August 2017

The Development of Preference for or Against Choice-making Opportunities

Melissa Drifke
University of Wisconsin-Milwaukee

THE DEVELOPMENT OF PREFERENCE FOR OR AGAINST CHOICE-MAKING OPPORTUNITIES

by

Melissa A. Drifke

A Dissertation Submitted in

Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

in Psychology

at

University of Wisconsin- Milwaukee

August 2017

ABSTRACT

THE DEVELOPMENT OF PREFERENCE FOR OR AGAINST CHOICE-MAKING OPPORTUNITIES

by

Melissa A. Drifke

The University of Wisconsin-Milwaukee, 2017
Under the Supervision of Professor Jeffrey Tiger

Many individuals prefer contexts in which choice-making opportunities are available relative to contexts in which the same experiences are arranged without the opportunity to choose. Further, providing contingent access to choice-making opportunities often results in increased engagement and decreased problem behavior for individuals in reinforcement-based programs. Little is known about why preferences for choice-making contexts develop. The current study examines pairing choice-making contexts with increased or decreased reinforcer magnitude, quality, and immediacy to develop preference for choice-making or no-choice contexts. We examined preferences in concurrent chains arrangements consisting of selection responses, brief work requirements, and reinforcement. In choice conditions, the child selected their edible item; in no-choice conditions, a single edible was available. During baseline probes, the edible items were identical, but during conditioning, edibles differed in magnitude, quality, or immediacy. Using these conditioning histories, we created changes in preference in 100% of opportunities, extending previous literature in this area.

Keywords: preference, choice, magnitude, quality, immediacy

TABLE OF CONTENTS

LIST OF FIGURES

The opportunity to make choices is one of the key components of our conceptualization of autonomy and personal liberty (Bannerman, Sheldon, Sherman, and Harchik, 1990). In the course of a typical day, an individual has the opportunity to make choices regarding what to eat, what to do with their free time, and when to go to sleep. However, the same choice-making opportunities that define independence are often not given to many dependent populations such as children, the elderly, and those with various disabilities (Parsons, Reid, Reynolds, & Bumgarner, 1990); rather, these choices are often made by caregivers and may not reflect the preferences or desires of those for whom they care. Bannerman et al. advocated for incorporating regular choice-making opportunities into the care and treatment of dependent populations, particularly those with disabilities to maximize opportunities for independence.

In addition to such humanistic interpretations, providing choice-making opportunities can result in desirable behavior changes when incorporated into therapeutic programming, such as increasing compliance with teacher instructions and engagement with educational and habilitative activities. Parsons et al. (1990) and Tasky, Rudrud, Schulze, and Rapp (2008) both found that adults with disabilities were more on-task and less disruptive with work activities when they were either allowed to choose their work activity or when a preferred work activity was assigned, as compared to when a non-preferred work activity was assigned. Rice and Nelson (1988) found that giving individuals with disabilities a choice of shirt to iron (from an array of five similar shirts with different logos) increased engagement in ironing over when the shirt was chosen for them. In a recent study, Toussaint, Kodak, and Vladescu (2016) found that each of three children with autism acquired language skills more quickly (requiring fewer sessions to mastery) when teachers provided learners with the opportunity to choose their reinforcer for correct responding relative to when the teacher selected the reinforcer.

Allowing choice-making opportunities can also decrease the occurrence of problem behaviors, such as disruption, aggression, and social avoidance. Dyer, Dunlap, and Winterling (1990) found that three children with developmental disabilities engaged in less problem behavior when allowed a choice of educational task to complete relative to a no-choice condition. Similarly, children's problem behavior decreased and engagement in academic tasks increased when they could choose a task to complete (e.g., Dunlap, DePerczel, Clarke, Wilson, Wright, White, & Gomez, 1994; Powell & Nelson, 1997). Romaniuk, Miltenberger, Conyers, Jenner, Jurgens, and Ringenberg (2002) indicated that the problem-behavior mitigating effects of choice may be differentially valuable in cases of escape-maintained problem behavior relative to attention-maintained problem behavior.

Although research has identified that providing choice-making opportunities often results in improved therapeutic outcomes, less is known regarding the behavioral mechanisms by which choice-making opportunities influence behavior. Providing choice-making opportunities may allow individuals to access qualitatively different outcomes than they would have experienced. For example, when two stimuli are available as reinforcers, offering a choice of those stimuli ensures the individual can access the more preferred option. Research has shown that high-preference stimuli serve as more effective reinforcers than low-preference stimuli (e.g., Fisher et al., 1992; Piazza, Fisher, Hagopian, Bowman, & Toole, 1996) and can more effectively compete with problem behavior (Ringdahl, Vollmer, Marcus, & Roane, 1997). Thus, the added value of providing choice-making opportunities may be accounted for simply as a means of identifying high-preference stimuli.

Providing choices also allows individuals to vary the stimuli or activities they consume to the extent that they choose different options periodically. Research has shown that stimulus

variation can minimize satiation, and therefore, increase the efficacy of those stimuli as reinforcers (Bowman, Piazza, Fisher, Hagopian, and Kogan; 1997; Koehler, Iwata, Roscoe, Rolider, and O'Steen; 2005; Sellers, Bloom, Samaha, Dayton, Lambert, and Keyl-Austin; 2013). Therefore, the added value of providing choice making activities may also be accounted for simply as a means of programming stimulus variation.

Although the behavior-changing effects of providing choice-making opportunities may be explained by providing access to varied, highly preferred stimuli, research has shown that individuals may continue to demonstrate a preference for choice-making conditions even when differences in stimulus preference and variation have been eliminated. For example, Fisher, Thompson, Piazza, Crosland, and Gotjen (1997) conducted a preference assessment with three individuals with developmental disabilities by presenting participants with three microswitch buttons. Presses to a "control" button resulted in no programmed consequences. Presses to the "choice" button resulted in the presentation of two edible stimuli, from which the individual could select and consume one item. Presses to the "no-choice" button resulted in the experimenter delivering one item, but those items were yoked (equated) to stimuli chosen for pressing the choice button. That is, presses to the no-choice button resulted in similar stimuli in a similar pattern as those selected for choice-button presses. Each participant responded more often on the choice button relative to the no-choice button indicating a preference for choice-making, even when the stimuli consumed were equated.

Tiger, Hanley, and Hernandez (2006) further evaluated preference for choice-making opportunities with preschool-aged children. Tiger et al. presented participants with three worksheets that were identical, other than by color, and allowed participants to select upon which worksheet they would complete an academic task. Completing a task on the control worksheet

resulted in no programmed consequence. Completing a task on the choice worksheet resulted in the presentation of an array of five identical edible items (e.g., five red M&M's) from which the participant was permitted to choose one. Completing a task on the no-choice worksheet resulted in the presentation of a single item, identical to those delivered for responding to the choice worksheet (e.g., one red M&M). In this regard, the consequences associated with completing the choice or no-choice worksheet were identical (one red M&M) other than whether the individual was permitted the opportunity to choose from an array. Three of six participants demonstrated a preference for completing tasks on the choice worksheet even though it was not associated with stimulus variation or higher quality reinforcement than the no-choice worksheet (see similar results by Schmidt, Hanley, & Layer, 2009).

Not only are contexts in which choice-making opportunities are available preferred, but some individuals will engage in extensive amounts of work to gain access to these opportunities. Tiger et al. (2006) examined the value of choice-making opportunities with these preschoolers by again providing the opportunity to select either a choice or no-choice worksheet upon which to complete academic tasks leading to reinforcer delivery. Throughout their experiment, children were required to complete one academic task on the no-choice worksheet, but the requirement on the choice worksheet increased progressively from one to 32 tasks. Participants continued to select the choice worksheet even when four to 16 times as much work was required.

