An Evaluation of the Value and Conditioning of Choice as a Reinforcer for Typically Developing Children

By

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Submitted to the graduate degree program in Applied Behavioral Science and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Date approved: April 9, 2013

Abstract

Providing choice opportunities has been a successful intervention for increasing appropriate behavior and decreasing inappropriate behavior; however, the mechanism responsible for this success is unknown. One hypothesis is that choice, in and of itself, is a reinforcer. Another hypothesis is that the differential outcomes associated with choice (e.g., access to high preferred items, access to a high variety of items, or perceived higher magnitude of items) are responsible for the treatment effects. Recently, choice itself has been evaluated as a reinforcer by using identical outcomes for choice and no-choice conditions. The results of these studies show that choice is a reinforcer for some individuals. As a result, the mechanism by which choice may become a reinforcer has come into question. In the current study, we replicated and extended previous research by (a) determining the prevalence of preference for choice in a large number of typically developing children and (b) evaluating whether a history of differential outcomes associated with choice and no-choice resulted in changes in preference for choice and no-choice conditions. Results showed that the majority of participants preferred choice over no-choice contexts and a history of differential outcomes associated with choice and no-choice resulted in changes in preference for choice and no-choice conditions.

Acknowledgements

I would like to first acknowledge my advisor, Dr. Claudia L. Dozier, for her contribution to the development and refinement of this research project. Second, I would like to acknowledge my fellow graduate students for their contributions to the conceptualization of this project. Third, I would like to acknowledge the undergraduate research assistants who helped to conduct the choice assessments.

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Choice is defined as the allocation of responding among concurrently available response options, which is often studied using concurrent-operants arrangements (Catania, 2007; Fisher & Mazur, 1997). In these arrangements, at least two response options are available, and each is associated with a different outcome (e.g., type of stimulus, schedule of reinforcement; Fisher et al., 1992; Herrnstein, 1961; Herrnstein & Lovelace 1975; Piazza, Fisher, Hagopian, Bowman, & Toole, 1996). Measurement of response allocation to the different response options allows one to compare the relative response rate of responding for each of the available options (Fisher & Mazur, 1997). When the relative rate of responding to one option is higher than other options, that option is said to be the "preferred" option. For example, if a child on the playground plays on the jungle gym for 12 min, in the sandbox for 4 min, and on the teeter-totter for 1 min, the amount of time allocated to each of these areas out of the total time allocated to all areas suggests that playing on the jungle gym is more preferred as compared to the other playground activities.

Over the past twenty years, researchers have evaluated the effects of choice as an intervention for increasing appropriate behavior and decreasing inappropriate behavior. Research has shown that the opportunity to choose the type of task or activity presented (e.g., Bambara, Ager, Koger, 1994; Dunlap, et al., 1994; Dyer, Dunlap, & Winterling, 1990; Parsons, Reid, Reynolds, & Bumgarner, 1990; Powell & Nelson, 1997; Romaniuk & Miltenberger, 2001; Romaniuk et al., 2002; Ulke-Kurkcuoglu & Kiracaali-Iftar, 2010; Vaughn & Horner, 1997), the order in which tasks or activities are presented (e.g., Kern, Mantega, Vorndran, Bailin, & Hilt, 2001; Tasky, Rudrud, Schulze, & Rapp, 2008), and which reinforcers will be delivered (e.g., Dyer et al., 1990; Graff, Libby, & Green, 1998; Waldron-Soler, Martella, Marchand-Martella, &

Ebey, 2000) is effective for increasing appropriate behavior, decreasing inappropriate behavior, or both during demand or task contexts.

Dunlap et al. (1994) evaluated the effects of providing choices of work tasks on both problem behavior and task engagement of three participants with emotional handicaps and intellectual disabilities. In one condition, the participants were allowed to choose their work tasks (choice condition); in the other condition, they were required to work on the task chosen by their teacher (no-choice condition). All participants engaged in decreased levels of problem behavior *and* increased levels of task engagement when they were provided the opportunity to choose their work tasks. In a similar study, Dyer et al. (1990) evaluated the effects of providing choices of work tasks *and* reinforcers on the severe problem behavior (i.e., aggression, self-injury, and tantrums) displayed by three participants with developmental delays. To determine the effects of choice on problem behavior, the experimenters compared two conditions. In the choice condition, the three participants were given the opportunity to choose the work task to complete and the reinforcers they would earn during a particular session. In the no-choice condition, the teachers chose the work tasks the participants would complete and the reinforcers they would earn during a particular session. The results showed that providing choices of the task and reinforcers led to a decreased level of problem behavior as compared to conditions in which choices were not provided during sessions.

Although previous research has suggested that the opportunity to choose reinforcers and tasks has been an effective intervention for increasing appropriate behavior and decreasing inappropriate behavior, it remains unclear whether the reinforcing effects of the opportunity to choose or differential outcomes associated with choice are responsible for behavior change (Lerman et al., 1997; Smith, Iwata, & Shore, 1995). In fact, in many of the studies that showed

that choice was an effective intervention, it is possible that choice produced outcomes that were more preferred than those delivered in no-choice conditions (e.g., Dyer et al., 1991). For example, it is possible that choice (a) resulted in more high-preferred items or activities, (b) increased the variety of stimuli accessed (stimulus variation), or (c) allowed for momentary fluctuations in preference. For example, previous research has shown that stimulus variation may affect reinforcer efficacy (e.g., Bowman, Piazza, Fisher, Hagopian, & Kogan, 1997; Egel, 1980; Egel, 1981; Milo, Mace, & Nevin, 2010) and is preferred over little or no stimulus variation (e.g., Sran & Borrero, 2010). In addition, research has shown that motivating operations (MO) such as satiation to and deprivation from a particular stimulus (or class of stimuli) may affect the amount of responding allocated to that stimulus (Vollmer & Iwata, 1991). Thus, the opportunity to choose may allow individuals to access reinforcers based on momentary fluctuations in motivating operations such as deprivation and satiation. Therefore, several researchers have attempted to answer the question of whether the effectiveness of choice as an intervention is due to choice as a reinforcer or the differential outcomes produced by choice. To do this, researchers have attempted to equate the outcomes across choice and no-choice conditions using various procedures (e.g., Dunlap et al., 1994; Lerman et al., 1997; Smith et al., 1995).

Dunlap et al. (1994) was one of the first applied studies that attempted to equate outcomes of choice and no-choice conditions by yoking the items delivered during no-choice conditions to those delivered during choice conditions. In the choice condition, the participant was given the opportunity to choose which book would be read in a particular session. In the yoked no-choice condition, the book selected by the teacher to be read across sessions were chosen in the same order the participant chose across sessions in the preceding choice condition.

Results showed that level of task engagement was higher and level of problem behavior was lower during the choice condition as compared to the yoked no-choice condition. These data suggest that choice (rather than the differential outcomes across conditions) may be the variable that results in behavior change.

Smith et al. (1995) and Lerman et al. (1997) also attempted to equate the outcomes of choice and no-choice conditions by delivering highly preferred items for responding on a simple, free-operant task (e.g., switch pressing, stamping) across choice and no-choice conditions. During the choice condition, the participant was given the opportunity to choose from high-preferred edible items either before each session (Smith et al.) or contingent upon responding (Lerman et al.); during the no-choice condition, the researcher chose which of the high-preferred items was delivered. Results of both studies showed that when highly preferred items were used across conditions, there was no difference in absolute levels of responding across choice and no-choice conditions. These data suggest that the mechanism by which choice procedures are effective for behavior change may be due to the outcome that is typically associated with choice (e.g., access to high-preferred items).

Fisher et al. (1997) used a concurrent-operants arrangement to evaluate whether preference for choice was affected by access to high-preferred outcomes. Three concurrently available switches (i.e., a choice key, a no-choice key, and a control key) were presented to the participant. The choice key was associated with the presentation of two edible items from which the participant could choose. The no-choice key was associated with the experimenter delivering one edible item to the participant; this item was yoked to the items chosen by the participant following responding on the choice key during the previous session. Responding on the control key resulted in no edibles. There were three different conditions (i.e., high-preference [HP],

low-preference [LP], high- and low-preference [HP/LP]) conducted to evaluate the influence of edible preference level on choice. During the HP phase, two high-preferred stimuli were available on the choice and no-choice keys. During the LP phase, two low-preferred stimuli were available on the choice and no-choice keys. During the HP/LP phase, one high-preferred and one low-preferred item were available on both the choice and no-choice keys. The results of this experiment were that all participants responded more to the choice key across different preference levels, indicating that choice was more preferred even if it did not result in more access to high-preferred edible items.

In summary, different results have been found across studies that have attempted to control for differential outcomes across choice and no-choice conditions by using similarly preferred items or activities or yoking no-choice stimuli to those during choice sessions. Differences in results may be due to the arrangements or procedures used across studies. For example, the use of single- versus concurrent-operants arrangements may influence the differences found between conditions. In a single-operant arrangement, the participant is provided a single response option; however, in a concurrent-operants arrangement, the participant is provided multiple response options, allowing comparisons of the *relative* reinforcing efficacy of the available stimuli. Therefore, single-operant arrangements may result in ceiling effects which may make it difficult to determine differences in the reinforcing efficacy of choice or no-choice contexts. For example, because highly preferred items were used in many of these studies, it is possible that the participants responded at high levels across all sessions to acess the reinforcer, regardless of whether they were able to choose which one they would consume. When a concurrent operants arrangement is used (e.g., Fisher et al., 1997), the relative levels of responding to each stimulus (choice or no-choice) is a function of the relative

magnitude of preference or reinforcing efficacy of the two stimuli. Thus, a concurrent-operants arrangement allows for a more sensitive measure of preference or reinforcer efficacy. In fact, studies that have compared the results of choice versus no-choice options using both single-operant and concurrent-operants arrangements have shown that preference for choice is only observed in the concurrent-operants arrangement (e.g., Brigham & Sherman, 1973; Geckler, Libby, Graff, & Ahearn, 2000; Graff & Libby, 1999; Tiger, Toussaint, & Roath, 2010).

Brigham & Sherman (1973) compared the effects of choice and no-choice conditions under single-operant and concurrent-operants arrangements with two typically developing kindergarten boys. First, the authors used a single-operant arrangement to compare levels of responding under conditions in which responding produced (a) marbles that were not exchanged for anything, (b) experimenter praise for responding that produced marbles, (c) marbles that could be exchanged for candy selected by the experimenter, or (d) marbles that could be exchanged for candy selected by the participant. Results showed that the participants responded more if candy was delivered, and responding was similar across conditions when the experimenter or participant selected the candy. Next, the authors used a concurrent-operants arrangement in which the participant could respond to one component (experimenter-selected candy) or the other (participant-selected candy) by using a "switch" key. Results showed that both participants responded more under the participant-selected candy condition as compared to the experimenter-selected candy condition. This was one of the first studies to suggest that choice may serve as a reinforcer in humans; however, it is possible that the participant-choice context was more preferred (even when the stimuli across conditions were similarly preferred) because choice still allowed for access to items based on moment-to-moment changes in preference (i.e., motivating operations).

Recently, researchers have attempted to control for variation in outcomes and momentary fluctuations in preference by using *identical* outcomes across choice and no-choice conditions within the context of concurrent-operants arrangement (e.g., Tiger, Hanley, Hernandez, 2006; Schmidt, Hanley, & Layer, 2009). Tiger et al. used a concurrent-chains procedure to compare the relative preference for choice and no-choice conditions using identical reinforcers across choice and no-choice conditions. Each session consisted of 15 trials that included an initial link and a terminal link. In the initial link of each trial, three worksheets were presented to the participant, and each was associated with a different condition (choice, no-choice, and control). Also, a plate containing five identical, high-preferred edibles was placed behind the choice worksheet; a plate containing one highly preferred edible (identical to those in the choice option) was placed behind the no-choice worksheet; and an empty plate was placed behind the control worksheet. During the initial link of each trial, the participant was asked to choose one of the three worksheets associated with different terminal links. During the terminal link of each trial, the participant was asked to receptively label one of the items on the chosen worksheet (from the initial link), and the correct, independent or prompted responses resulted in the delivery of the consequence associated with each worksheet. If the participant chose the choice worksheet in the initial link, correct responding in the terminal link resulted in praise and the opportunity to choose between the five identical items on the plate. If the participant chose the no-choice worksheet in the initial link, correct responding in the terminal link resulted in praise and the experimenter delivery of the one edible item on the plate. If the participant chose the control worksheet, correct responding resulted in praise only. Data were collected on the frequency of selections for each option (choice, no choice, and control) during the initial link. Results showed that 5 out of 6 participants preferred the choice option; however, preference did not maintain for

two participants. One of the participants preferred the no-choice option. Overall, these data indicate that choice is more preferred and functions as a relatively stronger reinforcer when the outcome across choice and no-choice conditions is identical. However, a limitation of this study was the difference between the number of reinforcers presented in the choice option compared to the no-choice option (i.e., five versus one), which may have been perceived as a difference in magnitude of reinforcers by some participants.

Schmidt et al. (2009) extended Tiger et al. (2006) by (a) attempting to control for the presence of different magnitudes of reinforcers across choice and no-choice conditions and (b) evaluating whether choice is still preferred if low-preferred items are available. In experiment 1, Schmidt et al. used procedures similar to Tiger et al., except that the number of items presented was equated across choice and no-choice options. That is, there were five identical items behind the choice worksheet, and the same five identical items were behind the no-choice worksheet. Results showed that 5 out of 6 typically developing preschool children showed a preference for choice; however, one participant displayed undifferentiated responding among the three conditions, which may have been due to a lack of preference or lack of discrimination across the different response options. These results indicate that the number of edibles on the plates in the Tiger et al. study was not responsible for the preference for choice. In experiment 2, Schmidt et al. showed the generality of preference for choice by using items that were thought to be low-preferred (i.e., office stickers). Results showed that all seven participants preferred choice to no-choice and control conditions even when identical low-preference items were used across choice and no-choice conditions.

Although the conditions under which choice may function to change behavior remains unclear, it is clear that choice is more preferred and a relatively more potent reinforcer than no-

choice across a variety of species and populations (Catania & Sagvolden, 1980; Cerutti & Catania, 1997; Fenerty & Tiger, 2010; Fisher Thompson, Piazza, Crosland, & Gotjen, 1997; Geckler et al., 2000; Tiger et al., 2006; Tiger et al., 2010; Thompson, Fisher, & Contrucci, 1998; Schmidt et al., 2009; Sran & Borrero, 2010; Voss & Homzie, 1970). In fact, several studies have shown that not only is choice more preferred or a more potent reinforcer, but the preference for choice is relatively strong and sometimes resistant to change (e.g., Tiger et al., 2006; Tiger et al., 2010; Thompson et al., 1998).

Thompson et al. (1998) attempted to evaluate the effects of increasing the reinforcement schedule for choice on preference for choice using a concurrent-operant arrangement. The participant was presented with three, identical switches, one for each condition (choice, no-choice, and control). The item to which the participant had access (i.e., soda) was kept constant across conditions; however, during the choice condition, he was able to choose the manner in which it was delivered (i.e., through a straw or a sip from a cup). There were two conditions in this study: an equal reinforcement phase in which the schedule of reinforcement was equal across all conditions and an unequal reinforcement phase in which the reinforcement schedule in the choice condition was increased across sessions. By increasing the reinforcement schedule, the authors were attempting to quantify choice by showing the schedule at which the participant would stop responding for choice and switch to responding for the no-choice condition. Results showed high levels of responding to the choice key, regardless of increases in the schedule of reinforcement. These results suggest that a preference for choice may be quite pervasive for some participants.

