 89%-99%) across the reinforcer assessments across participants.

Procedures

Stimulus Selection.

Edible stimuli designated for assessment were identified via staff and caregiver survey. The staff and caregivers were asked to list eight stimuli they believed to be highly preferred by each participant and rank the stimuli from most to least preferred. The edibles used were chosen because of their availability. In the occurrence of an overlap, caregivers suggested alternative stimuli to complete the list for a given participant. For Tommy the stimuli assessed were Oreo®, chocolate chip, salt and vinegar chip, Frito®, Skittle®, sour cream and onion chip, gummy worm, and M&M®. The stimuli assessed for Brian were chocolate chip, chocolate chip cookie, Cool Ranch Dorito®, Frito®, M&M®, Oreo®, Skittle®, sour cream and onion chip. Lastly, the stimuli assessed for Michael were cucumber, carrot, blue berry, tomato, Twix®, Cracker Jack®, candy spray, and mocha cookie.

Paired Stimulus Preference Assessment.

A paired stimulus preference assessment (Fisher et al. 1992) was conducted with the identified stimuli. Prior to the assessment the participant was exposed to each

stimulus one at a time to control for states of deprivation and unfamiliarity with novel items. Thus each participant consumed one of each stimulus just prior to conducting the assessment. The eight stimuli were presented in stimulus pairs across 56 trials. The stimuli were counter balanced across successive stimulus pairs with each stimulus being paired with all other stimuli twice. All stimuli were presented on both the right and left positions as a measure against side bias. Trial onset was signaled by the presentation of two stimuli approximately 7.6 cm apart and the therapist saying "Pick one." The participant had 5 s to select a stimulus or a no response was scored. In the event of a no response, the stimuli were removed, data were scored, and the next trial was presented. Subsequent to a stimulus selection the therapist allowed the participant to consume the stimuli and data were recorded. Attempts to access multiple stimuli were redirected and the trial was repeated until a single stimulus was selected. The resulting data were the baseline by which all other assessment results were compared.

Follow-up Paired Stimulus Preference Assessments.

If two or more stimuli were identified as most preferred, a follow-up paired stimulus preference assessment was conducted. Only the stimuli identified as most preferred by the first paired stimulus preference assessment were included in the follow-up assessment. This subsequent assessment was conducted identically to the initial paired stimulus preference assessment as described above. The assessment continued until a stimulus was selected across three consecutive trials (six trials with Brian and ten trials for Michael).

Daily Brief Assessment.

Following all of the paired stimulus preference assessments daily brief assessments were conducted. The daily brief assessment procedure is based on the Deleon et al. (2001) procedure. Each of the three participants took part in daily brief preference assessments 2 to 3 times a week when scheduling permitted. The same stimuli from the paired stimulus preference assessment were placed in a compartmentalized container approximately 10 cm by 15 cm. The daily brief assessment consisted of one trial and began when the therapist presented the open container and instructed the participant to "Pick one." Following a no response the stimuli were removed, data were scored, and the next trial was presented. Following a selection the participant consumed the stimulus, data were scored, and the session was complete. All attempts to access multiple stimuli simultaneously were blocked. All stimuli were systematically rotated within the eight compartments across sessions.

Reinforcer Assessment.

On the days in which the most preferred stimulus as identified by the paired stimulus preference assessment differed from the stimuli selected during the daily brief preference assessment a reinforcer assessment was conducted. During the reinforcer assessment two equivalent tasks were arranged in a concurrent operant design. Two stations were available from which the participant could select; each station was associated with different colored chairs that were kept consistent throughout the duration of the study and correct responses resulted in the delivery of the most preferred stimulus identified by the paired stimulus preference assessment or the daily brief preference assessment. Each reinforcer assessment began with the therapist standing behind the

participant saying, "(Participants name) you have (amount of time) to earn as much as you can. You can sit in the (color) chair and earn (paired stimulus item) or you can sit in the (color) chair and earn (daily brief item). Pick one." The participant had 15-s to select a station. Session time was started as soon as a station selection was made.

