

Published in final edited form as:

*Am J Ment Retard.* 2005 March ; 110(2): 145–154. doi:  
10.1352/0895-8017(2005)110<145:PTREOV>2.0.CO;2.

## Predicting the Relative Efficacy of Verbal, Pictorial, and Tangible Stimuli for Assessing Preferences of Leisure Activities

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### Abstract

We measured the relationships between choice stimulus modalities and three basic discriminations (visual, visual matching-to-sample, and auditory–visual) using the Assessment of Basic Learning Abilities test. Participants were 9 adults who had moderate to profound developmental disabilities. Their most and least preferred leisure activities, identified by prior preference assessments, were presented using choice stimuli in three modalities (tangibles, pictures, and verbal descriptions) in an alternating-treatments design. For 8 of the 9 participants, discrimination skills predicted the selections of choice stimuli associated with their preferred activities. The results suggest that choice stimulus modalities in preference assessment of leisure activities need to be matched to the discrimination skills of persons with developmental disabilities.

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There is ample research to show that persons with developmental disabilities can reliably indicate their preferences via direct systematic assessment (e.g., see reviews by Hughes, Pitkin, & Lorden, 1998; Logan & Gast, 2001; Lohrmann-O'Rourke & Browder, 1998). An area of research that has received much attention is focused on how stimuli are presented during preference assessments. Several researchers have compared single-stimulus, paired-stimulus, and multiple-stimulus presentations (e.g., DeLeon & Iwata, 1996; Fisher et al., 1992; Higbee, Carr, & Harrison, 2000; Windsor, Piché, & Locke, 1994). With an array of stimuli to be assessed, the single-stimulus procedure involves presenting one stimulus on each trial. Over a number of trials, the frequency of approach response to each stimulus is used as the measure of preference. The paired-stimulus procedure involves presenting two stimuli on each trial, and the participant is asked to select one. Each stimulus is paired with every other stimulus to be assessed for an equal number of trials. Finally, the multiple-stimulus procedure involves presenting all stimuli, usually six or seven, and the participant is asked to select one from the array. In one variation of this procedure, referred to as *multiple-stimulus without replacement*, the remaining stimuli are presented on the next trial, and so on, until all stimuli have been selected. In another variation, referred to as *multiple-stimulus with replacement*, all stimuli are presented on each trial. In general, the paired-stimulus method has been shown to be most sensitive in differentiating a preference hierarchy and is commonly used in research, although it takes more time to administer than do the other procedures.

Recently, researchers have examined the modality of the choice stimuli in preference assessments (e.g., tangible, pictorial, or verbal). Northup, George, Jones, Broussard, and Vollmer (1996) showed that both verbal and pictorial assessment procedures were about equally effective in identifying high- and low-preference stimuli for four verbal children with attention deficit with hyperactivity disorder (ADHD). In another study Cohen-Almeida, Graff, and Ahearn (2000) showed a high correspondence between the verbal and tangible assessments on the two most and two least preferred items. The six participants in that study had varied diagnoses (e.g., pervasive developmental disabilities, ADHD, behavior disorder, and mental retardation) and were able to use speech as their primary mode of communication. Higbee, Carr, and Harrison (1999) compared pictorial and tangible stimuli with two adults diagnosed with mental retardation, one moderate and one severe. Seven stimuli were assessed using a multiple stimulus without replacement procedure. The authors found that the tangible stimuli yielded a more differentiated preference hierarchy than did pictorial stimuli for both participants, despite the fact that both could vocally name the objects in the pictures or point to the picture when the name was spoken. Results of this study suggest that neither level of mental retardation nor verbal ability appears to be related to the assessment results.

