Effects of Teaching Generalized Identity Matching on Picture Preference Assessment for Persons with Developmental Disabilities

by

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Abstract

Research suggests that individuals with severe developmental disabilities are able to indicate preferences during direct preference assessments with objects. However, they may not have the discrimination skills to respond effectively to pictures. Recent research has begun to focus on identifying and teaching individuals the skills needed to indicate their preferences using pictures, due to the practical advantages of presenting choices with pictures versus objects. Further, it has been suggested that generalized identity matching may be associated with successful performance during picture preference assessments. The present study evaluated whether teaching generalized identity matching with pictures would lead to improved performance on picture preference assessments. Two adults, one male and one female, diagnosed with moderate to severe mental retardation, with limited to no speech, and varying degrees of physical impairments participated in the study. Before training, participants were able to indicate their preferences using objects but not with pictures and they were unable to perform generalized identity matching. Participants were trained on an object-picture matching-to-sample relation in a multiple baseline across tasks design. Individual data showed that neither Participant 1 nor Participant 2 met the pass criterion (80% or higher correct responses) on at least one generalized identity matching task after one training task was taught. Further, both participants showed improved concordance between preference assessments using objects and pictures of the same objects after mastering one training task respectively. These findings were independent of the accuracy of responding during the generalized identity matching post-assessment for each participant. These results suggest that the ability to respond accurately on generalized picture-picture identity matching tasks may not be related to performance on picture preference assessments (i.e., for individuals to indicate their preferences with pictures).

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Introduction

Intellectual disabilities affect approximately 1% of the population and approximately half of those affected fall within the severe range (Bradley, Thompson, & Bryson, 2002; Ouellette-Kuntz & Paquette, 2001). Based on a comprehensive review, recent prevalence estimates of individuals with autism spectrum disorders range from 60-70 per 10,000 (0.6-0.7%), with prevalence as high as 106/10,000 (approximately 1%) reported by Centre for Disease Control (CDC) in one region of the United States (Fombonne, 2009).

Providing individuals with developmental disabilities with choice opportunities promotes self-determination (Stancliffe, 2001), enhances on-task behaviors (Cole & Levinson, 2002) and enhances life quality (Cannella, O'Reilly, & Lancioni, 2005). Further, providing choice opportunities and teaching individuals to reliably respond to preference assessments provides individuals diagnosed with developmental disabilities with ways to communicate their wants and needs to caregivers. Research has indicated that individuals with severe and profound developmental disabilities with little or no speech have the ability to indicate their preferences when given choices during direct preference assessments (Hagopian, Long, & Rush, 2004). Moreover, items identified as being highly preferred during preference assessments have been found to function as reinforcers and be rewarding for the individual (Hagopian et al.; Lee, Yu, Martin, & Martin, 2010). In addition, preference assessments have been found to be more accurate in identifying preferences than relying on subjective impressions of caregivers (Green et al., 1988; Green et al., 1991). Preference assessments are conducted by presenting choices to individuals usually in object, pictorial, or spoken modes. During the object mode, actual items

are presented to the individual (e.g., an apple and an orange). For the picture mode, photographs or drawings of the items are shown. During the spoken mode the individual is given a vocal description of the items (e.g., “would you like an apple or an orange?”).

For stimuli that could be presented in all three modes, picture or vocal presentations are clearly more practical than objects for the caregiver. In addition, picture or vocal modes can also accommodate choices that may be difficult or impossible to present in object mode (e.g., large objects or activities such as going for a walk). Thus, using picture or vocal modes may also benefit the client by increasing the choices available to them. However, previous research has found that direct caregivers demonstrate over reliance on using objects for choice presentation to their clients (Michalyshyn, Lee, Yu, & Martin, in press). In addition, research has shown that individuals with developmental disabilities may not be able to respond effectively to picture or auditory stimuli during preference assessments (Conyers et al., 2002; de Vries et al., 2005; Reyer & Sturmey, 2006).

Recent research has suggested that generalized identity matching may be associated with successful performance during picture preference assessments (Nguyen et al., 2009; Thorne, Yu, Thiessen, & Martin, 2014). The purpose of this study was to evaluate the relation between generalized identity matching and picture preference assessments. Specifically, this study investigated whether generalized picture-picture identity matching is necessary to improve performance during picture preference assessments. In the ensuing sections, I review common preference assessment procedures, an assessment of discrimination skills, relevant research on the relation between preference assessment and discrimination skills, and present and discuss the results of the study.

Preference Assessment Procedures

Three commonly researched direct preference assessments include the single-stimulus (SS), paired-stimulus (PS), and multiple-stimulus (MS) presentation procedures. During the SS procedure (Pace, Ivancic, Edwards, Iwata, & Page, 1985), each stimulus is presented alone and the participant is permitted to approach or consume that stimulus. In the PS procedure (Fisher et al., 1992), each trial involves the presentation of stimuli in pairs. The participant is then given the opportunity to select one stimulus from the pair. During the MS procedure (Windsor, Piché, & Locke, 1994), the stimuli to be assessed (usually six to eight) are presented concurrently on every trial and the participant is asked to select one. A variation of the MS procedure was developed by DeLeon and Iwata (1996) and is referred to as the multiple-stimulus without replacement (MSWO). With the MSWO procedure, a stimulus is removed from the array on subsequent trials after it has been selected. In all procedures, the degree of preference for a stimulus may be determined by calculating the percentage of trials it was selected out of the number of trials in which it was presented. A higher percentage indicates a stronger preference. In the MSWO procedure, the degree of preference may also be determined by the order the stimuli were selected.

The SS procedure is the most time consuming among the above preference assessment procedures and it does not differentiate preferences well among the stimuli because participants have a tendency to approach all stimuli presented. The MS procedure is time efficient, but it also does not differentiate preferences well because participants have a tendency to approach the same item on every trial. The MSWO procedure is as time efficient as the MS procedure, differentiates preferences well, and, like the PS procedure, it has predictive validity in that the identified preferred stimulus also functions as a reinforcer during subsequent reinforcer

assessments (Hagopian et al., 2004; Carr, Nicolson, & Higbee, 2000; Higbee, Carr, & Harrison, 2000). The time efficiency of the MSWO procedure also makes it practical to conduct frequent sampling of preferences (DeLeon & Iwata, 1996). However, the MSWO procedure requires the individual to attend to more than two items on each trial and this could be a challenge for persons with visual discrimination difficulty.

Assessment of Basic Learning Abilities-Revised

Several studies on preference assessment and discrimination skills have used the *Assessment of Basic Learning Abilities* (ABLA; Kerr, Meyerson, & Flora, 1977) to measure the discrimination skills of individuals with developmental disabilities. The ABLA is a dynamic assessment during which the tester actively interacts with the client during the assessment in an attempt to modify the student's performance on several discrimination tasks. Since the assessment information for the ABLA was used in my research, a more detailed description of this assessment follows.

The ABLA was developed by Kerr and Meyerson to assess several visual and auditory discriminations for persons with severe and moderate intellectual disabilities. Since their initial research, described in a 1977 monograph, considerable research has extended the utility of this tool. As a result, one of the auditory tasks in the ABLA has now been replaced (Sakko, Martin, Vause, Martin, & Yu, 2004) and the assessment procedures are described in the ABLA-Revised manual (ABLA-R; DeWiele, Martin, Martin, Yu, & Thomson, 2011). The tasks and assessment procedures are summarized in Table 1 and described below.

The ABLA-R includes six tasks, also referred to as "levels": a motor imitation task, two simple discriminations (position and visual) and three conditional discriminations (visual-visual quasi-identity, visual-visual non-identity, and auditory-visual). The tasks are hierarchical and the

assessment has demonstrated high inter-tester and test-retest reliability, and high predictive validity (see review by Yu, Martin, Vause, & Martin, 2014).

On each trial of the Level 1 task (imitation), the individual is reinforced (with praise and an edible or brief access to a toy or an activity) for placing a manipulandum into a container after the appropriate response is demonstrated on each trial. The imitation task is typically administered first to familiarize the client with the materials and to strengthen imitative responding. To "pass" this level, a client must place a piece of white foam into a yellow cylinder and then a red box, for four trials each and for a combined total of eight consecutive correct trials, before eight cumulative errors occur.