Thus, some individuals demonstrate a preference for conditions with choice-making opportunities and these individuals will work to gain access to these opportunities, but the origin of this preference is less clear. Some have suggested phylogenic origins, which refers to the development and selection of behavior or behavioral traits at the species level through evolution (Moore, 2008). Catania and Sagvolden (1980) suggested, for example, that animals living in an

ecosystem with a greater number of food alternatives are more likely to survive a harsh winter than an animal living in an ecosystem with a single food alternative. Animals with a predisposition to live in the former are more likely to survive and reproduce, and therefore pass on these innate preferences to their offspring.

Preference for choice-making opportunities may also have an ontogenic origin (i.e., behavior that is learned at the individual level and is selected for by environmental consequences during that individual's lifetime; Moore, 2008). In other words, individuals may develop preferences for choice-making conditions because choices are presumably associated with more-immediate, higher-quality, or higher-magnitude reinforcement (i.e., their historical association with higher-quality consequences). For example, if a mother told her two children that she picked up two cookies from the bakery that they should eat for a snack, then each child has a choice. Do they go to the counter to select their own cookie, or do they let their sibling choose first? In most families, choosing your own cookie would result in the larger of the two (increased reinforcement magnitude), the one with a more preferred topping (higher quality), and it could be consumed more immediately than if the child allowed their sibling to choose. A prolonged history of similar experiences in which choice-making opportunities are associated with higher quality outcomes could result in a conditioned preference for these conditions.

There has been limited research on the impact of higher quality-outcome histories impacting preference for choice-making conditions. Karsina, Thompson, and Rodriguez (2011) began to evaluate the effects of providing a history of differential reinforcement associated with free-choice or restricted-choice options on college students' preferences for these conditions using a lottery-simulation game administered on a computer. On each trial, participants attempted to guess three winning numbers between 1 and 8. During free-choice trials,

participants selected from an array of all 8 numbers and during restricted-choice trials, only three were available. The likelihood of selecting the winning numbers in both conditions was systematically manipulated during sessions. When participants were given an immediate history that the free-choice condition resulted in a greater likelihood of earning points than the free-choice condition, 5 of 7 participants continued to demonstrate a preference for free-choice conditions even when the density of reinforcement was made equal between free- and restricted-choice options. Similarly, exposure to a greater likelihood of earning points in the restricted-choice condition resulted in the development of a subsequent preference for restricted-choice conditions. Therefore, preference for choice-making opportunities may develop due to a history of a higher probability (i.e., denser schedule) of reinforcement associated with choice-making opportunities.

Ackerlund Brandt, Dozier, Juanico, Laudont, and Mick (2015) further examined the impact of conditioning histories on the development of preference for choice-making conditions with young children. In study one, the participant selected between three sets of identical flashcards and then completed an expressive labeling task with those flashcards. Completing the labeling task resulted in no-reinforcement, a child-choice of reinforcement, or an identical experimenter-choice of reinforcement, depending on the flash cards selected. After identifying a preference (or ambivalence) between these conditions, the researchers attempted to modify participant's preferences by arranging child-choices between eight highly preferred edible items, whereas the experimenter-choices were made between two low-preferred edible items. They also attempted to modify preference in the opposite direction by arranging experimenter choices of the highly preferred items and child choices between the low preferred items. Thus, participants experienced a history in which child-choice or experimenter-choice conditions were associated

with a higher quality of reinforcement. After this experience, seven of eleven participants demonstrated a change in preference after the conditioning phase. However, this change in preference was not always in the direction of the prior conditioning provided, and none of the participants shifted their preference in the direction of no-choice conditions after undergoing that conditioning phase. It is possible that preference for choice-making opportunities may change due to a history of a higher quality of reinforcement associated with a condition, but more research is needed to understand the role in conditioning history in determining choice preference.

Prior research has demonstrated that preference for choice-making conditions may be influenced by a history of differential reinforcement schedule and quality associated with choice conditions. The purpose of the current study was to replicate and extend this research by examining changes in preference for choice conditions when we arranged experimental histories in which choice conditions were differentially associated with quality, magnitude, or immediacy of reinforcement.

Method

Participants and Setting

We recruited six preschool-aged children from local child-care centers, as well as by posting flyers around campus. Interested parents contacted the experimenter and completed an initial screening assessment by phone. We enrolled the first six children who (a) were between 3 and 6 years of age, (b) indicated matching availability with experimenters, (c) were reported to be without an intellectual or physical disability that would hinder participation, (d) participated in academic activities without problem behavior, and (e) returned parental consent. Parents also nominated preferred locations to conduct sessions and relevant academic tasks to include. Chris

(5-year old boy), Ben (3-year old boy) and Elle (3-year old girl) participated in the quality conditioning portion the study. Jason (4-year old boy) and Kate (6-year old girl) participated in the magnitude conditioning portion, and Ethan (5-year old boy) participated in the immediacy conditioning portion of the study. Chris participated in a common area on UWM's campus and his academic task included naming letters and numbers. Ben participated in his home and his academic task involved naming pictures. Elle participated in a 3 m by 3 m experimental room on UWM's campus and her task included pointing to letters. Jason participated in his home and his task included naming pictures. Kate also participated in her home and her task included addition and multiplication problems. Ethan participated in a 3 m by 3 m experimental room on UWM's campus and his academic task involved naming numbers. Minimally, each setting included a table and chairs, necessary work materials, and preferred edible items.

Measurement and Interobserver Agreement

Each session consisted of fifteen trials conducted in a concurrent-chains arrangement. That is, each session began with the presentation of three different colored worksheets. Children engaged in a selection response by touching one of the three worksheets, which completed the initial link and resulted in the immediate onset of a terminal link. In the terminal link, the participant completed an academic task following either a vocal, model, and physical prompt from the therapist; this resulted in the delivery of an edible item and the representation of the initial links. Data collectors scored initial-link selections and terminal-link compliance on each trial by circling letters on a pre-coded paper data sheet. Data sheets can be found in the Appendix.

We assessed interobserver agreement (IOA) by having a second observer simultaneously, but independently collect data during 31% of sessions for Jason, 36% for Kate, 32% for Chris,

28% for Ben, 28% for Elle, and 36% for Ethan. We then separately compared observers' records of initial-link selections and terminal-link compliance on a trial-by-trial basis with trials scored identically counted as agreements and trials scored non-identically as disagreements. We then divided the number of trials in agreement by the total number of trials and converted the quotient into a percentage. These calculations yielded mean IOA scores above 98% for both initial- and terminal-link responding across all participants (individual session IOA calculations ranged from 80% to 100%).

Procedures

Pre-experimental assessments. Prior to assigning participants to experimental conditions, we conducted preference assessments to identify sensitivity to differences in reinforcer quality, magnitude, and immediacy. Participants who did not display a sensitivity to greater quality, magnitude, or immediacy were excluded from participation. We also assessed preference for worksheet color to minimize the influence of a color preference for initial-link stimuli lending bias to our outcomes.

Reinforcer-quality assessment. We conducted a paired-item preference assessment, as described by Fisher et al. (1992) with food items nominated as preferred by children's parents. On each trial, we presented two items to the participant with the instruction to, "pick one." The child was then permitted to consume the selected item while data collectors recorded their selection. Each assessment included the presentation of each item paired with every other item once. After each assessment, we rank ordered items based upon the percentage of presentations in which it was selected. We defined sensitivity to quality as the identification of a preference hierarchy among the included items; equal or near equal selections across items would have indicated insensitivity to differences in reinforcer quality. All participants demonstrated

sensitivity to reinforcer quality. The attained hierarchies were also used to identify high-, moderate-, and low-preferred items through the remainder of this study. These hierarchies are shown in Figure 1 for all participants.