In two separate studies, Tiger et al. (2006) also evaluated the strength of preference for choice. Tiger and colleagues attempted to quantify the strength of preference for choice for three

typically developing children by increasing response requirements. The baseline condition was a concurrent-chains procedure in which there were three response options presented during the initial link (choice, no-choice, and control). Following a selection in the initial link, the terminal link was conducted according to the chosen condition using a fixed-ratio (FR) 1 schedule of reinforcement. In the next phase, the response requirement in the terminal link of the choice option was systematically increased across sessions, and schedules in the no-choice and control options remained the same as baseline (FR1). Results showed that participants consistently chose the choice option as compared to the no-choice option across phases, even when more effort was required to obtain the reinforcer. Tiger et al. (2010) used a progressive ratio (PR) schedule to attempt to quantify the strength of preference for choice by systematically increasing the number of responses required for reinforcement within session. Results showed higher rates of responding and higher break points (i.e., the last completed schedule before responding stopped) in the choice sessions as compared to no-choice sessions for two of the three participants. Overall, studies have shown that choice has more value and reinforcing strength than no-choice conditions, and .these effects have been shown across minimal, constant effort requirements as well as more difficult, increasing effort requirements (i.e., Tiger et al.; Tiger et al.; Thompson et al., 1998). However, these studies do not tell us the mechanism by which choice has become a reinforcer.

Catania (1980) suggested that preference for choice may be phylogenic or ontogenic. Phylogenic sources of preference for choice due to natural or cultural selection suggest that preference for choice could have survival value. Ontogenic sources of preference for choice due to differential reinforcement of choice-making in a person's lifetime suggest that preference for choice may be conditioned during a person's lifetime. For example, if an individual has a history

of choice-making resulting in quantitatively or qualitatively more reinforcement, choice may become a conditioned reinforcer. Smith et al. (1995) make an argument for the development of a preference for choice overtime as an explanation for why adults with intellectual and developmental disabilities (IDD) may not show differentiated responding between choice and no-choice conditions. The authors argued that these results may suggest that some individuals with IDD have not developed a preference for choice due to an insufficient history of making choices or choices being paired with qualitatively better outcomes.

Research on preference for choice suggests that various histories may affect choice responding (Catania, 1975; Catania, 1980; Catania & Sagvolden, 1980; Fisher et al., 1997; Karsina, Thompson, & Rodriguez, 2011). Results have shown that, when the choice option results in a better outcome, more responding will occur toward the choice option. However, when the no-choice option results in a better outcome, responding may shift to the no-choice option (e.g., Fisher et al.). For example, in the second of two experiments, Fisher et al. compared levels of responding to two keys, each associated with either a choice or no-choice condition. Responding on the no-choice key resulted in the experimenter providing either a high-preferred (HP) or a low-preferred (LP) item. Responding on the choice key resulted in the participant being provided the opportunity to choose between two low-preferred items. For one participant, however, responding on the no-choice key resulted in the experimenter providing one of two high-preferred items. Results showed that all three participants responded more to the no-choice key when the outcome was better (HP or LP item delivered) as compared to the outcome on the choice key (LP item only); however, when the outcomes were the same across the conditions, participants responded more to the choice key. These results indicate that children will forgo choice if the no-choice condition results in the opportunity for a better

outcome. The results of this study suggest that pairing choice with access to qualitatively better outcomes may be a mechanism by which to condition choice as a reinforcer.

Tiger et al. (2006) showed that the number of available items from which to choose may also be a variable by which choice may become a conditioned reinforcer. Tiger et al. attempted to establish a preference for choice by increasing the number of items available in the choice option for three participants for which preference for choice did not maintain (two participants) or for which choice was not preferred (one participant) during an initial comparison of choice versus no-choice contexts. Three response options were presented during the initial link (choice, no-choice, and control). During the choice condition, the number of items from which to choose was increased from 5 to 10 to 15 across phases, whereas the no-choice condition continued to be associated with only one item across phases. Results showed that as the number of items from which to choose increased in the choice condition, the participant's preference for choice also increased. These results indicate that pairing choice with more items from which to choose may be a mechanism by which to condition choice as a reinforcer.

In a recent study, Karsina et al. (2011) attempted to directly condition a preference for choice in undergraduate students using differential reinforcement. They did so by manipulating schedules of reinforcement associated with free- and restricted-choice conditions using a computer task. The authors used a concurrent-chains procedure to compare a "free-choice" condition, in which participants selected and ordered three numbers from an array of eight, and a "restricted-choice" condition, in which participants ordered three pre-selected numbers from an array of eight. During exposure trials, participants were presented with either a free-choice or restricted-choice trial. The initial link of exposure trials included a screen with a button reading "you select" (free-choice) or "numbers generated" (restricted-choice), and clicking this button

resulted in the presentation of the terminal link of the session. The terminal link included a screen with a box containing three blank spaces for the numbers to be entered. In free-choice trials, there was a pool of eight numbers from which the participants could enter numbers; during the restricted-choice trials, there was a pool of three numbers from which the participants could choose the order in which those numbers were entered. Following 32 exposure trials, 8 choice trials (baseline) were conducted in which the participant could choose either free-choice or restricted choice. Points were delivered on a variable-ratio (VR) 2 schedule during the exposure trials and a random ratio (RR) 2 schedule during choice trials. Results showed that 7 of 11 participants did not prefer the free-choice condition over the restricted-choice condition. Four of these participants showed a strong preference for the restricted-choice condition, and three participants showed similar preference for the free- or restricted-choice condition. Next, all seven of these participants were exposed to a differential reinforcement procedure in which the schedule of reinforcement on free-choice trials was denser than the restricted-choice trials. In choice trials conducted after these exposure trials, all seven participants showed a strong preference for free choice, and 5 of the 7 participants continued to display this preference after the exposure trials were no longer implemented. The experimenters also conducted a differential reinforcement procedure in which the schedule of reinforcement on restricted-choice trials was denser than free-choice trials; however, this exposure did not result in an increase in preference for the restricted-choice condition for any of the participants. It is possible that a preference for restricted-choice may have been conditioned if it had not followed the free-choice conditioning phase; however, this was not evaluated in the study. Overall, results of this study suggest that pairing denser schedules of reinforcement with choice options may be an effective way to condition choice as a reinforcer.

In summary, research has indicated the preference for and reinforcing efficacy of choice. However, several questions remain including the prevalence of choice as a reinforcer in young children and the mechanism by which choice may become a reinforcer. Most studies on choice as a reinforcer have been conducted with a small number of children, and there have been participants who have not shown this preference or for whom this preference did not endure. In addition, it may be interesting to determine whether a preference for choice is associated with the age of children. For example, if preference for choice is conditioned within a person's lifetime, it is possible that young children do not have sufficient exposure to the differential consequences associated with choice (Smith et al., 1995). Furthermore, little is known regarding the mechanism by which choice becomes preferred or how one might go about increasing the reinforcing efficacy of choice. Karsina et al. (2011) showed that a preference for choice could be "conditioned" by using denser schedules of reinforcement for choice. However, there are other variables that may be associated with choice responding that result in choice becoming preferred reinforcer. As mentioned, several variables may result in the "conditioning" of choice as a preferred context (e.g., high stimulus variation, access to preferred items, number of items available); however, there have been no studies directly evaluating the effects of these variables on conditioning choice.

There are several purposes of the current study. First, we attempted to replicate and extend previous research on the preference of choice by evaluating the prevalence of preference for choice in typically developing children (study 1). Second, we evaluated whether there was a significant correlation between age and preference for choice (study 1). Third, we evaluated whether differential histories associated with choice and no-choice conditions resulted in shifts in preference for choice and no-choice conditions (study 2).

Study 1 Method – Choice Assessment

Purpose

The two purposes of study 1 were to (a) replicate and extend previous research by determining whether choice is a reinforcer with a large number (N = 30) of typically developing children and (b) determine whether there was a statistically significant relationship between age and preference for choice in these children.

Participants and Setting

Participants were 30 typically developing children (ranging in age from 31 to 62 months) who attended a preschool in the Edna A. Hill Child Development Center (CDC) at the University of Kansas. These participants were selected from inclusive classrooms serving approximately 35 children with and without intellectual disabilities. None of our participants had a diagnosed disability; however one participant (Carrie) spoke English as a second language, and another participant (Xerxes) had a documented expressive speech delay. All participants were able to follow simple three-step instructions and displayed good receptive language skills as evidenced by curriculum assessments conducted on an ongoing basis in their classrooms. Also, all participants were able to label 90% of the pictures used for the study, as determined by a picture pre-test (see below for procedures).

Sessions were conducted in a 3 m x 3 m individual session room near the classrooms. Sessions were conducted 2 to 6 times a day, 2 to 5 days a week. The session room contained a table, chairs, session materials, and reinforcers appropriate to the particular session being conducted.

Materials

During all choice sessions, task materials, edible reinforcers, and discriminative stimuli were present. Task materials included three identical sets of flashcards that depicted pictures of common items (e.g., dog, spoon, and chair). Each set of flashcards included the same 50 pictures, but each stack was shuffled prior to a session so the pictures in each pile were presented in a different order. To aid in discrimination, two drawn pictures of a pointing hand were also used during sessions to denote which stack of flashcards was associated with which choice option. Edible reinforcers were cut into small pieces that were the same color, size, and shape.

Edible Preference Assessment

Prior to the first choice-assessment session, a paired-stimulus preference assessment (Fisher et al., 1992) was conducted to identify highly preferred edible items for each participant. Prior to the preference assessment, the participant was told the name of each of the 16 edibles and allowed to sample each one. During the preference assessment, 120 trials were conducted in which edible items were presented in pairs, and the participant was asked to select one. Once the participant selected an item, by touching the plate containing the item or stating the name of the item, that item was delivered to the participant to consume. The next trial was implemented once the participant finished consuming the chosen edible. If the participant refused to select an item or responded by saying "no" or "no, thank you," the next trial was conducted. The therapist blocked any attempts by the participant to select both items. Trials were conducted until each item was presented once with every other item. The items were ranked based on the percentage of trials for which each item was chosen. The item that was chosen on the highest percentage of trials was determined to be the highest preferred item and was used during the choice assessments of study 1 and 2. The items ranked second through ninth and the lowest ranked item that was chosen at least once were also used in study 2 (see procedures for study 2).

Data were collected by trained undergraduate and graduate research assistants taking paper and pencil data. Interobserver agreement (IOA) was assessed by having a second observer collect data for an average of 86.7% (range, 20%-100%) of sessions across participants. IOA was calculated by comparing both observers' data using a trial-by-trial method. For each trial, the items selected were compared between observers. If the same items were scored in a trial by both observers, this was scored as an agreement. If different items were scored in a trial by the observers, this was scored as a disagreement. At the end of each session the number of trials with agreements was divided by the total number of trials and multiplied by 100%. The average agreement across participants was 99.5% (range, 92.5%-100%).

Picture Pre-test

Pictures of common items (e.g., table, spoon, or flowers) were obtained to serve as task stimuli. Prior to the study, a picture pre-test was conducted to determine how many of the pictures each participant correctly labeled. During the pre-test, participants were presented with a picture, asked "What is it?," and given 10 s to respond. No differential consequences were delivered for correct or incorrect responses, but noncontingent praise (e.g., "nice job sitting at the table" or "great job looking at the pictures") was delivered every 30-45 s to increase the likelihood of maintained attention to the task. All participants were able to label at least 90% of the pictures prior to the study.

Response Measurement and Interobserver Agreement

The primary dependent variable was the frequency of selection of each choice option (child- choice, experimenter- choice, no reinforcement [control]) during the initial link of the concurrent-chains procedure. *Child- choice* was defined as the participant touching the stack of flashcards on top of the hand pointing to them. *Experimenter- choice* was defined as the

participant touching the stack of flashcards on top of the hand pointing to the experimenter. *Control* was defined as the participant touching the stack of flashcards on top of the blank piece of paper. A higher frequency of selection for one choice option over the others indicated a preference for the associated choice option.

Data were also collected on the frequency of additional participant and experimenter behaviors. Data were collected on the frequency of independent-correct and prompted-correct responses by the participant to the target task (i.e., expressive picture labeling) during the terminal links of each session. An independent-correct response was defined as accurately and independently labeling the item in the picture within 5 s of the presentation of the flashcard. A prompted-correct response was defined as accurately labeling the item in the picture within 5 s of a corrective verbal prompt delivered by the experimenter. Data were also collected on the frequency of reinforcer delivery by the experimenter during the terminal link to determine procedural integrity. Child-choice reinforcer delivery was scored if the experimenter presented the plate associated with child-choice materials for the participant to choose one of the five identical edible items. Experimenter-choice reinforcer delivery was recorded if the experimenter delivered one of the five identical pieces of food on the plate associated with experimenter-choice materials. Procedural integrity was assessed on a trial-by-trial basis. For each session, the number of trials in which the correct reinforcer was delivered (i.e., child-choice reinforcer [plate of five edibles] delivered when the child-choice option was selected) divided by the total number of trials in a session (15) and multiplied by 100%. Procedural integrity was assessed for an average of 34.8% (range, 26%-45.5%) of sessions across participants and was 99.6% (range, 87%-100%). Table 1 depicts average procedural integrity scores for individual participants.

Data were collected by trained undergraduate and graduate research assistants taking paper and pencil data. Interobserver agreement (IOA) was assessed by having a second observer collect data for an average of 47.1% (range, 22.2%-77.8%) of sessions. IOA was calculated by comparing both observers' data using a trial-by-trial method. For each trial, the responses in the initial link, terminal link, and reinforcer delivery in each trial were compared between observers. If the same behaviors were scored in a trial by both observers, this was scored as an agreement. If different behaviors were scored in a trial by the observers, this was scored as a disagreement. At the end of each session, the number of trials with agreements was divided by the total number of trials and multiplied by 100% for the initial link responses, terminal link responses, and reinforcer delivery responses. The average agreement across participants for choice selections during the initial link was 99.5% (range, 80%-100%). The average IOA for independent-correct and prompted-correct responses during the terminal link was 99.4% (range, 80%-100%), and the IOA for edible delivery following participants' responses was 99.1% (range, 86%-100%). Table 2 depicts average IOA scores for individual participants.

Procedure

A concurrent-chains arrangement, which has been used in numerous studies to determine preferred conditions or treatments (e.g., Catania & Sagvolden, 1980; Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997; Hanley, Piazza, Fisher, & Maglieri, 2005; Heal & Hanley, 2007; Layer, Hanley, Heal, & Tiger, 2008; Luczynski & Hanley, 2009; Luczynski & Hanley, 2010; Tiger et al., 2006; Schmidt et al., 2009) was used to determine relative preference for the different choice options. In the present study, each session consisted of 15 trials, each consisting of an initial link and a terminal link. A 15-s intertrial interval (ITI) was implemented between each trial. That is, 15 seconds elapsed between the presentations of each initial link. The ITI

was included to ensure that all trials were similar in length regardless of the choice option selected. During the initial link of each trial, three stacks of identical flashcards associated with different choice options (child-choice, experimenter-choice, and control) were presented to the participant. Each stack of flashcards was associated with distinct discriminative stimuli to increase the likelihood the participants would easily discriminate between the different choice options. At the beginning of each trial, the participant was instructed to "pick your favorite." Once the participant selected a choice option, the terminal link associated with that choice option was implemented. During the terminal link, one expressive labeling trial was implemented, and the consequence for an independent-correct or prompted-correct response that coincided with the selected choice option was implemented. If a participant responded incorrectly or did not respond within 5 sec of the presentation of the picture, one vocal prompt ("say cat") was provided. If the participant did not respond following the vocal prompt, the next initial link would be implemented following the 15-s ITI; however, this never occurred. That is, the participants always responded correctly either after the initial presentation of the flashcard or after the vocal prompt.

Initial link. As mentioned above, during the initial link of each trial, three sets of identical flashcards were presented to the participant. Each set of flashcards was associated with a different choice option (child- choice, experimenter- choice, no reinforcement [control]). In addition, a picture of a pointing hand with the finger pointing toward the participant was placed in front of the child-choice materials, a picture of a pointing hand with the finger pointing toward the experimenter was placed in front of the experimenter-choice materials, and a blank piece of paper was placed in front of the control materials. Finally, a plate containing five identical edibles was placed behind the child-choice and the experimenter-choice materials. An empty

plate was placed behind the control materials. Prior to the start of the session, the participant was given instructions regarding each of the choice options and one practice trial was conducted for each option. For example, for the experimenter-choice option, the participant was told "if you touch this hand (the picture of the hand pointing to the experimenter), you will tell me what is in the picture (on the flashcard) and I will pick what treat you get to eat." For each practice trial, the participant was prompted to choose each of the options (child-choice, experimenter-choice, and control), and the associated consequences were implemented in the terminal link.

