Stimulus Preference Assessment with Immediate versus Delayed Item Access

By

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Abstract

For individuals with severe intellectual or developmental disabilities, communicating preferences can be a monumental task. In order to help identify what a person likes or prefers, a formal stimulus preference assessment can be conducted with the individual. Typically, when examining preference in people with developmental disabilities, the individual being tested is given access to their chosen item immediately after a response is made. However, there are many items and activities in everyday situations that cannot be accessed immediately. The present study evaluated whether immediate or delayed access to items during a paired-stimulus preference assessment impacted preference hierarchy concordance for three people with developmental disabilities. The preference hierarchies between immediate and delayed access conditions were positively correlated for all three participants, with Tau coefficients ranging from .35 to .91, although they were not statistically significant. The most preferred item identified in the delayed condition was also the most preferred item in the immediate access condition for two of the three participants.

Keywords: access, choice, paired-stimulus, stimulus preference assessment

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Stimulus Preference Assessment with Immediate versus Delayed Item Access

A crucial part of behavioral interventions, especially those involving the use of reinforcement procedures, is the use of a systematic stimulus preference assessment. Stimulus preference assessments can foster the independence of individuals by allowing them to choose the types of activities, food, or items they prefer. Increasing the number of choices for individuals with developmental disabilities has been shown to reduce the frequency of problem behaviours (Lohrmann-O'Rourke & Yurman, 2001), and increase their level of engagement with tasks (Cole & Levinson, 2002). Previous research has largely operated under the assumption that immediate access to preferred items should be given when formal assessments are conducted. However, in preference assessments that are used to identify reinforcing leisure activities, there are inherent and natural delays that occur from the identification of the preferred stimulus, to the presentation of that activity. This naturally occurring delay may in fact be influencing the choices of the individual, and the reinforcing value of the stimulus. The purpose of my study was to compare the preference hierarchies derived from immediate vs. delayed access to selected items during stimulus preference assessment. In the ensuing sections, I will provide a review of stimulus preference assessment methods, a review of relevant studies, statement of the problem, the study's methodology, and the results and discussion of the experiment.

Stimulus Preference Assessment Methods

Behavior change programs based on applied behavior analytic principles often make use of reinforcement procedures to modify target behaviors. Reinforcement is defined generally by Cooper, Heron and Heward (2020) as when a response is followed by stimulus change, similar responses become more likely. Reinforcement can occur generally via two separate but related processes: negative and positive reinforcement. Positive reinforcement occurs when a response

becomes more likely after a particular stimulus is presented or added immediately following the occurrence of that response. In negative reinforcement, a response becomes more likely as a result of a particular stimulus being withdrawn or removed immediately following the occurrence of that response. In both positive and negative reinforcement, responses become more likely to occur in future similar situations. Alluded to above is that although often considered a basic assumption of behavior change programs, the identification of effective reinforcers can impact a programs overall effectiveness. By far the most widely used method for identifying reinforcers for individuals with severe developmental disabilities is the use of a direct assessment of preference called stimulus preference assessment. Preference assessments in general involve asking an individual to indicate their preferred items when the items presented either individually, in pairs, or in arrays. There are a number of different methodologies used when conducting stimulus preference assessments. Although there are variations of each, the most studied assessment formats include single-stimulus, paired-stimulus, multiple-stimulus, multiple stimulus without replacement, and free-operant (Heinicke, Carr, & Copsey, 2019; Kang et al., 2013; Virués-Ortega et al., 2014). Importantly, stimulus preference assessments have been shown to be effective across differing populations, including adults diagnosed with schizophrenia (Wilder, Ellsworth, White & Schock, 2003), and adolescents diagnosed with emotional-behavioural disorders (Paramore & Higbee, 2005).

In single-stimulus assessments, only one stimulus is presented on each trial. The most preferred stimulus is identified by comparing the duration of interaction for each item. The item that was interacted with for the longest period of time is seen as the most preferred. A disadvantage of this method is that it can be time consuming to conduct, since items are presented individually, and there is a tendency for individuals to approach all items.

A paired-stimulus procedure (Fisher et al., 1992) is done by presenting two stimuli at the same time, while asking a participant to choose only one. Preference in this type of procedure is measured by analyzing the proportion of trials a specific stimulus is chosen out of all the trials where it was presented. Advantages of the paired-stimulus procedure are that it is less time consuming than the single-stimulus procedure, and each item's reinforcing value is tested against every other item. This allows clinicians and researchers to be more confident in the preference value of the items.

In both multiple-stimulus and multiple-stimulus-without-replacement procedures, an array of six to eight stimuli is presented on each trial, and the participant chooses from the available stimuli. In multiple-stimulus, all stimuli are presented on every trial, whereas in multiple-stimulus-without-replacement, the chosen item on a trial is removed from subsequent trials during the assessment. Relative preference among the stimuli could be measured as a function of the order the items are chosen. That is, the item that is chosen first would be considered the most preferred item. Multiple-stimulus preference assessments can be advantageous in that they are typically more efficient than both the single-stimulus and paired-stimulus preference assessments. In this assessment, a person may choose the same item on every trial. Although this tells us which item is most preferred, a disadvantage is that no preference information is produced for other items. This limitation is corrected by the multiple-stimulus-without-replacement procedure. However, a disadvantage of this procedure is that not every item is paired with every other item equally. That is, after each response, the chosen stimuli is not placed back into the array, thereby creating the opportunity for each subsequent response to be impacted by the number/type of stimuli still available in the array.

Free operant procedures allow participants to interact with all available stimuli at the same time after a simultaneous presentation of the stimuli, with the amount of time a particular stimulus is engaged with as the measure of preference strength. Relative preference among the stimuli is determined by how much time is spent engaging with each item. In general, engagement-based procedures would be used over other types of procedures for specific reasons. Virués-Ortega et al. (2014) suggest using engagement-based procedures when you want to avoid tangibly-maintained behaviours, when you are identifying long-duration high preference items, and if you are required to assess the preference of a single stimulus. All of the above considerations should be taken into consideration when choosing a particular assessment method.