On each trial of the Level 2 task (position discrimination), a red box and a yellow can are presented concurrently, in the same left and right positions across trials, and the individual is reinforced for placing a piece of foam into the container on the left. An error is followed by a correction procedure (tester demonstrates the correct response, provides a guided practice, and provides an opportunity for the client to perform the task independently). For this and all remaining levels, the "pass" criterion is eight consecutive correct trials, and the "fail" criterion is eight cumulative errors, whichever occurs first. During the error correction procedure, a correct independent response is not counted towards the pass criterion and will result in the presentation of the next test trial. However, incorrect independent responses during the error correction procedure are counted towards the fail criterion and result in repeating the three-component error correction procedure.

On each trial of the Level 3 task (visual discrimination), the red box and yellow can are presented concurrently, in randomly alternated left and right positions across trials. The individual is reinforced for placing the white foam in the yellow can, regardless of its position.

On each trial of the Level 4 task (visual-visual quasi-identity conditional discrimination), the yellow can and red box are presented concurrently as in the Level 3 task and the individual is presented randomly with a yellow cylinder or a red cube. If the cylinder is presented, placing it in the yellow can is reinforced; if the cube is presented, placing it in the red box is reinforced.

On each trial of the Level 5 task (visual-visual nonidentity conditional discrimination), the presentation procedure is similar to the Level 4 task, except that the manipulanda are replaced with two pieces of wood that spell, “BOX” and “Can”, and that are colored silver and purple respectively. If the purple word “Can” is presented, placing it in the yellow can is reinforced; if the silver word “BOX” is presented, placing it in the red box is reinforced.

On each trial of the Level 6 task (auditory-visual conditional discrimination), the yellow can and red box are presented concurrently, in randomly alternated left and right positions across trials. The tester presents the white foam to the individual and says either “red box” (rapidly and in a high pitch) or “yellow can” (slowly and in a low pitch). The individual is reinforced for placing the foam in the container requested by the tester.

Conditional Discrimination and Generalized Identity Matching

Before proceeding further, a brief discussion of conditional discrimination, generalized matching, and matching-to-sample is relevant to the present research. The term conditional discrimination refers to responding to a stimulus among an array of (at least two) stimuli (called comparison stimuli) based upon another stimulus (called the sample stimulus). The sample changes across presentations and the positions of the comparisons are randomized or counterbalanced. On each presentation, the individual is reinforced for responding to the correct comparison stimulus (S+) and not the incorrect comparison(s) (S-). The relation between sample and comparison is referred to as “identity” matching (when the sample and comparison stimuli

are physically identical) or “nonidentity” (when sample and comparison stimuli are physically non-identical but belong to the same class). Moreover, the sample or comparison stimuli may be visual (e.g., objects, pictures, printed words) or auditory (e.g., spoken words or sounds). For example, the ABLA-R Level 4 is described as a “visual-visual quasi-identity” conditional discrimination because the sample and comparison stimuli are both visual and they are identical in colors and shapes, but differ in size. Level 5 is a visual-visual nonidentity conditional discrimination because the sample and comparison stimuli are not physically identical, but are related based on the English language (the yellow can and red box are members of the stimulus classes described by the words “Can” and “BOX”, respectively). Lastly, Level 6 is an auditory-visual nonidentity conditional discrimination because the sample is spoken and the comparisons are visual and not physically identical to the sample.

Generalized identity matching refers to the ability to match novel stimuli that have not been taught previously (Pear, 2001), after being explicitly taught to perform one or more identity conditional discriminations. Among various strategies for promoting generalization discussed by Stokes and Baer (1977), teaching multiple-exemplars may be a practical procedure for developing generalized matching. For example, suppose a child is taught to match a poodle to an identical poodle and a canary to an identical canary. Next, the child is taught to match a chair to an identical chair and a pen to an identical pen. After learning several identity-matching tasks with a variety of stimuli, if the child is then able to match, without training, new stimuli that have not been previously presented, generalized identity matching is said to have occurred.

For individuals with severe delays who may encounter difficulty in learning identity matching, systematic stimulus prompt-fading procedures (e.g., fading the size, intensity, and positions of the stimuli) could be used (Dube & Serna, 1998). Dube and Serna devised a multi-

step teaching program for individuals for whom these prompt-fading techniques were ineffective. In this program, participants were taught first to perform a simple visual discrimination. The simple discrimination was then brought under the control of a sample stimulus. This was then followed by the addition of S- comparisons and the random alternation of the sample stimulus and the positions of the comparison stimuli across trials.

Preference Assessment and Discriminations

Basing the method of choice presentation on a person's discrimination ability is important (Conyers et al., 2002; de Vries et al., 2005; Reyer & Sturmey, 2006). Conyers et al. found that during preference assessments, participants who had passed up to and including ABLA Level 3 consistently selected their preferred food items when choices were presented using objects (actual food items) but not when photographs depicting the food items or spoken words were used. Participants who had passed up to and including ABLA Level 4 chose their preferred food items when choices were presented using objects or pictures, but not when choices were presented using spoken words. Participants who had passed ABLA Level 6 selected their preferred food items consistently during all three presentation methods. Conyers et al. replicated these relations with both food and nonfood items. de Vries et al. systematically replicated Conyers et al.'s study using leisure activities and found similar results. Lastly, Reyer and Sturmey partially replicated the above findings when they sought to determine whether the presentation methods for assessing preference of work tasks could be predicted by the ability to learn discrimination skills assessed by the ABLA. When a choice was presented between high- and low-preferred tasks in object, picture, and spoken words, three of nine participants' discrimination skills predicted their choice of task. With the exception of one trial, these results were observed for two other participants as well.

Limited studies, however, have attempted to teach the discrimination skills that might be required when making choices during a preference assessment. Clevenger and Graff (2005) suggested that matching pictures to objects and matching objects to pictures may be important prerequisites for picture preference assessments. In their study with six participants, only those who could perform object-picture (objects were samples and pictures were comparisons) and picture-object (pictures were samples and objects were comparisons) matching showed similar preferences between preference assessments conducted with objects and pictures. Nguyen et al. (2009) evaluated the effects of teaching picture-object matching to three participants with developmental disabilities on preference assessment with pictures. Before training, they identified high preference (HP) and low preference (LP) food items using PS preference assessments with objects (food). When the HP and LP food items were presented concurrently, all participants selected the HP items on at least 90% of the trials. However, when photographs of the same food items were presented instead of the objects, selection of the HP item decreased to near 50% (chance level). Participants were then taught to perform object-picture matching with nonfood stimuli in a multiple baseline design across tasks. Preferences for the HP and LP items were re-assessed in object and picture modes after a training task had met a mastery criterion, and the concordance in percentage of trials the HP item was selected in each assessment was examined. Concordance in HP item selection between object and picture preference assessments improved after mastering two object-picture matching tasks for one participant and after mastering three object-picture matching tasks for a second participant. However, the third participant did not show improved concordance after mastering two tasks. The authors did not assess whether generalized object-picture matching had emerged for the first two participants.

Thorne et al. (2014) compared the discrimination skills of individuals with developmental disabilities who could perform picture preference assessments reliably (Picture Group, $n = 9$) and individuals who could perform object preference assessments reliably but not picture preference assessments (Object Group, $n = 11$). Five conditional discriminations were tested: (a) object-picture matching and (b) its symmetry, picture-object matching; (c) generalized object-picture matching and (d) its symmetry, generalized picture-object matching; and (e) generalized identity picture-picture matching. The Picture Group performed significantly better than the Object Group on four of the five tasks ($p < .01$). Eight of the nine Picture Group participants were able to perform at least one of the three generalized matching tasks. In contrast, only one of the 11 Object Group participants passed one of the three generalized matching tasks. The authors concluded that perhaps the critical skill for picture preference assessment is the ability to perform some form of generalized matching, be it object-to-picture, picture-to-object, or picture-to-picture.

Research Methodology

Single-subject or within-subject designs typically expose individuals to both treatment and control allowing individuals to serve as their own control. Visual inspection of individual data is the primary method of determining whether the treatment or intervention is responsible for any observed changes in the dependent variable (Martin & Pear, 2011). Common within-subject designs include alternating treatments (i.e., multi-element) designs, reversal-replication (ABAB) designs, and multiple-baseline designs.