Terminal link. After the participant selected a choice option in the initial link of each trial, the terminal link associated with that choice option was implemented. In the terminal link of each trial, the experimenter presented a flashcard from the stack associated with the selected choice option and asked the participant "What is this?" If the participant correctly labeled the picture in the flashcard within 5 s of the instruction (independent-correct response), the consequence associated with the selected choice option was implemented. If the participant did not correctly label the picture in the flashcard within 5s of the instruction (i.e., labeled the picture incorrectly or did not respond), the experimenter vocally prompted the participant to say the correct label of the picture on the flashcard. For example, if a picture of a cat was presented and the participant said "dog" or did not respond within 5 s, the experimenter said "say cat", and waited 5 s for the participant to respond correctly. If the participant correctly labeled the picture on the flashcard within 5 s of this vocal prompt (prompted-correct response), the consequence associated with the selected choice option was implemented.

Child-choice terminal link. During child-choice terminal links, independent-correct or prompted-correct responding resulted in the experimenter providing praise and sliding the plate associated with child choice to the participant. The experimenter told the participant to pick one

of the edibles on the plate. Once the participant picked one edible, he or she was given time to consume the edible. Next, the experimenter replaced that edible and positioned the plate back behind the task materials associated with the child-choice option.

Experimenter-choice terminal link. During experimenter-choice terminal links, independent-correct or prompted-correct responding to the flashcard resulted in the experimenter providing praise, choosing an item from the plate associated with experimenter choice, and providing that item to the participant to be consumed immediately.

Control terminal link. During control terminal links, independent-correct or prompted-correct responding to the flashcard resulted in the experimenter providing praise and presenting the empty plate associated with the control to the participant.

Results and Discussion – Study One

Data from study 1 showing the number of selections for the child-choice, experimenter-choice, and control options during the choice assessments for each participant are depicted in Figures 1 through 8. Overall, there were four general patterns of behavior. First, some participants responded at variable rates, but overall, more so for the child-choice option than the experimenter-choice and control option (Figure 1). Second, some participants responded consistently more for the child-choice option than the experimenter-choice and control options (Figures 2, 3, and 4). Third, some participants responded similarly to both the child-choice and experimenter-choice options initially, and then began to consistently respond to the child-choice option (Figure 5). Fourth, some participants responded similarly to both the child-choice and experimenter-choice options throughout the assessment (Figures 6, 7, and 8). No participants responded at higher levels for the experimenter-choice option.

Figure 1 shows the results for Irina, Xerxes, Hank, and Cole, who all responded at variable, but higher frequencies for the child-choice option compared to the experimenter-choice and control options. Irina (top left panel) selected the child-choice option most frequently (M = 9.3) as compared to the experimenter-choice (M = 4) and control (M = 1.7) options. Xerxes (top right panel) selected the child-choice option most frequently (M = 9.4) as compared to the experimenter-choice (M = 5.4) and control (M = .2) options. Hank (bottom left panel) selected the child-choice option most frequently (M = 10) as compared to the experimenter-choice (M = 4.4) and control (M = .6) options. Cole (bottom right panel) selected the child-choice option most frequently (M = 9.4) as compared to the experimenter-choice (M = 5.1) and control (M = .5) options. These data indicate that, for some participants, there was an overall preference for the child-choice option; however, they did not respond exclusively or at consistently higher frequencies to the child-choice option.

Figures 2, 3, and 4 show the results for 12 participants who responded at consistently higher frequencies for the child-choice option, as compared to the experimenter-choice or control options, throughout the assessment. Figure 2 show the results for Britt, Ezra, Roxy, and Evan. Britt (top left panel) consistently selected the child-choice option more frequently (M = 10) than the experimenter-choice option (M = 5) and did not select the control option. Ezra (top right panel) consistently selected the child-choice option most frequently (M = 9) as compared to the experimenter-choice (M = 5.7) and control (M = .3) options. Roxy (bottom left panel) consistently selected the child-choice option most frequently (M = 12.4) as compared to the experimenter-choice (M = 2.4) and control (M = .1) options. Evan (bottom right panel) consistently selected the child-choice option most frequently (M = 10.8) as compared to the experimenter-choice (M = 3.3) and control (M = .9) options.

Figure 3 shows the results for Lamar, Larra, Eddie, and Claire. Lamar (top left panel) selected the child-choice options most frequently (*M* = 10.8) as compared to the experimenter-choice (*M* = 3.2) and the control (*M* = 1) options. Larra (top right panel) selected the child-choice option more frequently (*M* = 11.6) than the experimenter-choice option (*M* = 3.4) and did not select the control option. Eddie (bottom left panel) selected the child-choice option more frequently (*M* = 12.8) than the experimenter-choice option (*M* = 2.2) and did not select the control option. Claire (bottom right panel) selected the child-choice option more frequently (*M* = 13.2) than the experimenter-choice option (*M* = 1.8) and did not select the control option.

Figure 4 shows the results for Eric, Brad, Corey, and Larry. Eric (top left panel) selected the child-choice option most frequently (*M* = 13.4) as compared to the experimenter-choice (*M* = 1.4) and the control (*M* = .2) options. Brad (top right panel) selected the child-choice option most frequently (*M* = 13.4) as compared to the experimenter-choice (*M* = 1.6) and the control (*M* = .2) options. Corey (bottom left panel) selected the child-choice option most frequently (*M* = 13.2) as compared to the experimenter-choice (*M* = 1.6) and the control (*M* = .2) options. Larry (bottom right panel) selected the child-choice option exclusively (*M* = 15). These data indicate that for many participants, the child-choice option was consistently more preferred than the experimenter-choice option.

Figure 5 shows results for Mickey, Jonah, Zelda, and Hayden who responded similarly to the child- and experimenter-choice options initially, and then began responding more frequently for the child-choice option over the experimenter-choice and control options. Mickey (top left panel) selected the child-choice option more frequently (*M* = 10.1) as compared to the experimenter-choice (*M* = 4.8) and the control (*M* = .1) options. Jonah (top right panel) selected the child-choice option most frequently (*M* = 9.1) as compared to the control (*M* = 3.5) and the

experimenter-choice (*M* = 2.4) options. Zelda (bottom left panel) selected the child-choice option most frequently (*M* = 11.1) as compared to the experimenter-choice (*M* = 3.5) and the control (*M* = .4) options. Hayden (bottom right panel) selected the child-choice option most frequently (*M* = 10.5) as compared to the experimenter-choice (*M* = 4) and the control (*M* = .5) options. These data indicate that, for some participants, it was necessary to come into contact with the different consequences initially for a preference to develop. However, after coming into contact with the consequences associated with the different choice options, the child-choice option was more preferred.

Figures 6, 7, and 8 show the results for 11 participants who responded similarly for the child- and experimenter-choice options throughout the assessment. Figure 6 shows results for Carrie, Jody, Kelly, and Lucy. Carrie (top left panel) selected the child-choice option at a similar frequency (*M* = 8) as the experimenter-choice option (*M* = 6.8), whereas she selected the control option at a low frequency (*M* = .2). Jody selected the experimenter-choice at a similar frequency (*M* = 7.9) as the child-choice option (*M* = 6.9), whereas she selected the control option at a low frequency (*M* = .2). Kelly selected the child-choice option at a similar frequency (*M* =8.1) as the experimenter-choice option (*M* = 6.9), whereas she never selected the control option. Lucy selected the child-choice option at a similar frequency (*M* =8.1) as the experimenter-choice option (*M* = 6.9), whereas she never selected the control option.

Figure 7 shows results for Valerie, Cate, and Max. Valerie selected the experimenter-choice option at a similar frequency (*M* = 7.2) as the child-choice option (*M* = 7), whereas she selected the control option at a low frequency (*M* = .8). Cate selected the child-choice option at a similar frequency (*M* = 7.1) as the experimenter-choice option (*M* = 5.4), whereas she selected the control at a low frequency (*M* = 1.1). Max selected the child-choice option at a similar

frequency (*M* = 8.4) as the experimenter-choice option (5.4), whereas he selected the control option at a low frequency (*M* = 1.1).

Figure 8 shows the results for Elle, Missy, and Sadie. Elle selected the child-choice option at a similar frequency (*M* = 7.7) as the experimenter-choice option (*M* = 6.7), whereas she selected the control option at a low frequency (*M* = .6). Missy selected the experimenter-choice option at a similar frequency (*M* = 7.3) as the child-choice option (*M* = 6), whereas she selected the control option at a low frequency (*M* = 1.7). Sadie selected the experimenter-choice option at a similar frequency (*M* = 7.3) as the child-choice option (*M* = 6.9), whereas she selected the control at a low frequency (*M* = .8). These data indicate that some participants may be indifferent to the different consequences associated with the different choice options. This indifference may be due to a lack of preference, which may be associated with a lack of differential histories associated with choice-making opportunities. It is important to note that these participants rarely selected the control option, indicating that the indifference was not due to a lack of discrimination across available options.

Table 2 displays the name of all participants listed in chronological order according to age in months and the choice option that was determined through visual analysis to be the preferred option. Overall, there were 20 participants who preferred the child-choice option over the experimenter-choice and control options. There were 10 participants who responded relatively equally for the child-choice and experimenter-choice options, indicating relative indifference to the two options. There were no participants who preferred the experimenter-choice option over the child-choice and control option.

A chi-square analysis between age and frequency of child-choice selections was computed using GraphPad Prism® software. A chi-square analysis is a test commonly used in

inferential statistics to evaluate the goodness of fit of the distribution of observed data to a theoretical distribution in order to determine the independence of two criteria of qualitative data. For the current analysis, two age groups were used (i.e., younger than 48 months and older than 48 months) and compared to two preference groups (i.e., child-choice preference, no preference). The preference for the child-choice option did not differ significantly based on the age of the participants, χ^2 (1, N = 30) = .6000, p = .4386. Chi-square (χ^2) is calculated based on the degrees of freedom (1), which are the distribution of a sum of squares of the independent, standard normal random variables. The population in the current study (N) is 30, and the probability of observing this chi-square value is p = .4386. This p value indicates that there is not a statistically significant relationship between age and preference for choice because it is higher than .05, a common value used to determine statistical significance. However, it is possible that these statistical analyses are not valid due to the small sample size because a chi-square calculation only provides an approximation. When large sample sizes are used, the possible difference due to this approximation is minimal; however, with small sample sizes, as in the current study, this difference may be substantial. To somewhat address this, a Fisher's test was conducted. However, the probability was still not statistically significant (p = 0.6999). Based on the results of these two tests, there does not appear to be a significant relationship between age and a preference for choice. However, the range of ages of the participants in the current study is still quite narrow (31-62 months); therefore, it is possible that if participants with a wider range of ages were included there may be a significant relationship.

Overall, the majority of participants (20/30 = 66%) preferred the child-choice option during the choice assessments. However, approximately one-third of the participants did not display a preference for either the child- or experimenter-choice options. According to previous

research, it is possible that a preference for choice may develop based on an individual's history with choices resulting in better outcomes. Study 2 was conducted to determine whether programming a history of one choice option (either the child- or experimenter-choice) consistently resulting in more preferred and varied outcomes would result in participants responding differently toward the different choice options during subsequent assessment phases.

Study 2 Method – Conditioning of Child-Choice and Experimenter-Choice

Purpose

The purpose of study 2 was to use differential consequences to attempt to (a) condition experimenter-choice as a reinforcer for participants who showed a preference for child-choice condition in study 1, (b) condition experimenter-choice as a reinforcer for participants who responded similarly for both choice conditions in study 1, and (c) condition the child-choice condition as a reinforcer for participants who responded similarly for both choice conditions in study 1.

To attempt to condition child-choice as a reinforcer, we paired the child-choice condition with a large variety of high-preferred edibles while we paired the experimenter-choice condition with a small variety of low-preferred edibles. To attempt to condition experimenter-choice as a reinforcer, we paired experimenter-choice with a large variety of high-preferred edibles while we paired the child-choice condition with a small variety of low-preferred edibles. We chose to pair eight, different, highly preferred items during our conditioning phases because previous research has indicated that the repeated pairing of these variables (i.e., higher stimulus variety, higher preferred items, and higher magnitude) with making choices may be the mechanism by which a preference for choice develops in the natural environment.

Participants and Setting

A subset of participants from study 1 participated in study 2. Participants included four participants who showed a preference for the child-choice option during study 1 and seven participants who responded similarly to the child- and experimenter-choice options in study 1. Four participants who preferred the child-choice option in study 1 and two participants who responded at similar levels to child- and experimenter-choice options in study 1 participated in the experimenter-choice conditioning phase. Two of the four participants who initially preferred the child-choice option also participated in an alternative conditioning phase. Five participants who responded similarly for the child- and experimenter-choice options in study 1 participated in the child-choice conditioning phase. In addition, two of these five participants also participated in the experimenter-choice conditioning phase. Finally, two participants also participated in an alternative conditioning phase.

Sessions were conducted in a 3 m x 3 m individual session room near the classrooms. Sessions will be conducted 3 to 6 times a day, 3 to 5 days a week. The session room contained a table, chairs, session materials, and reinforcers appropriate to the particular session being conducted.

Materials

Task materials, edible reinforcers, and discriminative stimuli were identical to those in study 1. That is, three identical sets of flashcard, discriminative stimuli, and edible reinforcers were present in all sessions.

Response Measurement and Interobserver Agreement

The dependent variables were identical to those described for study 1. That is, the primary dependent variable was the frequency of selection for each choice option (child-choice, experimenter-choice, no reinforcement [control]) during the initial link of the concurrent-chains

procedure. In addition, data were collected on the frequency of participant independent-correct and prompted-correct responses to the target task (i.e., expressive picture labeling) during the terminal links of each session as well as reinforcer delivery during the terminal links of each trial. Procedural integrity was assessed by having an observer collect data for an average of 24.9% (range, 26%-32%) of sessions and was 99.7% (range, 93%-100%). Table 4 depicts average procedural integrity scores for individual participants.

Interobserver agreement (IOA) was assessed by having a second observer collect data for an average of 47.8% (range, 28%-88%) of sessions across participants in study 2. Similar to study 1, IOA was calculated by comparing both observers' data using a trial-by-trial method. The average agreement across participants for choice selections during the initial link was 99.8% (range, 87%-100%). The average IOA for independent or prompted-correct responding during the terminal link was 99.7% (range, 87%-100%), and the IOA for edible delivery was 99.9% (range, 87%-100%). Table 5 depicts average IOA scores for individual participants.

Procedure

Baseline data were the data collected during the choice assessment from study 1. Following that assessment, a conditioning phase was implemented to attempt to condition the child-choice or experimenter-choice option as a reinforcer. After the conditioning phase, another choice assessment (identical to the one conducted in study 1) was conducted to determine whether the participant's preference shifted from one choice option to another. For two participants who did not show significant or consistent change in behavior during the second choice assessment, a second conditioning phase was implemented to condition the other choice option as a reinforcer. After that conditioning phase, another choice assessment was conducted.

For four participants who did not show a change in preference during the post-test choice assessment after the original conditioning phase, an alternative method was used to attempt to condition that same choice option. This alternative conditioning phase included conducting five conditioning sessions followed by one choice assessment session, and repeating this pattern five times for a total of 25 conditioning sessions interspersed with five test sessions. These procedures are similar to those used by Karsina et al. (2011) in which more frequent choice trials were conducted after a recent history of conditioning trials. It is possible that conditioning effects for some participants in the current study were not maintained during the original choice assessment phase that followed the conditioning phase because multiple sessions were conducted in the choice assessment phase in which the outcomes of the two choice options were equated, which may have resulted in extinction.