Each stimulus preference assessment method carries with it advantages or disadvantages in terms of predictive validity, consistency, and efficacy. For example, a disadvantage of the multiple stimulus without replacement procedure is that not all items are paired together as they are in paired-stimulus procedures. This has the potential to influence preference. The paired stimulus procedure, however, allows for each item to be paired with every other item at least once, providing for a more complete analysis of each item's preference relative to each other item being assessed. In contrast, an advantage of multiple-stimulus procedures is that they are generally faster to administer. This has the potential to reduce the number of occurrences where participants fail to make choices due to fatigue.

Preference Assessment and Access to Chosen Stimulus

Once the individual makes a choice in paired-stimulus, multiple-stimulus, and multiple-stimulus-without-replacement procedures, they are usually given access to the item for a set amount of time (e.g., 30 s), and a new trial begins with a new item, pair of items, or array of items that either does or does not include the previous item that has been chosen (i.e., with or

without replacement). However, there have been relatively few studies that have systematically investigated the impact of providing access to a preferred item immediately versus not providing access to items or delaying access to items. An examination of the effects of access on preference hierarchies is important for a simple, yet important reason: making a choice in everyday situations does not always result in receiving the selected item immediately. If an individual is given the opportunity to choose between activities as a reward such as watching their favourite TV program, going to a walk, going to a movie, or riding their bike through the park, the reward often only occurs after a delay. Examples in relation to the above may include an individual having to put their shoes or coat on, driving to the movie theatre, or simply waiting until the TV program is on. In these examples, the reinforcement does not occur immediately, but rather after a naturally occurring delay that may last a few minutes, to possibly hours or even days. Heinicke et al. (2019) conducted a systematic review of alternative modality stimulus preference assessments and specifically highlighted the implications associated with giving access to reinforcing items during a stimulus preference assessment. The authors noted that 58% of the 32 studies included in the review included contingent (immediate) reinforcer access, and approximately 20% of studies directly assessed access to stimuli as a variable that could impact assessment results. Overall, the authors concluded that further research was needed into differential item access across stimulus preference assessment modalities.

More specifically, previous research has attempted to answer the question of how access to items during a preference assessment impacts preference hierarchy stability. Hanley, Iwata and Lindberg (1999) looked at how delivering activities as reinforcers impacted preferences when access to the activity was given immediately, or when access was delayed using a pictorial preference assessment. Results indicated that differential responding (i.e., exhibiting a

preference) only occurred during the immediate access condition, and not during no access condition. These results highlight that the unique reinforcement that occurs while interacting with the stimuli and not simply the reinforcement associated with the act of choosing a stimulus can impact preference. A limitation of this study was that the no-access condition always preceded the access condition, since it was the baseline condition in the multiple-baseline design. Also, preference hierarchies from the two conditions were not compared.

Higbee, Carr and Harrison (1999) compared two preference assessment methods. One involved presenting tangible items and a choice response resulted in 20-s access to the selected item and the other involved presenting pictures (representing the items) and a choice response did not result in access to the item in the selected picture. Results indicated that differential responding only occurred when participants were given access to the tangible stimuli, and not when photographs of the stimuli were used, and access to tangible stimuli was not given. Across the two participants, item selection percentage differences from the most to least preferred items were 37.7% in the tangible assessment, and 13.3% in the pictorial assessment for one participant, and 48.2% and 11.3% for the second participant in tangible and pictorial assessment respectively. The most preferred items chosen in the tangible/access conditions were stronger reinforcers (as measured by direct reinforcer assessments) than those found in the pictorial/no-access condition. A limitation of this study was that the stimulus modality (tangible vs. pictorial) was confounded with access.

Tessing, Napolitano, McAdam, DiCesare, and Axelrod (2006) presented items verbally using a paired-stimulus preference assessment procedure. All stimuli were presented only verbally by asking the participants, “would you rather do *x* or *y*?” In the no-access condition, the next trial was presented after each selection, whereas in the access condition, 2-minute access to

the selected stimulus was given after a selection. Changes in preference rankings were found in 6 of 7 participants' preference hierarchies, with a mean rank correlation (Tau) of .24. The participant who showed similar preference rankings across the items had a rank correlation of .73. Subsequent reinforcer assessments found that higher rates of math problem completion occurred for preferred activities identified in the access condition, when compared to a no access condition.

Kuhn, DeLeon, Terlonge, and Goysovich (2006) compared verbal only with access and verbal plus tangible with no-access. Participants in the study were given paired-choice assessments (Fisher et al., 1992). In verbal-only assessments, all stimuli were presented only verbally by asking the participants, "would you rather do *x* or *y*?" Choice indication resulted in the next trial being presented without access to items. In the verbal-plus-tangible assessment, participants were again asked "would you rather do *x* or y?" and upon choice indication, access was given to the chosen stimulus for approximately 30 seconds. The authors conducted spearman rank-order correlations and found coefficients comparing the two assessment methods to be .33 for the first participant, and -.17 for the second participant. Following reinforcer assessments, the authors concluded that the verbal plus tangible assessment was more accurate in identifying reinforcing stimuli. As identified by the authors, a significant limitation to the study was that both the antecedents and consequences were manipulated across the verbal-only and verbal-plus-tangible preference assessments. This increases the difficulty with isolating the impacts of variables impacting responding.