Visual and auditory discriminations are clearly important prerequisite skills in making consistent choices across stimulus modalities. For example, in a paired-presentation procedure (a) a simple two-choice visual discrimination is required when tangible stimuli of choice options are presented, (b) a visual matching-to-sample discrimination is needed when pictorial representations of the choice options are used, and (c) an auditory discrimination is necessary when choice stimuli are described verbally. Recent research on the Assessment of Basic Learning Abilities test, an instrument designed to measure basic visual and auditory discriminations, such as those described above, has shown that such discrimination repertoires in persons with mental retardation do not seem to be correlated with level of functioning (Marion et al., 2003; Martin & Yu, 2000) or IQ (Richards, Williams, & Follette, 2002). In this test, the simple visual discrimination (Level 3) requires the participant to place a manipulandum (piece of white foam) into a yellow can, when the yellow can and a red box are presented in random left–right positions across trials. The visual matching-to-sample discrimination (Level 4) requires the participant to place a small yellow cylinder into the yellow can and a red cube into the red box, with the positions of the two containers and the cylinder and the cube being randomly alternated across trials. The auditory–visual discrimination (Level 6) requires the participant to place the white foam into the yellow can or the red box on each trial as instructed verbally by the tester. The positions of the two containers (yellow can vs. red box) and the instructions given are randomly alternated across trials. For each task, a “pass” is eight consecutive correct trials before eight cumulative errors.

Conyers et al. (2002) examined whether the Assessment of Basic Learning Abilities test could predict choice consistency across stimulus modalities during preference assessments for persons with severe developmental disabilities. They included three participants who had passed visual discrimination (Level 3 on the test) and not visual match-to-sample or auditory–visual discriminations (Levels 4 and 6), three participants who had passed the simple visual and visual match-to-sample discriminations (Levels 3 and 4) and failed the

auditory–visual discrimination (Level 6), and three participants who passed all three discriminations (Levels 3, 4, and 6). They found that across tangible, pictorial, and verbal modalities, participants who passed Assessment of Basic Learning Abilities Level 3 demonstrated consistent preferences for their preferred stimuli with tangibles, but not with pictorial and verbal modalities; participants who passed Level 4 demonstrated consistent preferences for their preferred stimuli with tangibles and pictures, but not with the verbal modality; and those who passed all three discriminations demonstrated consistent preferences for their preferred stimuli in all three modalities. Conyers et al. found similar results for the nine participants in two experiments, involving food and non-food items, respectively. Schwartzman, Yu, and Martin (2003) systematically replicated the findings of Conyers et al. (2002) with six adults who had developmental disabilities. These studies suggest that the discrimination skills of the person must be considered when determining which stimulus modality is the most appropriate in preference assessment. In addition to the practical value of being able to determine the appropriate stimulus modality by administering the brief Assessment of Basic Learning Abilities test, results of these studies underscore the fact that an apparent equal preference between two stimuli may reflect a deficit in discrimination or an inappropriate stimulus modality used during preference assessment rather than a lack of preference.

A limitation of the studies by Conyers et al. (2002) and Schwartzman et al. (2003) is that the stimuli involved simple food items and small manipulable nonfood items. Many everyday activities, such as leisure, are more complex, protracted, and cumbersome, if not impossible, to present using tangibles. Can the Assessment of Basic Learning Abilities test be used to predict the choice of preferred stimuli across stimulus modalities for leisure activities? No investigators have addressed this question. Therefore, our purpose in this study was to evaluate whether discrimination skills, as measured by the Assessment of Basic Learning Abilities test, would predict choice consistency of preferred leisure activities across stimulus modalities. Our hypotheses were similar to those of Conyers et al.: (a) persons with severe developmental disabilities who have demonstrated a simple visual discrimination (Level 3), but not visual matching-to-sample (Level 4) or auditory–visual discriminations (Level 6), would select their preferred stimuli more consistently during the tangible modality, but not during pictorial or verbal modalities; (b) those who have demonstrated simple visual and visual matching-to-sample (Levels 3 and 4), but not auditory–visual discriminations (Level 6), would select their preferred stimuli more consistently during the tangible and pictorial modalities, but not during the verbal modality; and (c) those who have demonstrated all three discriminations (Levels 3, 4, and 6) would select their preferred stimuli consistently in all three modalities.

## Method

### Participants and Setting

Nine adults with moderate to profound developmental disabilities participated. They were selected based on a screening with the Assessment of Basic Learning Abilities test as described above. Participants 1, 2, and 3 had passed Level 3 (visual discrimination), but failed Level 4 (visual matching-to-sample discrimination) and Level 6 (auditory–visual

discrimination). Participants 4, 5, and 6 had passed Levels 3 and 4, but failed Level 6. Participants 7, 8, and 9 had passed Levels 3, 4, and 6. Table 1 contains the characteristics for each participant.