Child-choice conditioning. During each child-choice conditioning session, 15 trials were conducted. Each trial consisted of an initial link and a terminal link. Similar to study 1, during the initial link of each trial, all three stacks of flashcards were placed on the table in front of the participant and the experimenter said, "Pick one." Once the participant selected a stack, he or she entered the terminal link. The terminal link consisted of one expressive labeling trial, which was followed by a 15-s ITI before the next trial was presented.

Initial link. As mentioned above, during the initial link of each trial, three sets of identical flashcards were presented to the participant. Each set of flashcards was associated with a different choice option (child-choice, experimenter-choice, no reinforcement [control]). A picture of a pointing hand with the finger pointing toward the participant was placed in front of the child-choice materials, a picture of a pointing hand with the finger pointing toward the experimenter was placed in front of the experimenter-choice materials, and a blank page was

place in front of the control materials. A plate containing eight high-preferred edibles (items ranked 2-9 during the preference assessment conducted prior to study 1) was placed behind the child-choice materials. A plate containing two of the same low-preferred edibles (item ranked lowest but selected at least once during the preference assessment conducted prior to study 1) was placed behind the experimenter-choice materials. An empty plate was placed behind the control materials. Prior to the start of the session, the participant was given instructions regarding each of the choice options and one practice trial was conducted for each option. For each practice trial, the participant was prompted to choose each of the options (child-choice, experimenter-choice, and control), and the associated consequences were implemented in the terminal link.

Terminal link. After the participant selected a choice option in the initial link of each trial, the terminal link associated with that choice option was implemented. In the terminal link of each trial, the experimenter presented a flashcard from the stack of flashcards associated with the selected choice option and asked the participant "What is this?" If the participant correctly labeled the picture on the flashcard within 5 s of the instruction (independent-correct response), the consequence associated with the selected choice option was implemented. If the participant did not correctly label the picture on the flashcard within 5 s of the instruction (i.e., labeled the picture incorrectly or did not respond), the experimenter vocally prompted the participant to say the correct label of the picture on the flashcard. If the participant then correctly labeled the picture on the flashcard within 5 s of the corrective prompt (prompted-correct response), the consequence associated with the selected choice option was implemented. If the participant did not respond following the vocal prompt, the next initial link would be implemented following the

15-s ITI; however, this never occurred. That is, the participants always responded correctly either after the initial presentation of the flashcard or after the vocal prompt.

Child-choice terminal link. During child-choice terminal links, independent-correct or prompted-correct responding resulted in the experimenter providing praise and sliding the plate containing eight, high-preferred edible items to the participant. The experimenter told the participant to pick one. Once the participant consumed the edible, the experimenter replaced that edible and positioned the plate back behind the task materials associated with the child-choice option.

Experimenter-choice terminal link. During experimenter-choice terminal links, independent-correct or prompted-correct responding resulted in the experimenter providing praise, picking one of the two identical low-preferred edible items from the plate, and providing it to the participant to consume.

Control terminal link. During control terminal links, independent-correct or prompted-correct responding resulted in the experimenter providing praise and presenting the empty plate to the participant.

Experimenter-choice conditioning. Experimenter-choice conditioning sessions were identical to child-choice conditioning sessions except for the stimuli presented in the initial link and the consequences implemented in the terminal link.

Initial link. The initial link in this condition was identical to that in the child-choice conditioning phase with the exception that a plate containing two of the same low-preferred edibles was placed behind the child-choice materials, and a plate containing eight high-preferred edibles was placed behind the experimenter-choice materials.

Terminal link. The terminal link in this condition was identical to the terminal link in the child-choice conditioning phase except for the consequences associated with correct responding in the various terminal links (see below).

Child-choice terminal link. The child-choice terminal link was identical to the one conducted in the child-choice conditioning phase with the exception that independent-correct or prompted-correct responding resulted in the experimenter providing praise and sliding the plate containing two of the same low-preferred edible items to the participant.

Experimenter-choice terminal link. The experimenter-choice terminal link was identical to the one conducted in the child-choice conditioning phase with the exception that independent-correct or prompted-correct responding resulted in the experimenter providing praise, picking an item from the plate containing eight high-preferred edibles, and providing it to the participant.

Control terminal link. The control terminal link was identical to the one conducted in the child-choice conditioning phase.

Experimental Design

A pre- and post-test design was used in which a choice assessment (identical to the assessment conducted during study 1) was conducted prior to (pre-test) and after (post-test) conditioning sessions to determine changes in preference for child-choice versus experimenter-choice conditions. Baseline was the choice assessment conducted during study 1. After each original conditioning phase (i.e., conditioning phases with 25 consecutive conditioning sessions), a choice assessment was conducted to determine the effects of conditioning on preference for child-choice versus experimenter-choice options. During alternative conditioning phases, five conditioning sessions were followed by a single choice-assessment session. This pattern was repeated five times for a total of 25 conditioning sessions and five choice-assessment sessions.

Results and Discussion – Study Two

Data from study 2 showing the number of selections for the child-choice, experimenter-choice, and control options across choice assessments and conditioning phases are presented across participants. Three interesting outcomes were found. First, during the conditioning phases, all of the participants in study 2 responded to the option paired with favorable outcomes. This replicates previous research which showed that participants would allocate more responding to a less-preferred option if it was associated with better outcomes (e.g., Fisher et al., 1997). Second, some participants did not show a change in preference from the pre- to post-tests, especially those who showed a clear preference for the child-choice option in the pre-test. Third, two participants who initially responded similarly to both the child- and experimenter-choice options in the pre-test and then participated in the experimenter-choice conditioning phase, showed a preference for the child-choice option during the post-test. Fourth, three participants who initially responded similarly to both the child- and experimenter-choice options in the pre-test and then participated in the child-choice conditioning phase, showed a preference for the child-choice option during the post-test.

Figure 9 shows the results for Claire and Ezra, who participated in the experimenter-choice conditioning phase. Although Claire (top panel) showed a substantial preference for the child-choice option during the pre-test, during the conditioning phase, she selected the experimenter-choice option more frequently (M = 14.5) than the child-choice option (M = .5), and she never selected the control option. In the post-test, Claire selected the child-choice option more frequently (M = 13) than the experimenter-choice option (M = 2), and did not select the control option. Based on these results, we determined that if a participant displays a significant preference for the child-choice option during the pre-test, the experimenter-choice conditioning

phase may not be sufficient to affect this preference. During the pre-test, Ezra (bottom panel) showed a slight preference for the child-choice option, and during the conditioning phase, he selected the experimenter-choice option more frequently (*M* = 13.6) than the child-choice option (*M* = 1.6), and did not select the control option. During the first four sessions of the post-test, he selected the child-choice option much more frequently than the experimenter-choice option; however, after this he began selecting the child- and experimenter-choice options at a similar frequency. Based on this pattern of responding, we concluded that any effects of the experimenter-choice conditioning phase did not maintain over repeated sessions in which the outcomes for both choice options were identical. Taken together, these data show that, if you associate better outcomes with a less-preferred context, participants will respond for that context; however, when the consequences are equated again, they may respond similarly to the pre-test.

Figure 10 shows the results for Kelly and Elle who responded similarly for both choice options during the pre-test, and then participated in the experimenter-choice conditioning phase. Kelly (top panel) responded similarly for the child-choice and experimenter-choice options during the pre-test, and during the conditioning phase, she selected the experimenter-choice option more frequently (*M* = 14.2) than the child-choice option (*M* = .8), and did not select the control option. During the post-test, she selected the child-choice option most frequently (*M* = 12.8) as compared to the experimenter-choice (*M* = 1.1) and control (*M* = 1.1) options. Elle (bottom panel) also responded similarly to the child-choice and experimenter-choice options during the pre-test, and during the conditioning phase, she selected the experimenter-choice more frequently (*M* = 14.3) than the child-choice option (*M* = .7) and did not select the control. During the post-test, she selected the child-choice option most frequently (*M* = 10.8) as compared to the experimenter-choice (*M* = 4) and control (*M* = .2) options. These data indicate

that, if a participant does not show a significant preference for one choice option during the pre-test, there may be something about the experimenter-choice conditioning phase that makes the *child*-choice option more preferred.

Figure 11 shows the results for Lucy, Jody, and Carrie who responded similarly for the child- and experimenter-choice options during the pre-test, participated in the child-choice conditioning phase and showed an increase in their selection for the child-choice option in the post-test. Jody and Carrie also participated in the experimenter-choice conditioning phase following the first post-test. During the child-choice conditioning phase, Lucy (top panel) selected the child-choice option most frequently (M = 14.8) as compared to the experimenter-choice (M = .1) and control (M = .1) options. During the post-test, she selected the child-choice option most frequently (M = 13.6) as compared to the experimenter-choice (M = 1.3) or control (M = .1) options. This was a substantial change in responding from the pre-test, indicating that the child-choice conditioning phase increased the reinforcing efficacy of the child-choice condition. Jody (middle panel) also responded similarly to the child- and experimenter-choice options during the pre-test. During the child-choice conditioning phase, she selected the child-choice option more frequently (M = 14.6) than the experimenter-choice option (M = .4) and did not select the control option. During the first post-test, she selected the child-choice option most frequently (M = 10.3) as compared to the experimenter-choice (M = 2.5) and the control (M = .2) options; however, the pattern of responding was highly variable. Based on the results shown by Kelly and Elle, an experimenter-choice conditioning phase was conducted to attempt to increase the consistency of responding for the child-choice option. During the experimenter-choice conditioning phase, she selected the experimenter-choice option most frequently (M = 14.2) as compared to the child-choice (M = .2) and the control (M = .1) options. During the second post-

test, she selected the child-choice option most frequently (*M* = 11.7) as compared to the experimenter-choice (*M* = 3.1) and the control (*M* = .2) options. Also, responding in the second post-test was also more consistent than the responding in the first post-test. Carrie (bottom panel) also responded similarly to the child- and experimenter-choice options during the pre-test. During the child-choice conditioning phase, she selected the child-choice option more frequently (*M* = 14) than the experimenter-choice option (*M* = 1), and did not select the control. During the first post-test (after child-choice conditioning sessions), she selected the child-choice option most frequently (*M* = 9.7) as compared to the experimenter-choice (*M* = 4.7) and control (*M* = .6) options. Although the frequency of selections for the child-choice option was consistently higher during this post-test than the pre-test, based on the results shown by Kelly and Elle, we conducted an experimenter-choice conditioning phase to attempt to increase the frequency of selections of the child-choice option. During the experimenter-choice conditioning phase, she selected the experimenter-choice option more frequently (*M* = 14.9) than the child-choice option (*M* = .1) and did not select the control option. During the second post-test (after experimenter-choice conditioning sessions), she selected the child-choice option more frequently (*M* = 11.2) than the experimenter-choice option (*M* = 3.8) and did not select the control option. These data indicate that, for some participants, the child-choice conditioning phase may increase their preference for the child-choice option somewhat, but the experimenter-choice conditioning phase may have a greater effect. These effects replicate the results shown by Kelly and Elle (figure 10) who preferred the child-choice option following the experimenter-choice conditioning phase.

Although many of the participants shifted their responding, at least to some degree, in favor of the child-choice option following a conditioning history, there were some participants who did not show a change in responding after conditioning. An alternative method was used to

condition either the child- or experimenter-choice option in which choice assessment sessions were interspersed among conditioning sessions.

Figure 12 shows data for Larra and Cole who showed a preference for the child-choice option during the pre-test. Although Larra (top panel) showed a substantial preference for the child-choice option during the pre-test, during the experimenter-choice conditioning phase, she selected the experimenter-choice option most frequently (*M* = 13.7) as compared to the child-choice (*M* = .9) and control (*M* = .4) options. However, during the post-test, Larra again selected the child-choice option most frequently (*M* = 13.1) as compared to the experimenter-choice (*M* = 1.3) and control (*M* = .6) options, which was similar to responding in the pre-test. During the alternative conditioning phase in which experimenter-choice conditioning sessions were conducted, Larra selected the experimenter-choice option most frequently (*M* = 14.3) as compared to the child-choice (*M* = .3) or control (*M* = .4) options. During the choice assessment sessions, Larra continued to select the child-choice option most frequently (*M* = 8.2) as compared to the experimenter-choice (*M* = 4.6) or control (*M* = 2.2) options. Although she did select the child-choice option fewer times than she had in the previous choice assessment phase, the frequency of child-choice selections during each choice assessment session is higher than the previous session. These data may indicate that the experimenter-choice conditioning sessions may have initially decreased her preference for the child-choice option and increased her preference for the experimenter-choice option; however this pattern of responding did not maintain over time. Cole (bottom panel) also showed an overall preference for the child-choice option in the pre-test; however, his responding was variable. During the initial experimenter-choice conditioning phase, he selected the experimenter-choice option more frequently (*M* = 14.2) than the child-choice option (*M* = .8) and never selected the control. During the post-test,

he selected the child-choice option most frequently (*M* = 8.6) as compared to the experimenter-choice (*M* = 6.3) and the control (*M* = .1) options. However, during the third and fourth session of the post-test, he did select the experimenter-choice option at a much higher frequency than the child-choice option. Therefore, we conducted the alternate conditioning phase in which fewer experimenter-choice conditioning sessions were interspersed with a choice-assessment session. During these conditioning sessions, Cole selected the experimenter-choice option most frequently (*M* = 14.2) as compared to the child-choice (*M* = .7) or control (*M* = .1) options. During the choice assessment sessions, Cole selected the child-choice option more frequently (*M* = 10.8) than the experimenter-choice (*M* = 4.2) option, and did not select the control option. Also, similar to Larra, there appears to be an increasing trend in the frequency of child-choice selections during these test sessions. These data indicate that it is difficult to condition experimenter-choice, particularly when an individual already has a preference for child choice. However, it is possible that additional variables may be necessary to change responding in favor of the experimenter-choice option.

Figure 13 shows the results for Cate and Valerie who responded similarly for the child-choice and experimenter-choice options during the pre-test and then participated in the child-choice conditioning evaluation. Cate (upper panel) displayed similar levels of responding for child- and experimenter-choice during the pre-test. During the child-choice conditioning phase, she selected the child-choice option more frequently (*M* = 14.5) than the experimenter-choice option (*M* = .5) and never selected the control option. During the post-test, she selected the child-choice option at a similar frequency (*M* = 7.4) as the experimenter-choice option (*M* = 6.8), whereas she selected the control option at a lower frequency (*M* = .8). This pattern of responding was similar to the pre-test; therefore, the alternative conditioning phase was

conducted with Cate. During these child-choice conditioning sessions, Cate selected the child-choice option most frequently (*M* = 14.2) as compared to the experimenter-choice (*M* = 5) or control (*M* = .1) options. During the choice assessment sessions, Cate selected the child-choice condition most frequently (*M* = 10) as compared to the experimenter-choice (*M* = 4.8) or the control (*M* = .2) options. The data for Cate indicate that interspersing frequent and single choice-assessment sessions allowed us to observe changes in preference. It is possible that, for Cate, there were short-term conditioning effects that dissipated, possibly due to extinction, in the extended choice assessment post-test. Valerie (bottom panel) also displayed similar levels of responding across child-choice and experimenter-choice options during the pre-test. During the child-choice conditioning phase, she selected the child-choice option most frequently (*M* = 14.5) as compared to the experimenter-choice (*M* = .4) and control (*M* = .1) options. During the post-test, she selected the child-choice option at a similar frequency (*M* = 8) as the experimenter-choice option (*M* = 6.7), whereas she selected the control option at a lower frequency (*M* = .3). This pattern of responding was similar to the pre-test; therefore, the alternative conditioning phase was conducted with Valerie. During these child-choice conditioning sessions, Valerie selected the child-choice option most frequently (*M* = 13.8) as compared to the experimenter-choice (*M* = 1) or control (*M* = .2) options. During the choice assessment sessions, Valerie again selected the child-choice at a similar frequency (*M* = 7) as the experimenter-choice option (*M* = 7.8), whereas she selected the control option at a lower frequency (*M* = .2). Thus, the method of interspersing frequent and single choice-assessment sessions with conditioning sessions was not effective for showing any effect of the conditioning procedure for Valerie.