The current study utilized a within subject multiple baseline across tasks. In this design, baseline assessments were initiated for three training tasks and training was introduced for one task while the others remained at baseline. Training would have been introduced for each

remaining task after the preceding task had met a predetermined mastery criterion. To evaluate the effects of training, the stability of the data, the immediacy and magnitude of performance improvement after the initiation of training, and the replicability of the observations across tasks and participants were taken into account.

Statement of the Problem

Further research is needed on developing effective strategies to teach persons, who need to rely on objects, to indicate their preferences in other modes for a couple of reasons. First, using objects for choice presentation and preference assessment is impractical for large items. Second, presenting choices using only objects limits the range of choices for individuals with developmental disabilities.

However, investigations on teaching individuals to respond to picture or vocal preference assessments are scarce. Although a number of discriminations have been shown to be related to effective picture preference assessments, only one study has attempted to develop this skill by teaching an object-picture conditional discrimination (Nguyen et al., 2009). Considering the recent findings by Thorne et al. (2014), the purpose of this study was to evaluate whether teaching persons with developmental disabilities to perform generalized picture-picture identity matching would result in improvement in picture preference assessments. I chose to teach picture-picture matching, instead of object-picture or picture-object matching, because the Picture Group in Thorne et al.'s study performed the best on this task (with a mean of 77% correct and with six of the nine participants at or above 80%). I hypothesized that the ability to perform picture preference assessments would be related to the emergence of generalized picture-picture identity matching.

Method

Participants and Settings

Two adults with developmental disabilities participated in the study. Participant 1 was 46-year-old male with a diagnosis of moderate to severe mental retardation according to his health records. The term "mental retardation" was a formal diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; *DSM-IV-TR*; American Psychiatric Association, 2000) and this term has been replaced with "intellectual disability" in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-V*; American Psychiatric Association, 2013). In practice, the term developmental disability has replaced the term mental retardation among most professionals. In 1992, the American Association on Mental Retardation (AAMR) suggested that the previously used categories of mild, moderate, severe, and profound mental retardation be refrained from use for classification purposes (Martin & Pear, 2011). However, at the time of each participant's diagnosis, the term mental retardation and corresponding classification categories were still retained and as a result both participants' official diagnoses were used in the current study. Participant 1 had limited communication skills and right divergent eye with amblyopia for which scanning abilities were not affected. Participant 2 was a 44-year-old female, and was functioning at a severe level according to her health records. In addition, she presented with no speech, had experienced blurred vision (i.e., myopic astigmatism), and had severe flexion contractures in both arms which limited her range of movements. However, she could "point" by rotating her wrist to the left or right side. Both participants were recruited from a community agency serving individuals with developmental disabilities.

Participant 1 had passed up to ABLA Level 3, and failed Levels 4, 5, and 6. His most recent ABLA assessment was conducted in 2010. Participant 2 had passed up to ABLA Level 4, and failed Levels 5 and 6. Her most recent ABLA assessment was conducted in 2011. Participants were included in the study because they were able to indicate their preferences with objects but not with pictures of the same objects. Moreover, participants were not able to perform generalized identity matching during pre-training assessments (described later).

During the study, participants were assessed and trained individually, and sessions were conducted in session rooms at St.Amant Research Centre. Participants sat in a chair, behind a table, and across from the experimenter for all sessions. A second observer was present during the majority of sessions to conduct interobserver reliability and procedural integrity checks.

The study was reviewed by the University of Manitoba Psychology/Sociology Research Ethics Board and found to be ethically sound. Since neither participant was legally able to provide consent for themselves, written informed consent was obtained from their legal guardians or substitute decision makers before beginning the study.

Research Plan Overview

Pre-training assessments. The following assessments were completed with each participant before training: (a) a preference assessment with food or leisure activity items, (b) a preference assessment with pictures of the objects identified in the preceding assessment, (c) a generalized picture-picture identity matching assessment, and (d) baseline assessments of the training tasks.

Training and Post-Training Probes. During this phase, training was introduced for each participant in a multiple-baseline design across tasks. After the participant attained a

predetermined mastery criterion of 80% correct for two consecutive 10-trial blocks for a training task, the pre-training assessments were re-administered.

Pre-Training Assessment Procedures

Preference assessment procedures were selected and individualized based on the discrimination abilities and motor limitations of the participants. Specifically, the MSWO procedure with food items was conducted with Participant 1. However, the PS procedure was used with Participant 2 because she had limited range of motion in her neck and arms. Various leisure activity items were selected for Participant 2 in place of food items due to oral motor limitations which did not allow her, for safety reasons, to consume edible items during sessions.

MSWO preference assessment procedure with food items for Participant 1. Six food items (Rolo-chocolate®, fruit snacks, crackers, M&M's®, marshmallows, and juice) were chosen based on caregiver suggestions and on ease of presentation and availability. I conducted the assessment following the procedures described in the MSWO self-instructional manual by Nguyen and Yu (2009). The MSWO assessment consisted of three blocks of trials and each block consisted of a maximum of *n*-1 trials, where *n* was the number of items assessed. On the first trial of each trial block, the items were arranged in a row in front of the participant with approximately 5 cm between each item and I asked the participant to "pick one". An *approach* response was defined as the participant touching or pointing to an item without pushing it away within 8 s after being asked to choose. Immediately following an approach response, the participant was provided with the item for approximately 10 sec of interaction. A *rejection* was recorded if the participant pushed an item away. An approach to another available item was accepted after a rejection response. A *no-selection* was recorded if no item was chosen after 8 s. If the participant attempted to approach more than one item simultaneously, I blocked the

response gently and the trial was repeated. On the next trial, the item chosen on the previous trial was not presented, thus reducing the number of items by one. In addition, the item that was introduced last on the previous trial was introduced first, followed by the remaining items in the same order as in the previous trial. This had the effect of shifting the positions of the remaining items by one across trials. Presentation continued until the last two items had been presented for selection or until the participant did not make a choice. Preference for each item was defined as the percentage of trials the item was selected out of the number of trials that the item was available.

PS preference assessment procedure with leisure activity items for Participant 2. Six leisure items (necklace, bracelet, stickers, headbands, lip balm, and a mirror) were chosen for the preference assessment for Participant 2 based on caregiver suggestions and on ease of presentation and availability. I conducted the assessment following the procedures described in the self-instructional manual by Chand and Yu (2010). The PS assessment consisted of one-block of 30 trials in which each item was paired with every other item twice, in counterbalanced positions, so that each item was presented on the left and right an equal number of times. On each trial, two items were presented in front of the participant with approximately 5 cm between them and I asked the participant to “pick one”. The definitions of an approach response, rejection response, no response, and the consequence for each response were the same as in the MSWO procedure described above. In addition, the computation procedure for preference for each item was identical to that used in the MSWO procedure.

Preference assessment with pictures for both participants. Following the preference assessment with objects above, the assessment was repeated using photographs of the corresponding objects. Each participant was assessed using the same procedures (PS or MSWO)

except that photographs of the items were presented as choices instead of objects. Participants received the food or leisure item that corresponded to the selected photograph on each trial. Percent preference for each item was calculated as described above.

Generalized picture-picture identity matching assessment. The stimuli that were used to assess generalized picture-picture identity matching were identical to those used by Thorne et al. (2014). Most of the stimuli were made up of parts from everyday objects to minimize familiarity and influence of reinforcement history. Color photographs (15 cm x 20 cm) of each item, taken against a white background, were used as the sample and comparison stimuli (some samples of the stimuli are included in Appendix A).

On each assessment trial, I showed the participant two comparison pictures, one at a time, approximately 15 cm apart in front of Participant 1. For Participant 2 who displayed significant motor challenges, pictures were presented on an apparatus constructed by the experimenter, which allowed the participant to indicate her preference by left-right wrist pronation (a drawing of the apparatus is included in Appendix B). Then I showed the participant a sample picture identical to one of the comparisons and said “match”. A correct response was recorded if the participant touched or pointed to the identical comparison picture within 8 s. A response was scored as incorrect if the participant selected the incorrect comparison, or did not respond within 8 s. During this assessment, participants were not reinforced for correct responses. The experimenter said “thank you” in a neutral tone after every response regardless of its accuracy, and each trial was followed by an inter-trial interval of 5 s. To maintain on-task and attending behaviors, a participant was praised and given a small edible or brief access to a leisure item for completing an arbitrary response (e.g., stacking two blocks, making eye contact with the experimenter, or imitating a motor response) immediately before each trial.