Groskreutz and Graff (2009) compared three different paired-stimulus preference assessment formats: tangible with access, pictorial with access, and pictorial without access. Across participants, a paired-stimulus assessment was used (Fisher et al, 1992). During tangible

assessments, items were presented in pairs, where item order was pre-determined, items were presented equally on both left and right sides. Choice responses lead to access the item (i.e. consuming the item). Pictorial access assessments differed in that pictures of edible items were used as stimuli. Again, choice responses lead to accessing the tangible item for consumption, which were stored out of view of the participant during the session. Pictorial without access assessments differed only from pictorial access assessments in that choice responding lead to the next trial being presenting, with no access to the edible item given to the participant. Phase 1 results showed that for four out of the five participants, the same item was ranked highest across assessment formats. Subsequent Kendall rank order correlations were conducted, which showed that when compared to tangible assessments, pictorial assessments both with and without access were similar across four out of five participants. Pictorial with access assessment concordance ranged from .84 to 1, and pictorial without access concordance ranged from 0 to .98. A limitation of the study is the small sample size. Systematic replication of the results would strengthen the results found.

In 2010, Davis et al. investigated the impact that item access had on preference when they compared tangible and pictorials preference assessments with and without item access using a variety of stimulus modalities (e.g., toys, activities and edibles). Four different conditions were randomized across six participants: actual item with access, actual item with no access, picture with access, and picture with no access. In actual item with access condition. Participants were asked to “choose one” after each item was made. When choice responding occurred, the participant was given access to the item for one minute (i.e. consumption of edibles or access to tangibles). In the actual item with no access condition, procedure differed only in that after choice responding occurred, items were removed without allowing access, and the next trial was

presented. In picture with access conditions, participants were presented with pictures of items, and asked to "choose one" after each item was named. When choice responding occurred, the actual item was presented, and access was given for one minute (i.e., consumption of edibles or access to tangibles). The picture with no access condition differed only in that after a participant engaged in choice responding, the pictures were removed, and the next trial began with no access to the actual item given. Results of the study indicated that any one of the four possible conditions generated reliable high preference items, as confirmed by subsequent reinforcer tests. Overall, the picture-based, no item access condition was the most efficient in general, compared to the picture-based immediate access, tangible no access, and tangible immediate access conditions. Limitations of the study as noted by the author included a small sample size, and lack of procedural fidelity measures regarding preference assessment procedures. Systematic replication of the results addressing those limitations would strengthen the study's findings.

Preference assessments can also vary in the mode of stimuli that are assessed. Items can range from tangible items such as toys, pictorial representations of items/activities, and video representations of items/activities. Both the assessment method and the mode of stimuli used have been shown to impact assessment results. A recent review of preference assessment studies indicated a wide array of results that can be summarized by saying that perhaps the most effective method at identifying reinforcers for an individual is to tailor the assessment method and stimuli used to the individual themselves, and to the type of intervention being created (Kang et al., 2013). Choosing the correct method to assess preference has clinical implications as well. Virués-Ortega et al. (2014) conducted a literature review and created a decision-making model for clinicians based on several key aspects of preference assessments such as: preference assessment methods, type of stimuli, time needed to complete the assessment, and the setting.

Statement of the Problem and Study Purpose

Although there is a large body of literature investigating stimulus preference assessments (see reviews by Heinicke et al., 2019; Virués-Ortega et al., 2014), there have been relatively few studies that have investigated item access during preference assessment with only one study (Davis et al., 2010) that directly compared access and no access using tangible items as the choice stimuli.

Therefore, my study sought to address this question: Would paired-stimulus preference assessment with immediate versus no item access to the chosen stimulus yield similar preference hierarchies?

Method

Participants

Three participants with developmental disabilities were recruited from St.Amant to take part in the study. St.Amant is a not-for-profit organization in Winnipeg, Manitoba that offers resources and services to individuals with developmental disabilities and autism spectrum disorder and their families. Two males and one female participated in the study. Participant 1 (P1) was a 27-year-old male, with a diagnosis of intellectual disability. P1 had no speech and used a wheelchair for mobility. P1 laughed out loud when he appeared to enjoy the interactions during assessment sessions. P1 completed all preference assessments after three, 30-minute sessions, which occurred across a span of 20 days. Participant 2 (P2) was a 44-year-old female, with a diagnosis of intellectual disability. P2 has no speech, used a wheelchair, and engaged in some vocalizations. Researchers confirmed with P2's circle of care that vocalizations from P2 typically appeared to indicate that she wanted a break or could lead to a lack of engagement with activities. P2 completed all preference assessments after five 30-minute sessions, which

occurred across a span of 28 days. Participant 3 (P3) was a 22-year-old male with a diagnosis of intellectual disability. P3 had no speech and used a wheelchair for mobility. P3 did engage in some vocalizations during sessions, as well as clapping, which appeared to indicate enjoyment. P3 completed all preference assessments after three, 30-minute sessions, which occurred across a span of 19 days. None of the participants had been previously assessed on the ABLA-R.

Diagnoses, age, and gender were not controlled in the study since previously described research indicated that both preference and discrimination skills assessments have been found to be applicable to individuals with a range of diagnoses, ages, as well as gender. Ethical approval for the study was obtained from the Psychology/Sociology Research Ethics Board at the University of Manitoba. Research Access approval was also obtained from St.Amant. Signed informed consent was obtained from the legal decision maker for each participant before sessions began (see Appendix A). Before the beginning of each session, I assessed whether the participant assented to the session. If participants engaged in any behaviour (e.g., pushing table away, repeated lack of responding, and loud vocalizations) that suggested they did not assent, the session was cancelled, and attempted again at a later date.

Setting

All stimulus preference assessments took place in a quiet testing room at St.Amant, where the participant and researcher sat at a table across form one another. All sessions were video recorded, with consent, in order to facilitate interobserver agreement and procedural fidelity assessments.

Materials

Items for stimulus preference assessments. Five items were tested for each participant and the same items were used in the immediate and delayed conditions. Specific items were

chosen based on staff and caregiver recommendations, as well as the ease of presenting each stimulus. The following items were used for each participant: P1 was assessed using a slinky, maraca, stuffed dog, clap toy, and Slinky Pop Toob®; P2 was assessed using a stuffed dog, slinky, maraca, Playdoh® and a Slinky Pop Toob®; and P3 was assessed using a toy keyboard, slinky, Slinky Pop Toob®, toy drum, and a stuffed dog.