The task during the reinforcer assessment for Brian was matching colored squares to corresponding colored anagrams. Correct responses were reinforced on a fixed ratio (FR) 2 schedule such that every second correct response Brian received the stimulus associated with that station. Sessions lasted for 5 min in which time he could earn as many edibles as he could. Tommy's task during the reinforcer assessment was pointing to a photo of either the top ranked stimulus identified by the paired stimulus preference assessment in one station or the top ranked stimulus identified by the daily brief preference assessment in the other station. In both stations, correct responses were reinforced on an FR1 schedule. Sessions lasted for 2 min in which time he could earn as many edibles as he could. The task arranged in Michael's reinforcer assessment was pointing to colored squares such that a red square was arranged in one station while a green square was arranged in the other station. Correct responses were reinforced on an FR1 schedule and sessions lasted for 1 min in which time he could earn as many edibles that he could. It should be noted that Michael's sessions were of this length based on a recommendation by his case manager.

Materials

The materials for this study were a table, two chairs, a timer, edibles for each participant, a box with eight compartments for the edibles, and pencil and paper to record data. Task materials for the reinforcer assessments were constructed for each participant.

Laminated 10 cm by 15 cm photos of all the edibles were made for Tommy. Michael's materials were two different colored pieces of construction paper (four by six inches). Brian's materials (colored squares and anagrams) were made out of laminated construction paper. Each of the squares was approximately one inch by one inch and fixed with velcro. The templates were eight and a half inches by 11 inches and fixed with velcro. The materials used in this study were found in the participants setting with the exception of the tackle box.

Results

Paired Stimulus Preference Assessment

Figure 1 displays the results of Tommy's paired stimulus preference assessment. Oreos® were selected on 11 of 14 opportunities resulting in a selection percentage of 79%. Based on these results, Oreos® were deemed as the most preferred stimulus. Results of Brian's paired stimulus preference assessment are depicted in Figure 2 and show that both chocolate chips and Skittles® were selected in 12 of 14 opportunities, a selection percentage of 86%. Therefore it was determined that chocolate ships and Skittles® were the most highly preferred stimuli. The results of Michael's paired stimulus preference assessment were similar to Brian's with two stimuli identified as most preferred as can be seen in Figure 3. Twix® and blueberries were selected in 11 of 14 selection opportunities for a selection percentage of 79%.

Follow-up Paired Stimulus Preference Assessment

The results of Michael and Brian's follow-up assessment suggested blueberries to be most preferred for Michael and chocolate chips as most preferred for Brian. Brian's follow-up assessment lasted six trials with the chocolate chip being selected five times

for a percentage of 83%. The follow-up assessment for Michael was ten trials. The blueberry was selected in eight of the ten trials for a percentage of 80%.

Daily Brief Assessment

Tommy participated in eight brief assessments. During these assessments Tommy chose an item different than the paired stimulus assessment three times (see Figure 4). Figure 5 shows the results of Brian's brief assessments. During these assessments Brian chose a different stimulus in every brief assessment. Michael took part in four brief assessments and chose a different item once, in the first session (see Figure 6).

Reinforcer Assessment

During these sessions Tommy pointed to the paired stimulus item 5, 6, and 8 times averaging 2.5, 3, and 4 RPM (see Figure 4) with the greatest number of responses allocated to the paired stimulus item. Tommy's average RPM for all sessions was 3.2. (see Figure 4). Brian participated in ten 5-min reinforcer assessments (see Figure 5). His number of color matches per session ranged between 0 and 50 with RPM varying between 0 and 10 for a session average of 5.6 RPM (see Figure 5). Brian allocated the majority of his responses to the daily brief item. Michael took part in one, 1-min session (see Figure 6). During this session Michael responded solely to the paired stimulus item. Michael responded a single time during the session for an RPM of 1 and a session average of 1 RPM (see Figure 6).

Discussion

Reinforcement is a basic element of human and animal behavior, therefore, researchers in the field of behavior analysis commonly use stimuli identified via

systematic preference assessment (DeLeon & Iwata, 1996; DeLeon et al., 2001; Fisher et al., 1992; Hanley et al., 2006; Windsor et al., 1994). Several studies have demonstrated the efficacy of systematic preference assessment and the reinforcing effects of the participant's most preferred stimuli. In the present study the stimuli identified by the paired stimulus assessment and the daily brief assessment were used in conjunction with the participant's IEP objectives. All of the participants demonstrated an increase in responding during the reinforcer assessment regardless of the reinforcer. These data are consistent with past research (Fisher et al., 1992; DeLeon et al., 2001) supporting both assessment types as viable identifiers of reinforcing stimuli.