Reinforcer-magnitude assessment. On each trial, the therapist presented two plates with a full size, half size, or quarter size version of a preferred edible item on each plate. The therapist then prompted the child to, "Pick one" and allowed consumption of the selected item. This assessment included six trials such that each item size was paired with each other item size once. We then rank ordered selections in terms of the proportion of presentations in which each size was selected. We defined sensitivity to magnitude as consistent selections of the larger size of each item presentation and insensitivity to magnitude if the child responded equally across options. The results of this assessment are shown in Figure 2. Note that Ethan and Elle demonstrated sensitivity to magnitude, but displayed a preference for smaller sized reinforcers; they were both excluded from further evaluation involving reinforcer magnitude.

Reinforcer-immediacy assessment. On each trial, the therapist presented identical, preferred edible items side-by-side with a timer behind each item and prompted the child to "Pick one." Following a selection, the therapist started the countdown timer associated with the selected item and delivered the edible item following timer expiration. These timers include delays of 0 s, 10 s, 15 s, 20 s and 30 s. This assessment included ten trials in which each delay value was paired with every other delay value. We then rank ordered selections of delay values based upon the percentage of presentations that each delay was selected. We defined sensitivity to immediacy as consistently selecting the briefer delay values and insensitivity to immediacy as equal responding across all delay values. The results of this assessment are depicted in Figure3.

Elle and Chris demonstrated insensitivity to immediacy of reinforcement and were excluded from further evaluations involving reinforcer magnitude.

Color preference assessment. On each trial, the therapist presented two sheets of different colored paper (pink, blue, yellow, green, orange, or white) and prompted the child to, "Pick one." Following selection, the therapist delivered brief praise (e.g., "thanks") regardless of the selected worksheet. This assessment included 15 trials such that each color was presented with every other color once. We then rank ordered colors based upon the percentage of presentations each color was selected. The results of this assessment are depicted in Figure 4. We chose three colors from the middle of the preference hierarchy. If children's selections did not indicate a color preference hierarchy, we chose three colors randomly. We then randomly assigned chosen colors to serve as initial-link stimuli.

Choice Context Preference Assessment. We assessed children's preferences for choice, no-choice, and control conditions in a concurrent chains arrangement. Each trial began with the presentation of three worksheets; which served as initial-link stimuli. Participants completed the initial link by engaging in a selection response towards one of the three worksheets. Depending upon the worksheet selected, the experimenter then initiated one of three terminal links. In each terminal link, the experimenter instructed the participant to complete an academic task using three-step (graduated) prompting and then delivered reinforcement, completing the terminal link. If the child selected the *choice* link, the experimenter delivered an array of three identical edible items, from which the child could select one as reinforcement. If the child selected the *no-choice* link, the experimenter delivered a single edible item, identical to those delivered in the choice condition as reinforcement. If the child selected the *control* link, the therapist delivered praise as reinforcement, but no edible item. Following completion of the terminal link, there was a brief

(5-s) inter-trial interval followed by the representation of the three-initial links. Each session included 15 such trials. To ensure the edible items delivered served as reinforcers, we presented participants with a small array of edible items prior to each session and allowed them to select the item available for the remainder of the session. If participants selected the control link for three consecutive trials, we interpreted this pattern as indicating that the edible was no longer serving as a reinforcer and provided them with the opportunity to choose a new edible item for use during the remainder of the session. If the participant selected the control link on six or more trials within a session, the session was not included due to a high likelihood of child satiation.

To promote discrimination between the contingencies arranged for initial-link selections, the available edible items were present on a paper plate just behind the relevant worksheets during the initial-links. We also provided prompted exposure to the consequences of selecting each initial link. That is, prior to each session the therapist would vocally prompt the participant to point to each worksheet and then conducted a single exposure to the relevant terminal link. To minimize the likelihood of biasing selections, the order of this prompted exposure was determined randomly prior to each session and the location of each initial-link stimulus was rotated on each trial.

This assessment initially established baseline levels of selecting choice and no-choice initial links for each participant. Following this initial baseline period, participants were exposed to conditioning sessions (described more fully below). Following every 10 conditioning sessions, we conducted two additional probes of this assessment to assess changes in choice-context preference. These probes were conducted under the exact same contingencies as the baseline sessions (i.e., the only difference between choice and no-choice terminal links was the number of

edible items available). These changes were assessed in a combination of reversal and multiple baseline across participants designs.

Conditioning sessions. We assigned participants in a random, but counterbalanced order to one of three experimental conditions (Quality, Magnitude, or Immediacy; unless they were excluded due to insensitivity to that manipulation as indicated above). During conditioning sessions, trials began by presenting participants with the same three worksheets as in the choice context-preference assessment. Initial-link selections again resulted in a prompt to complete an academic task and the delivery of a choice or no-choice reinforcement, or the delivery of no consequence in the control link. However, during conditioning sessions, the reinforcement across choice and no-choice links was not equated, but rather favored one of those conditions.

Quality conditioning (Chris, Ben, and Elle). When associating choice conditions with a higher quality of reinforcement, task completion in the choice terminal link involved the presentation of one high-preference item (as determined by the reinforcer-assessment) in an array with two low-preference items from which the participant could choose one. Task completion in the no-choice terminal link involved the presentation of a single low-preference item. When associating no-choice conditions with a higher quality of reinforcement, task completion in the choice link resulted in the presentation of an array of three low-preference items and task completion in the no-choice link resulted in the delivery of a single high-preference item. We chose to associate choice and no-choice conditions with higher-quality reinforcement based upon participants' baseline levels of responding to avoid ceiling effects. We conducted reversals by sequentially associating choice and no-choice links with higher quality reinforcement with Elle.

Magnitude conditioning (Jason and Kate). When associating choice conditions with a greater magnitude of reinforcement, task completion in the choice terminal link resulted in the

presentation of an array (e.g., one regular-sized M&M and two mini M&M's) from which the participant could select one and task completion in the no-choice terminal link resulted in the presentation of a single smaller sized item (e.g., one mini M&M). When associating no-choice conditions with a greater magnitude of reinforcement, task completion in the choice link resulted in an array of three smaller sized items from which the participant could select one and task completion in the no-choice link resulted in the delivery of a larger sized item. Again, we elected to associate choice and no-choice links with greater magnitude reinforcement based upon baseline levels of responding, and we conducted reversals with both participants.

Immediacy conditioning (Ethan). When associating choice conditions with more favorable outcomes, the therapist delivered an array of three identical edible items immediately following task completion from which the participant could select and consume one item. In the no-choice terminal link, the therapist delivered a single, but otherwise identical, edible item 15 s following task completion. When associating choice links with less favorable outcomes, 15s after completion of the choice link, the therapist delivered an array of identical edible items from which the participant could select one. In the no-choice link, the therapist delivered a single edible item immediately following task completion. For trials in which the participant selected the immediate link, we arranged a 15-s inter-trial interval (ITI) to equate total session time irrespective of the initial link selected.

Results

Quality. The results from Chris, Ben, and Elle's choice-context preference assessments are presented in Figure 5 with choice initial-link selections indicated by white-filled circles and no-choice initial-link selections indicated by black-filled circles. These three participants experienced reinforcement-quality conditioning. Note that the presented data does not reflect

performance during conditioning sessions, but rather probes of the choice-context preference assessment that occurred prior to and following exposure to conditioning sessions[1]. These probes were identical to baseline sessions in that choice and no-choice links resulted in access to identical edible items, differing only in the number of items and the participant's ability to choose. To aide in visual inspection of the graphs, following baseline, we added a dotted line at the ambivalence point in the figures (50%). We shaded the area above the line in the conditioning phases associated with higher-quality reinforcement in choice conditions and the area below the line in conditioning phases associated with lower-quality reinforcement in choice conditions. We matched the color of the data points to the shaded areas, using grey for choice and white for no-choice. Thus, the effects of conditioning would be apparent if each data path trended towards its corresponding colored area (i.e., grey choice data points in the shaded area and white no-choice data points in the unshaded area). Chris (top panel, Figure 5) selected the no-choice link on 15.3% of trials during baseline. We then associated no-choice conditions with higher-quality reinforcement and his no-choice selections increased to 48.9%. His choice link selection decreased from 62% in baseline to 42.2%, when associated with lower quality reinforcement. Ben (middle panel, Figure 5) displayed a similar pattern in which levels of no-choice selections increased from 25.4% in baseline to 54.6% following conditioning and choice selections decreased from 66.6% during baseline to 44% following conditioning. Elle (bottom panel, Figure 5) initially selected choice links during 86.6% of trials during baseline, which decreased to 36.2% when choice links were associated with lower-quality reinforcement, and increased again to 68.5% when choice links were associated with higher-quality reinforcement. Her no-choice selections averaged 9.8% during her baseline and increased to 53.2% when

[1] During conditioning, participants selected the higher quality, greater magnitude, and greater immediacy on 93.9% of opportunities.

associated with higher quality reinforcement and decreased to 30% when associated with lower-quality reinforcement.