Procedures

Preference assessment with immediate access. A paired-stimulus preference assessment procedure was used to establish a preference hierarchy. The paired-stimulus assessment method was chosen over other methodologies (e.g., multiple stimulus without replacement) due to the fact that the paired-stimulus procedures allows each item to be paired with each other item. This ensures that the preference of each individual item is weighted against each other item equally. Each stimulus was paired with every other stimulus twice. The positions and order of the stimuli were counterbalanced across trials. Before each block of trials, participants were given a brief exposure period to each stimulus for approximately 30 seconds in order to become acquainted with the items. During each trial, I presented the stimuli at eye level to each participant and asked the participant to "look". Once the participant attended to each stimulus, items were placed on the table and participants were asked to "pick one". When the participant touched or pointed to an item, verbal praise was given, all other stimuli were removed from the table, and access was given to the chosen item immediately and for approximately 30 seconds. If the participant attempted to touch both stimuli simultaneously, they were blocked gently, and that trial was repeated. At the conclusion of each session, the preference for each stimulus was calculated by dividing the number of trials each stimulus was chosen by the total

number of trials that particular stimulus was available and multiplied by 100. This resulted in a percentage for each item.

Preference assessment with delayed access. The preference assessment procedures with delayed access were identical to the procedures for immediate access with one exception. During the delayed access condition, the participants were not given the selected stimulus immediately after making a choice. Instead, only verbal praise was given, and all stimuli were removed from the table. At the conclusion of a session, the percent preference for each stimulus was calculated as in the immediate access condition, and the most preferred item was presented to the participant for a specific period of time, dependent on the number of times the item was chosen. Specifically, the duration of access was calculated by taking 30 seconds and multiplying it by the number of times the item was chosen. For example, if the most preferred item was chosen six times during the session, the participant would be given access to the item at the conclusion of the assessment for three minutes.

Counterbalancing of conditions. The order of the immediate and delayed access conditions was counterbalanced across participant. P1 completed the delayed condition first based on a coin flip. Participants alternated between immediate and delayed conditions thereafter.

Reliability Checks

Interobserver agreement on dependent measures. Observers were trained to observe and record the responses during paired stimulus preference assessment procedures until a 100% agreement with the experimenter had been achieved for one mock training session. An assessment trial was defined as being in agreement if both the experimenter and the observer

recorded the same response; a trial with different recordings by the experimenter and observer were scored as a disagreement.

Interobserver agreement assessments were conducted for all preference assessment sessions and for all participants. An observer viewed each recorded session independently and scored the participant's choice on each trial. Percent agreement for each session was calculated by taking the number of agreements divided by the number of agreements plus disagreements and multiplied by 100. Across all participants, mean percent agreement per session was 99% (range 99 to 100%), indicating high level of agreement across observers.

Procedural fidelity assessment. Procedural reliability checks were conducted for all sessions and for all participants. To assess procedural fidelity, a checklist of steps (Appendix C) was used to score each trial (e.g., the correct stimuli were presented in the correct positions, the stimuli were removed after a choice, the correct consequence is applied, etc.). A trial is scored as delivered correctly if all the above steps are performed correctly. The mean percentage of correctly delivered trials per sessions across participants was 99.1% (range 99 to 100%), indicating a high level of procedural fidelity.

Results

All trials were completed over a seven-week span, with a total of approximately 184 minutes spent in session across all participants. Figure 1 shows the percentage of trials each item was selected for each participant in both immediate and delayed item access conditions. Items are ordered from the most to least preferred based on the assessment in the immediate access condition along the *x*-axis. P1's results are shown in the top graph. P1's most preferred item in the immediate condition was the Slinky® (100%), followed by the maraca (62.5%), the stuffed dog (50%), the clap toy (25%), and the Slinky Pop Toob® (12.5%). In the delayed condition,

Slinky® and maraca tied as the most preferred items (75%), followed by the stuffed dog and clap toy (tied at 50%), and the Slinky Pop Toob® as the least preferred item (0%). Relative preference among the items was similar on both preference hierarchies, with agreements on the most, moderately, and least preferred items. The two preference hierarchies were strongly and positively correlated, with a Kendall's Tau (τ) rank coefficient of .91, although it was not statistically significant (p = .07).

P2's results are shown in the second graph of Figure 1. P2's most preferred items in the immediate condition were Slinky® and stuffed dog (tied at 87.5%), followed by maraca (37.5%), Playdoh® (25%), and the Slinky Pop Toob® (12.5%), in order. In the delayed condition, Slinky® remained the most preferred item (75%), followed by maraca and Playdoh® (tied at 50%), and lastly the stuffed dog and Slinky Pop Toob® (tied at 37.5%). Except for the stuffed dog, the relative preferences among the stimuli were similar in both conditions. The two preference hierarchies were positively but not significantly correlated, with a Kendall's Tau (τ) rank coefficient of .35 (p = .59).

P3's results are shown in the bottom graph of Figure 1. P3's most preferred items in the immediate condition were the keyboard and Slinky® (tied at 75%), followed by the Slinky Pop Toob® (62.5%), drum (37.5%), and the stuffed dog (0%). In the delayed condition, the Slinky Pop Toob® was the most preferred item (87.5%), followed by the keyboard (75%). Slinky® and drum tied as the next most selected items (37.5%), with the stuffed dog in the last position (12.5%). Although the two preference hierarchies agreed on the least preferred item, there was only moderate agreement on relative preference for the remaining items. For P3, the two preference hierarchies were positively but not significantly correlated, with a Kendall's Tau (τ) rank coefficient of .44 (p = .30).