The results of the present study suggest the methods used as a reliable means to identify highly preferred stimuli previously identified by an established method (Fisher et al. (2001). In an attempt to replicate DeLeon et al. (2001) the results of the present study were consistent for one of the three participants in identifying a change in preference (see Figure 5). Brian's data demonstrate the techniques used as a functional means to capture shifts in preference. .

The present study also highlighted the utility of frequent sampling of individual preference (DeLeon et al. 2001). Previous research in the area of environmental determinants and their effects on established reinforcers supports the necessity for frequent sampling (Hanley, Iwata, & Roscoe, 2006). DeLeon and Iwata (1996) and DeLeon et al. (2001) extended preference assessment research by designing and expressing the utility of brief and frequent assessments. The design of the daily brief assessment used in this study was an attempt to replicate that of DeLeon et al. (2001) with minor differences. By using only a single response and placing the items in a

compartmentalized box these adjustments made for a more brief assessment. Lastly, the single response assessment attempted to capture typical verbal contingencies. Verbal individuals can state their most preferred stimulus when given an array.

Data gathered via the daily brief assessment are of particular interest because they are consistent with DeLeon and colleagues (2001). During the original paired stimulus assessment these data suggested Oreo's® (see Figure 1), chocolate chips (see Figure 2), and blueberries (see Figure 3) as the most preferred stimuli for Tommy, Brian, and Michael. By administering the daily brief assessment consistently even when the participant's preference was found to be stable, the daily brief assessment was consistent with the findings of the paired stimulus assessment. The daily brief assessment captured a shift in preference from chocolate chips to Oreo's® for Brian (see Figure 5). These data support the findings of DeLeon et al. (2001) that when frequent and brief assessments are administered preference shifts can be captured.

Capturing a shift in client preference is advantageous for healthcare providers because preference stability is suggested to be idiosyncratic (Dyer, 1987; Roane et al., 1998). What may have been a preferred stimulus a month ago, a week ago, a day ago or even an hour ago, may no longer be preferred for a certain client (Roane et al.). If preference hierarchies are dynamic in nature, frequent assessment could assure the most preferred item is used during treatment (DeLeon et al.). Furthermore, if the assessment does not require extensive therapist involvement, more assessments could be conducted to counter the effects of environmental determinants (Hanley, Iwata, & Roscoe, 2006).

Preference assessment should be a key component in the identification of preferred items, especially when attempting to educate individuals with developmental

delays. Lavie and Sturmey (2002) illuminated the difficulties within special education when trying to identify preferred stimuli. Previous research demonstrated staff and caregiver opinion as less reliable identifiers of client preference than a systematic analysis of preference (Green et al., 1988). Preference assessment has become a necessity when attempting to reliably identify client preference (Green et al., 1988). If staff had a means of reliably identifying preference through a simplistic assessment, personnel may be willing to conduct frequent assessments without sacrificing time that could be allocated to more therapeutic events. If clients of special education facilities are repeatedly exposed to a single item they could easily become sated and responding could suffer (Laraway, Snycerski, Michael, & Poling, 2003). If staff conducted an assessment once per task or provided multiple assessments during a task, client performance potentially would not suffer. The present assessment technique provides a simple answer to this potential problem due to its brevity and simplicity. Assessment duration takes all of a few seconds to administer. This assessment could be easily taught and implemented by healthcare providers without extensive training in applied behavior analysis.

There are several strengths and some limitations to the present study. The strengths are as follows. The present assessment could grant therapists the brevity to allocate time to tasks more useful than assessing preference. Plus, as demonstrated by Lavie and Sturmey (2002) preference assessment can be taught to staff that do not have extensive behavior analytic training. A benefit of a short duration is the potential for frequent assessment. This increases the probability of capturing a shift in client preference (DeLeon et al., 2001).

The brief duration of the assessment procedure can also allow for frequent samples of client preference. By frequently sampling client preference, preference shifts can be detected and contingencies can be altered maximizing client performance. With that said, no duration data was taken for either preference assessment which limits the significance of the daily assessment's brevity. However, a second strength of the daily assessment was the use of a compartmentalized box. The box is small and easily taken from an applied setting to the community. The box easily fit into rear pant and jacket pockets. The physical features of the box, plus a single response assessment allows the therapist to conduct multiple assessments per session. However, a single response may not generate enough data for an accurate reading of client preference.

