SENSITIVITY OF PASSIVE APPROACH DURING PREFERENCE AND REINFORCER ASSESSMENTS FOR CHILDREN WITH SEVERE AND PROFOUND INTELLECTUAL DISABILITIES AND MINIMAL MOVEMENT

Sara Spevack, C. T. Yu^{*}, May S. Lee, and Garry L. Martin

University of Manitoba and St. Amant, Canada

Abstract

We evaluated the use of passive approach to assess preferences of two children, with severe and profound intellectual disabilities. Both children had physical challenges and exhibited minimal physical movement. We also compared the relative reinforcing effects of the identified high and low preference stimuli for a switch pressing response, and for a more passive looking response. High and low preference stimuli were identified for both children. Moreover, the high preference stimulus maintained higher rates of responding than the low preference stimulus for both children for the passive looking response, but not for switch pressing. The study extended the use of passive approach to assess preferences and identified the choice of target response as a potential limiting factor during reinforcer tests for these children.

Ample research has shown that preference assessments can be used to identify reinforcers for persons with intellectual disabilities (Fisher et al., 1992; Logan & Gast, 2001; Pace, Ivancic, Edwards, Iwata, & Page, 1985). However, a few studies have examined preference assessment with persons with profound mental retardation and multiple disabilities (PMD; Reid, Phillips, & Green, 1991), and research has reported difficulty in identifying reinforcers for this population (Logan & Gast, 2001).

Ivancic and Bailey (1996) used a single-stimulus presentation procedure to assess preferences of persons with PMD with two levels of motor movements. That is, participants were required to emit either an active (e.g., reach for or touch the stimulus) or passive (e.g., orient towards the stimulus or smile) approach response on each trial in order to receive the stimulus. Preferred stimuli were identified for all five participants with motor movements and only two of the 10 participants with minimal movement. The identified preferred stimulus functioned as a reinforcer for four of the five participants with motor movements and for neither of the participants with minimal movement.

Logan et al. (2001) conducted two studies with children with PMD, using a single-stimulus preference assessment, followed by reinforcer testing. They found that children with PMD were able to discriminate between events in the environment, but that the preference

^{*}Correspondence to: C. T. Yu, St. Amant, 440 River Road, Winnipeg, Manitoba, Canada R2M 3Z9. yu@stamant.mb.ca.

assessment procedure (which required either active or passive responses) was not very successful at identifying reinforcers. They found preferred stimuli for six of the 11 participants and when tested, most of the stimuli were either not reinforcers or were at best weak or inconsistent reinforcers.

In the above studies, the target responses used during reinforcer testing involved smiling or having open eyes (Logan et al., 2001, Experiment 2) and switch pressing (Ivancic & Bailey, 1996; Logan et al., 2001, Experiment 1). The preferred items may not have functioned as reinforcers because the responses may have been too effortful, given the physical limitations of the participants (Ivancic, 2000). Logan et al. (2001) recommended having the responses required for the preference assessment and reinforcer testing be the same. The purposes of this study were twofold. First, we sought to extend previous research on preference assessments with persons with PMD and minimal movement by assessing preferences using passive approach without requiring an active approach response. Second, we evaluated the reinforcing effects of the identified preferred stimuli for two target responses, with one being more active (switch pressing) and the other more passive (looking at the switch).

METHOD

Participants and Setting

Participants were two children who attended the St. Amant School, a community residential and resource center for individuals with developmental disabilities in Winnipeg, Manitoba, Canada. Ada was 12 years old, and was diagnosed with profound developmental disabilities and spastic quadriplegia with severe spasticity and hyperlordosis. Troy was 8 years old, and was diagnosed with severe developmental disabilities, visual impairments, spastic quadriplegia, cerebral palsy, seizure disorder, and scoliosis. Both children were nonambulatory, had no speech or communication skills, received their nutrition through gavage feeding, and showed minimal physical movement.

Preference assessment and reinforcer testing sessions were conducted individually in an assessment room. The child sat in his/her wheelchair at a table and the experimenter stood or sat facing the child. The experimenter and the child were present during each session, and an observer was present during some sessions to conduct reliability checks.

Materials

Twelve stimuli were tested for each child during preference assessment. The stimuli included various sensory activities that provided auditory, olfactory, visual, tactile, or thermal stimulation. The stimuli were identified after consulting with the teachers, and stimuli that were known to be disliked by the children, or that were potentially unsafe were excluded.