To examine whether preference changed within sessions, percentage of trials each item was selected was computed based on the first 10 trials and the second (last) 10 trials of each assessment (see Table 1). There does not appear to be a consistent pattern of preference change from the first half to the second half of preference assessment sessions in either the immediate or delayed access condition. In general, the most and second most preferred items identified during the first and second half of the session were also the most and second most preferred items identified during the full session in both the immediate and delayed access conditions. In order to extend this data analysis, the range and standard deviation for each half of the sessions, for each participant was calculated for immediate item access and delayed item access conditions (see Table 1). In the immediate condition, P1's standard deviation was 39.53 in both the first and second half of the trials with the range also remaining constant at 100. P2's standard deviation in the first half of the trials was 39.53, and 35.36 in the remaining 10 trials, with ranges of 100 and 75 in the first and second half respectively. P3 had an SD of 30.62 in the first half, and 39.53 in the second half, with ranges of 75 and 100 in each respective half of trials. For the delayed condition, P1's standard deviation was 30.62 in the first half of trials and increased to 39.53 in the second half. P1's ranges in the delayed condition were 75 and 100 in the 1st and second half of trials respectively. P2 had a standard deviation of 30.62 in the first half of trials, and 13.69 in the second half. The ranges were 75 and 25 respectively. Finally, P3's standard deviation across the first and second half of trials remained constant at 39.52, as did their range of 100. In general, standard deviations remained relatively consistent across participants and conditions. P2 was the exception, an SD of 30.62 in the first half of the trials in the delayed condition, and 13.69 in the second half of the trials. A reduction in the range from 75 to 25 was also identified.

Discussion

The preference hierarchies between immediate and delayed access conditions were positively correlated for all three participants, ranging from .35 (P2) to .91 (P1), although they were not statistically significant. P1 shows high concordance between preference hierarchies with agreement in the most and least preferred items. For P2, although one of the most preferred items in the immediate access condition became one of the least preferred items in the delayed condition, relative preference among the remaining items was similar in both conditions. For P3, concordance in relative preference for the two most preferred items in the immediate condition was low. However, relative preference among the three remaining items was similar. From a practical standpoint, the most preferred item identified in the delayed condition was also a most preferred item in the immediate condition for two of the three participants (P1 and P2). This result holds potential clinical implications. If clinicians take this finding into account, they may choose to conduct a delayed access SPA in order to increase the efficiency of their assessment. However, given that the most preferred item was only identified for two out of three participants, clinicians should be cautious in moving to stimulus preference assessments that withhold all access, as well as to other formats of assessments.

Resulting correlations, although all positive, were not statistically significant. There are a couple of plausible explanations for this. The range of preference within subject was not large. P1, who happened to have the largest ranges between least and most preferred (87.5% and 75% for the immediate and delayed access conditions, respectively), also had the highest correlation, whereas P2, who had the smallest ranges (75% and 37.5%) had the weakest correlation. Moreover, except for the most preferred item (Slinky at 75%), P2's preference for the remaining items was relatively undifferentiated, ranging from 37.5% to 50%. Correlation coefficients were

likely further reduced by ties. P2 had three ties (one in the immediate condition and two in the delayed condition), P3 had two (one in each condition) and P1 had one tie in the delayed condition. Finally, it is likely that the small sample (5 items per participant) in the study impacted the values obtained. It should be noted that the reported correlations were calculated using Microsoft Excel© Real Statistics Resource Pack software (Zaiontz, 2020). Correlation for P1 approached significance (p = .07) using the above software. However, this was found to be statistically significant (p = .04) using the following online calculator (https://astatsa.com/CorrelationTest/). In order to address this in future research, replications may wish to increase the number of items assessed (e.g., 6-10 items). A larger number of items may increase statistical power. When taken into context of previous research in this area, my study fell slightly below the range of items assessed. Specifically, Davis et al. (2010); assessed 8 stimuli per participant; Hanley et al. (1999) assessed 7 stimuli; Higbee et al. (1999) evaluated 7 stimuli; and Tessing et al. (2006) assessed 9-10 stimuli.

P3's assessment results could have been affected by fatigue also. P3 was attending school daily from 9:00am and 4:00pm. It is possible that by the time he was assessed around 5:00 pm, response fatigue had set in. P3 had a number of sessions postponements caused by him being asleep in his chair at his scheduled session time.

It is also important to note that each of the studies highlighted above compared immediate item access with no item access, differing from this studies comparison of immediate versus delayed item access. For my study, the term delayed was chosen over no item access because participants did receive their preferred items at the end of the session.

Delayed access may constitute an extinction condition in that a person does not receive the item immediately after choosing it, especially if the delayed access condition preceded by the

immediate access condition. In the present study, based on random assignment, P2 was the only participant who was exposed to the immediate condition before the delayed condition. Indeed, the most preferred item (Slinky) did show a decrease in preference within session during the delayed access condition. However, Slinky did remain the most preferred item based on the full session assessment. More data, both in terms of participants and trials, are needed before firm conclusions can be drawn regarding extinction effects

It is also important to discuss the possibility that verbal praise given throughout both immediate and no access conditions mediated the impacts of tangible reinforcement of access, reducing the impact of access. Since there were no trials in which participants did not choose an item, a more direct analysis of this possibility is difficult. However, it should be taken into consideration with future replications.

As highlighted above, several studies have compared access and no access conditions using the same stimulus mode as choice stimuli during preference assessment. For example, Hanley et al. (1999) and Groskreutz and Graff (2009) both compared access vs. no access using pictures as choice stimuli during preference assessment, and Tessing et al. (2006) compared access conditions using verbal presentations. In general, these studies have shown that immediate access was more reliable in identifying preference. Davis et al. (2010) was the only study that compared immediate and no-access conditions using tangibles as the choice stimuli and their findings appeared to be comparable to the present study. Although Davis et al. did not compute correlations, I computed the Tau coefficient for each of their participants based on visual inspection of the individual data presented in their publication. The mean Tau coefficients was .59, ranging from .09 to .87 across 6 participants. The correlations appeared comparable to the present study, which had a mean correlation of .57, ranging from .35 to .91 across 3

participants. The present study adds to the limited research comparing access conditions using tangibles, which suggests that both immediate and delayed access in tangible preference assessments yield similar results, unlike picture or verbal preference assessments. It is possible that tangible items exert stronger stimulus control on choice responses than pictures and verbal presentations regardless of the consequence. If this is true, perhaps future research should compare access conditions using video clips of the choice stimuli in preference assessment.