General Discussion

The purpose of study 1 was to determine the prevalence of a preference for choice with a relatively larger population (N = 30) of typically developing children and to determine whether age was associated with preference for choice. The majority of participants (20 out of 30) showed a preference for choice even though the outcomes were identical. These data replicate the results of previous research (e.g., Tiger et al., 2006; Schmidt et al., 2009; Sran & Borrero, 2010) showing that the majority of typically developing children prefer making choices as compared to having someone else choose for them. The results of study 1 support the view that choice is valued by society (Leotti, Iyengar, & Ochsner, 2010; Lefcourt, 1973), even for children as young as 3-years-old. That is, choice is considered a vehicle for control because choices allow us to exercise control over our environment, and perhaps decrease the aversive aspects of certain activities or contexts (Lefcourt, 1973).

Although the majority of participants in study 1 preferred child-choice over experimenter-choice options, approximately one-third (10 out of 20) of the participants responded similarly to both choice options suggesting that one was not more preferred than the other when the outcomes were identical. There are several possible reasons for the lack of preference for choice displayed by these participants. First, it is possible that these participants did not have a robust history with choices resulting in better outcomes such as more preferred items or activities, higher magnitudes of reinforcement, and increased stimulus variation. Second, it is possible that the discriminative stimuli used to aid in discrimination between child-choice and experimenter-choice options were not effective for some participants. For example, it is possible that some participants only attended to the presence of the edibles (or other stimuli), which were identical across child-choice and experimenter-choice options resulting in

indiscriminate responding. It is possible that if more salient discriminative stimuli were used, we may have seen increased discrimination in some of these participants.

Of the 10 participants that responded similarly to child- and experimenter-choice options in study 1, 60% of these participants were younger than 48 months of age. In addition, 40% of the 15 participants that were under 48 months of age responded similarly across child-choice and experimenter-choice options, whereas only 27% of the 15 participants that were 48 months of age or older responded similarly between these two choice options. This may indicate that children under 48 months of age may not have an extensive history with choice opportunities and therefore, have not had extensive exposure to choices resulting in better outcomes, as mentioned earlier. If a relationship between age and a preference for choice can be determined, this may indicate that this preference has an ontogenic origin, meaning it develops during a person's lifetime due to their experiences. However, when we conducted a chi-square analysis, we found that there was not a statistically significant relationship between age (i.e.., under 48 months versus 48 months and older) and preference for the child-choice option. As mentioned before, these results may be due to a relatively small sample size or to the limited range of participant ages. Although many of our participants were younger than participants in previous research studies, it is possible that a stronger relationship would have been found if we had included participants that were even younger as well as participants that were older. If a relationship between age and preference for child-choice could be determined, it might suggest the possibility of ontogenic sources of a preference for choice, meaning that a longer history of the repeated association of choice-making and preferred outcomes is the mechanism by which a preference for choice develops.

The purpose of study 2 was to determine whether we could condition preference for child-choice option, experimenter-choice option, or both options by exposing participants to differential outcomes associated with child-choice or experimenter-choice options. Several interesting results were found in this study. First, during conditioning sessions, all participants selected the choice option that was associated with the better outcome (a higher variety of high-preferred items), regardless of which option was being conditioned (child choice or experimenter choice) and regardless of their pattern of responding in previous choice assessment sessions. These results replicate previous research showing that participants will shift responding to a previous low-preferred option if the outcome for selecting this option is better than the previous high-preferred option (e.g., Fisher et al. 1997; Tiger et al. 2006). Fisher et al. showed that associating highly preferred items with a less-preferred choice context resulted in participants allocating higher levels of responding to that choice context. In addition, Tiger et al. showed that increasing the number of items available for one choice context resulted in participants allocating responding to that choice context.

Another interesting finding in study 2 was that the experimenter-choice conditioning phase was not effective for conditioning experimenter-choice as a reinforcer during subsequent choice-assessment sessions for any of the participants for which this was evaluated (8 out of 11 participants in study 2). First, for the four participants who showed a preference for the child-choice option during the initial choice assessment (Claire, Ezra, Larra, and Cole), the experimenter-choice conditioning did not result in a change in preference (or sustained change in preference [Cole]) during the subsequent choice-assessment. That is, participants continued to prefer the child-choice option after the experimenter-choice conditioning phase. Furthermore, when the alternative conditioning phase was implemented with two of these participants (Larra

and Cole), the single and more frequent choice-assessment sessions also did not show a change in preference for the experimenter-choice option. Albeit, there were a few choice-assessment sessions during the alternative conditioning phase in which Larra displayed a lower frequency of selection for the child-choice option and a somewhat higher frequency of selection for the experimenter-choice option. These results are similar to the results found by Karsina et al. (2011). That is, after Karsina et al. successfully conditioned a preference for the "free-choice" option with several participants, they were unable to successfully condition a preference for the "restricted-choice" option. Collectively, our results and those of Karsisna et al. may indicate that if a participant has a preference for choice, it may be difficult to change that preference. However, the difficulty in conditioning experimenter-choice may also be due to the procedures or variables that were used in the conditioning procedures. We used different high-preferred stimuli during our conditioning procedure, and Karsina et al. used denser schedules of reinforcement in their conditioning procedure. It is possible that other variables that have been shown to affect choice responding, such as delay to reinforcement and the effort required to obtain a reinforcer (DeLeon, Iwata, Goh, & Worsdell, 1997; Mace, Neef, Shade, & Mauro, 1996; Neef, Mace, & Shade, 1993; Neef, Shade, & Miller, 1994) would have been effective for conditioning experimenter-choice as a reinforcer for these individuals. It is also possible that providing these participants with a more extensive conditioning history (i.e., more conditioning sessions) would have resulted in a change in preference for the experimenter-choice option.

Second, for participants who responded similarly for child-choice and experimenter-choice options during the initial choice assessment (Kelly, Elle, Jody, and Carrie), the experimenter-choice conditioning also did not result in preference for the experimenter-choice option during subsequent choice-assessment sessions. However, following experimenter-choice

conditioning, all four of these participants displayed increased levels of responding for the child-choice option during subsequent choice-assessment sessions (as compared to responding in the initial choice assessment). For Kelly and Elle, experimenter-choice conditioning was immediately implemented following the initial choice assessment in which similar responding occurred. During the choice assessment conducted after the experimenter-choice conditioning phase, both Kelly and Elle displayed increased frequency of selections of the child-choice option suggesting a change in preference for the child-choice option as compared to the initial choice assessment. For Jody and Carrie, the experimenter-choice conditioning was conducted after a child-choice conditioning phase and second choice assessment, which showed that child-choice conditioning increased the frequency of selection of the child-choice option somewhat over the initial choice assessment. However, the subsequent implementation of experimenter-choice conditioning resulted in a larger increase in the selection of the child-choice option in the third choice assessment suggesting that the experimenter-choice conditioning enhanced child preference for the child-choice option. The effects of the experimenter-choice conditioning phase for increasing preference for child-choice are particularly interesting and are counter to what we hypothesized would occur. However, one possible reason for these results is that although participants could respond to the child-choice option during the experimenter-choice conditioning phase, the relatively less preferred outcome associated with the child-choice option resulted in them rarely choosing this option and allocating most of their responding toward the experimenter-choice option. Thus, it is possible that continued responding to the experimenter-choice option during conditioning resulted in satiation to the experimenter-choice option or inadvertent restriction of (deprivation from) the child-choice option, possibly making the child-choice option more valuable when the outcomes were again equated during subsequent choice-

assessment sessions. In fact, previous research has shown that continued access to (satiation) or restriction of (deprivation) various stimuli or responses may affect responding to access those stimuli or the frequency of engaging in those responses, respectively (Rapp, Vollmer, St. Peter, Dozier, & Cotnoir, 2004 ; Vollmer & Iwata, 1991). Vollmer and Iwata (1991) evaluated the effects of satiation and deprivation on three different types of reinforcers (i.e., food, music, and social interaction). During satiation phases, participants were provided continuous access to a particular reinforcer for 15 min prior to a session in which they responded to access that stimulus. During deprivation phases, participants were restricted access to a particular reinforcer for either 15 or 30 min prior to a session in which they responded to access that stimulus. Results showed that, across all reinforcers, participants responded more after periods of stimulus restriction (deprivation) than periods of continuous access (satiation). Similarly, Rapp et al. evaluated the effects of restricting the occurrence of high frequency stereotypic behaviors on the level of other, low frequency stereotypic behaviors. Results showed that during restriction conditions, the occurrence of high frequency stereotypic behaviors decreased; however, during subsequent free-operant phases, the occurence of the restricted stereotypic behavior increased above levels in previous free-operant phases for four of five participants. These results indicate that the reinforcing efficacy of these behaviors may have been increased during the restriction phases due to deprivation from the reinforcer associated with engaging in a particular topography of stereotypy. Therefore, it is possible that the experimenter-choice conditioning phase increased the preference of child-choice option due to either satiation, deprivation, or a combination of both.

Another interesting finding of study 2 was that the child-choice conditioning phase resulted in an increase in responding for the child-choice option during subsequent choice-

assessment sessions for 3 out of 5 children with which this evaluation was implemented. Lucy, Jody, and Carrie all showed similar levels of responding for child-choice and experimenter-choice options in the initial choice assessment. After child-choice conditioning was implemented for 25 sessions with these participants, all three participants showed an increase (albeit to varying degrees) in responding for the child-choice option in the subsequent choice-assessment phase. One participant (Lucy) show increased and maintained preference for the child-choice option after the child-choice conditioning phase. For the other two participants (Jody and Carrie), selections for the child-choice option increased as compared to the initial choice assessment following child-choice conditioning; however, higher and more stable preference for the child-choice options did not occur until after the experimenter-choice conditioning phase. The other two participants (Cate and Valerie) for which we evaluated the effects of child-choice conditioning did not show a change in preference from the initial to the subsequent choice-assessment phase. In fact, even when we implemented the alternative conditioning procedure in which we conducted single and more frequent choice-assessment sessions, we did not see a *large* increase in selection of the child-choice option during these assessment sessions. However, we did see somewhat more stable and higher levels of child-choice selections as compared to experimenter-choice selections during choice-assessment sessions during this phase for Cate. As mentioned above, it is possible that more conditioning sessions or additional variables during the conditioning phase may have resulted in conditioning the child-choice option as a reinforcer.

A substantial limitation in the present study is the possible discrimination failure between the different choice contingencies during the choice-assessment sessions. It is possible that the participants who responded similarly for the child-choice and experimenter-choice options

during the choice assessments did so because they were not attending to discriminative stimuli that we programmed. All participants responded very little, if at all, to the control option, indicating that they discriminated the presence or absence of the reinforcers, but the number of participants (10/30, or 33%) who responded similarly to both choice options was substantial. As mentioned earlier, it is possible that this apparent lack of preference was due to a limited history of making choices, but it is also possible that the participants were not discriminating between the child-choice and experimenter-choice options because they both included the same edibles. Future research should consider including more salient discriminative stimuli to control for this possible discrimination failure.

Future researchers may also consider evaluating the effectiveness of conditioning by evaluating or including additional variables that have been shown to affect choice responding, such as delay to reinforcement or the effort necessary to obtain the reinforcers. These variables may increase or enhance the effects of the conditioning procedures. There are also procedural changes can be made to increase the effectiveness of the conditioning procedure. For example, conducting more conditioning sessions may be necessary to provide an individual with a substantial history to change preference for particular choice options. Second, as we attempted to do with several participants, conducting single and more frequent choice-assessment sessions may allow for determining the effects of conditioning sessions on preferences because they allow one to determine the immediate effects of the conditioning procedure without continued exposure to extinction that is inherent in consecutive choice-assessment sessions.

There are several important implications of the results of this study. First, as mentioned, we showed that a large number of participants preferred the child-choice option over the experimenter-choice option prior to any conditioning. This is particularly important because the

outcome of these options was the same (i.e., the same edible was provided). These data replicate previous research showing that choice is a reinforcer for children and some individuals with IDD (i.e., Tiger et al., 2006, Tiger et al., 2010; Schmidt et al., 2009; Sran & Borrero, 2010) and suggest that choice may be an effective intervention for increasing appropriate behavior and decreasing inappropriate behavior because it is a reinforcer in itself. That is, the opportunity to choose may increase the reinforcing aspect of demand contexts or decrease the aversive aspects of demand contexts. Second, study 2 showed that conditioning procedures were effective for increasing preference for child-choice options. These results are important for two reasons. First, these results are preliminary evidence to suggest how choice-making behavior becomes reinforcing in humans. That is, through contingencies which result in preferred outcomes in the natural environment. Second, these results suggest simple ways in which clinicians and researchers may increase choice-making in individuals that do not currently make choices or prefer choice contexts. However, additional research is needed to determine the most efficient and effective ways to condition choice as a reinforcer and determine why a history of others choosing for you may result in more of an increase in preference for choice than conditioning procedures.

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Tables

	Choice Assessment	
	Percentage of Sessions	Percentage Procedural Integrity
Britt	47.8	97.7 (93-100)
Valerie	31.8	99 (93-100)
Lamar	33	95.9 (87-100)
Larra	33	100
Cate	33	100
Mickey	33	97.6 (93-100)
Jonah	37.5	100
Missy	33	100
Carrie	37.5	100
Irina	33	100
Eric	40	100
Roxy	33	100
Ezra	26	100
Jody	34.5	100
Elle	34.5	100
Zelda	40	100
Xerxes	35.7	100
Max	33	97.6 (93-100)
Brad	40	100
Hank	28.6	100
Eddie	33	100
Cole	29	100
Kelly	35.3	100
Lucy	33	100
Claire	45.5	100
Sadie	28.6	100
Larry	33	100
Corey	40	100
Hayden	33	100
Evan	35.5	100

Table 1. Percentage of sessions in which procedural integrity data were collected, and average and range of percentage of procedural integrity for individual participants during the choice assessment.

Choice Assessment Interobserver Agreement

	Percentage of Sessions	Initial Link Responses	Terminal Link Responses	Reinforcer Delivery
Britt	57	100	100	96.5 (93-100)
Valerie	50	100	97.7 (93-100)	100
Lamar	40	97.4 (87-100)	98.6 (93-100)	97.4 (87-100)
Larra	37.5	97.4 (87-100)	100	97.4 (87-100)
Cate	33.3	100	100	100
Mickey	33.3	97.4 (87-100)	100	97.4 (87-100)
Jonah	40	100	100	100
Missy	22.2	100	100	93.5 (87-100)
Carrie	60	100	100	100
Irina	42.9	99.1 (93-100)	93.4 (80-100)	99.1 (93-100)
Eric	77.8	99 (93-100)	100	99 (93-100)
Roxy	44.4	95 (80-100)	100	95 (80-100)
Ezra	42.9	100	100	100
Jody	66	100	95 (80-100)	100
Elle	66.7	100	100	100
Zelda	40	100	100	100
Xerxes	44.4	100	100	100
Max	33.3	100	100	100
Brad	59.1	99.4 (86-100)	100	99.4 (86-100)
Hank	45	100	100	100
Eddie	66.7	100	98.8 (93-100)	100
Cole	53	100	99.7 (93-100)	100
Kelly	52.2	100	100	100
Lucy	31	100	99.2 (93-100)	100
Claire	37.9	100	100	100
Sadie	45.2	100	100	100
Larry	37.5	100	100	100
Corey	57	100	100	100
Hayden	63	100	100	100
Evan	33	100	100	100

Table 2. Percentage of sessions in which IOA was calculated, and average and range of IOA percentages for individual participants during the choice assessment.