Ten stimulus pairs were randomly selected from the stimulus pool (Appendix A) for this assessment as was used for both pre- and post-training assessments. Each pair was presented for only one trial. A participant would have been excluded from the study if he/she had performed correctly on 8 or more trials.

Baseline assessments of training tasks. The purpose of this assessment was to identify three two-choice matching tasks for each participant for training. Training tasks involved matching color photographs (15 cm x 20 cm) of a variety of stimuli such as animals (e.g., dog and cat), everyday objects (e.g., computer, car, and flower), food items (e.g., fruits), and shapes (e.g., star and heart). The baseline procedures for the training tasks were the same as those described above for Generalized Picture-Picture Identity Matching with two differences. First, the training task stimuli were different from all the stimuli used for the generalized matching assessment. Second, the consequence for correct responses was different. During a training trial, if the participant matched the sample and comparison correctly within 8 s, he/she immediately received praise and an edible or brief access to a leisure activity. To minimize satiation of the HP item, the second ranked item was used for reinforcement during the assessment. If the participant touched or pointed to the incorrect comparison within 8 s or did not respond after 8 s, the trial was terminated, all stimuli were removed from the table, and the next trial was presented after a 5-s interval. Choosing the incorrect comparison and not responding were recorded differently on the datasheet, but both were treated as errors.

Each task was presented for two sessions where each session consisted of 10 trials with a break of at least 5 min between sessions. The left-right positions of the stimuli were counterbalanced across trials.

Training Procedures

Each training session consisted of two blocks of 10 trials, with a break of at least five minutes between trial blocks. During all training sessions, a correct response was recorded if the participant touched or pointed to the correct picture within 8 s. A response was scored as incorrect if the participant selected the incorrect picture or did not respond within 8 s.

During training, every correct response was immediately followed by praise and a preferred edible or activity, depending on the participant. Every incorrect response was followed by the experimenter issuing a statement that the response was incorrect (e.g., “that’s not the one”), demonstrating the correct response, and proceeding to the next trial.

Post-Training Probes

After each training task had met mastery criterion, I conducted (a) a preference assessment with pictures, (b) a preference assessment with objects, (c) generalized picture-picture identity matching assessment, and (d) baseline assessments of the remaining training tasks that had not yet received training. The assessment procedures were the same as those described above.

Interobserver Reliability and Procedural Integrity

Interobserver agreement on dependent measures. For Participant 1, an observer was present during all sessions of pre-training assessments, all training sessions, and 36% of post-training assessments to conduct reliability checks. For Participant 2, an observer was present during 85% of pre-training assessments, 50% of training sessions, and 66% of post-training assessments to conduct reliability checks. During a session, the observer independently scored the participant’s responses on each trial. A trial was considered an agreement if the observer and I had recorded the same response, and a disagreement if the recordings differed. Percent

agreement per session was calculated by dividing the number of agreements by the sum of agreements and disagreements, and then converting it to a percentage. Percent agreement per session was 100% in all observed sessions for both participants.

Procedural integrity. Procedural integrity is a measure of how well the procedures have been administered or carried out (Martin & Pear, 2011). For each session selected for reliability checks, the observer also recorded whether the experimenter had carried out each trial correctly using a checklist. The checklist included steps appropriate to the assessment or training procedures in effect and were identical to those used by Ramon and Yu (2010) and Chand and Yu (2010). For example, steps may have included presenting the correct stimuli in the correct order and positions, providing the correct vocal instruction, and providing the correct consequence based on the participant's response. A trial was scored as correct only if all steps were carried out correctly. The percentage of trials correctly delivered was calculated for each observed session and was 100% in all observed sessions for both participants.

Results

Participant 1

Figure 1 shows the results for Participant 1. The top graph shows the percent preference of the HP (circle) and LP items (square) in object preference assessment or Obj PA (unfilled) and picture preference assessment or Pic PA (filled), respectively, and the percent correct responses during the generalized identity or Gen ID matching assessment (triangle). The next three graphs show the percent correct responses during baseline and training sessions conducted for the three training tasks, respectively. During the first preference assessment with objects, M&M's® was the HP (100%) and juice was the LP (0%). However, during the picture preference assessment, the results were reversed where M&M's® was the LP (21%) and juice was the HP (100%). Due

to the radical shift in preference, the assessment was repeated with objects to ensure that the observed difference in preference was in fact due to the participant's inability to indicate his preference with pictures and not due to a true preference change. If the results of this assessment with objects were similar to the prior picture preference assessment, it would have suggested that there had been a change in preference and Participant 1 was in fact able to indicate his preferences using pictures. However, the second object preference assessment replicated the results of the first object preference assessment. This finding suggested that Participant 1 was unable to reliably indicate his preferences with pictures. During the pre-training generalized identity matching assessment (triangle), Participant 1's matching accuracy was 10% suggesting that the generalized matching skill was not present and that the participant met the inclusion criteria for further participation in the study.

Three tasks were selected and identified for Participant 1 for teaching. During the first two baseline sessions (Figure 1), Participant 1 performed at a mean of 40% correct for Task 1 (Eye and Flower), a mean of 25% for Task 2 (Dog and Cat), and a mean of 35% for Task 3 (Computer and Car). Training was introduced to Task 1 (selected randomly from among the three tasks) and Participant 1's response accuracy increased from baseline to a mean of 87.5% during the last two training sessions.

The preference assessments with objects and pictures and the generalized identity matching assessment were repeated (top graph, Figure 1). Preferences for the HP and LP items during object assessment remained the same (M&M's® 100%, Juice 0%) and preferences for those items during picture assessment were near chance level (M&M's® 60%; Juice 50%). Participant 1 performed near chance level (60% correct) during the generalized identity picture-picture matching assessment. Thus, results of the assessments after training the first task showed

that generalized identity matching with pictures had not emerged and the participant was not able to select his HP item using pictures.

Baseline assessments of Tasks 2 and 3 that had not yet been trained were conducted (Figure 1 bottom two graphs) and the participant demonstrated improved responding for both tasks during the third and fourth sessions. Given the improvement, baseline sessions were extended for two more sessions. Performance accuracy for Task 2 averaged 80% and accuracy for Task 3 averaged 70% during the last two baseline sessions.

Given the improved baseline performance, no training was provided for Tasks 2 and 3, and the pre-training object and picture preference assessments and generalized identity matching were repeated (top graph) to determine whether improved concordance between the pre-and post-preference assessments could be observed. Participant 1 selected M&M's® as the most preferred item (100%) during both picture and object preference assessments and juice as the least preferred item during both picture and object preference assessments (7.7 and 0%, respectively). These results were consistent with Participant 1's object preference assessment throughout the study (top graph). However, Participant 1's performance on the generalized identity picture-picture matching assessment remained near chance level.

Participant 2

Figure 2 shows the results for Participant 2. The top graph shows the percent preference of the HP (circle) and the LP items (square) in object preference assessment or Obj PA (unfilled) and picture preference assessment or Pic PA (filled), respectively and the percent correct responses during the generalized identity or Gen ID matching assessment (triangle). The next three graphs show the percent correct responses during baseline and training sessions conducted for the three training tasks, respectively. During the first preference assessment with objects,

headband was the HP (90%) and mirror was the LP (10%). However, during the picture preference assessment the results differed from the object assessment with the participant choosing both headband and mirror near chance levels (40%). This finding suggested that Participant 2 was unable to reliably indicate her preferences with pictures. During the pre-training generalized identity matching assessment (triangle), Participant 2's matching accuracy was 50% suggesting that the generalized matching skill was not present and that the participant met the inclusion criteria for further participation in the study.

Three tasks were selected and identified for Participant 2 for teaching. During the first two baseline sessions (Figure 2), Participant 2 performed at a mean of 60% correct for Task 1 (Heart and Pen), a mean of 55% for Task 2 (ring and flower), and a mean of 45% for Task 3 (star and smiley face). Training was introduced to Task 1 (selected randomly among the three tasks) and Participant 2's response accuracy increased from baseline to a mean of 95% during the last two training sessions.