Magnitude. The results from Jason and Kate's choice-context preference assessments are presented in Figure 6. These two participants experienced reinforcement-magnitude conditioning. Graphs are presented in the same manner as Figure 5. Jason (top panel, Figure 6) selected the choice links during 83.3% of trials during baseline, which decreased to 33% when choice links were associated with a smaller-magnitude reinforcement. Choice-link selections increased to 65% when they were associated with larger-magnitude reinforcement, and again decreased to 28.5% when choice links were associated with smaller-magnitude reinforcement. Jason selected no-choice links during 9.8% of trials during baseline, which increased to 67% when no-choice links were associated with larger-magnitude reinforcement. No-choice link selections decreased to 35% of trials when associated with smaller-magnitude reinforcement, and increased to 71.5% when no-choice links were again associated with larger-magnitude reinforcement. Kate (bottom panel, Figure 6) selected choice links during 46.4% of trials during baseline, which increased to 71.8% when choice links were associated with larger-magnitude reinforcement. Choice link selections decreased to 45.9% when associated with smaller-magnitude reinforcement, and again increased to 83.3% once they were associated with larger-magnitude reinforcement. Kate selected no-choice links during 50% of trials during baseline, which decreased to 21.5% when no-choice links were associated with smaller-magnitude reinforcement. No-choice link selections increased to 49.1% when they were associated with larger-magnitude reinforcement, and decreased to 15.3% when they were associated with smaller-magnitude reinforcement again.

Immediacy. The results from Ethan's choice-context preference assessments are presented in Figure 7. He experienced reinforcement-immediacy conditioning. Graphs are presented in the same manner as Figures 5 and 6. Ethan selected choice links during 24.5% of trials during baseline, which increased to 69.6% when choice links were associated with immediate reinforcement delivery. Choice links were selected 3.5% of trials when associated with delayed reinforcement delivery. No-choice links were selected 73.9% of trials during baseline, and decreased to 29.4% when no-choice links were associated with more delayed reinforcement delivery. He selected no-choice links 96.5% of trials when they were associated with immediate reinforcement delivery.

Discussion

Research has suggested that children (and some animals) demonstrate preferences for contexts that allow for choice-making, even when those choices do not result in improved or varied outcomes. Involved researchers have speculated that these preferences may exist due to a biological predisposition, or due to conditioning histories of differential outcomes associated with choice-making contexts. Studies attempting to condition preferences for choice-making opportunities have been limited in number and have yielded inconsistent results (Ackerlund Brandt et al., 2015; Karsina et al., 2011), raising questions of the explanatory power of conditioning histories in describing these preferences. The current study effectively conditioned the preferences of six preschool-aged children in regards to choice and no-choice contexts by providing participants with a history of choosing and not choosing resulting in differential reinforcement quality, magnitude, or immediacy. These results support the assertion that preference for choice-making contexts stem from environmental experience.

These results were unique, not only in demonstrating the conditionability of choice preference, but also in the consistency with which we were able to do so. That is, we observed reliable shifts in choice and no-choice preference with each of our participants, including the demonstration of reversals in this preference. Across our six participants, preferences shifted in the direction of our conditioning history in each of 12 opportunities (conditioning phases). These outcomes can be compared to Ackerlund Brandt et al. (2015) who observed shifts in preference consistent with conditioning in five of 17 opportunities. There are number of potential explanations for these differences.

Our methodology differed from Ackerlund Brandt et al (2015) who, following baseline periods, arranged 375 pairing trials (25 sessions of 15 trials) in which either child-choice or experimenter choice was associated with higher quality outcomes, and then assessed shifts in preference for choice and no-choice contexts in which reinforcer quality was equated. That is, they arranged a single extended conditioning period followed by an extended assessment period. By contrast, our study programmed frequent assessment probes during the conditioning process. It is possible that ongoing pairing with differential consequences was necessary to maintain conditioning effects and that presentation of extended periods without differential consequences could eliminate this preference. However, if gradual deconditioning played a role in Ackerlund Brandt et al., we would have expected to see initial conditioning effects during their assessment period that gradually declined to baseline levels. That was not the case for any of their participants, rather participants' response patterns tended to be highly stable throughout their assessment periods. Further, for four of their participants, Ackerlund Brandt et al. conducted interspersed assessment probes following every five conditioning sessions (more akin to our current preparation) and still failed to see evidence of conditioning.

Our arrangement allowed a greater number of conditioning exposures than Ackerlund Brandt et al. (2015), who as noted above, arranged a total of 375 conditioning trials prior to assessing preference shifts. By contrast, our procedures involved conducting two assessment probes following every 150 conditioning trials (10 sessions of 15 trials each). Cumulatively, our participants experienced more conditioning trials but tended to show preference shifts within the first four probe sessions (i.e., following fewer conditioning trials than those of Ackerlund Brandt et al). Several of our participants' data displayed trends during our assessment, suggesting that increased conditioning experience strengthened choice or no-choice preference, but differences in the number of conditioning trials alone could not account for the differences between our and Ackerlund Brandt et al.'s data.

Our conditioning-session stimulus presentation also differed from Ackerlund Brandt et al (2015) who arranged differential consequences by presenting eight high-preference items from which either the child or therapist selected one. By contrast, our quality manipulation involved presenting a single high-preference item in an array with two low-preference items. It is possible that the contrast of choosing a high-preference item among an array of low-preference items was more visually salient or more subjectively valuable than choosing a high-preference item among an array of other high-preference items. Future research will be necessary to determine what impact the surrounding items in choice arrays play in establishing preference for choice-making contexts.

Beyond providing histories of differential reinforcement quality, our study also examined the effects of providing histories of differential reinforcement magnitude and immediacy on subsequent choice preferences, both of which were sufficient to condition preferences for or against choice-making opportunities. We included these variables based upon casual observation

of the consequences of choosing in the natural environment, but there are likely several other historical associations with choice making (or not choice making) that may result in the development of a preference for these conditions as well. For example, choice making may be associated with a higher probability of reinforcement (similar to Karsina et al., 2011) or a decreased probability of punishment. This study offers an effective methodology for studying these historical variables on preference for choice contexts.

Although our current study demonstrated that choice preferences could be conditioned by programmed experiences in an experimentally controlled preparation, this may not describe how these preferences are created in more natural environments. That is, our study demonstrated that conditioning *could* result in these preferences, not that conditioning does result in these preferences in normative child development. Generalizing knowledge derived from laboratory studies to normative development requires additional data collection. Baer (1973) proposed a model to translate controlled laboratory studies to an understanding of child development. The recommended first stage involved creating a learning history in a controlled laboratory to demonstrate a behavior of interest could be developed or changed based upon the presentation of a particular independent variable. Next, Baer recommended conducting observational studies in normative environments to determine if similar behavior-consequence relations (or seeming behavioral contingencies) exist naturally, and if so, then conducting studies in which independent variables are manipulated in the natural environment to see if behavior changes in the same manner. Our current study represents the first step in this sequence of understanding the normative development of preferences for choice-making conditions.

