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Running Head: CHOICE-MAKING AND DIFFERENTIAL CONSEQUENCES WITH  
TYPICALLY DEVELOPING CHILDREN

On the Relative Reinforcing Effects of Choice-Making and Differential Consequences

with Typically-Developing Children

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Abstract

Research has shown that children with developmental disabilities generally prefer situations in which they have the opportunity to make choices, relative to situations in which they do not. Some researchers have suggested that this opportunity to choose has a reinforcing effect because it provides access to preferred items. However, others have suggested that choice is valuable beyond providing access to preferred items. The present experiment aimed to discover whether typically developing children would surrender their choice-making opportunities to gain access to preferred items. In the first assessment, the researcher attempted to identify participants who displayed a preference for choice-making opportunities. Using a concurrent-chains arrangement, participants made selections between a choice condition (participants were allowed to choose one of two leisure items) and a no-choice condition (participants were given a leisure item by the experimenter). In the second assessment, the researchers attempted to determine the strength of the participants' preferences for choice. One participant demonstrated a preference for choice in the first assessment and no preference for either condition in the second assessment. Another participant did not demonstrate a preference for choice in the first assessment, but preferred choice when it was associated with differential consequences in the second assessment.

On the relative reinforcing effects of choice-making and differential consequences with  
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Choice may be defined as the behavior of selecting among available alternatives and is a means by which individuals can exercise control in their lives. Whether a person chooses to vote for a certain political candidate, to attend a specific college, or to wear a certain color shirt, he or she is choosing to modify his or her environment into a more preferred, agreeable atmosphere. The opportunities to make such choices are fundamental to our autonomy as individuals, and should be respected in the care of dependent populations whose opportunities to make choices may be limited (e.g., the elderly, the developmentally disabled, and very young children; see Harchik, Sherman, Sheldon, & Bannerman, 1993 for a further discussion).

Beyond the social importance of the opportunity to make choices, research has shown that children with developmental disabilities engaged in less problem behavior (e.g., social avoidance) when they were allowed to choose among tasks, compared to when they were assigned tasks by a caregiver. Dyer, Dunlap, and Winterling (1990) discovered that the rates of problem behavior of preschool-aged children with developmental disabilities significantly decreased when they were allowed to choose a task to complete (e.g., constructing a small puzzle or inserting coins into a bank) relative to when they were asked to complete other tasks assigned by the experimenter.

Although some people like to ascribe a particular value and dignity to choice making, there are reasons beyond exercising control over one's environment that may lead individuals to prefer situations in which they have the opportunity to make choices relative to situations in which they do not. Some researchers have suggested that choice-

making opportunities may be more attractive, because they provide access to preferred stimuli (Fisher, Piazza, Bowman, Hagopian, Owens, & Slevin, 1992). For instance, a young boy is more likely to obtain his favorite piece of candy by selecting it himself than by asking his older brother to pick a piece of candy for him. For much of the previous research in this area, the consequences of choosing and not choosing resulted in very different outcomes, and can most parsimoniously be described in terms of obtaining more preferred consequences.

However, there is some research that suggests that choice-making opportunities may be valuable, even when they do not result in access to a more preferred outcome. Tiger, Hanley, and Hernandez (2006) developed a methodology to isolate the effects of choosing among numerous stimuli, by ensuring that those choices did not result in differential consequences. Specifically, Tiger et al. (2006) used what they called a concurrent-chains procedure in which children were initially provided with 3 colored worksheets. In what they called the initial link of the chain, children were prompted to select one of the three worksheets and then, depending upon which worksheet they selected, experienced one of three conditions arranged in what they called the terminal links of the chain. If the children selected the worksheet associated with the no-choice condition, the children were prompted to complete an academic response (e.g., point to the letter J) and were provided access to a single small snack (e.g., a red M&M). If the child selected the worksheet associated with the choice condition, they were prompted to complete an academic response and then were provided access to an array of identical snacks (e.g., 5 red M&Ms) from which they could choose one. Selections of the worksheet associated with the control condition resulted in no access to the snacks. In

this regard, Tiger and colleagues controlled for the effect of differential consequences by ensuring that the same stimulus (e.g., red M&Ms) was delivered in both the choice and no-choice conditions of their study; the only difference was whether the children selected the particular snack (e.g., which red M&M). The results of Tiger et al. (2006) showed that 7 preschool children generally preferred the choice condition, suggesting that there is some value in the opportunity to choose beyond access to more preferred events.