The following are some limitations to the present study. One is the design. Following the presentation of the box, Tommy selected an item different to the paired stimulus item three times. These data could identify the daily brief assessment as a purveyor of false positive results. Later assessments of preference suggest this not to be the case. Another limitation may be the concurrent chain design. The design could potentially reinforce selection of a non-preferred item at the first step (daily brief assessment) only to gain prolonged access to the most preferred item at the second step (reinforcer assessment).

The briefness of a single response assessment is also a limitation. The single response may not provide adequate trials for an accurate measure of individual preference. Additionally it is important to mention that when environmental determinants act on established reinforcers the present techniques were able to identify a preference shift for one of the three participants. Still, the present study did not test for

the effects of environmental determinants on shifts in preference. Satiation and deprivation could have played a role in the present studies data.

The present study attempted to replicate the findings of DeLeon et al. (2001). Future research should examine the relationship between duration of item interaction and preference onset. Preference assessment research could also investigate the relationship between the number of responses needed to determine preference for an item. Also more research in the education of staff working in special education may be beneficial. Continuing staff education in behavior analytic techniques can only help health care providers and their clients.

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Figure Captions

Figure 1. Tommy's paired stimulus assessment

Figure 2. Brian's paired stimulus assessment

Figure 3. Michael's paired stimulus assessment

Figure 4. Results of Brian's reinforcer assessments

Figure 5. Results of Tommy's reinforcer assessments

Figure 6. Results of Michael's reinforcer assessments

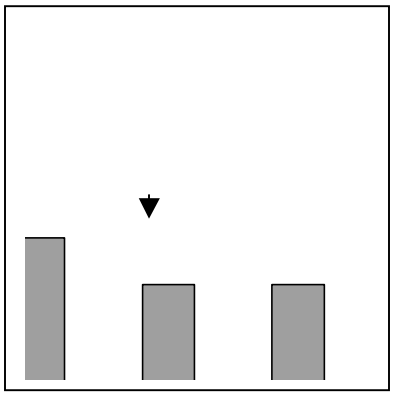

Figure 1

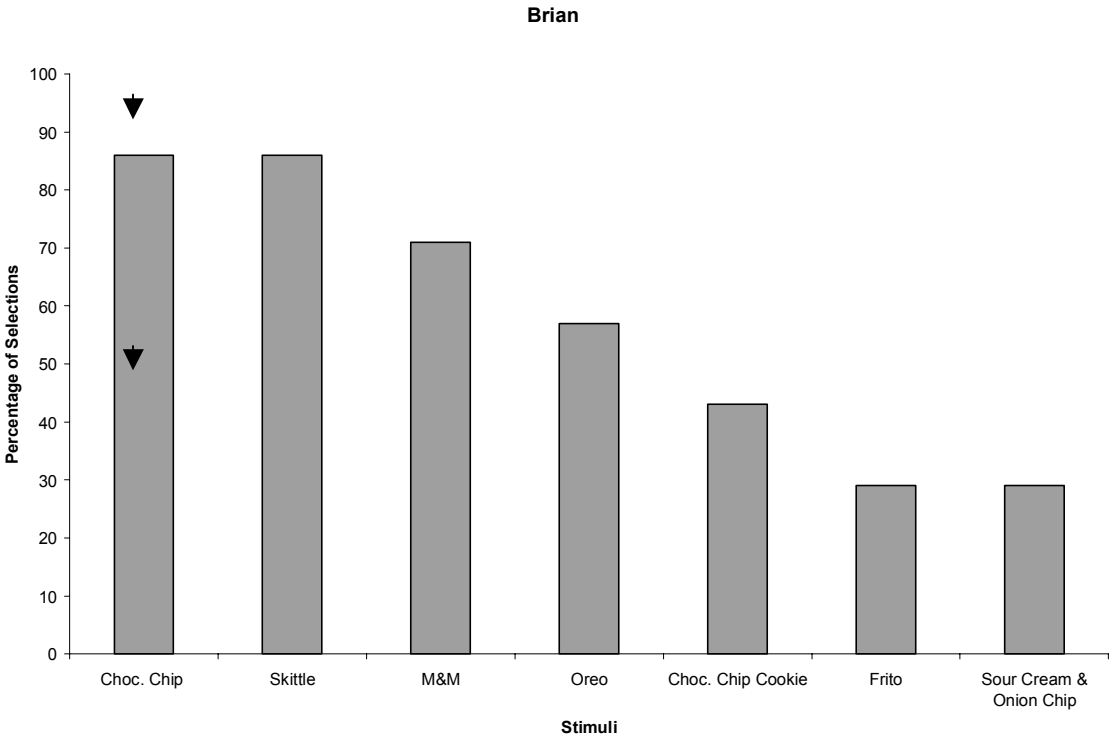

Figure 2

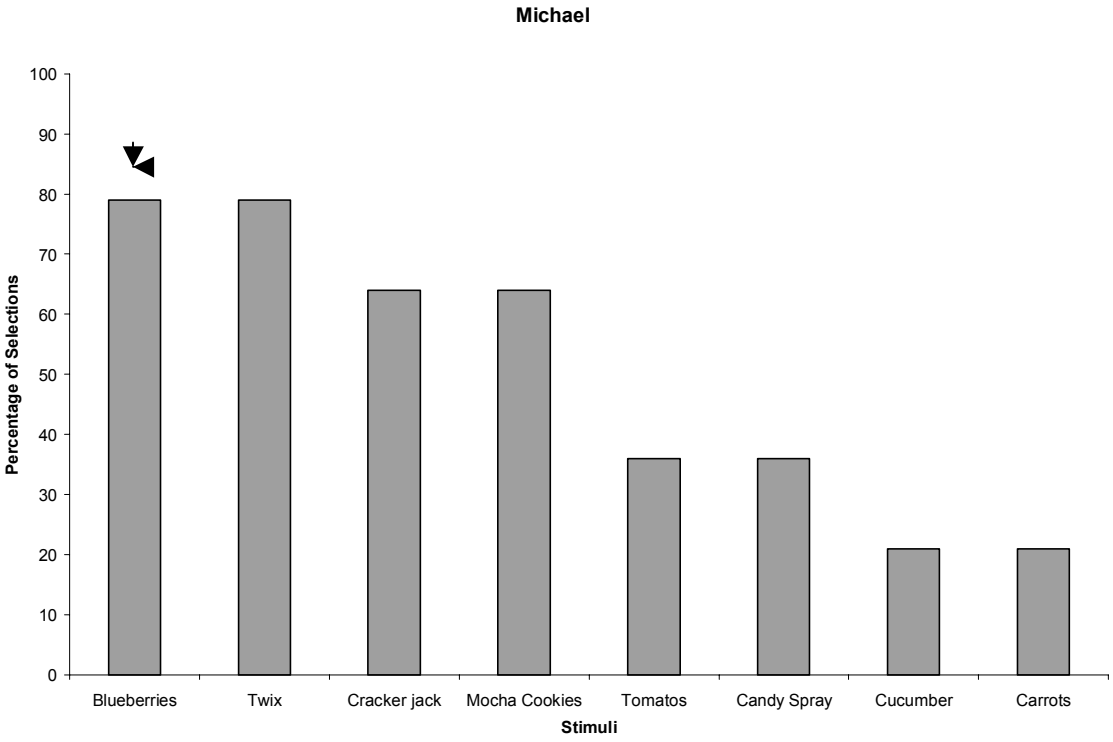
Michael
Percentage of Selections
100
90
80
70
60
50
40
30
20
10
0
Blueberries
Twix
Cracker jack
Mocha Cookies
Tomatos
Candy Spray
Cucumber
Carrots
Stimuli