A micro-switch was used during reinforcer testing. The switch was a round button approximately 6 cm in diameter, and was used in the classroom by students to activate toys and equipment to provide sensory stimulation. It required 2–3 g of force to activate according to the manufacturer. Both children in this study were physically capable of activating the switch.

Procedures

Movement Observation—We used a partial-interval, 5 s observation and 5 s recording procedure (Martin & Pear, 2003) to evaluate each child's level of physical movement. Each child was observed in the classroom for two 3.5-min sessions on different days. Movement was defined as a change in body position of greater than 2 cm, and movements caused by breathing, blinking, coughing or hiccupping, and any involuntary movements triggered by seizures were not recorded (see Ivancic & Bailey, 1996). Observations were conducted only when the participant was awake. The average percent of intervals with movements across the two sessions was 5% for both children.

Preference Assessment—A single-stimulus presentation was used for each participant. During each trial, the experimenter presented a stimulus (e.g., moving an unlit cherry-scented candle slowly in front of the child's face), provided a verbal prompt to the child to attend to the stimulus (e.g., 'smell this'), and recorded the child's responses. The stimulus was presented for 60 seconds on each trial, if no rejection occurred. A trial was scored as a *rejection* if the child pushed away the stimulus, turned away from the stimulus, withdrew from the stimulus, frowned, grimaced, or cried. The stimulus was removed immediately following a rejection response and the trial was terminated. A trial was recorded as *active approach* if the child reached for, touched or manipulated the stimulus, without rejecting the stimulus during the trial. A trial was scored as *passive approach* if the participant looked at or turned toward the stimulus, or smiled or laughed, without rejecting the stimulus during the trial. A trial was recorded as *no response* if none of the preceding behaviors occurred. If more than one response occurred simultaneously, all responses were recorded. Each session consisted of 6–10 trials and the stimuli were presented in a randomized order for a total of 120 trials, with 10 trials per stimulus. One to three sessions were conducted per week.

Reinforcer Assessment—Following the preference assessment, the highest and lowest ranked stimuli, based on the response measure that best differentiated the preference hierarchy, were used as consequences during the reinforcer assessment phase. If two or more stimuli had tied rankings, one was selected randomly for reinforcer testing. During reinforcer testing, each child was exposed to an ABAB design to compare switch pressing (A) with looking at the switch (B) as the target behavior.

During A phases, the micro-switch was placed either in front of the child or mounted on the wheelchair, and the highest or lowest ranked stimulus was presented immediately after each switch press (FR 1) for 15 seconds. At the start of each session, three primer trials were conducted, where the experimenter guided the child to engage in the target response and presented the stimulus to the participant for 15 seconds. Then the experimenter gave a verbal instruction to the child, '<specify the response> if you want <stimulus>' and began the session. Consequence intervals were subtracted from the session time so that the same amount of time was available for responding across sessions. During each A phase, two sessions were conducted with the high preference stimulus as the consequence and two sessions with the low preference stimulus as the consequence.

During B phases, the assessment procedures were the same as in the A phases except that stimulus presentation was contingent on looking at the switch instead of activating the switch. This response was selected because it was less effortful than switch pressing, and because looking at presented stimuli was one of the passive approach behaviors measured in the preference assessment, as recommended by Logan et al. (2001). Ada was required to look at the switch twice before receiving the stimulus (FR 2). Troy was required to look at the switch twice or continuously for 3 seconds to receive the stimulus (FR 2 or Fixed Duration 3 seconds). FR 2 was used for the children because of the higher rate of the looking response and the necessity to reduce the frequency of reinforcement so that the session duration was kept to approximately 30 minutes. Troy had a tendency to look at the switch for long durations without breaking his gaze in both the high and low preference conditions; therefore, he was also presented the stimulus for looking at the switch continuously for 3 seconds. As in the A phases, the amount of time available for responding was equated across sessions within B phases. During each B phase, two sessions were conducted with the high preference stimulus as the consequence and two sessions with the low preference stimulus as the consequence. During the second B phase for Ada, two additional sessions each for the high and low preference stimuli were conducted because of the smaller effects observed.

Reliability

Movement Assessment—Interobserver reliability checks were conducted for both children on at least one of the two movement observation sessions. Two observers independently recorded the child's movements during each interval. An interval was scored as an agreement if both observers recorded the occurrence or nonoccurrence of movement; otherwise, it was scored as a disagreement. Percent agreement was calculated by dividing the number of agreements by the total number of intervals and multiplying by 100%. The mean percent agreement across participants was 100%.