Our data also highlight that preference may develop not only for conditions that provide choice-making opportunities, but also for conditions in which choice making is not provided, if

those conditions result in differentially better outcomes in terms of quality, magnitude, or immediacy of reinforcement. Fisher et al., (1998) similarly presented data indicating that participants would prefer no-choice conditions if those were associated with more preferred reinforcers than choice conditions; our data suggests that given sufficient exposure to those conditions, children could develop a preference for no-choice conditions even when such consequences are equated. Under the preparation initially proposed by Tiger et al. (2006) in which reinforcement in choice and no-choice conditions are equated, nearly all children demonstrated either a choice-condition preference or ambivalence between choice and no-choice conditions. For instance, of the eleven children in Ackerlund Brandt (2015), six demonstrated a choice preference during baseline and five demonstrated ambivalence; none demonstrated a preference for no-choice conditions. Of the six children in Tiger et al. (2006) three demonstrated a choice preference, two were ambivalent, and one demonstrated a no-choice preference. In our current study, four participants demonstrated a choice preference during baseline, one demonstrated ambivalence, and only one demonstrated a preference for no-choice conditions (Ethan). This individual subject variability could be accounted for by differences in natural histories associated with choice making. We would speculate that choice making typically results in preferred outcomes, but there may be those whose history of deferring to the judgement (choices) of others has resulted in better outcomes.

Providing choice making opportunities has been discussed frequently as a means of promoting autonomy, increasing engagement, and reducing problematic behavior within the applied literature, but the underlying behavioral mechanisms associated with providing choices, or the demonstrated preference for conditions with choice-making have been less clear. Translational evaluations such as the current study provide a clearer understanding of these

underlying behavioral processes associated with interventions, and potentially result in more refined or targeted interventions in the future. To the extent that preference for choice-making conditions is a desirable trait, the current study offers a means of enhancing this preference. To the extent that a preference for choice-making may be detrimental, the current study may offer guidance on how to weaken these preferences as well.

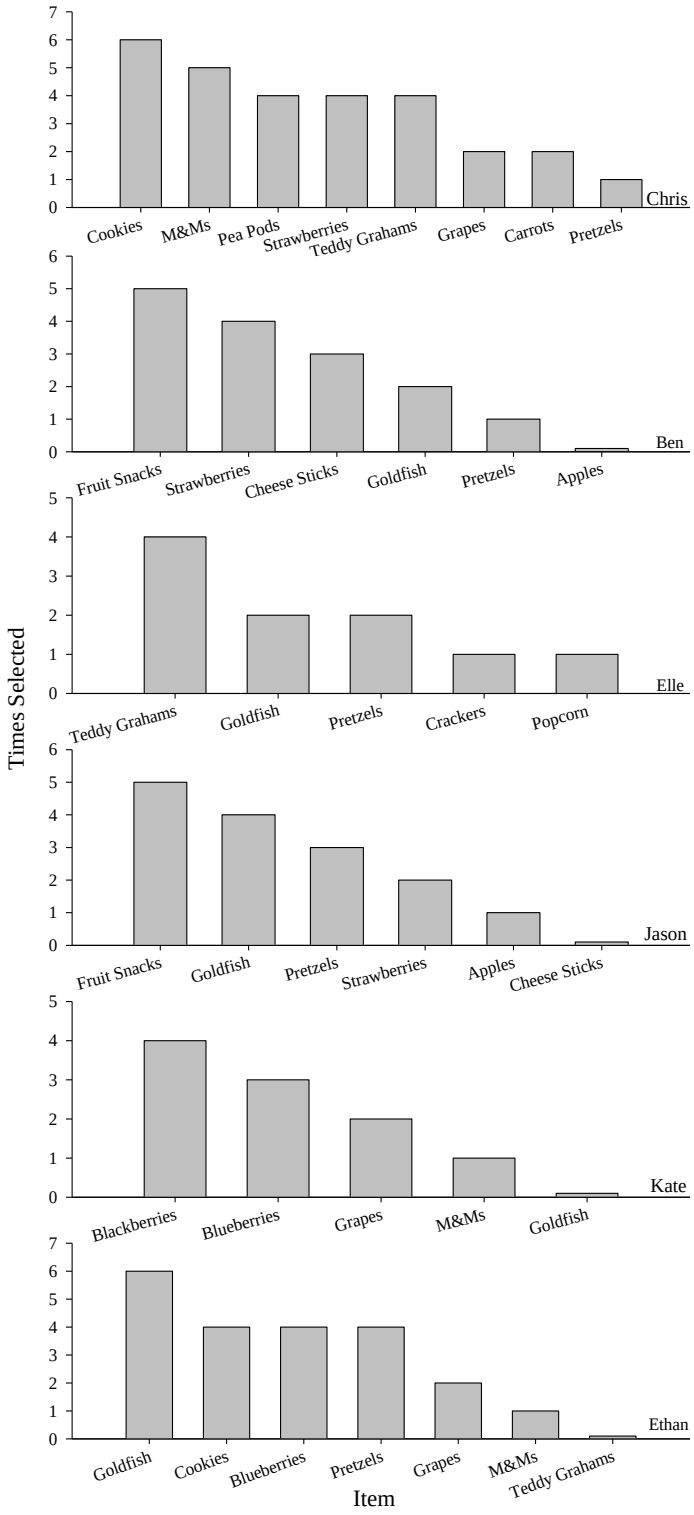

Figure 1: Reinforcer-quality assessment for Chris, Ben, Elle, Jason, Kate, and Ethan.