Several limitations of the current study should also be noted. Importantly, the small number of participants limits the generalizability of the results. Replication with more individuals is needed to establish the external validity of the present findings. Another limitation is the small number of items tested and the range of the preference values, which may have led to the lack of statistical significance in the correlations. Future research should seek to remedy this by replicating this study using more items and maximizing the range of preference values among the items. Also, future research could compare immediate access and delayed access conditions using edible items, as well as using different assessment procedures (e.g., multiple-stimulus-without-replacement). Lastly, no reinforcer assessment was conducted in the present study. Future study could assess the reinforcing values of the most and least preferred items identified by the assessments.

Because I was unable to complete the sessions needed to test my additional hypothesis of discrimination skills impacting concordance, no conclusions can be drawn regarding the relationship between discrimination skills and preference as a result. Future research regarding the influence of prerequisite skills such as discrimination skill level may seek to build on measuring the relationship between those skills and preference assessment hierarchy

concordance. Specifically, future studies should seek to test whether concordance across access conditions improves if discrimination skill level also improves.

Initial results suggest that a relationship may exist between how items are presented, and the relative preference of that item. The vast majority of the time, immediate item access is given after correct response in clinical settings. However, if delays impact preference for items, it is possible that how paired-stimulus preference assessments are done in clinical settings are directly impacting assessment results, and therefore, outcomes of larger behaviour change programs. In clinical settings, it may be best to perform the assessment in a way that best approximates the conditions under which the individual would encounter the stimuli in the natural environment. One example illustrating this point would be to match the assessment parameters to a typical situation where someone points out the potential difference between two choices. Specifically, when describing possible choices for reinforcing activities, one might point out that while the movie theatre may be reinforcing, you have to wait to a certain time of day to come into contact with that reinforcer. A possible procedural match to that situation would be delaying access to the reinforcing item during pre-trial exposures for a period of time, mimicking the delay that occurs naturally in the environment. As well, clinicians may note that sacrificing efficiency for accuracy may prove a worthwhile endeavor. While some assessment methods take longer than others, the accuracy of the assessment results is the main indicator of success in later behaviour change programs involving the item assessed as possible reinforcers. Finding varying stimulus preference methodologies that test a wide variety of potentially reinforcing stimuli, and that do not sacrifice accuracy for efficiency should be the main goal for future research.

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Table 1

Percentage of Trials an Item was Selected During the First and Last 10 Trials for Immediate and Delayed Access Preference Assessments

	Immediate Access Condition		Delayed Access Condition	
	First 10 Trials	Last 10 Trials	First 10 Trials	Last 10 Trials
Participant 1				
Slinky	100	100	75	75
Maraca	75	50	50	100
Stuffed Dog	25	75	50	50
Clap Toy	50	0	75	25
Slinky Pop Toob	0	25	0	0
Range	100	100	75	100
Standard Deviation	39.53	39.53	30.62	39.53
Participant 2				
Slinky	75	100	100	50
Stuffed Dog	100	75	50	75
Maraca	50	25	25	75
PlayDoh	25	25	50	50
Slinky Pop Toob	0	25	25	50
Range	100	75	75	25
Standard Deviation	39.53	35.36	30.62	13.69
Participant 3				
Keyboard	50	100	75	75
Slinky	75	75	50	0
Slinky Pop Toob	75	50	100	100
Drum	50	25	25	50
Stuffed Dog	0	0	0	25
Range	75	100	100	100
Standard Deviation	30.62	39.53	39.53	39.53