Participants 1 through 6 and 9 had few language skills. Participant 1 intermittently vocalized the same words, and Participants 2 through 6 never used words, although they sometimes vocalized. Participant 9 occasionally repeated words spoken by others or would say “hello.” Participants 7 and 8 occasionally spoke to answer simple questions and periodically used short or incomplete phrases to state questions or initiate conversation.

Throughout the study, a leisure activity selected by the participant was always provided in the setting in which the activity normally occurred. These settings varied according to the phases of the study (described later). An experimenter and an assistant were present at all sessions to present trials and deliver the selected leisure activity. An observer was occasionally present to conduct reliability checks.

## Materials

During trials involving tangible stimuli, objects in the leisure activities were used to represent the choice options. Table 2 shows all activities used in the study, the stimuli presented during trials involving tangibles, and the setting where each leisure activity was provided, if selected. Materials used during pictorial trials included 20 cm × 25 cm, laminated, color photographs of the objects presented during tangible trials. Materials for verbal trials included two 20 cm × 25 cm sheets of laminated white paper.

## Research Design

Following the selection of participants based on their discrimination skills, we conducted a preference assessment involving six activities per participant to determine the most and least preferred leisure activities for each of them. Activities included for assessment were selected based on suggestions from staff members who worked closely with each participant and on practical considerations in the delivery of the activity. Next, the most and least preferred activities, identified during the preference assessment, were presented in an alternating-treatments design, in which the three modalities (tangible, pictorial, and verbal) were alternated in a counterbalanced order, with no one modality being repeated for more than 2 consecutive trials.

## Preference Assessment to Determine Most and Least Preferred Activities

We conducted an initial preference assessment using the 2-choice paired-comparison procedure (Fisher et al., 1992), as described earlier, and all trials were presented using tangible stimuli to represent the leisure activities (see Table 2). The paired-comparison procedure was selected over a multiple-stimulus procedure because the former involved a 2-choice discrimination, similar to the Assessment of Basic Learning Abilities test. To be successful in making consistent discriminations on multiple-stimulus trials (e.g., including 6 stimuli), participants needed a more developed scanning response, and we could not assume all participants had this skill. Finally, a 2-choice procedure was easier to manage due to the large life-size tangible stimuli used.

On each trial, tangible stimuli representing the two leisure activity options were presented at an approximately equal distance from the participant. The left–right positions of the two choice stimuli were counterbalanced across trials such that each option appeared on each side with equal frequency. As noted earlier, in order to incorporate as much as possible the contextual stimuli as part of the choice presentation, we presented trials in the settings in which the leisure activities actually occurred. However, because the two activities took place in different settings for most participants, only one of the activities was presented “in context” on each trial. This was counterbalanced across trials such that each option was presented in context on half the trials. For example, Participant 1’s most and least preferred activities were, respectively, playing with a ball and watering plants. Therefore, half the trials were presented in the gym (where ball playing was in context) and the other half in the multipurpose room (where watering plants was in context).

After the tangible stimuli were laid out, the experimenter prompted the participant to look at the materials for each activity and then asked the participant to “Pick one,” without saying the activities’ names. A *choice response* was defined as a participant touching, pointing, or moving towards a set of stimuli. If an individual touched both sets of stimuli, or did not choose either activity after approximately 5 seconds, the stimuli were removed and re-presented. After the participant had made a selection, the nonchosen stimuli were removed. If the selected activity were to take place in the location in which the trial was presented (e.g., selecting “ball” when the trial was presented in the gym), the participant was immediately provided with the chosen activity for a maximum of approximately 4 minutes. If the selected activity were to take place in a different location (e.g., selected ball when the trial was presented in the multipurpose room), the participant was taken immediately to the appropriate location and provided with the chosen activity for approximately 4 minutes.

Typically, 3 to 5 sessions were conducted each week, with 1 session per day and with approximately 5 to 6 trials per session. At least 60 trials were presented during this phase for each participant. Additional trials were presented for several participants until a high- and a low-preference activity could be differentiated. The maximum number of trials presented was 90 (for Participants 8 and 9).