Preference Assessment—During reliability checks, the experimenter and an observer independently recorded the child's responses on each trial. The experimenter and observer practiced recording the child's responses until they achieved at least 80% agreement on three consecutive sessions before beginning data collection. An agreement was defined as both observers having recorded the occurrence of the same response; otherwise, it was considered as a disagreement. Percent agreement per session was calculated for each measure by dividing the number of agreements by the total number of trials presented and multiplying by 100%. Interobserver reliability checks were conducted on 25% of the sessions for Ada and 36% for Troy. The mean per cent agreements across sessions and participants were 100% for rejection, 100% for active approach, 92.8% for passive approach, and 92.8% for no response.

In addition, the observer assessed procedural integrity using a checklist. A trial was scored as delivered correctly if the experimenter had presented the planned stimulus, given the appropriate verbal prompt, and had removed the stimulus immediately following a rejection response. The mean percentage of trials delivered correctly was 99.4% across the two children.

Reinforcer Assessment—During interobserver reliability checks, the experimenter and an observer independently recorded the frequency of the target response during each session. Per cent agreement per session was calculated by dividing the lower number by the higher number recorded and then multiplying by 100%. Interobserver reliability checks were conducted on 55% of the sessions for Ada and 44% for Troy. The mean per cent agreement across children was 99%.

Procedural integrity checks were also conducted for 50% of the reinforcer assessment sessions. During each session, the observer recorded if the experimenter had conducted the three primer trials, used the correct target response, and presented the correct consequence for the target response. All checks yielded 100% procedural compliance by the experimenter.

RESULTS

Figure 1 shows the proportion of trials with passive approach, rejection, and no response for each stimulus for Ada and Troy. Active approach is not shown because none was observed for the children. Ada showed passive approach on all trials for seven of the 12 stimuli (first 7 stimuli in Figure 1), followed by Soap Scent at 0.9, Music and Read Story at 0.8, Hand Massage at 0.7, and Warm Facecloth at 0. Rejection occurred for three stimuli (Soap Scent, Hand Massage, and Warm Facecloth) and for a combined total of four trials. Trials with no response were infrequent, except for one stimulus (Warm Facecloth, 0.9). Among the seven stimuli which were tied as the most preferred stimuli, Teddy Bear was selected at random as the high preference stimulus for reinforcer testing in the next phase. Warm Facecloth was the least preferred stimulus because it evoked no approach and only a rejection response. However, this suggested that the stimulus might be mildly aversive or at best neutral for Ada. Therefore, we selected the next lowest ranked stimulus that evoked at least some passive approach, which was Hand Massage, at 0.7.

Troy showed either passive approach or no response on each trial during the preference assessment (Figure 1). The two measures, therefore, differentiated the preference hierarchy equally well. Teddy Bear was the high preference stimulus used in the next phase. Massager and warm Gel Pack tied as the least preferred stimuli, and Massager was randomly selected as the low preference stimulus for the next phase.

Figure 2 shows the number of responses per minute per session during reinforcer assessments for the children. For Ada, the rates of responding were near or at zero during the two switch-pressing phases, but were substantially higher during the looking phases. During the first looking phase, she averaged 14 responses per minute with the high preference stimulus as the consequence, and 5 responses per minute for the low preference stimulus across the two sessions. During the second looking phase, the rates of responding for the high preference stimulus were lower than during the first phase and showed some overlap with response rates for the low preference stimulus. She averaged 7.1 responses per minute across the four HP sessions and 5.8 responses per minute across the four LP sessions.

Troy's responses per minute during the switch-pressing phases ranged from 0.07 to 0.27. His response rates increased during the looking phases and were consistently higher during sessions with the HP stimulus as the consequence. During the first looking phase, he averaged 2.7 responses per minute with the high preference stimulus as the consequence and 1.7 for the low preference stimulus. During the second looking phase, responses per minute averaged 3.5 for the HP sessions and 1.0 for the LP sessions.

DISCUSSION

The results of this study showed that the use of single-stimulus presentation and passive approach responses were effective in identifying preferred stimuli with both children. Moreover, the study showed that the physical demand of the target response might be a limiting factor during reinforcer assessment. Neither the high nor low preference stimulus increased responding to any extent when switch pressing was the operant. However, differential reinforcement effects between the high and low preference stimuli were observed when looking was the target response. These results support Logan et al.'s (2001) recommendation that the same behavior be used in preference and reinforcer assessments. We have replicated their results, in that a reinforcer effect was not found for the high preference stimuli when the target response was pressing a switch, but when the response was the same as in the preference assessment, and was less effortful, the effect emerged.