Name	Choice Preference
Britt (31 mo)	Child-choice
Valerie (31 mo)	No Preference
Lamar (34 mo)	Child-choice
Larra (35 mo)	Child-choice
Cate (37 mo)	No Preference
Mickey (38 mo)	Child-choice
Jonah (39 mo)	Child-choice
Missy (39 mo)	No Preference
Carrie (40 mo)	No Preference
Irina (41 mo)	Child-choice
Eric (42 mo)	Child-choice
Roxy (43 mo)	Child-choice
Ezra (43 mo)	Child-choice
Jody (46 mo)	No Preference
Elle (47 mo)	No Preference
Zelda (48 mo)	Child-choice
Xerxes (49 mo)	Child-choice
Max (49 mo)	No Preference
Brad (49 mo)	Child-choice
Hank (52 mo)	Child-choice
Eddie (54 mo)	Child-choice
Cole (54 mo)	Child-choice
Kelly (54 mo)	No Preference
Lucy (55 mo)	No Preference
Claire (55 mo)	Child-choice
Sadie (57 mo)	No Preference
Larry (57 mo)	Child-choice
Corey (57 mo)	Child-choice
Hayden (61 mo)	Child-choice
Evan (62 mo)	Child-choice

Table 3. The choice preferences for all participants in chronological order by age.

	Type of Conditioning Conducted	Percentage of Sessions	Percentage Procedural Integrity
Valerie	Child	26	100
Larra	Experimenter	26	100
Cate	Child	28	97.6 (93-100)
Carrie	Child	26	99.5 (93-100)
Carrie	Experimenter	26	100
Ezra	Experimenter	26	100
Jody	Child	26	100
Jody	Experimenter	26	100
Elle	Experimenter	26	100
Cole	Experimenter	26	100
Kelly	Experimenter	32	100
Lucy	Child	28	100
Claire	Experimenter	32	99.1 (91-100)

Table 4. Percentage of sessions in which procedural integrity was calculated, and average and range of procedural integrity percentages for individual participants during the conditioning phase.

	Type of Conditioning Conducted	Percentage of Sessions	Initial Link Responses	Terminal Link Responses	Reinforcer Delivery
Valerie	Child	62	100	99.1 (87-100)	99.8 (93-100)
Larra	Experimenter	37.7	100	99.6 (87-100)	100
Cate	Child	66	99.7 (93-100)	99.4 (93-100)	99.7 (93-100)
Carrie	Child	64	100	100	99.7 (93-100)
Carrie	Experimenter	100	100	100	100
Ezra	Experimenter	32	99.2 (93-100)	100	100
Jody	Child	40	100	99.3 (93-100)	100
Jody	Experimenter	37.5	100	99.2 (93-100)	100
Elle	Experimenter	32	100	100	100
Cole	Experimenter	43	100	100	100
Kelly	Experimenter	28	100	100	100
Lucy	Child	88	99.4 (87-100)	99.4 (93-100)	99.4 (87-100)
Claire	Experimenter	33.3	100	100	100

Table 5. Average and range of IOA scores for individual participants during the conditioning phase.

Figures

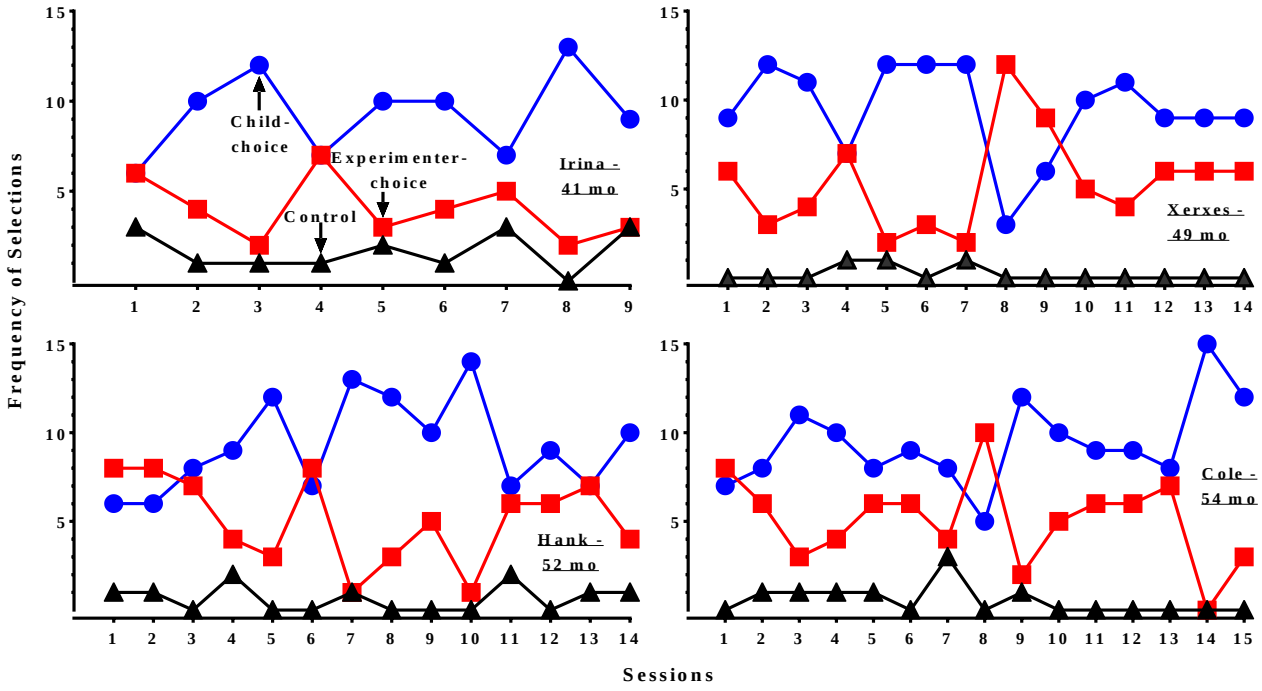

Figure 1. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Irina, Xerxes, Hank, and Cole.

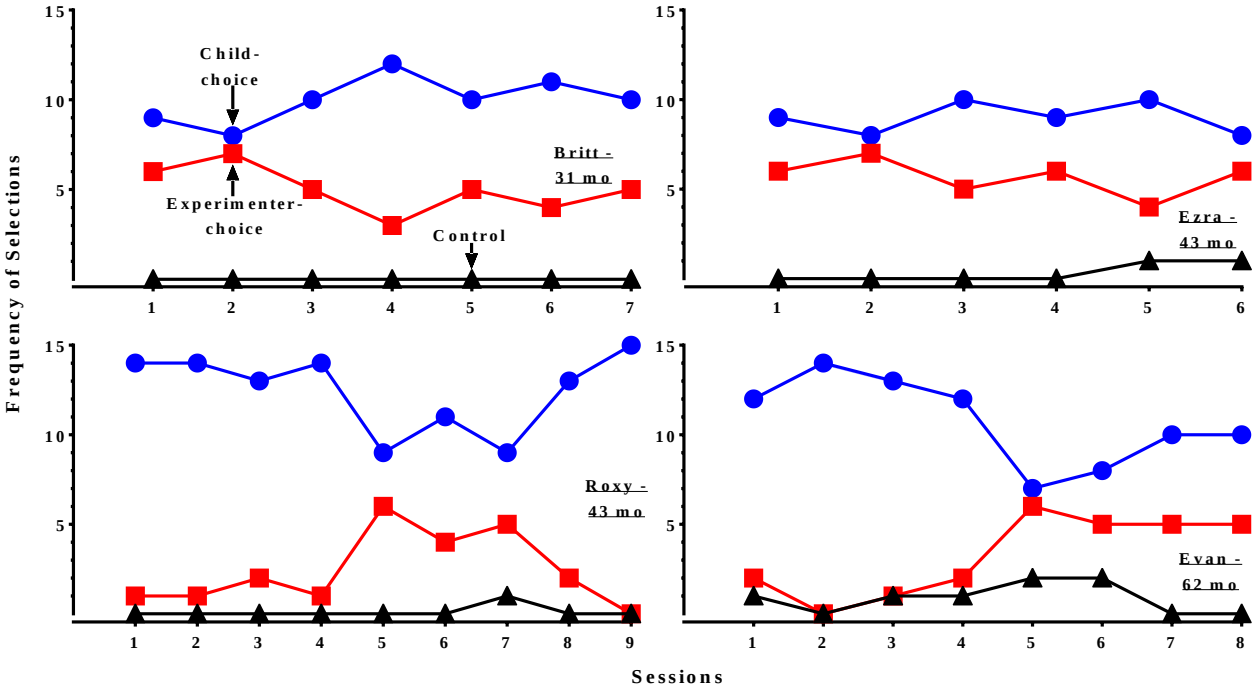

Figure 2. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Britt, Ezra, Roxy, and Evan.

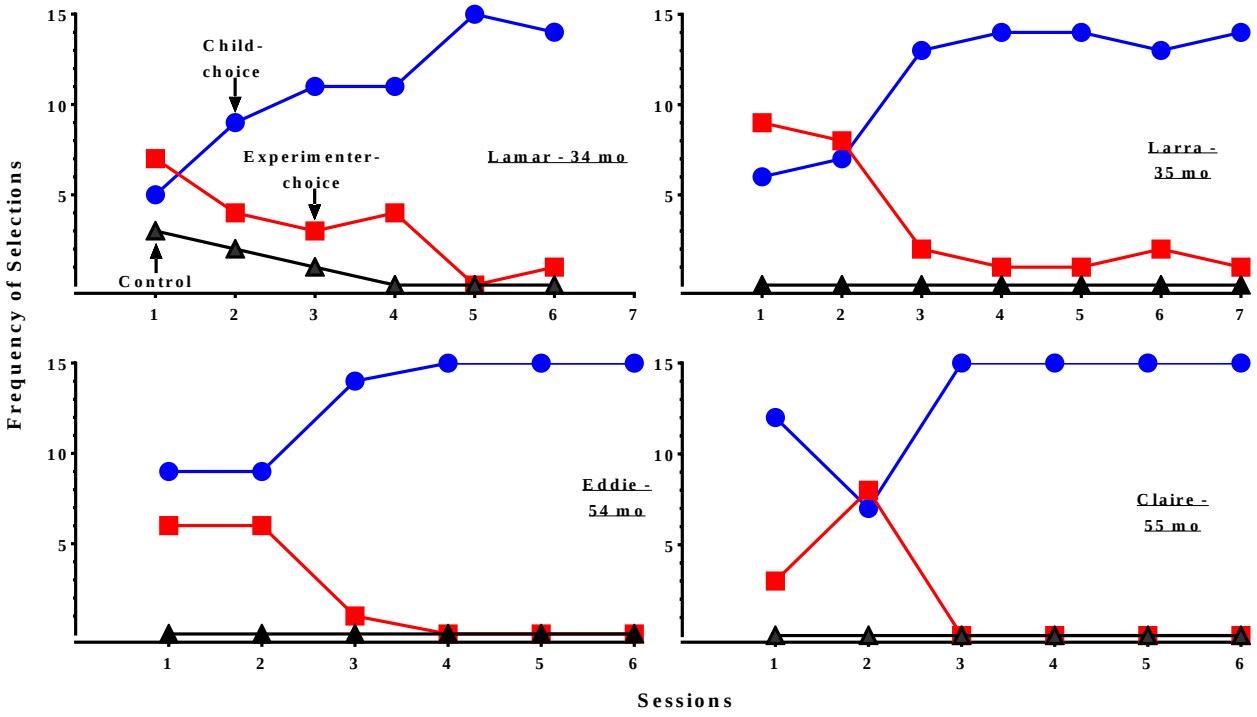

Figure 3. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Lamar, Larra, Eddie, and Claire.

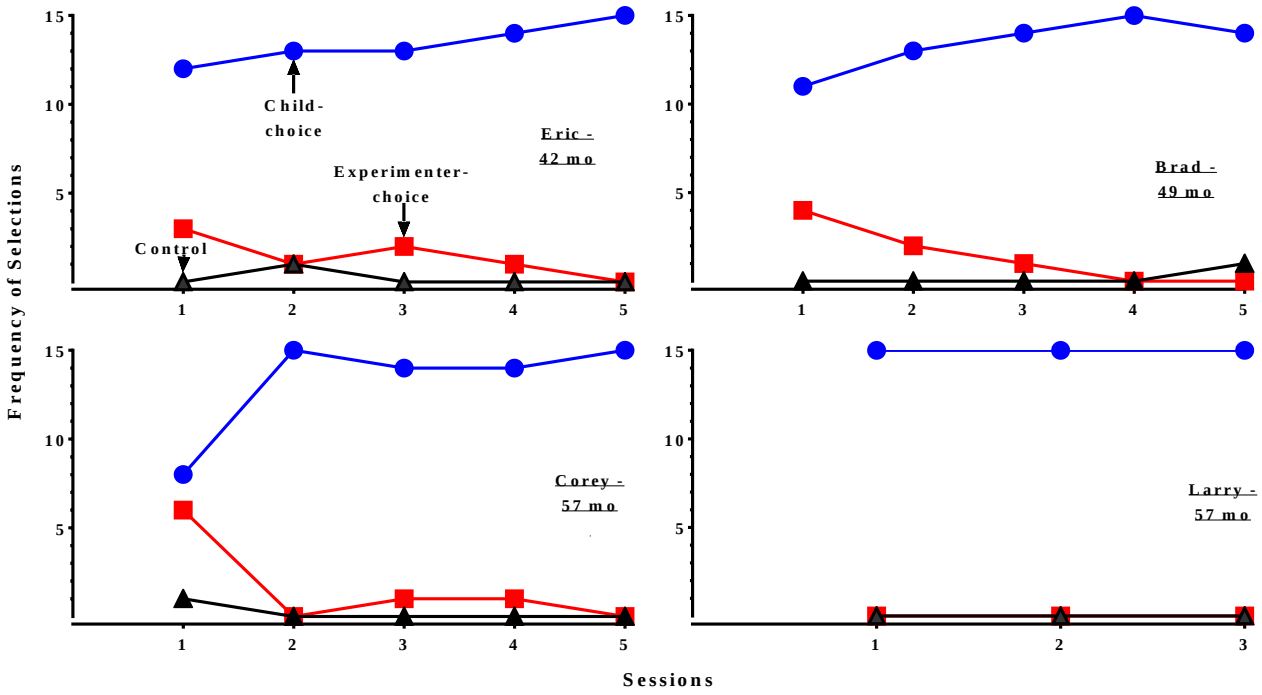

Figure 4. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Eric, Brad, Corey, and Larry.

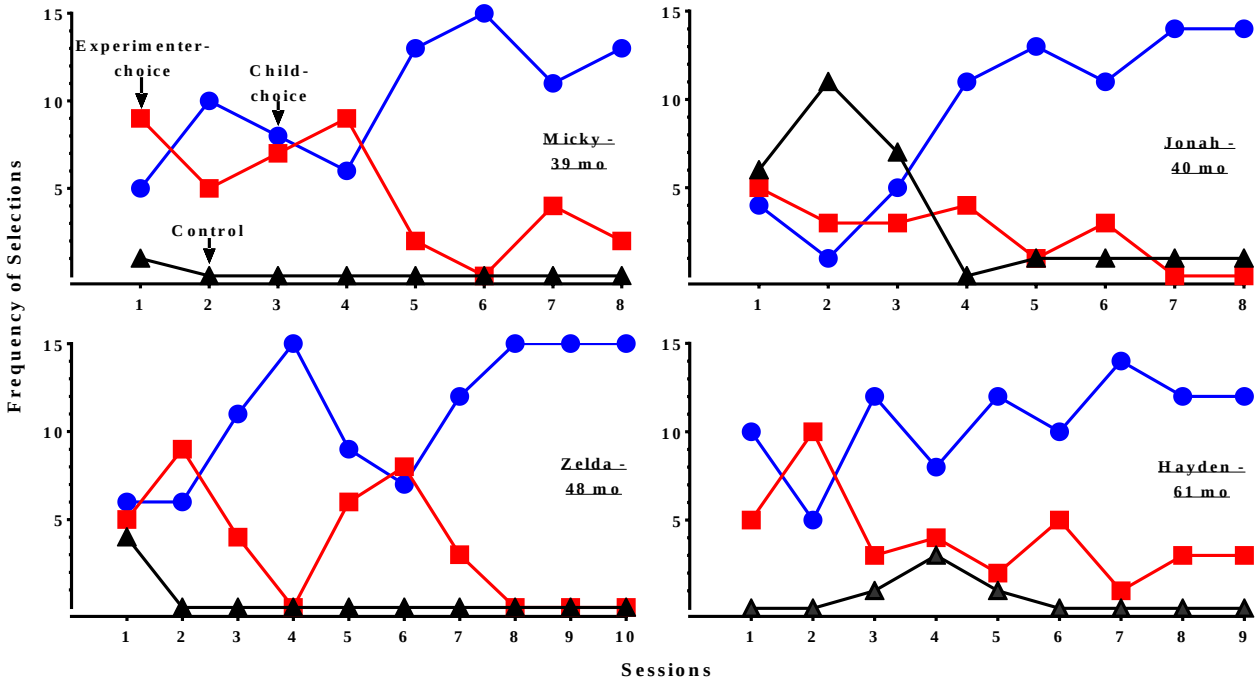

Figure 5. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Mickey, Jonah, Zelda, and Hayden.