Figure 3

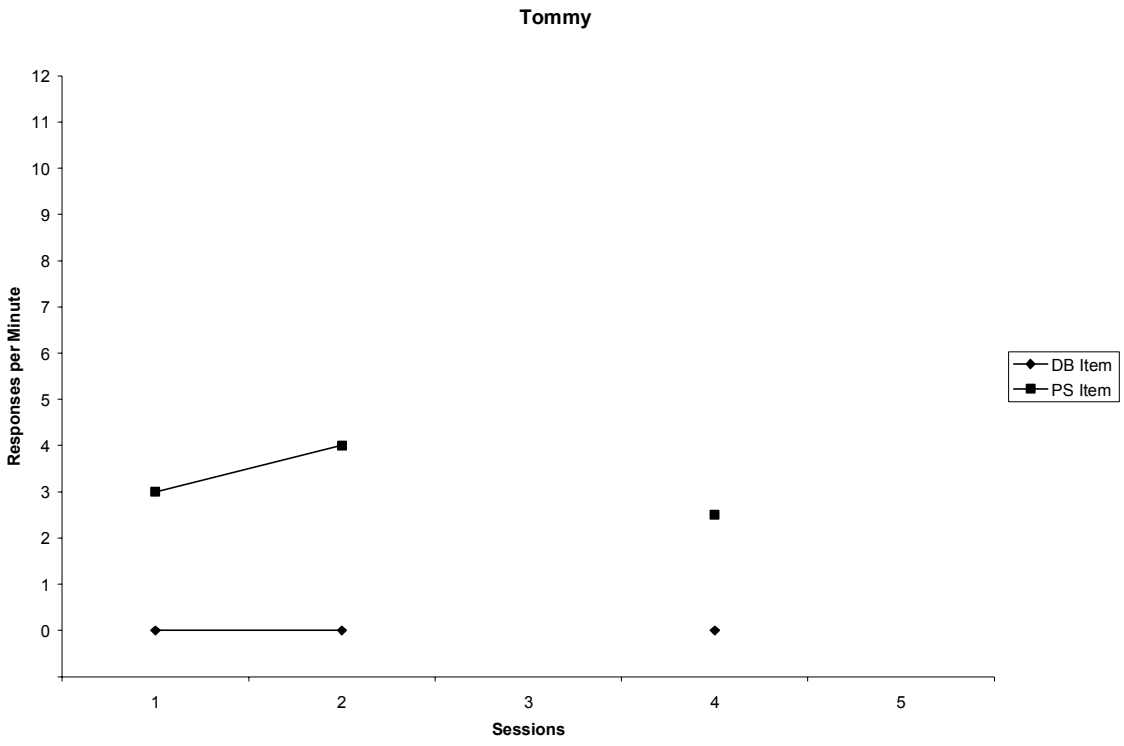
Tommy
Responses per Minute
12
11
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
Sessions
DB Item
PS Item

Figure 4

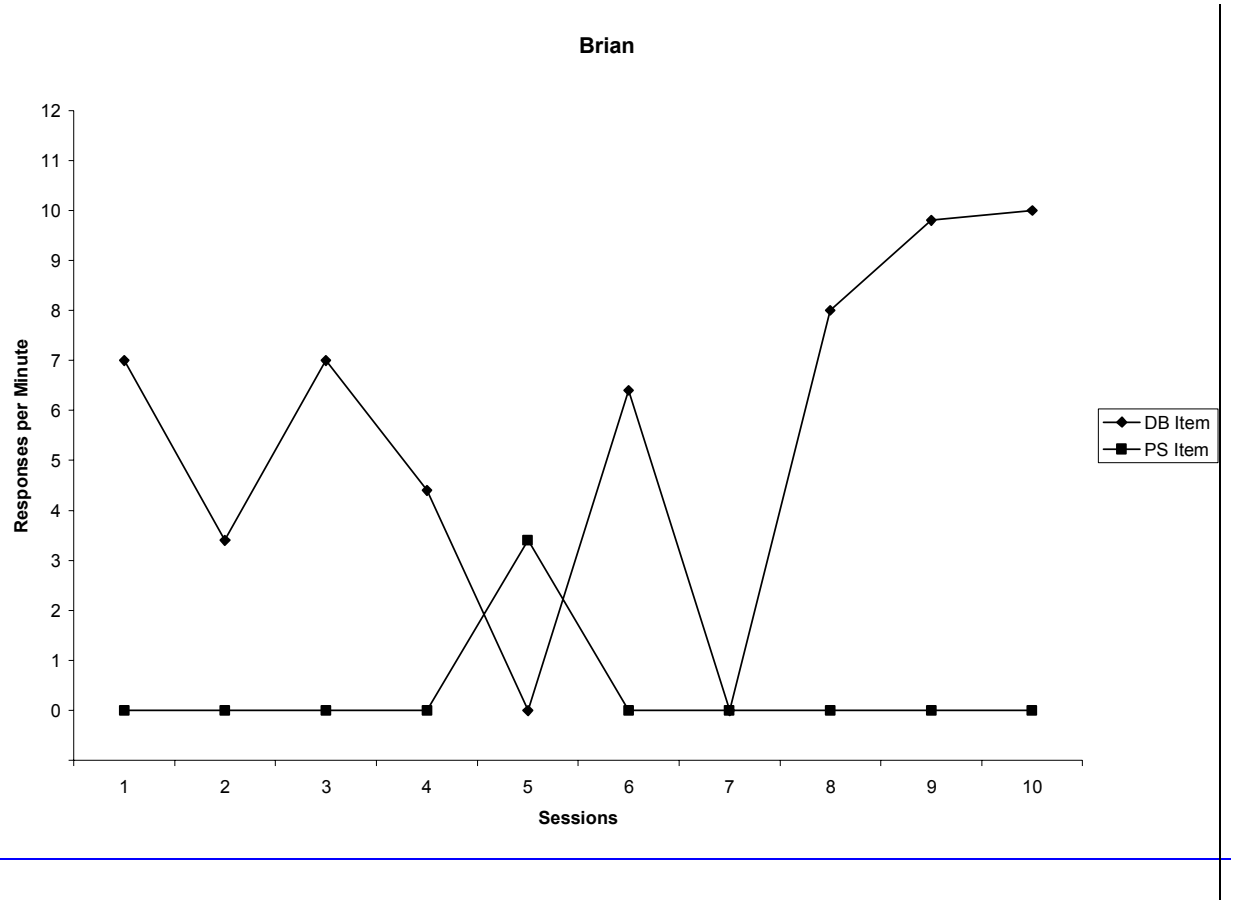
Brian
Responses per Minute
0
1
2
3
4
5
6
7
8
9
10
11
12
Sessions
1
2
3
4
5
6
7
8
9
10
DB Item
PS Item