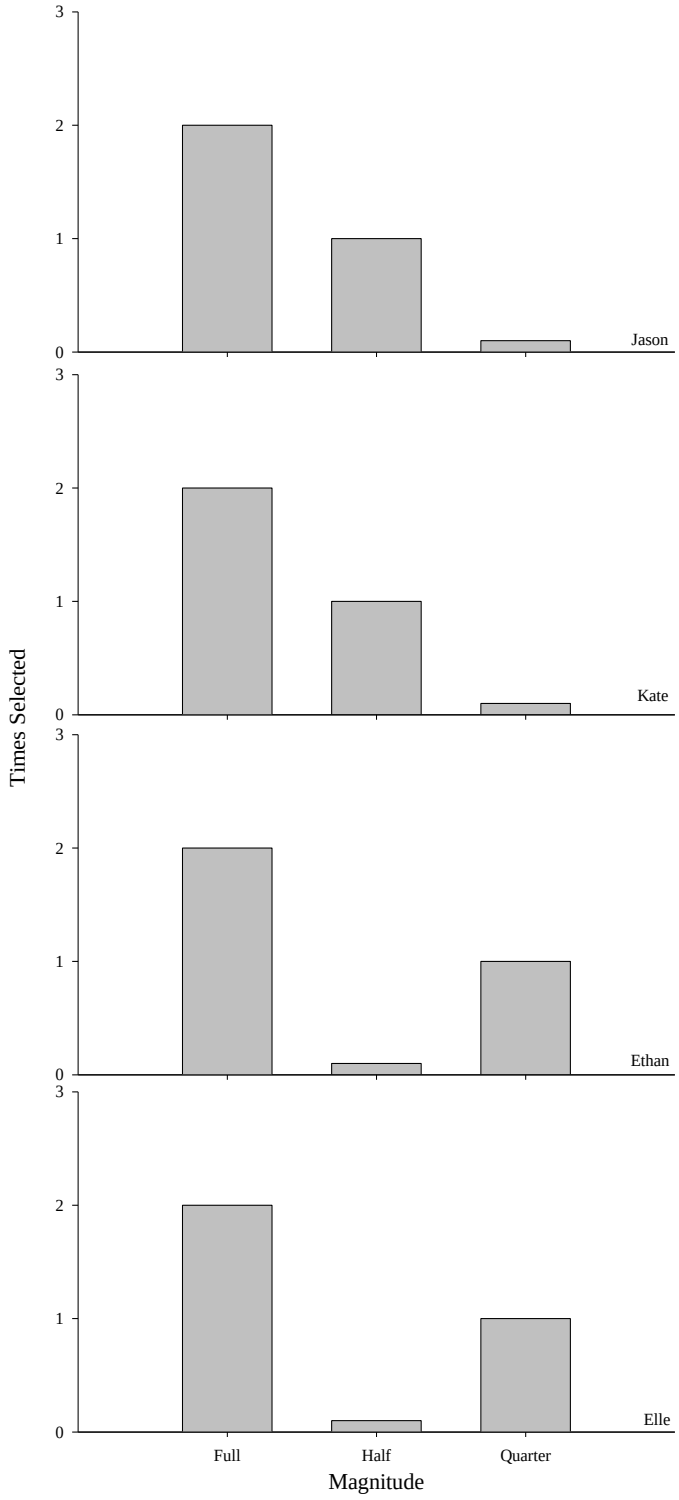

Figure 2: Reinforcer-magnitude assessment for Jason, Kate, Ethan, and Elle.

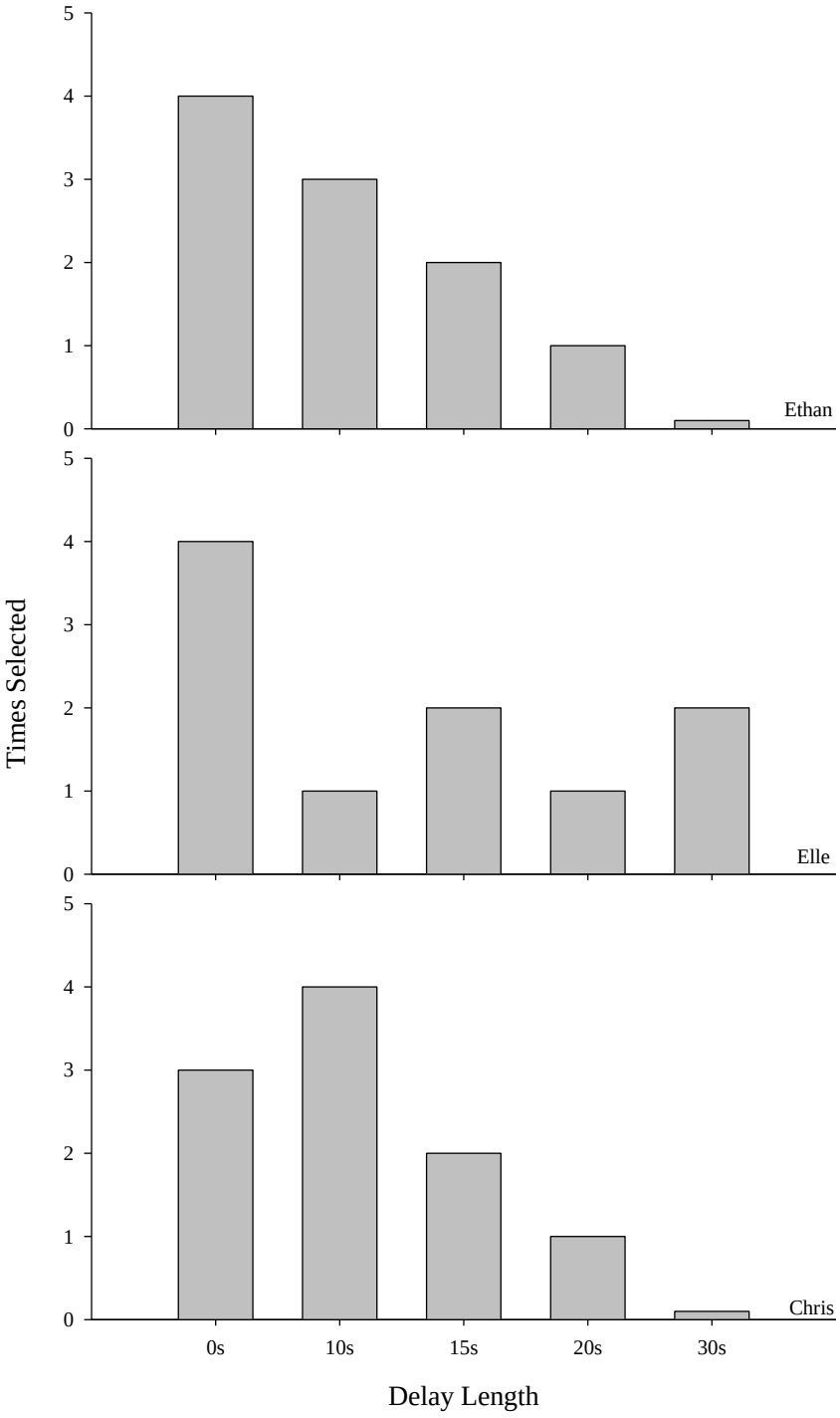

Figure 3: Reinforcer- immediacy preference assessment for Ethan, Elle, and Chris.

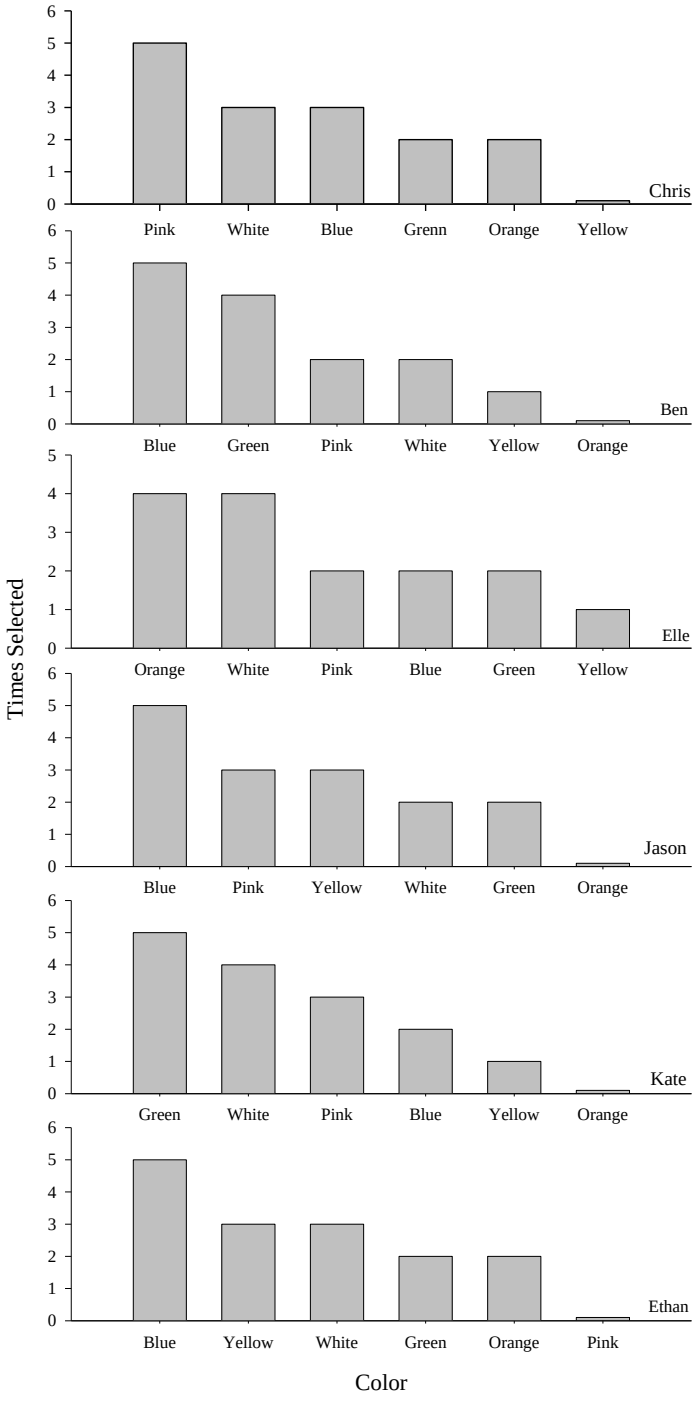

Figure 4: Color preference assessment.