After identifying the value of choice making opportunities, research had begun to attempt to quantify that value. Tiger et al. (2006) attempted to determine the value of choice by increasing the number of academic tasks necessary to access the choice condition while one task was required to access the no-choice condition. Across the experimental condition the number of tasks associated with the choice condition increased from 1 to 2, 3, 4, 8, 12, 16, and 32. Through this comparison the experimenters found that participants chose to complete 8 to 32 times the number of academic tasks just to be able to choose the same reinforcement from an array, suggesting that choice may be highly valuable for some children.

Another study of the value of choice was conducted by comparing the value of choice relative to the value of more-preferred items (Fisher, Thompson, Piazza, Crosland, & Gotjen 1997). Fisher et al. (1997) initially conducted a preference assessment to determine a hierarchy of leisure items and edibles (suggested by caregivers) ranging from high preference to low preference. Next, they arranged a concurrent-operants procedure in which participants were presented with three micro-switches on a tabletop. Presses on the associated micro-switch resulted in access to a choice condition, a no-choice condition, and a control (no reinforcement) condition. Unlike the previous Tiger et al.

(2006) study, the same items were not delivered following presses to the choice and no-choice switches. When a mixture of high and low preference stimuli were available from among which to choose in the choice condition, children responded most often to the choice switch. However, when a choice of relatively low preference items was provided for pressing the choice switch and relatively high preference items were presented for pressing the no-choice switch, the participants generally selected the no-choice condition. In other words, although these children preferred conditions in which they could make choices, this preference was overcome when more preferred items were available for not choosing (e.g., as when we allow a financial planner to choose our investments for us).

Although Fisher et al. (1997) demonstrated that three children with developmental disabilities surrendered choice-making opportunities to gain access to higher preference items, it is unclear if typically developing children would behave similarly. It is conceivable that children with developmental disabilities are more likely to be deprived of choice-making opportunities in their daily lives and thus more likely to persist in responding to the choice condition (i.e., the opportunity to exert control over their environment is more valuable than better toys) relative to their typically developing peers. It is also conceivable that children with limited choice-making opportunities have less learning experience that choosing your own reinforcers is typically associated with better outcomes, and therefore may be less likely to persist in selecting the choice condition than their typically developing peers. Therefore, the purpose of the current study will be to replicate the procedures used by Fisher et al. (1997) with typically developing preschool-aged children to determine if this population will similarly surrender choice making opportunities when not choosing results in more preferred

outcomes. It is hypothesized that the participants will more frequently select the choice condition when both the choice condition and no-choice condition provide access to the same reinforcement. It is hypothesized that the participants will more frequently select the no-choice condition when the no-choice condition provides increased access to preferred reinforcement.

## Method

### *Participants and Settings*

Two typically-developing, pre-school aged children (4 to 5 years old) were recruited to participate from a university affiliated childcare center. Participation was solicited by sending home information and consent forms with the children. Participants were selected based upon (a) the schedule availability of the experimenters, (b) order in which parental consent was received, and (c) child assent to participation. Sessions were conducted while seated at a table in a hallway just outside of the child's classroom. Approximately two sessions, each comprised of 12 trials, were conducted with each participant each day.

### *Materials*

Three 7.6 cm by 12.7 cm index cards were positioned about 15 cm apart on a table during each session. Each card was a different color (e.g., red, green, and blue) and was positioned approximately 30 cm in front of the participant. Healthy snacks such as raisins and cheerios were used as edible reinforcement.