Figure 5

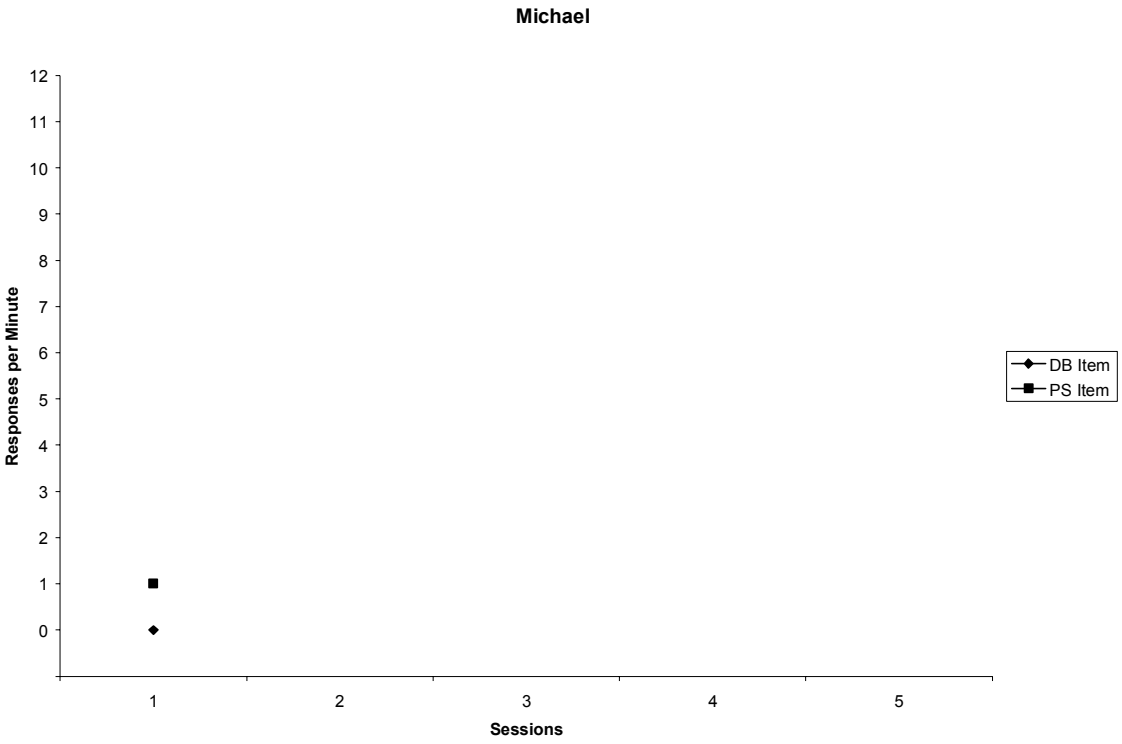
Michael
Responses per Minute
12
11
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
Sessions
DB Item
PS Item

Figure 6

s