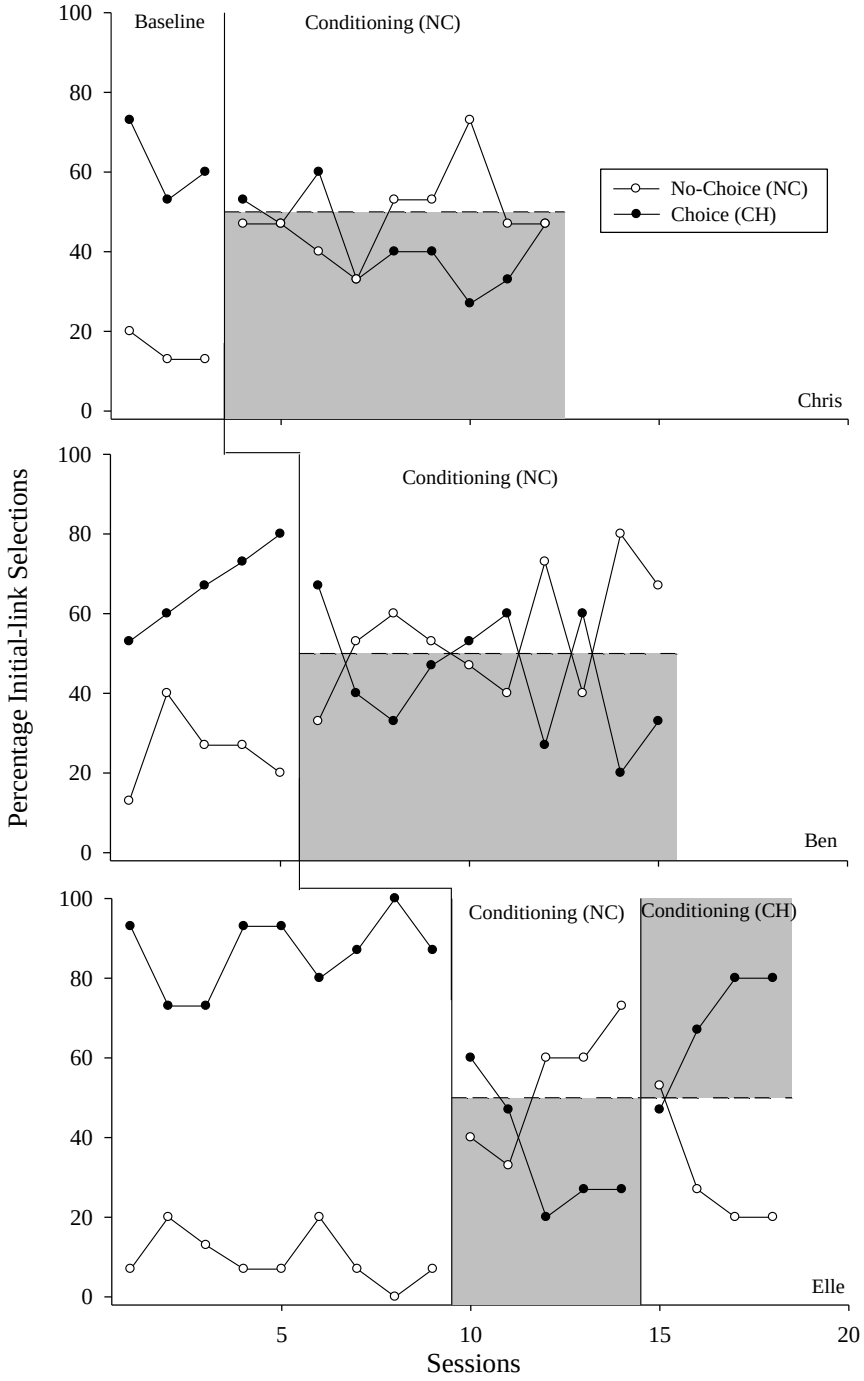

Figure 5: Results of quality conditioning with preference for choice and no-choice during baseline, conditioning for choice, and conditioning for no-choice.

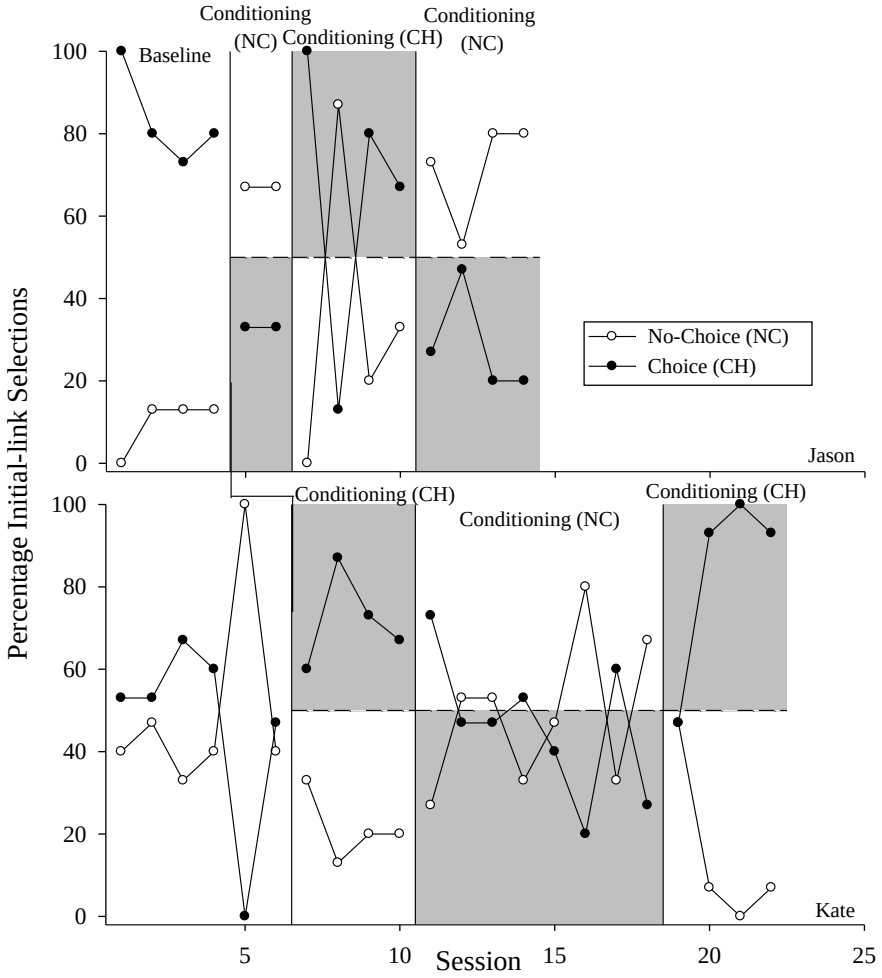

Figure 6: Results of magnitude conditioning with preference for choice and no-choice during baseline, conditioning for choice, and conditioning for no-choice.