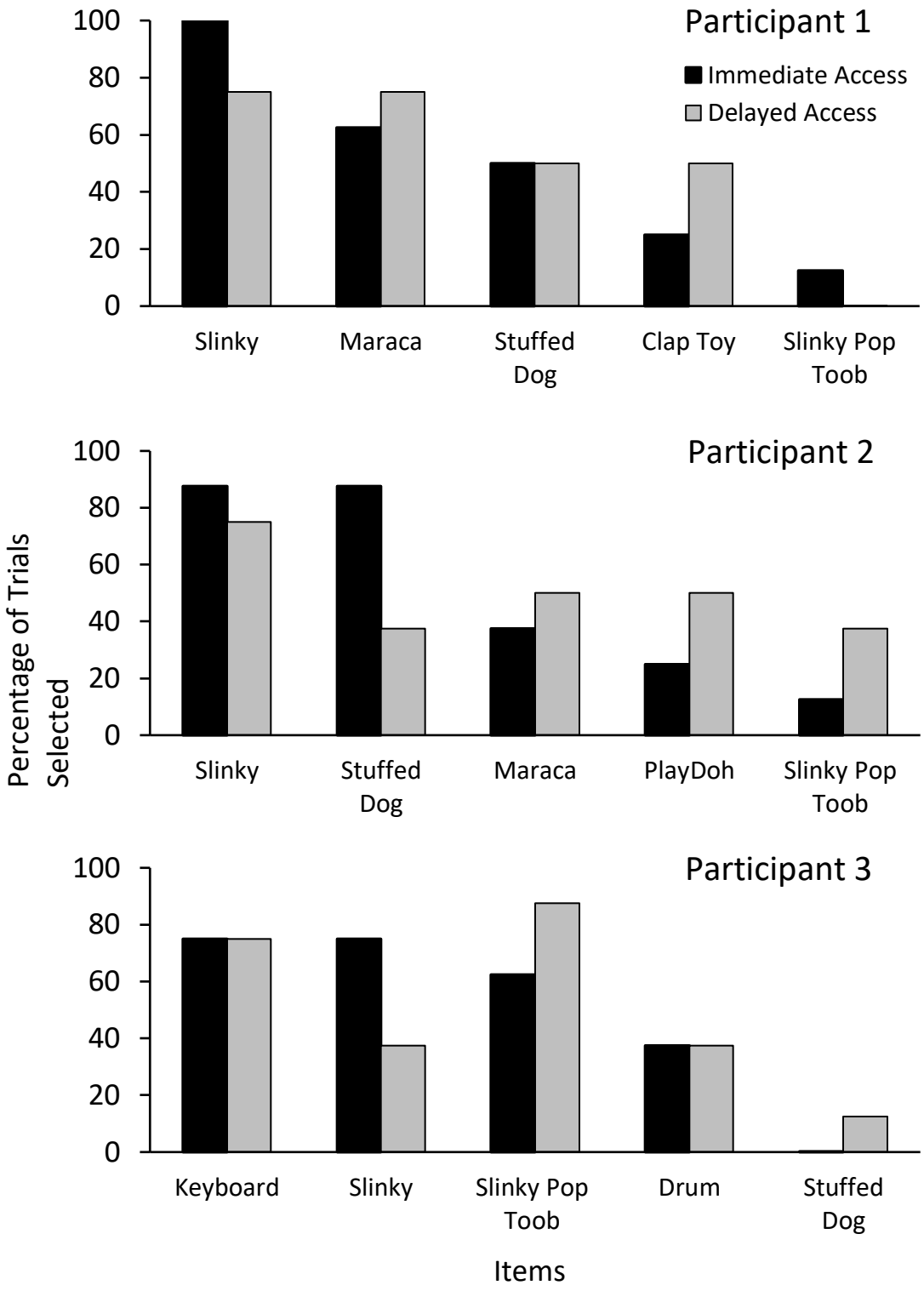

Figure 1. Percentages of trials each item was selected during preference assessment with immediate access (black) and delayed access (grey) for Participants 1, 2, and 3. Items are ordered along the *x*-axis from the most to least preferred in the immediate access condition.

Appendix A: Project Description and Consent Form

Research Project Title: **Do discrimination skills predict preference hierarchies during stimulus preference assessments with immediate versus delayed item access?**

Principle Investigators: Brennan Foidart, Graduate Student. Ph: 204 256 4301 ext. 3467, foidartb@myumanitoba.ca
Dr. C.T. Yu, Supervisor. Ph: 204 474 9453, ct.yu@umanitoba.ca

Affiliations: University of Manitoba and St.Amant Research Centre

This description, 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 research is about and what participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

What is the purpose of the project?

This study will evaluate whether the ability to perform various discrimination skills affects the accuracy of preference assessment when they involve delayed reinforcement in people with developmental disabilities. Preference assessment is a reliable way of learning what a person likes or dislikes. In this assessment, a person is asked to choose among several items and usually receives the chosen item immediately. However, this is not always possible. Many leisure activities have naturally occurring delays such as watching a TV show later. We know from previous research that being able to make various visual and verbal discriminations affects the accuracy of preference assessment when both involve immediate reinforcement. In this study, we plan to find out how delayed reinforcement affects the relation between discrimination skills and preference assessment. The findings of this study should help us improve our assessment methods.

What are the project procedures?

This study will have two phases. In Phase 1, the researcher will conduct two preference assessments (immediate and delayed access) for each participant using a paired-item procedure for a total of 5 items. Both assessments will share the following procedures. The researcher will present two items on each trial and ask the participant to choose one. Each item will be paired with every other item twice. The researcher will always give a brief praise statement immediately for choosing (e.g., good job). The two assessments will differ on the following. In the immediate access assessment, the participant will receive the selected item immediately for 30 seconds at the end of each trial. In the delayed access assessment, the participant will receive the most preferred item at the end of the session for a period equal to the total access time in the immediate access assessment. Each assessment will take approximately 20 minutes. No session will exceed 30 minutes.

In Phase 2, the researcher will conduct two assessments (immediate and delayed access) for each participant using the Assessment of Basic Learning Abilities-Revised (ABLA-R). The ABLA-R

assesses how easily people with developmental disabilities could learn to perform five two-choice visual and vocal discriminations. In both assessments, the researcher will praise the participant immediately after every correct trial. If an incorrect response occurs, the researcher will model the correct response, guide the participant to perform the response, and then ask the participant to perform the response independently. In the immediate access assessment, the researcher will also provide a preferred edible or activity for about 15 seconds (e.g., listening to music) after a correct response. In the delayed access assessment, the participant will receive the preferred edible or activity at the end of the session for an amount equal to the immediate access assessment. Each assessment will take approximately 30 to 60 minutes, depending on the participant. The latter will be completed over 2 or more shorter sessions. No session will exceed 30 minutes.

Will the participant's personal information be kept confidential?

Personal identifying information will appear only on the consent form and it will be stored in a locked office at St.Amant. Paper data sheets will be stored in a locked research office at St.Amant. The participants' identities will be coded on all score forms. All public presentations, written reports and thesis, and publication of the findings will contain no identifying information about individual participants. A participant will be referred to by a number or a pseudonym. Description of participant characteristics will include age, gender, diagnosis (e.g., developmental disability, autism spectrum disorder, Down syndrome), and communication skills (e.g., speaks, uses signs)**.**

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 to the appropriate authority, as specified by The Vulnerable Persons Living with a Mental Disability Act and the Child Protection Act of Manitoba. We would divulge your identity to the authority when reporting abuse.

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

We do not foresee any risks for the participants beyond what might be normally encountered in everyday situations. The procedures used in both the ABLA and SPA assessments are positive, reinforcement-based procedures. Based on our past experience, participants appear to enjoy the one-to-one interactions in this type of research.