The most and least frequently chosen activities were used in the next phase of the study. Across participants, the most preferred activities were selected an average of 81% of the trials (range = 63% to 95%), and the least preferred activities, an average of 17% of the trials (range = 8% to 33%). The differences between the most and least preferred activities ranged from 50% to 85% across the participants. The high- and low-preference activities, respectively, for each participant were as follows: Participant 1, playing ball and watering plants; Participant 2, listening to music and watering plants; Participant 3, sitting on a swing and baking cookies; Participant 4, listening to music and playing golf; Participant 5, looking at magazines and watering plants; Participant 6, playing ball and baking cookies; Participant 7, listening to music and using carpentry tools; Participant 8, listening to music and bowling; and Participant 9, making popsicles and playing ball.

### Alternating-Treatments Design: Tangible, Pictorial, and Verbal Stimuli

During this phase, trials involving tangible, pictorial, and verbal choice stimuli corresponding to the high- and low-preference activities were alternated in a predetermined counterbalanced order, such that each modality was not repeated for more than two consecutive trials and was presented an equal number of trials for each participant. Trials were presented until stability of choice responses was observed, but with a minimum of 12 trials for each modality.

**Tangible stimuli**—On trials involving tangible stimuli, the presentation procedures were the same as the preference assessment described above, except that only the most and least preferred activity options were presented on each trial.

**Picture stimuli**—On trials involving pictorial stimuli, the procedures were the same as those involving tangibles, except that color photographs of the tangible stimuli were used instead of the objects, and the trials were presented in an assessment room not associated with either activity. On each trial, the photographs were placed face-down on a table in front of and at an approximately equal distance to the participant. The experimenter lifted the photograph on the left to face the participant while saying, “See this?” or “Look here.” After the participant looked at the picture for approximately 3 seconds, the picture was returned to the table, facing down. The picture on the right was presented similarly. Then both pictures were lifted simultaneously to face the participant, with each picture at an approximately equal distance from the participant, who was then prompted to “Pick one.” The left–right positions of the photographs were counterbalanced across trials, such that each stimulus appeared in each position an equal number of times.

**Verbal stimuli**—On trials involving verbal stimuli, the procedures were similar to the pictorial trials, except that the activity options were described verbally, and the choice stimuli were two blank sheets of paper. On each trial, the two sheets were placed on a table in front of and approximately equal distance to the participant. The paper on the left was lifted, the experimenter said the name of the activity, the paper on the right was lifted, and the experimenter said the name of the activity. Then both sheets of paper were held at an approximately equal distance from the participant, who was asked to “Pick one.” The names of the activities were spoken by the experimenter in a neutral tone of voice, with a neutral facial expression. In addition, the order in which the activity names were stated (i.e., the left–right positions of the activities) was counterbalanced across trials. The purpose of the blank sheets of paper was to provide a physical and visual reference, such that a participant with receptive but not expressive language could point to the paper associated with the spoken name to indicate his or her preference.

For all trial types, after a selection had been made on each trial, the participant was immediately taken to the corresponding location of the selected activity (except when the participant was already in the activity location during tangible trials) and was provided the activity for approximately 4 minutes. Following the completion of the activity, the experimenter and the participant returned to the assessment room (if the next trial involved



pictorial or verbal stimuli) or went to one of the appropriate activity locations (if the next trial involved tangible stimuli), and a new trial was presented.

### Reliability Assessments

Interobserver reliability checks were conducted during the study for each participant. An observer and the experimenter independently recorded the responses of the participants on each trial. A trial was considered an agreement if the same response was recorded by the experimenter and the observer and a disagreement if different responses were recorded. The percentages of agreement were calculated over all trials by dividing the number of agreements by the number of agreements plus disagreements, and multiplying by 100% (Martin & Pear, 2003). Interobserver reliability checks were conducted for each participant and for over 61% of the trials. The mean inter-observer agreement score was 98%, ranging from 90% to 100% across participants.

Procedural reliability checks were conducted for each participant and during 39% of the trials. An observer and the experimenter independently recorded whether or not the experimenter followed a checklist of steps. A trial was considered an agreement if the experimenter and the observer both recorded that all steps were followed; otherwise, it was a disagreement. Agreement for procedural reliability was calculated similarly to interobserver reliability, averaged 99%, and ranged from 97% to 100% across participants.