Baseline assessments of Tasks 2 and 3 that had not yet been trained were conducted (Figure 2 bottom two graphs) and the participant demonstrated improved responding for both tasks averaging (80%) for Task 2 and (70%) for Task 3 during the third and fourth sessions. Given the improved baseline performance, no training was provided for Tasks 2 and 3, and the pre-training object and picture preference assessments and generalized identity matching were repeated (top graph, Figure 2) to determine whether improved concordance between the pre-and post-preference assessments could be observed. During the picture preference assessment, Participant 2 selected a new item as the most preferred item (bracelet, 100%) while preference for the previous HP item (headband) decreased to 40% and preference for the previous LP item (mirror) remained low (10%). The bracelet was also found to be the HP during the object

preference assessment (90%) and preference for the headband and mirror tied as LPs at 30%. Thus, concordance between picture and object preference assessments was high. The similar results obtained between the object and picture assessment suggested that the observed difference in preference was in fact due to a true preference change and not the participant's inability to indicate her preferences with pictures. However, Participant 2's performance on the generalized identity picture-picture matching assessment remained near chance level (60%). Thus, results of the assessments after training the first task showed that generalized identity matching with pictures had not emerged, but the participant was able to select her HP item using pictures.

Discussion

I investigated whether learning generalized identity picture-picture matching would lead to improved performance on picture preference assessments for individuals who needed to rely on objects to indicate their preferences. I hypothesized that for individuals who indicated their preferences reliably with objects but not with pictures during preference assessments, gaining the ability to perform picture preference assessments would be associated with the emergence of generalized picture-picture identity matching. The results for Participants 1 and 2 did not support the above hypothesis. The results indicated that after being taught to perform one picture-picture identity matching task, Participant 1 and 2 were both able to indicate HP items reliably in both object and picture modes. Further, results showed that generalized identity picture-picture matching did not emerge after training one task (remained near chance levels) and improved performance was observed on the other untrained tasks without the acquisition of the generalized matching skill. Thus, the results suggest that the ability to perform accurately on generalized

identity picture-picture matching tasks is not a pre-requisite skill for individuals with developmental disabilities to learn to indicate their preferences with pictures.

Research has demonstrated that passing ABLA Level 4 (ability to acquire the discrimination skills necessary to perform partial-identity visual matching) is correlated positively with accuracy of performance on picture preference assessments (Conyers et al., 2002; de Vries et al., 2005). This particular finding is of interest to the current study as Participant 2 had passed up to and including ABLA Level 4. Though, inconsistent with this finding, Participant 2 was unable to respond accurately during picture preference assessments during baseline. This may suggest that ABLA Level 4 may overestimate an individual's ability to respond effectively during picture preference assessments. That Participant 2 was able to indicate her preferences with pictures after training one task suggests that perhaps some individuals who pass up to and including ABLA Level 4 are on the cusp of responding reliably to picture preference assessments (i.e., some individuals are able to do so and some are unable but have the ability to learn to fairly quickly). Similar findings were found for participants in previous research (Thorne, 2010).

Another potential explanation for the improvement in concordance during object and picture preference assessment for both participants, is that ABLA assessment results may have changed between the time each participant was assessed on the ABLA and participation in the current study. However, previous research has shown that these assessments are quite durable and stable over time (Martin, Yu, Quinn, & Patterson, 1983). To control for this, future research should assess participants on the ABLA at the beginning and end of the study.

There are several limitations that are important to note concerning the present study. First, the study was only conducted with two participants due to challenges with recruitment.

Thus, confidence in the conclusion that the ability to perform accurately on generalized picture-picture matching tasks is not a pre-requisite skill to perform accurately on picture preference assessments would have been stronger if replicated across additional participants. Moreover, future research should examine whether similar results would be observed with individuals of differing ages and diagnoses.

Second, the effects of repeated preference assessments were not controlled for. It may be possible that improved concordance between the objects and pictures used in the current study could be a result of repeated object and picture preference assessments in alternation. A potential way to control for this in future research could be to assess the effects of repeated preference assessments with pictures and objects in alternation. Both participants in the current study showed the emergence of the ability to indicate their preference with pictures following three picture preference assessments. If participants are tested on repeated alternating assessments and the ability to indicate preferences with pictures does not emerge following three to five assessments then we could be more confident in drawing the conclusions that the improved concordance is not a direct result of the repeated assessments.

Previous research has suggested that a number of discriminations are related to responding effectively to picture preference assessments. However, only one study has attempted to develop this skill by teaching an object-picture conditional discrimination (Nguyen et al., 2009). Further, Thorne et al. (2014) had suggested that teaching generalized identity matching could result in improvement in picture preference assessments. In the present study, concordance in HP and LP item selection between object and picture preference assessments improved after achieving mastery criteria for one training task for both participants without the occurrence of generalized identity picture-picture matching. These findings raise the possibility that skills other

than generalized identity picture-picture matching may be important to develop the skills needed to reliably indicate preferences with pictures. Potentially, the critical skill may be acquiring the ability to perform another form of generalized matching such as object-object, object-picture, or picture-object as examined by Thorne et al.

This study extended the findings of previous research by Nguyen et al. (2009) and Thorne et al. (2014) by examining the relation between generalized identity picture-picture matching and performance on picture preference assessments. Both participants showed improved concordance between object and picture preference assessments after receiving training on one picture-picture conditional discrimination independent of their performance on the generalized identity matching assessment. Due to the practical benefits of using pictures over objects when assessing an individual's preference, further research is needed to develop strategies and training procedures to teach individuals who need to rely on objects to reliably respond during picture preference assessments. Moreover, self-determination is an important dimension of quality of life (Nota, Ferraril, Soresi, & Wehmeyer, 2007; Wehmeyer & Schwartz, 1998). Promoting choice making, by allowing individuals to express their preferences is a way of implementing or promoting self-determination thereby improving life quality of individuals with developmental disabilities. Future research is crucial so that these assessments can be more consistently incorporated by educators and caregivers into their services for people diagnosed with developmental disabilities to promote methods of communication and life quality.

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Table 1

Visual and Auditory Cues Presented at Each Level of the ABLA-R[a]

Tasks or Levels	Containers on each Trial	Manipulandum on each Trial	Cues from Tester	Correct Response[c]	Incorrect Response
1. Imitation	1, box or can	1, cube, cylinder, or white foam	Demonstrates the correct response on every trial, and say "Put it in"[b]	Put manipulandum in container	Put manipulandum anywhere outside container
2. Position[d]	2, box and can, position *stable* across trails	1, white foam	"Where does it go?"	Put foam in can on the right	Put foam in box on the left
3. Visual	2, box and can, position *randomized* across trials	1, white foam	"Where does it go?"	Put foam in can regardless of position	Put foam in box regardless of position
4. Matching-to-sample (Visual-visual quasi-identity)	Same as Level 3	1, cube or cylinder, randomized across trails	"Where does it go?"	Put cube in box or cylinder in the can	Put cube in can or cylinder in box
5. Visual-visual nonidentity[e]	Same as Level 3	1, BOX or Can foam block, randomized across trials	"Where does it go?"	Put BOX foam block in box or Can foam block in can	Put BOX foam block in can or Can foam block in box

Table 1 (*cont'd*)

6. Auditory-visual	Same as Level 3	1, white foam	"*y-e-l-l-o-w c-a-n*" (spoken slowly and in a low pitch) or "*red box*" (spoken quickly and in a high pitch)	Put foam in the requested container	Put foam in the non-requested container

[1] From "Kerr-Meyerson Assessment of Basic Learning Abilities-Revised: Recent Findings and A Conceptual Analysis of Ordering," by Yu, C. T., Martin, T., Vause, T., & Martin, G. L., 2014, submitted for publication, Reprinted with permission on August 18, 2014.