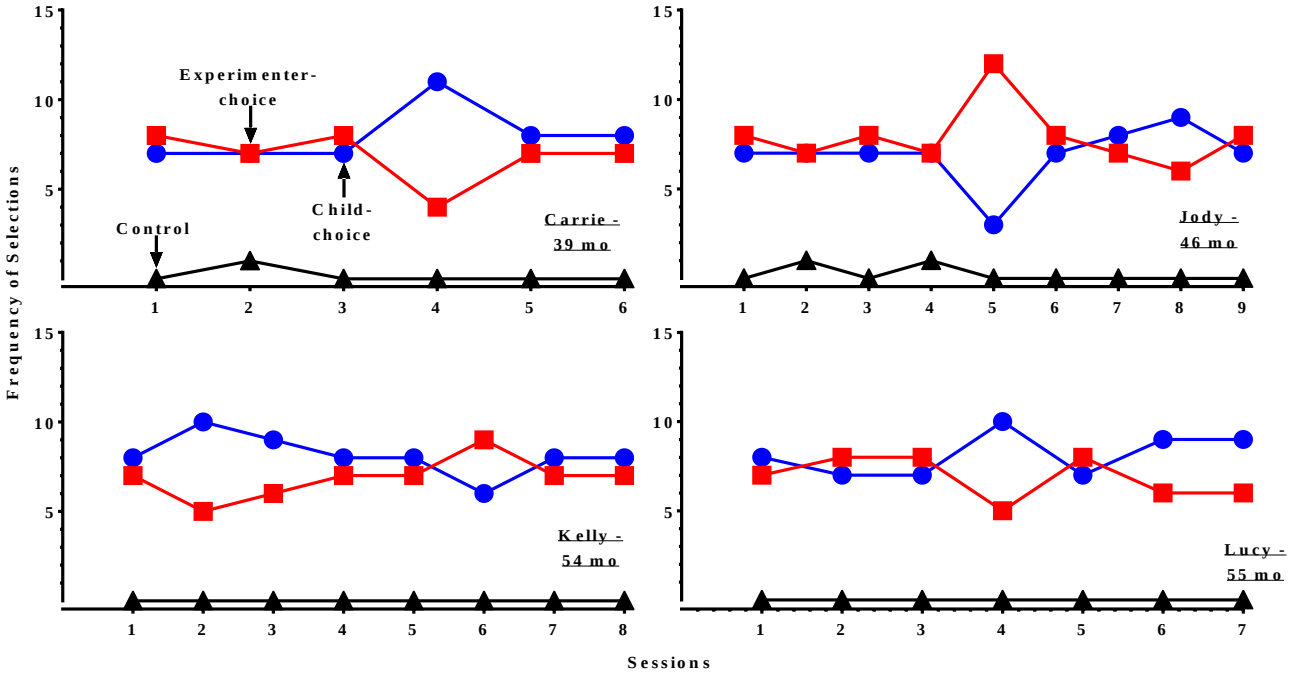

Figure 6. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Carrie, Jody, Kelly, and Lucy.

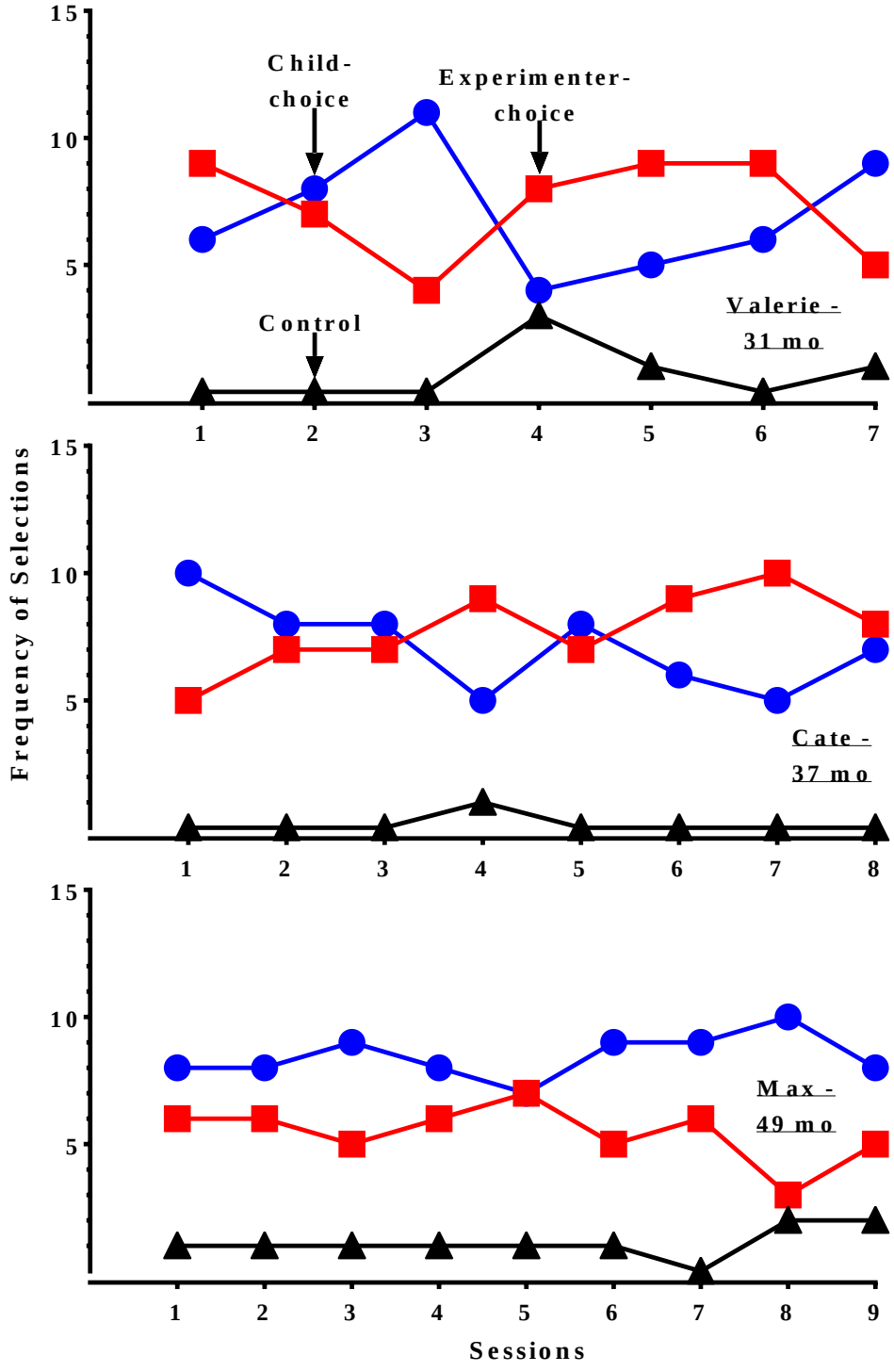

Figure 7. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Valerie, Cate, and Max.

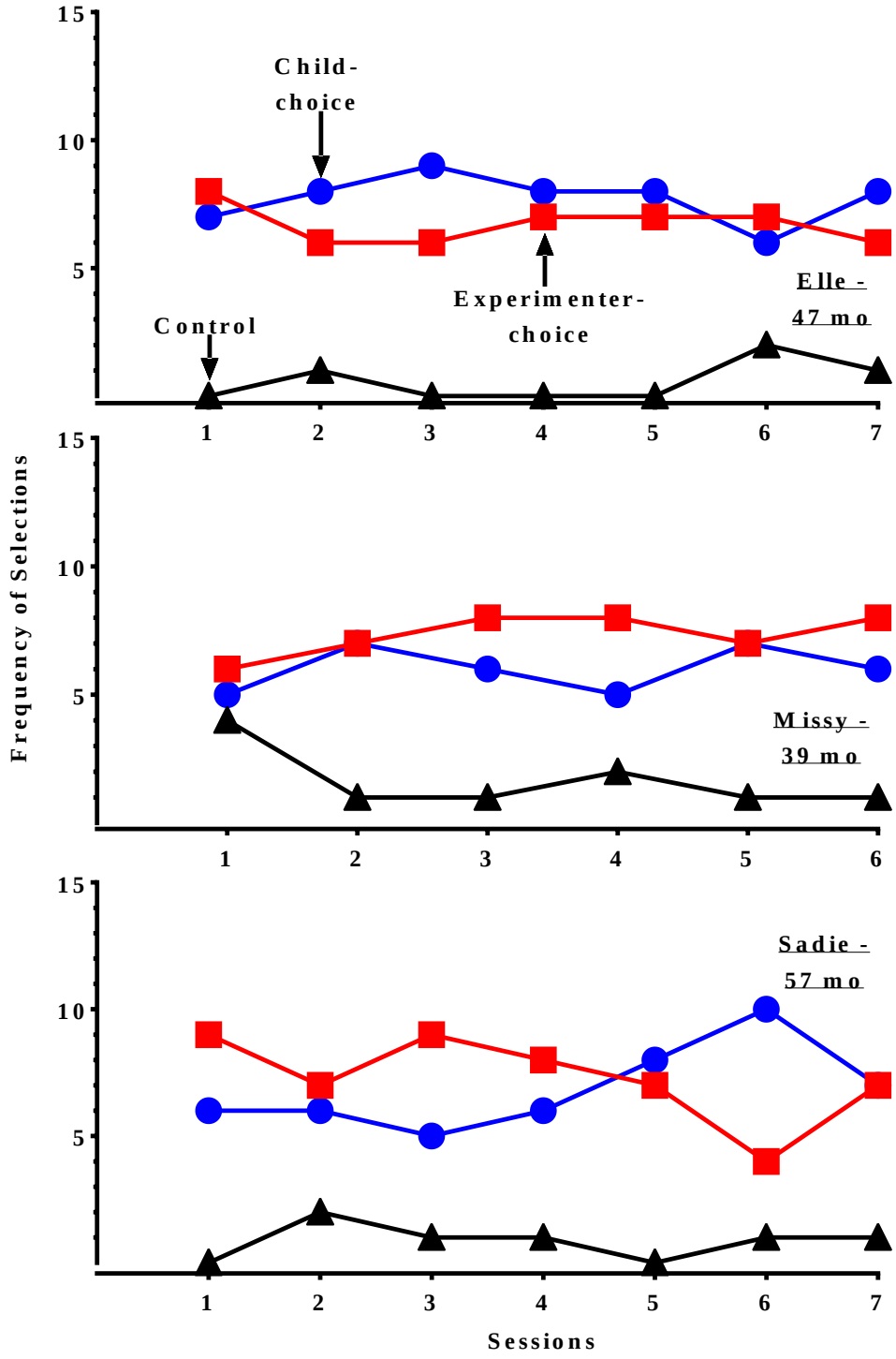

Figure 8. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the choice assessment for Elle, Missy, and Sadie.

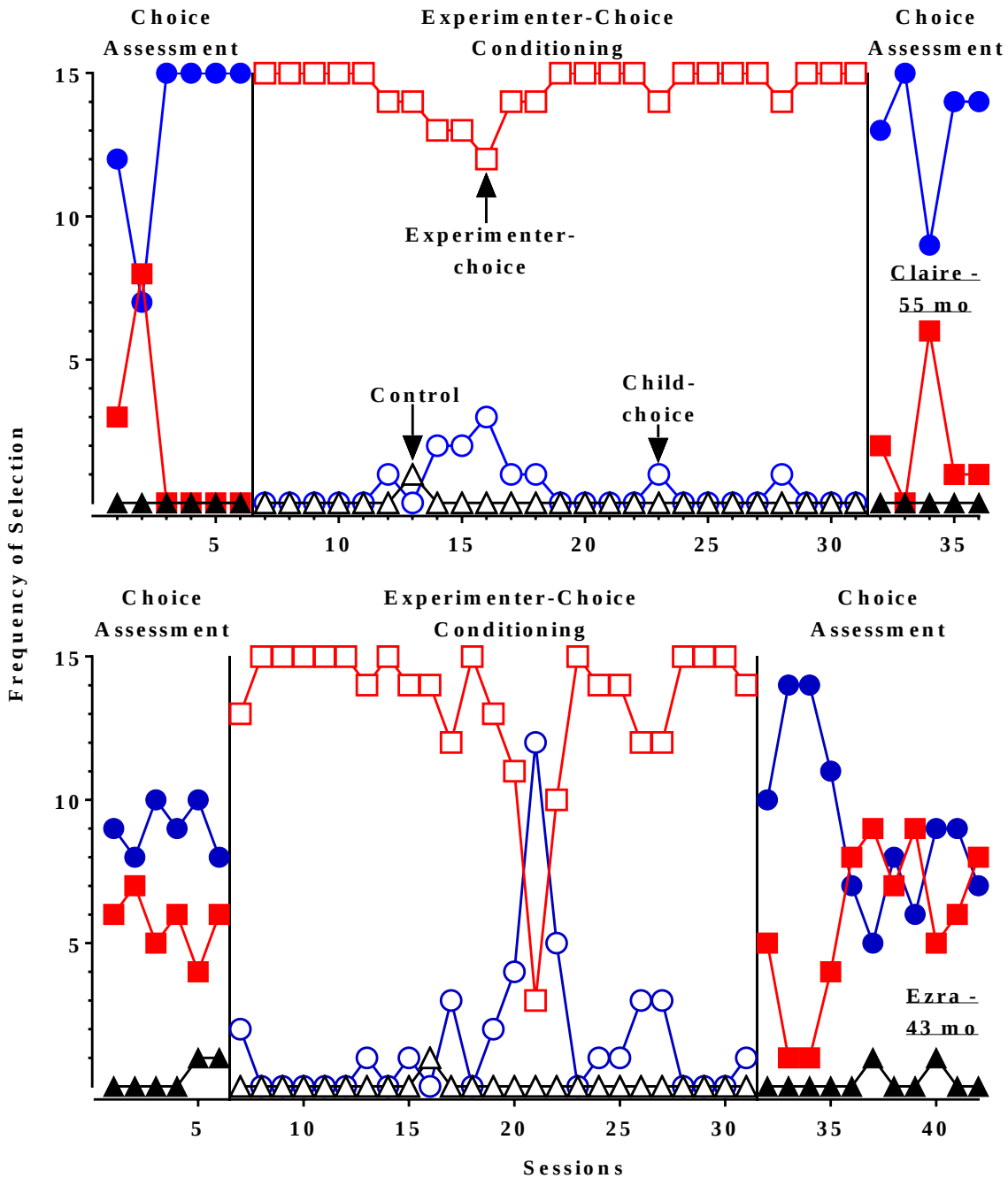

Figure 9. The frequency of selections for the child-choice, experimenter-choice, and control initial links during the pre-test (initial choice assessment), experimenter-choice conditioning, and post-test (choice assessment after conditioning) for Claire and Ezra.