### Results

Figure 1 shows the percentage of trials on which the choice stimuli associated with the high-preference activities were selected during the alternating-treatments phase. Participants 1 through 3 each received 36 trials, with 12 trials per stimulus modality. These 3 participants, who had passed Assessment of Basic Learning Abilities Level 3 (visual discrimination) but not Levels 4 (visual matching-to-sample discrimination) and 6 (auditory-visual discrimination) selected their high preference activities during 100%, 83%, and 92% of the trials, respectively. During the pictorial and verbal trials, however, they selected the preferred and less preferred activities with approximately the same frequencies, with the percentages of preferred activities selected ranging from 42% to 61% across participants.

Participants 4 and 6 each received 36 trials, with 12 trials per stimulus modality, and Participant 5 received 66 trials, with 22 trials per modality. Participants 4 through 6, who had passed both Assessment of Basic Learning Abilities Levels 3 and 4, but not Level 6, selected their preferred activities on 100% of the trials during tangible trials, and on 92%, 83%, and 75% of the pictorial trials, respectively (Figure 1). During verbal trials, these participants selected their preferred and less preferred activities at approximately the same frequencies, with the percentages of preferred activities selected ranging from 50% to 58% across participants.

Participant 7 received 36 trials, with 12 trials per stimulus modality. This participant, who had passed all three Assessment of Basic Learning Abilities discriminations, selected her preferred activity during 92% of the tangible trials and 100% of the pictorial and verbal trials (Figure 1).

Participant 8 received 63 trials, with 21 trials per stimulus modality. This participant, who had passed all three Assessment of Basic Learning Abilities discriminations, however, selected her preferred and less preferred activity at about the same frequencies in all three modalities. Percentage of trials during which the preferred activity was selected ranged from 43% to 62% across the three modalities (see Figure 1, Participant 8A). We speculated that her preference might have changed as the study progressed. Therefore, the preference assessment was repeated, and new high and low preference activities were identified. The alternating-treatments phase was then repeated with the new activities for 36 trials, 12 trials per modality. Participant 8 chose her preferred activity during 100% of the tangible and pictorial trials and 92% of the verbal trials during this phase (see Figure 1, Participant 8B).

Participant 9 received 63 trials, with 21 trials per modality. He had passed all three Assessment of Basic Learning Abilities discriminations and selected his preferred activity on 40% to 50% of the trials during all three modalities (see 9A in Figure 1). This pattern was similar to that displayed by Participant 8. We repeated the preference assessment for Participant 9, identified new high and low preference activities, and repeated the alternating treatment phase (see 9B, Figure 1). However, this phase was terminated after 12 trials, with 4 trials per modality. Participant 9's selections were inconsistent across modalities after 12 trials. He showed a preference for the preferred activity on tangible trials, equal preference for the preferred and less preferred activities on pictorial trials, and a preference for the less preferred activity on verbal trials. The preference assessment was repeated for a third time with completely novel activities, new high and low preference activities were identified, and the alternating-treatments phase was presented for 60 trials, 20 trials per modality (see 9C, Figure 1). During the third alternating-treatments phase, Participant 9 chose his preferred activity on 80% of the tangible trials, 70% of the pictorial trials, and 60% of the verbal trials.

## Discussion

We hypothesized that participants who had passed Assessment of Basic Learning Abilities Level 3 but failed Levels 4 and 6 would select the choice stimuli associated with their preferred activities more frequently than the less preferred activities when the stimuli were tangibles but not when they were pictorial or verbal. This hypothesis was supported by the results of Participants 1 through 3 in all modalities. Second, we hypothesized that participants who had demonstrated simple visual and visual matching-to-sample (Levels 3 and 4), but not auditory–visual discriminations (Level 6), would select the choice stimuli associated with their preferred activities more frequently when the stimuli were tangibles or pictorial, but not when they were verbal. This hypothesis was supported by the results of Participants 4 through 6, in all three modalities. Third, we hypothesized that participants who had demonstrated all three discriminations (Levels 3, 4, and 6) would select the choice stimuli associated with their preferred activities more frequently when the stimuli were either tangibles, pictorial, or verbal. This hypothesis was supported by the results of Participant 7. However, if the final replications of Participants 8 and 9 are considered (8B and 9C, Figure 1), this hypothesis was supported by both Participants 7 and 8 and partially by Participant 9.