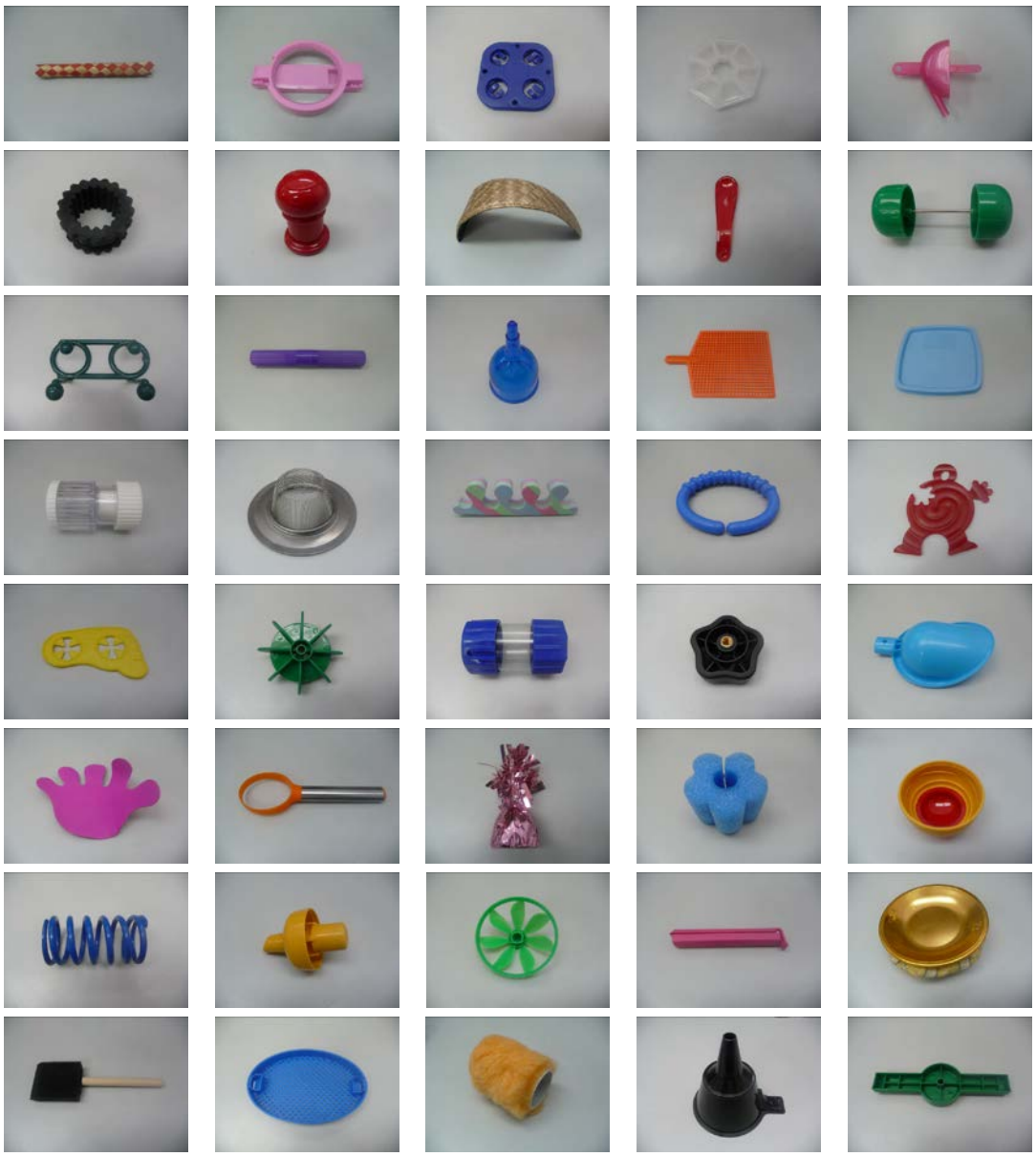
[2] Except for the auditory-visual task (Level 6), the vocal cue is not "instructional" and serves simply to prompt the testee to initiate responding.

[3] Correct response is reinforced. Incorrect response is followed by an error correction procedure.

[4] Despite its name, this is a *visual* discrimination in which position is one of the relevant cues.

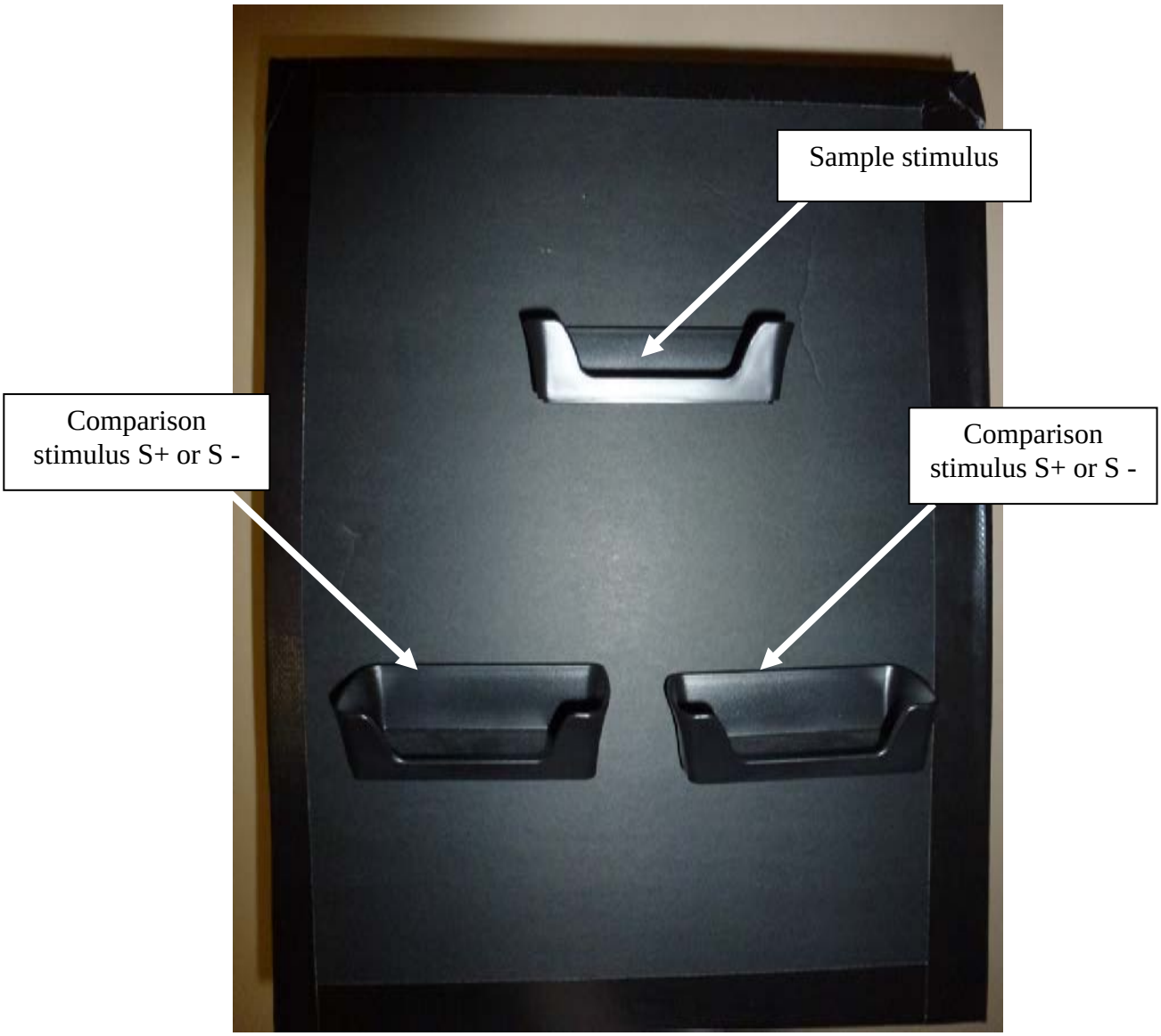
[5] The auditory discrimination in the original ABLA has been replaced with the visual-visual nonidentity conditional discrimination in the ABLA-R.

Appendix A: Stimuli for Generalized Identity Picture-Picture Matching



[1] From "Are Symmetric and Generalized Matching-to-Sample Skills Associated with Picture Preference Assessments for People with Developmental Disabilities?" by Thorne, L. M. E., 2010, Doctoral Dissertation, pp.37-38. 2010 by Thorne Dissertation. Reprinted with permission on June 20, 2014.

Appendix B: Photograph of Apparatus used for Participant 2 Pre-, Training, and Post-Assessments



Appendix C: Sample Consent and Access to Information Forms

190 Dysart Road
Winnipeg, Manitoba
Canada R3T 2N2
Phone (204)

UNIVERSITY OF MANITOBA | Department of Psychology

Dear Parent,

My name is Chelsey Michalyshyn and I am a graduate student in Psychology at the University of Manitoba. I am conducting my Master's thesis research and my advisor is Dr. Dickie C.T. Yu, Professor of Psychology and Director of St.Amant Research Centre. I am writing to ask you to consider having your son/daughter participate in my study.