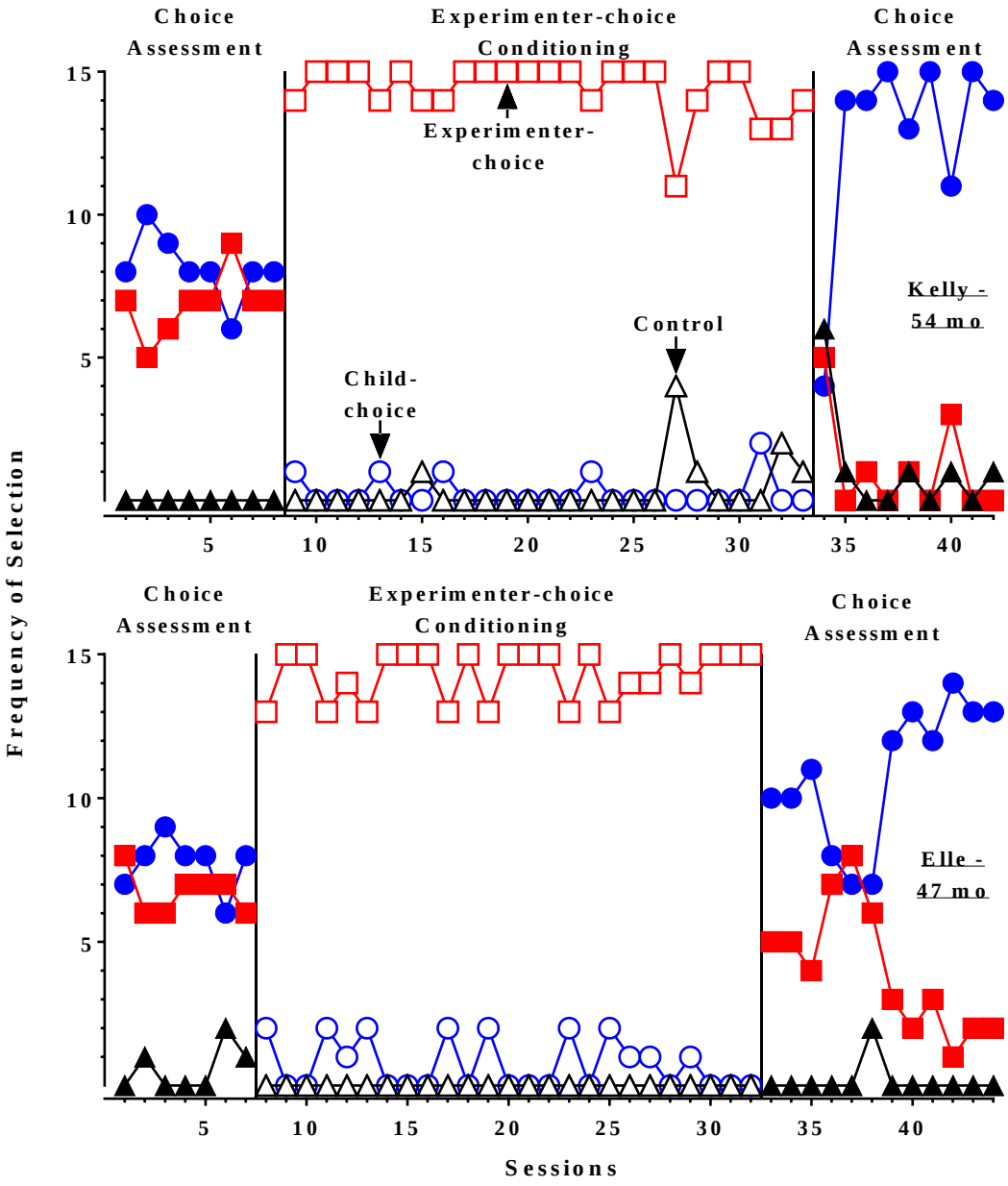

Figure 10. The frequency of selection for the child-choice, experimenter-choice, and control initial links during the pre-test (initial choice assessment), experimenter-choice conditioning, and post-test (choice assessment after conditioning) for Kelly and Elle.

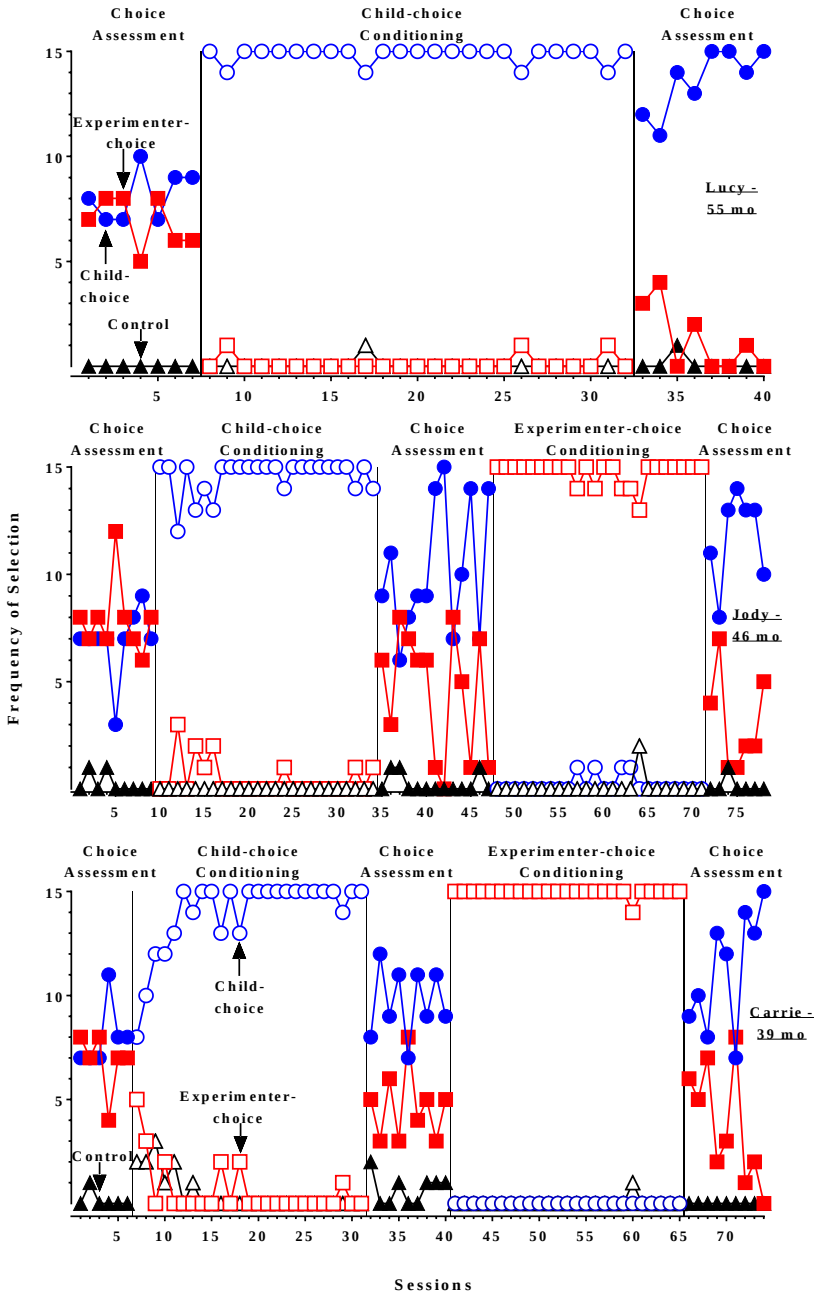

Figure 11. The frequency of selection for the child-choice, experimenter-choice, and control initial links during the pre-test (initial choice assessment), child-choice conditioning, and post-test (choice assessment after conditioning) for Lucy, Jody, and Carrie, as well as the experimenter-choice conditioning, and second post-test (choice assessment after conditioning) for Jody and Carrie.

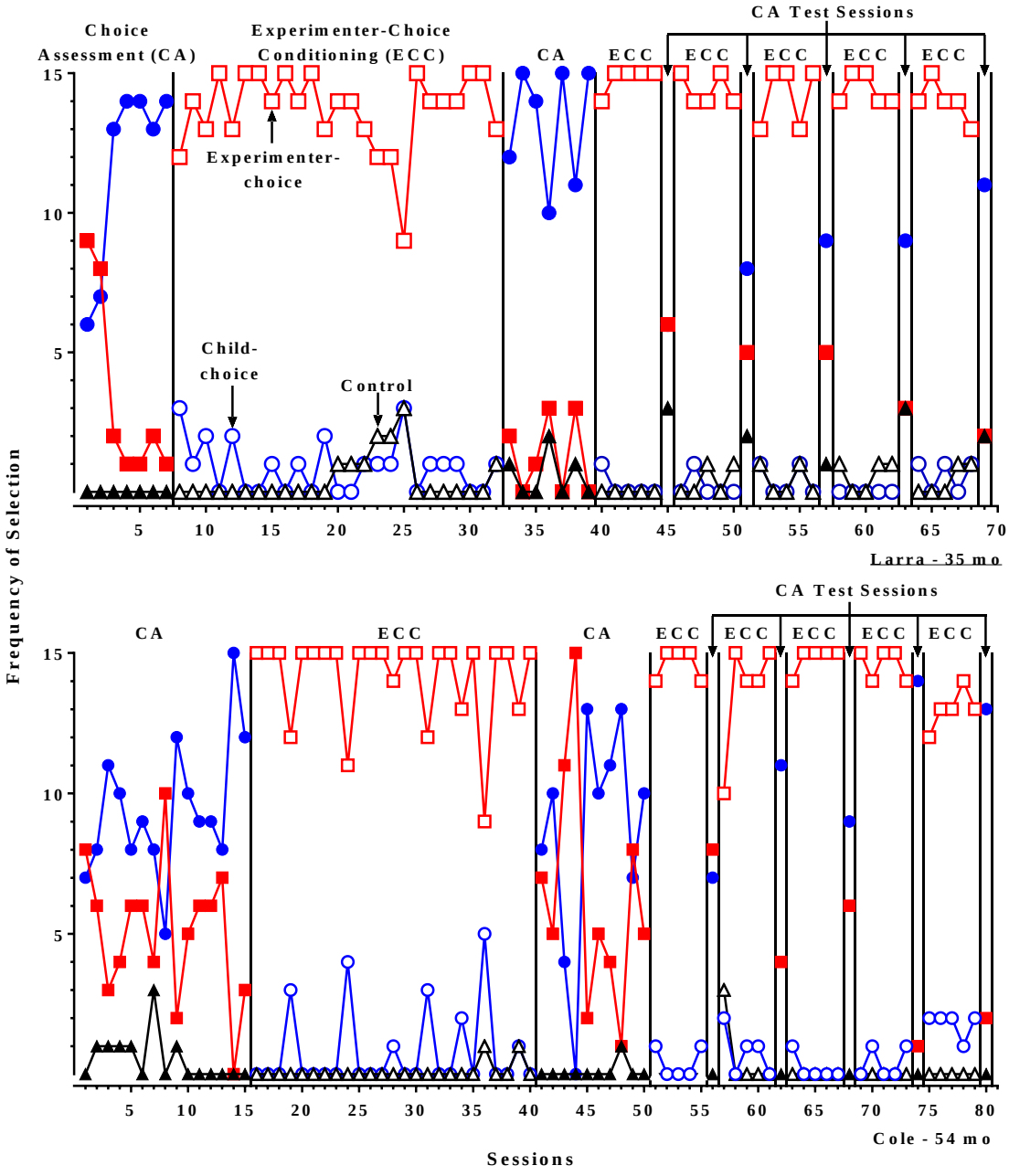

Figure 12. The frequency of selection for the child-choice, experimenter-choice, and control initial links during the pre-test (initial choice assessment), experimenter-choice conditioning, and post-test (choice assessment after conditioning), and alternative experimenter-choice conditioning phase for Larra and Cole.

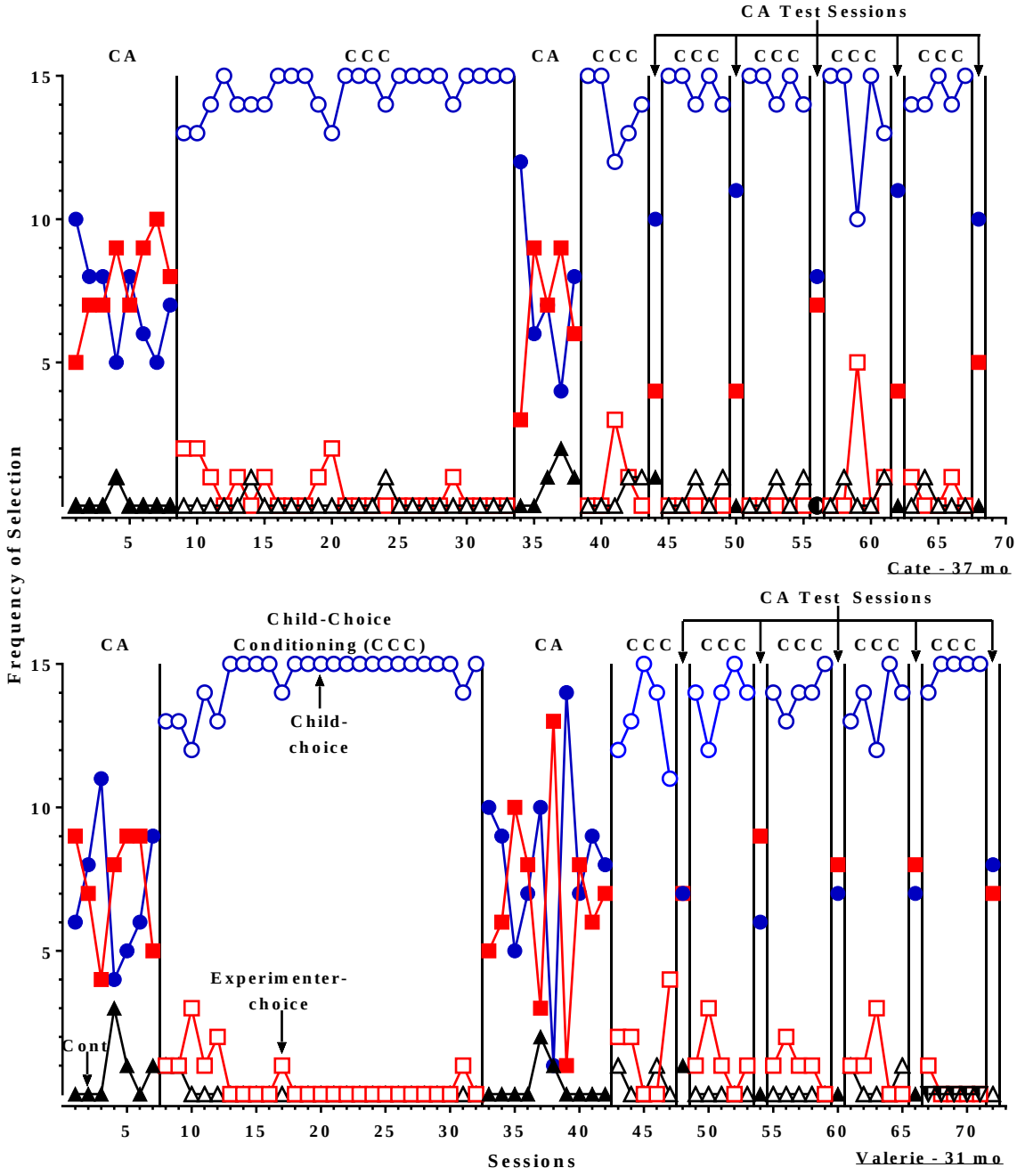

Figure 13. The frequency of selection for the child-choice, experimenter-choice, and control initial links during the pre-test (initial choice assessment), child-choice conditioning, and post-test (choice assessment after conditioning), and alternative child-choice conditioning phase for Cate and Valerie.