The initial results of Participant 8 did not support our hypotheses. As noted previously, we speculated that her preferences might have changed following the initial preference assessment and replicated the experiment with new high and low preference activities. Results from her replication with the new activities were consistent with our predictions.

We have two explanations for Participant 9's inconsistent performance. First, he did not show a strong preference for the identified preferred activities in all three replications. During the first preference assessment, he chose the preferred activity on 63% of the 90 trials presented and the least preferred activity on 10% of the trials (all other participants' preferred activities were above 80%). During the second preference assessment, his most and least preferred activities were selected on 70% and 15% of the trials, respectively. During the last preference assessment, his most and least preferred activities were selected on 70% and 15% of the trials, respectively. Second, research has shown that the Assessment of Basic Learning Abilities discrimination skills are hierarchically ordered in difficulty (Martin & Yu, 2000; Richards et al., 2002), with Level 6 being more difficult than Level 4, and Level 4 being more difficult than Level 3. Therefore, it is possible that although Participant 9 had passed all three discriminations on the Assessment of Basic Learning Abilities test, his auditory–visual discrimination skills were the weakest and, thus, he failed to choose the preferred activity more consistently during verbal trials (9C, Figure 1). Unfortunately, this speculation was not verified by retesting the participant on the Assessment of Basic Learning Abilities test. Future research is needed to address this type of response pattern.

The present study is limited by its small sample size and by a limited range of leisure activities. The generality of the current findings will need to be established through systematic replications with additional participants and various leisure activities, including those that could occur in the community (e.g., shopping, going to a park or a movie).

To make tangible presentation as close as possible to the real-life activity, we incorporated setting cues by conducting tangible trials in the settings associated with the leisure activities. As noted earlier, however, each activity could be presented “in context” (i.e., in the location where the activity normally occurred) on only half the trials if the two activities were normally delivered in different settings. A question could be raised as to whether choice responding during the tangible trials could have been influenced by the presence or absence of the setting cues. If setting cues exerted strong control over choice responding, we would expect that the choice stimuli would be selected frequently when they were presented “in context” and rarely when presented out of context. We examined the percentage of trials in which the tangible stimuli were selected “in context” out of the total trials selected. For Participants 1 through 8, the mean percentage was 54%, ranging from 47% to 57% across participants. This suggests that the tangible stimuli were selected about equally often in and out of contexts, there was no apparent contextual effect, and the participants' responses were primarily under the control of the tangible stimuli (and not the setting). However, for Participant 9, who displayed a preference of 63% for the preferred activity during the initial preference assessment, of the 19 trials in which the preferred activity was selected, 14 (74%) were made in context. Thus, although the contextual cues did not exert control for other participants, it may have influenced the relative preference of the activities for Participant 9.

Therefore, future researchers should consider presenting all tangible trials in a neutral setting.

Researchers examining the relation between discrimination skills and choice-stimulus modalities thus far have not addressed the effects of discrimination-skill training on the ability to respond to various choice stimulus modalities. For example, if participants who demonstrated only a simple visual discrimination (Level 3) were taught to perform visual match-to-sample discriminations (Level 4), as measured by the Assessment of Basic Learning Abilities test, would they then be able to choose their preferred items or activities consistently with pictorial stimuli? Future training studies are needed to address such questions, which have significant clinical benefits in enhancing the independence of persons with developmental disabilities.

Although previous research has been focused on different presentation procedures in preference assessments (e.g., single, paired, and multiple-stimulus presentation), few investigators have examined the relation between discrimination skills and stimulus modalities in preference assessment, and none have examined this relationship with protracted leisure activities. The findings of this study extend previous research conducted using food and non-food items (Conyers et al., 2002; Schwartzman et al., 2003) to protracted leisure activities. The results show that an apparent equal preference between two stimuli may reflect a deficit in discrimination skills or inappropriate stimulus modality used during preference assessment, rather than a lack of preference. Therefore, choice stimulus modality in preference assessments should be selected based on the discrimination skills of individuals.