While we were not able to identify a stimulus that would increase the switch pressing response, these results are still useful in that preferred stimuli can be provided to enrich the children's environment and may enhance their quality of life and happiness indices (Green & Reid, 1996; Yu et al., 2002). This can be a valuable goal in itself.

Three limitations of the study should be noted. First, it is possible to argue that the observed low rates of switch pressing, relative to the looking response, may be self-evident given that participants were physically challenged and exhibited minimal movement. However, the teachers of both participants indicated they were physically capable of pressing the switch, and the children demonstrated that they could do so during the switch-pressing phases although at very low rates (Figure 2). Moreover, the switch was used in the classroom for both participants and other students with similar characteristics. The identified preferred stimuli appeared to be reinforcers for the looking response, but may not have been sufficiently powerful to increase or maintain switch pressing, which is a more effortful response. This suggests that switch pressing may not be an appropriate target response for persons with severe or profound intellectual disabilities and minimal movement.

Second, we did not conduct extinction baselines for the looking response to verify the observed effects were due to reinforcement. It is possible that the looking response may have occurred at rates during extinction similar to those observed during the HP and LP conditions. However, the differential effects obtained with the high and low preference stimuli with both children strongly suggest reinforcement effects. The reinforcer assessment could be strengthened in future research by using an extinction baseline or a multiple baseline design across several target behaviors if extinction could not be implemented.

Third, the effects were examined with two children. Further research with more participants and with similar characteristics is needed to demonstrate generality of the findings.

Current research on assessment methods for persons with severe and profound disabilities and minimal physical movement is limited. This study extends previous research with this population by demonstrating that a passive approach response can be used to differentiate preferences, that the identified high preference stimulus is more reinforcing than the low preference stimulus for passive responses, and that the target response used during reinforcer testing can be a limiting factor.

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References

- Fisher WW, Piazza CC, Bowman LG, Hagopian LP, Owens JC, Slevin I. A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*. 1992; 25:491–498. [PubMed: 1634435]
- Green CW, Reid DH. Defining, validating and increasing indices of happiness among people with profound multiple disabilities. *Journal of Applied Behavior Analysis*. 1996; 29:67–78. [PubMed: 8881345]
- Ivancic, MT. Stimulus preference and reinforcer assessment applications. In: Austin, J., Carr, J., editors. *Handbook of applied behavior analysis*. Reno, NV: Context Press; 2000. p. 19–38.
- Ivancic MT, Bailey JS. Current limits to reinforcer identification for some persons with profound multiple disabilities. *Research in Developmental Disabilities*. 1996; 17:77–92. [PubMed: 8750077]
- Logan KR, Gast DL. Conducting preference assessments and reinforcer testing for individuals with profound multiple disabilities: Issues and Procedures. *Exceptionality*. 2001; 9:123–134.
- Logan KR, Jacobs HA, Gast DL, Smith PD, Daniel J, Rawls J. Preferences and reinforcers for students with profound multiple disabilities: Can we identify them? *Journal of Developmental and Physical Disabilities*. 2001; 13:97–122.
- Martin, G., Pear, J. *Behavior modification: What it is and how to do it*. 7. Upper Saddle River, New Jersey: Prentice Hall; 2003.
- Pace GM, Ivancic MT, Edwards GL, Iwata BA, Page TJ. Assessment of stimulus preference and reinforcer value with profoundly retarded individuals. *Journal of Applied Behavior Analysis*. 1985; 18:249–255. [PubMed: 4044458]
- Reid DH, Phillips JF, Green CW. Teaching persons with profound multiple handicaps: A review of the effects of behavioral research. *Journal of Applied Behavior Analysis*. 1991; 24:319–336. [PubMed: 1832422]
- Yu CT, Spevack S, Hiebert R, Martin TL, Goodman R, Martin TG, Harapiak S, Martin GL. Happiness indices among persons with profound and severe disabilities during leisure and work activities: A comparison. *Education and Training in Mental Retardation and Developmental Disabilities*. 2002; 37(4):421–426.

Figure 1.
The proportion of trials with passive approach, rejection, and no response across stimuli during preference assessment.

Figure 2. Responses per minute during reinforcer tests. Switch-pressing responses were reinforced on an FR1 schedule for both participants. Looking responses for Ada were reinforced on an FR2 schedule, while for Troy they were reinforced on either FR2 or FD 3 seconds.