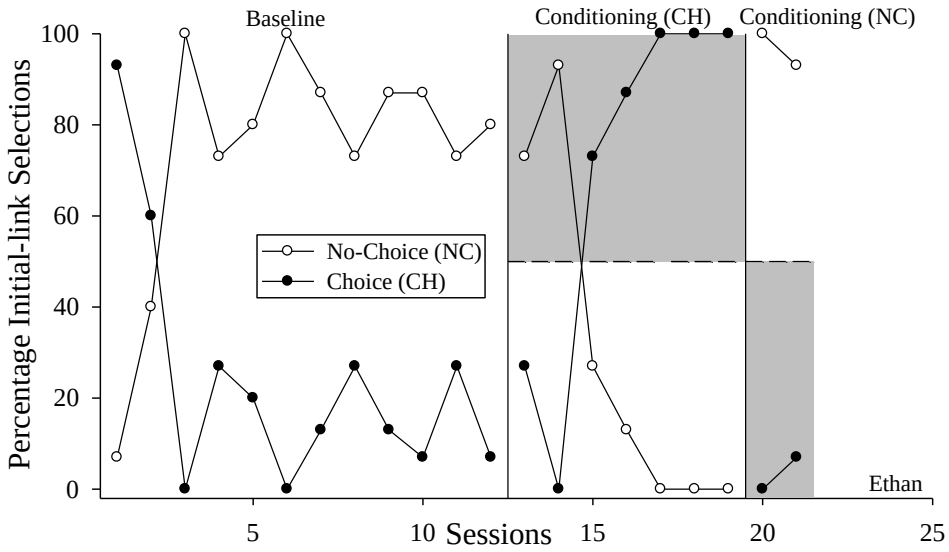

Figure 7: Results of immediacy conditioning with preference for choice and no-choice during baseline, conditioning for choice, and conditioning for no-choice.

References

Ackerlund Brandt, J. A., Dozier, C. L., Juanico, J. F., Laudont, C. L., & Mick, B. R. (2015). The value of choice as a reinforcer for typically developing children. *Journal of Applied Behavior Analysis, 48,* 344- 362. doi: 10.1002/jaba.199

Baer, D. M. (1973). Life-span Developmental Psychology: Methodological Issues. Elsevier Science & Technology Books.

Bannerman, D. J., Sheldon, J. B., Sherman, J. A., & Harchik, A. E. (1990). Balancing the right to habilitation with the right to personal liberties: The rights of people with developmental disabilities to eat too many doughnuts and take a nap. *Journal of Applied Behavior Analysis, 23,* 79- 89. doi: 10.1901/jaba.1990.23-79

Bowman, L. G., Piazza, C. C., Fisher, W. W., Hagopian, L. P., & Kogan, J. S. (1997). Assessment of preference for varied versus constant reinforcers. *Journal of Applied Behavior Analysis, 30,* 451- 458. doi: 10.1901/jaba.1997.30-451

Catania, A. C., & Sagvolden, T. (1980). Preference for free choice over forced choice in pigeons. *Journal of the Experimental Analysis of Behavior, 34,* 77- 86. doi: 10.1901/jeab.1980.34-77

Dunlap, G., DePerczel, M., Clarke, S., Wilson, D., Wright, S., White, R., & Gomez, A. (1994). Choice making to promote adaptive behavior for students with emotional and behavioral challenges. *Journal of Applied Behavior Analysis, 27,* 505- 518. doi: 10.1901/jaba.1994.27-505

Dyer, K., Dunlap, G., & Winterling, V. (1990). Effects of choice making on the serious problem behaviors of students with severe handicaps. *Journal of Applied Behavior Analysis, 23,* 515- 524. doi: 10.1901/jaba.1990.23-515

Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis, 25,* 491- 498. doi: 10.1901/jaba.1992.25-491

Fisher, W. W., Thompson, R. T., Piazza, C. C., Crosland, K., & Gotjen, D. (1997). On the relative reinforcing effects of choice and differential consequences. *Journal of Applied Behavior Analysis, 30,* 423- 438. doi: 10.1901/jaba.1997.30-423

Karsina, A., Thompson, R. H., & Rodriguez, N. M. (2011). Effects of a history of differential reinforcement on preference for choice. *Journal of the Experimental Analysis of Behavior, 95,* 189- 202. doi: 10.1901/jeab.2011.95-189

Koehler, L. J., Iwata, B. A., Roscoe, E. M., Rolider, N. U., and O'Steen, L. E. (2005). Effects of stimulus variation on the reinforcing capability of nonpreferred stimuli. *Journal of Applied Behavior Analysis, 38,* 469- 484. doi: 10.1901/jaba.2005.102-04

Moore, J. (2008). *Conceptual foundations of radical behaviorism*. New York: Sloan Publishing.

Parsons, M. B., Reid, D. H., Reynolds, J., & Bumgerner, M. (1990). Effects of chosen versus assigned jobs on the work performance of persons with severe handicaps. *Journal of Applied Behavior Analysis, 23,* 253- 258. doi: 10.1901/jaba.1990.23-253

Piazza, C. C., Fisher, W. W., Hagopian, L. P., Bowman, L. G., & Toole, L. (1996). Using a choice assessment to predict reinforcer effectiveness. *Journal of Applied Behavior Analysis, 29,* 1- 9. doi: 10.1901/jaba.1996.29-1

Powell, S. & Nelson, B. (1997). Effects of choosing academic assignments on a student with attention deficit hyperactivity disorder. *Journal of Applied Behavior Analysis, 30,* 181-183. doi: 10.1901/jaba.1997.30-181

Rice, M. S. & Nelson, D. L. (1988). Effect of choice-making on a self-care activity in mentally

retarded adult and adolescent males. *Occupational Therapy Journal of Research, 8 (3*), 176- 185. doi: 10.1177/153944928800800306

Ringdahl, J. E., Vollmer, T. R., Marcus, B. A., & Roane, H. S. (1997). An analogue evaluation of environmental enrichment: The role of stimulus preference. *Journal of Applied Behavior Analysis, 30*, 203- 216. doi: 10.1901/jaba.1997.30-203

Romaniuk, C., Miltenberger, R., Conyers, C., Jenner, N., & Ringenberg, C. (2002). The influence of activity choice on problem behaviors maintained by escape versus attention. *Journal of Applied Behavior Analysis, 35*, 349- 362. doi: 10.1901/jaba.2002.35-349

Schmidt, A. C., Hanley, G. P., & Layer, S. A. (2009). A further analysis of the value of choice: Controlling for illusory discriminative stimuli and evaluating the effects of less preferred items. *Journal of Applied Behavior Analysis, 42*, 711- 716. doi: 10.1901/jaba.2009.42-711

Sellers, T. P., Bloom, S. E., Samaha, A. L., Dayton, E., Lambert, J. M., & Keyl-Austin, A. A. (2013). Evaluation of some components of choice making. *Journal of Applied Behavior Analysis, 46*, 455- 464. doi: 10.1002/jaba.46

Tasky, K. K., Rudrud, E. H., Schulze, K. A., & Rapp, J. T. (2008). Using choice to increase on-task behavior in individuals with traumatic brain injury. *Journal of Applied Behavior Analysis, 41*, 261- 265. doi: 10.1901/jaba.2008.41-261

Tiger, J. H., Hanley, G. P., & Hernandez, E. (2006). An evaluation of the value of choice with preschool children. *Journal of Applied Behavior Analysis, 39*, 1- 16. doi: 10.1901/jaba.2006.158-04

Toussaint, K. A., Kodak, T., & Vladescu, J. C. (2016). An evaluation of choice on instructional

efficacy and individual preferences among children with autism. *Journal of Applied Behavior Analysis, 49*, 1-6. doi: 10.1002/jaba.263

Appendix.

Choice Selections								
Trial 1	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 2	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 3	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 4	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 5	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 6	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 7	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 8	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 9	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 10	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 11	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 12	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 13	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 14	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		
Trial 15	**Selections**			**Compliance**			**Problem Behavior**	**Totals**
	Choice	No-Choice	Control	Verbal	Model	Physical		