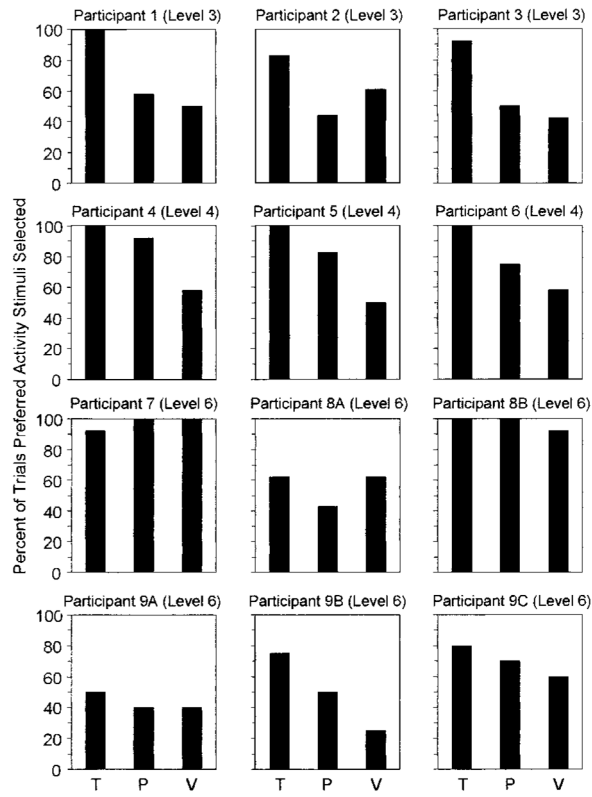
## Acknowledgments

This research was supported by Grant MOP-36433 from the Canadian Institutes of Health Research. The authors are also affiliated with St. Amant Centre (Winnipeg, Manitoba). We thank the participants for their cooperation throughout the study; the staff of St. Amant Centre for their assistance in recruitment and cooperation; and Aynsley Verbeke, Doung Nguyen, Sara Spevack, Lori Doan, Paulo Salvador, Samara Harp, and Lisa Schwartzman for their help on reliability assessments.

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**Figure 1.** Percentage of trials on which the preferred activity stimuli were selected during tangible (T), pictorial (P), and verbal (V) trials for each participant.

**Table 1**

## Participant Characteristics

Participant	Sex	Age	Diagnoses	Highest level passed on the Assessment of Basic Learning Abilities test <sup>a</sup>
1	F	46	Severe developmental disability	3
2	F	30	Primary microcephaly and severe developmental disability	3
3	F	41	Chromosomal abnormality and severe to profound developmental disability	3
4	F	32	Unidentified genetic disorder and severe developmental disability	4
5	M	45	Progressive ataxia and moderate developmental disability	4
6	M	36	Down syndrome and profound developmental disability	4
7	F	37	Oculocerebral facial syndrome and significant developmental disability	6
8	F	33	Autism and severe developmental disability	6
9	M	35	Moderately severe developmental disability	6

<sup>a</sup>Level 3 = visual discrimination, Level 4 = visual matching-to-sample discrimination, and Level 6 = auditory-visual discrimination.

**Table 2**

## Leisure Activities Across Participants, Tangible Stimuli, and Locations of Delivery of Activities

<b>Leisure activity</b>	<b>Tangible stimuli presented</b>	<b>Location of activity</b>
Ball playing	Large ball	Gym
Bowling	Plastic bowling ball and 2 bowling pins	Gym
Basketball	Basketball and hoop	Gym
Listening to music	CD player and several CD cases	Multipurpose room
Looking at magazines	Several magazines, different varieties	Multipurpose room
Watering plants	Watering can and 2 or 3 plants in pots and soil	Multipurpose room
Velcro-ball	Tennis ball and 2 rackets with Velcro on one side	Gym
Carpentry	Tool kit and hammer	Multipurpose room
Swinging on swing	Seat of the swing with rope looped through the holes	Outside
Golf	Putter and golf ball	Gym
Latch hooking	Wooden hook, wool, and meshing	Multipurpose room
Baseball	Foam baseball bat and ball	Gym
Spa	Lotions and sponges	Family room
Making iced tea	Nestea container and water pitcher	Kitchen
Baking cookies	Baking sheet, knife, and oven mitts	Kitchen
Painting	Smock, watercolor kit, and paintbrush	Family room
Water play	Bin of water and various floating toys	Family room
Play Doh	3 colors of Play Doh and cookie cutters	Family room
Making mosaics	Potter, various beads, and craft glue	Family room
Making popsicles	Plastic popsicle set	Kitchen