This letter has been sent to you on my behalf by either the St.Amant Privacy Officer or the Service Coordinator of the St.Amant Applied Behaviour Analysis Program for Children with autism. I have not received any personal information about you. You have received this letter because the individual for whom you are the parent may benefit from participating in this study.

The aim of my research is to teach participants the ability to relate things that are identical in appearance and to see if having this ability will help them make choices using pictures. Learning to do so yields important clinical benefits such as increased independence and choice opportunities. You are being asked because your son/daughter may benefit from participating in this study. My research project is entitled, *Effects of teaching generalized identity matching on picture preference assessment for persons with developmental disabilities*, and it has been approved by the Psychology/Sociology Research Ethics Board at the University of Manitoba.

A *Project Description and Consent Form* is enclosed with more details of the study. It should provide you with a general understanding of the study and what is required for participation.

- If you would like your son/daughter to participate, please complete the last page of the form provided and mail all pages using the attached pre-paid envelope.

- If you are interested in participating in the study, like to receive additional information, or have any questions or concerns please do not hesitate to contact me.

Participation is voluntary. Whether you give consent to take part in the study will in no way affect any services you or the participant may be receiving now or in the future from St.Amant or from the University of Manitoba. If you do not wish to participate, no response is required.

Thank you for your time and consideration.

Sincerely,

Chelsey Michalyshyn, Principal Investigator
Phone:
Email: ummichal@cc.umanitoba.ca

Dr. C. T. Yu, Research Supervisor
Phone:
Email:

UNIVERSITY OF MANITOBA

Project Description and Consent to Participation Form

St.Amant

Research Thesis Title: Effects of teaching generalized identity matching on picture preference assessment for persons with developmental disabilities

Principal Investigator: Chelsey Michalyshyn, Masters Student
Department of Psychology, University Manitoba
Phone ; email: ummichal@cc.umanitoba.ca

Research Supervisor: Dr. Dickie C.T. Yu, Professor of Psychology, University of Manitoba; and Director, St.Amant Research Centre
Phone ; email:

This study is being conducted by Chelsey Michalyshyn as her Master's thesis, under the supervision of Dr. Dickie C.T. Yu. This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the study is about and what participation will involve. If you would like additional details about something mentioned here, or information not included here, please feel free to contact the principal investigator or the research supervisor. Please take the time to read this carefully and to understand any accompanying information.

What is the purpose of the project?

The aim of this research is to teach research participants the ability to relate things that are identical in appearance and to see if having this ability will help the participant make choices using pictures, which is an important skill to increase independence and choice opportunities.

What will participants do in the study, and how long will it take?

Each participant will be assessed on several tasks to determine if they are able make choices using pictures and whether training is necessary. During these tasks, I will present various materials (e.g., different containers, food items, and pictures) and ask the participant to match items based on various features (e.g., items that are identical, items that look different but they go together). These assessments will take up to approximately 6 hours, to be completed over a number of half-hour sessions. If a participant is not able to make choices with pictures, we will proceed with training (next phase). However, if a participant is already able to make choices with pictures, no training will be needed and his/her participation in the study will end.

During training, a participant will receive one-to-one teaching sessions on matching pictures. During teaching, I will provide positive reinforcement for correct answers, verbal feedback and modeling of the correct answer after an error, and if necessary, provide added cues to increase the likelihood of correct answers and then fade out those cues. After a task is learned, we will repeat some of the assessments described above to determine whether the ability to make choices with pictures has emerged. If the ability is not detected, we will teach a second task, up to a maximum of 5 tasks. If the ability has emerged, training will stop and the study will end. If all five tasks are taught, this phase will take approximately 35 hours, completed over a number of half-hour sessions.

The total amount of time needed to participate in all phases of this study will be approximately 41 hours. We will work with the participant in half-hour sessions and the sessions will be scheduled at mutually convenient times. If we are able to schedule and conduct 6 sessions per week, participation in the study will last approximately 13 weeks.

Will any recording devices be used?

With your consent, sessions will be videotaped so that we can ensure that we have carried out the procedures and recorded the participant's responses accurately. Videotapes will be stored in a locked research office at St. Amant and will be accessed only by the principal investigator and research supervisor. They will be erased in a confidential manner within 3 months after data collection has been completed. If you do not wish to consent to videotaping, you can still participate in the study. Please check either YES or NO at the end of this form.

What are the risks and benefits in taking part in the project?

The procedures of this study are commonly used in educational settings and present no foreseeable risk to the participant beyond what he/she might encounter in everyday activities.

Potential benefits from participating in the study include improving the ability to match identical pictures and to make choices using pictures. What we learn from the study may also help other individuals with similar characteristics.

How will confidentiality be maintained?

Personal identifying information obtained regarding the participant will be handled in compliance with Section 24 of the Personal Health Information Act (PHIA). A participant's identifying information will be kept in a locked office at the St.Amant Research Center. Only the researchers will have access. Any subsequent reports, publications, or presentations will not contain any identifying information. The identifying information will be destroyed in a confidential manner within 6 months after the study has been completed.

What if abuse is discovered during the course of this project?

All researchers and assistants working on this project have a legal responsibility to immediately report any instance of abuse (physical, sexual, or emotional) to the appropriate authority, as specified by The Vulnerable Persons Living with a Mental Disability Act of Manitoba and the Child and Family Services Act. We would report abuse even if doing so conflicted with our confidentiality obligations.

Is there any payment or cost for participating?

There is no payment or cost for participating.

Is participation voluntary?

Participation is voluntary. Whether you give consent for the participant to take part in the study will in no way affect any services you or the participant may be receiving now or in the future from St.Amant or from the University of Manitoba.

Moreover, even after you give consent, you may terminate your participation at any time and for any reason by calling the principal investigator (listed at the beginning of this form). Again, stopping your participation will not affect any services you or the participant may be receiving now or in the future from St.Amant or the University of Manitoba.

The assent of the participant to work with researcher will be determined at each contact by his/her willingness to come to the work area with the researcher when requested. If the participant does not do so, the session will be rescheduled. If during a session the participant pushes the teaching materials away, leaves the work area, or vocally indicates that he/she wishes to stop, the session will be determined. If a participant declines to work with the researcher or terminates a session for three sessions in a row, we will accept this as a possible indication that the person does not wish to participate in the study and will discontinue his/her participation in the study. We will discuss this with you before a decision is made.

How and to whom will the research results be shared?

The results of the study will be described in the principal investigator's written MA thesis and at her oral defense, as part of the degree requirements. The results may also be published in a scientific journal, professional newsletter, and presented at professional meetings and workshops, so that others may learn from this research. The participants' identities will be protected in all forms of results dissemination.

Since the assessment and training results obtained during the study may be clinically useful for primary care staff supporting the participant or instructors/tutors working with the participant, we can share the results with identifying information with the participant's primary care staff or primary instructors/tutors at St.Amant if you give us permission to do so at the end of this form.

Signing the Consent Forms

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the project at any time, and/or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the Psychology/Sociology Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator (HEC) at phone number . A copy of this consent form has been given to you to keep for your records and reference.

Signatures

I, _____ here by consent to: _____'s
(*please print your name*) **(*please print participant's name*)**

participation in the project, entitled *"Effects of teaching generalized identity matching on picture preference assessment for persons with developmental disabilities"*.

Please provide a primary phone number and address which you can be reached by the researcher here:
Phone: (_____) _____- _____ Address:

Please check YES or NO for the following items:	**YES**	**NO**
• I would like to receive the results of this project.		
If you responded Yes to the previous statement, please write your preferred email or mailing address here:		
• I allow the researchers access to personal health information (i.e., DOB, diagnosis, cognitive function, adaptive behaviors, visual and/or hearing impairments.		
• I allow the researchers to make confidential video records of sessions to improve the reliability of their observations.		
• I allow the researchers to share the participant's assessment and training results with authorized St.Amant staff who work directly with the participant. The results may help the staff provide better care and support for the individual.		
• I allow the researchers to share the participant's results with another individual or individuals (e.g., family members). *Please attach name and mailing address for each individual.*		
• The researchers may contact me directly to inform me of possible future related studies.		

_____	_____	_____
Signature of Consenting Individual	**Relationship to Participant**	**Date**
_____	_____	_____
Name of Researcher/Delegate	**Signature of Researcher/Delegate**	**Date**

Please return all pages of this *Project Description and Consent to Participation Form* in the enclosed stamped envelope to the researcher. A copy will be sent to you for your records. Thank you.