Benefits are twofold. There are two main benefits of this research. First, we may learn more about the discrimination skills of the participant using the modified procedure that could not be accomplished using the standard procedure. Second, if supported, the modified SPA and ABLA procedures could have clinical implications. If it is found that individuals cannot perform discriminations in delayed reinforcement conditions, or that preference for activities appears to change depending on whether the access to that item is delayed, that information would be beneficial to support staff, guardians, and clinicians.

With your permission indicated at the end of the consent form, we will share the results with the clinicians and staff who work with the participant at St.Amant so that they can be more informed about the participant's abilities.

Will any recording devices be used?

Assessment sessions will be recorded on video (not including the participant's face), if consent has been given. The videos will allow us to view the sessions more closely, at a later time, to verify the accuracy of our observations and procedures. Session videos will be transferred immediately after the conclusion of a session to a secure network at St.Amant.

Will I receive the results of the project?

If you wish to be informed of the results, please check "YES" in the appropriate box at the end of this form and we will send you a summary of the findings by approximately December 2019.

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 project 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.

Even after you give consent, you can stop any time and for any reason by simply contacting any of the investigators listed at the beginning or end of this document. Your decision to stop 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 cooperation of the participant during the project (e.g., their willingness to come to a session and to work with the research staff) will be monitored throughout the project. If at any time the participant is unwilling to come to a session, that decision will be respected and the session will be rescheduled. Rescheduling will be done with the staff or caregiver who work with the participant. All sessions will be scheduled at mutually convenient times and with no disruptions to the participants programs. If a participant declines to work with the researcher for three consecutive sessions, the researcher will take that as an indication that the participant does not wish to continue in the study. Participation will be terminated.

Signing the Consent Forms

Signing the following page of this **Project Description and Consent to Participation Form** indicates that you understand the above information, and agree to participate in the project. 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.

Dr. C.T. Yu, Supervisor. Ph: 204 474 9453, ct.yu@umanitoba
Brennon Foidart, Graduate Student, Ph: 204 256 4301 ext. 3467; foidartb@myumanitoba.ca

The Psychology/Sociology Research Ethics Board has approved this research. If you have any concerns or complaints about this project, you may contact any of the above-named persons or the Human Ethics Secretariat at 204-474-7122 (humanethics@umanitoba.ca). A copy of this Project Description and Consent Form has been given to you to keep for your records and reference.

Signatures

I _____ (print name of consent giver) hereby give consent for _____ (please print participant's name) to participate in the project, "**Do discrimination skills predict preference hierarchies during stimulus preference assessments with immediate versus delayed item access?"**

By giving consent, I allow the research project staff to:

- Obtain personal health information, including: age, diagnosis, level of functioning, previous intellectual and adaptive behaviour assessments, and physical and sensory difficulties from the health records at St.Amant.

- Include the participant's results in publications, reports, thesis, and talks, so that others may learn from this project. The identity of the participant, however, will not be disclosed.

- I understand that I can revoke or amend this consent at any time and for any reason.

- I would like to receive the results of this project (circle one): YES NO
  If yes, please provide preferred email or mailing address: _____
  _____

- I allow the researchers to share the participant's results with St.Amant staff who work with the participant. Information shared may include the following: item/activity preferences and discrimination skill levels passed (circle one): YES NO

- I allow the researchers to record the research sessions on video (circle one): YES NO

_____	_____	_____
Signature of Consenting Individual	Relationship to Participant	Date
_____	_____	_____
Signature of Researcher	Print Name of Researcher	Date

Please return all pages of this **Project Description and Consent to Participation Form** in the enclosed stamped, self-addressed envelope to the researcher. Keep the extra copy for your records. Thank you for your cooperation.

Appendix B: Preference Assessment Data Sheet

Date: _____ **Tester:**_____ **Client:**_____

Session_____ **Start Time** _____ **End Time** _____

Items to be Assessed:

A.		B.	
C.		D.	
E.			

Trial	Items		Choice	Trial	Items		Choice
	Left	Right			Left	Right	
1	A	B		11	B	A	
2	C	D		12	D	C	
3	A	C		13	C	A	
4	C	E		14	E	C	
5	B	E		15	E	B	
6	B	C		16	C	B	
7	D	E		17	E	D	
8	B	D		18	D	B	
9	A	D		19	D	A	
10	A	E		20	E	A	

Preference Values:

A: /8 = ____ x 100 = ____ % B: /8 = ____ x 100 = ____ %

C: /8 = ____ x 100 = ____ % D: /8 = ____ x 100 = ____ %

E: /8 = ____ x 100 = ____ %

Appendix C: Preference Assessment Procedural Integrity Datasheet

Date:_____ Participant:_____ Observer:_____ Tester:_____

Pre-assessment	Item	1	2	3	4	5
	Item Sampling (30s)					

			Session 1																			
		Trial	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Trial Presenta-tion	Instruct client to "look", present items one at a time																				
		Place correct item in correct location																				
		Instruct client to "pick one"																				
Fill out only one section for each trial	Appropriate Selection	Allow interaction with object (30s), if selection is made																				
		Remove unselected object from table																				
		Retrieve object after 30s																				
	Two items selected simultaneously	Block access to items or remove 2nd object																				
		Re-present instruction to "pick one"																				
		If selection made, allow access to object																				
		Remove unselected object from table																				
		Retrieve object after 30s																				
	No response within 10 seconds	Repeat instruction to "pick one"																				
		No response to second "pick one"																				
		Remove all items																				
		Initiate next trial (if applicable)																				
		Response within 10 seconds																				
		Allow access to item																				
		Remove unselected object from table																				
		Retrieve object after 30s																				
		Number correct																				
		Total possible correct																				

$$Total\ score = \frac{Number\ correct}{Total\ possible\ correct} = \text{—} = \_\_\_\_\%$$