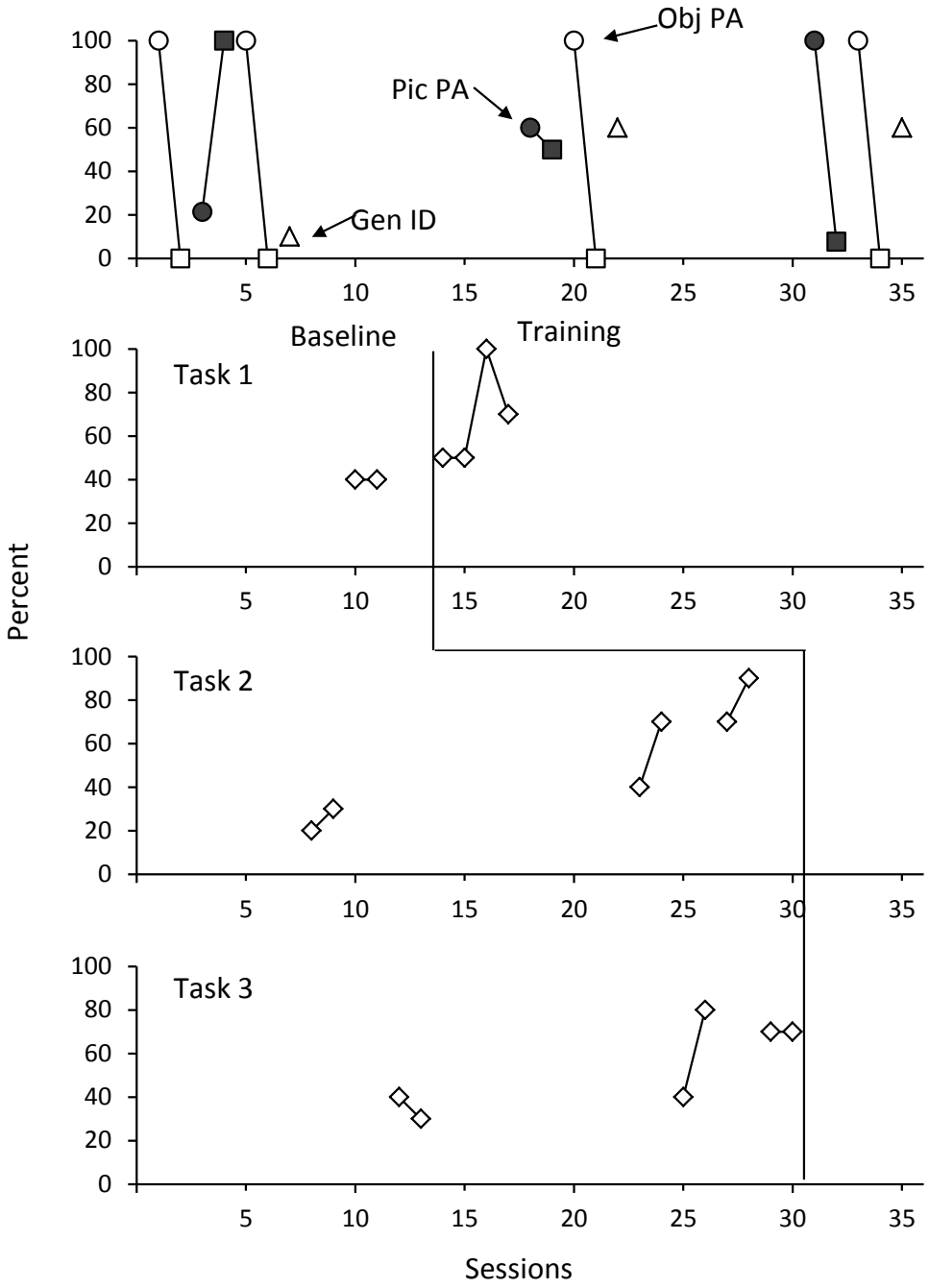


Figure 1. Top graph shows percentage of trials of HP and LP item selection during preference assessment with objects and pictures and performance on generalized identity matching for Participant 1. Bottom three graphs show percentage of correct responses on identity matching tasks during pre-training baseline, training, and post-training baseline sessions for Participant 1.

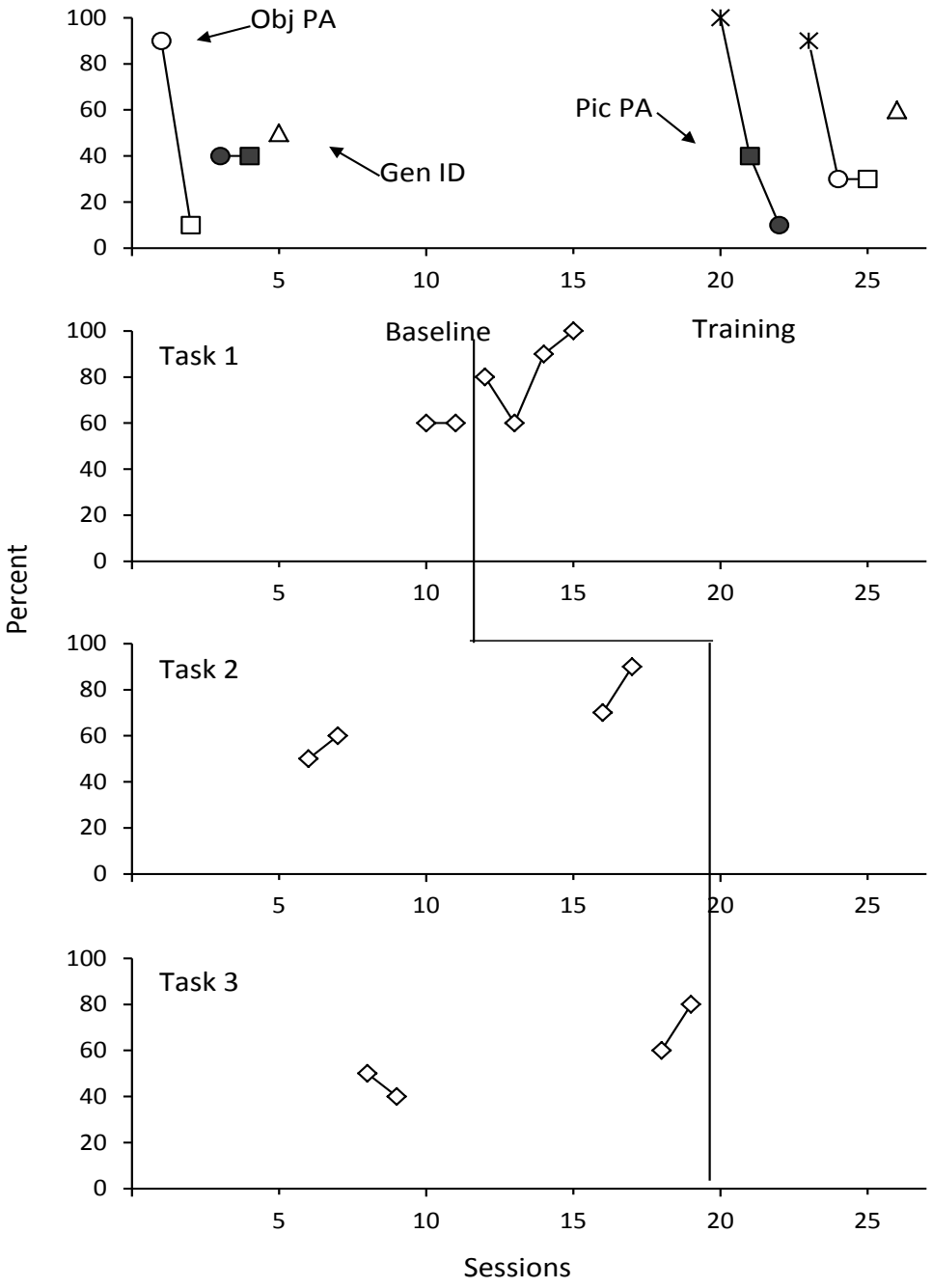


Figure 2. Top graph shows percentage of trials of HP and LP item selection during preference assessment with objects and pictures and performance on generalized identity matching for Participant 2. Bottom three graphs show percentage of correct responses on identity matching tasks during pre-training baseline, training, and post-training baseline sessions for Participant 2.