### *Measurement and Interobserver Agreement*

Selection of a card was defined as physical contact with the card by the participant's hand. The experimenter calculated interobserver agreement by dividing the



number of agreements by the sum of the number of agreements and the number of disagreements and multiplying the quotient by 100%. Two independent observers recorded selections for 80% of sessions conducted with Mary and 84% of sessions conducted with Susan. Agreement coefficients were 100% for both participants.

### *Procedures*

#### *Preference Assessments*

Preference assessments were conducted with each participant to identify a preference hierarchy among the events delivered in later phases of the study. First, we chose a wide variety of healthy snacks. Next, we systematically evaluated the value of these stimuli by conducting a paired-stimulus preference assessment in which each item was presented as a pair with each of the other items, and participants were allowed to select one item from each pair to consume (e.g., one small piece of a healthy snack) in order (Fisher, Piazza, Bowman, & Hagopian, 1992). The experimenter prevented any attempts made by the participant to approach both items at the same time. If the participant did not choose an item within 5 s of the presentation, the experimenter allowed the participant to sample each item to allow the participant to become familiar with the items; both items were then removed and re-presented as a pair. The items were ranked from most preferred to least preferred based on the number of times selected divided by the number of times presented (expressed as a percentage) and were categorized as highly preferred, moderately preferred, or lowly preferred. The items we identified as highly preferred were, for Mary, fruit snacks and Cheeze-Its; for Susan, Teddy Grahams and fruit snacks. The items we identified as least preferred were, for Mary, almonds and yogurt raisins; for Susan, Goldfish and popcorn.

A second preference assessment was conducted to determine each participant's preference hierarchy for ten differently colored index cards. This assessment was conducted in the same manner as the previous preference assessment (i.e., presenting each colored index card as a pair with each of the other colored index cards). The purpose of this color preference assessment was to eliminate any potential confounds by preventing each participant's most highly and lowly preferred colors from being used in later phases of the study. The colors we identified as highly preferred were, for Mary, purple, red, and light blue; for Susan, light blue, navy, and purple. The colors we identified as least preferred were, for Mary, gray and white; for Susan, white, orange, and gray. The colors we determined as moderately preferred and used in later phases of the study were, for Mary, brown, green, and yellow; for Susan, brown, red, and yellow.

#### *Choice-Making Opportunities Preference Assessment*

We conducted an initial assessment to determine children's preference for choice-making opportunities when choices were made among high-preference items, low-preference items, and a combination of high and low-preference items. Three moderately preferred colored index cards (determined by the color preference assessment) were presented in an array in front of the participant who was prompted to select one of the sheets during each phase of this assessment. Selections of the card associated with the choice condition resulted in the opportunity to choose one of two edible items, resulting in access to the chosen item. Selections of the card associated with the no-choice condition resulted in access to an experimenter-selected item. In order to equate children's experiences following selections of the choice and no-choice cards, the items delivered following no-choice selections were yoked to those items chosen by the

participant in the most recent choice condition trial. Selections of the card associated with the control condition resulted in no edible reinforcement. The experimenter described the contingencies associated with selections of each card and prompted the participant to select each card and experience the associated consequence twice prior to each session to facilitate the participant's sampling of each consequence. Throughout all sessions, the cards were rotated after each trial so that no card remained in the same position (e.g., left, middle, right) for two consecutive trials. We recorded the position of each initial link selection made by each participant for all trials.

High preference stimuli were presented in the array following choice-card selections during *high-preference (Hp) choice* sessions. Lower preference stimuli were presented in the choice array following choice-card selections during the *low-preference (Lp) choice* sessions. One high-preference item and one low-preference item were presented in the choice array following choice-card selections in the *high preference and low preference (Hp & Lp) choice* sessions. Choice and no-choice selections were determined in each phase by repeated measurement within a concurrent operants arrangement. Differences in selections were identified via visual inspection of the data.

### *Results and Discussion*

The data collected from the choice-making opportunities preference assessment are shown in Figure 1. The mean percentage of choice selections made by Mary across all sessions was 78.6% (range, 58% to 92%). Mary's relatively high percentage of choice selections was consistent across all three phases of this assessment. Throughout all phases, Mary's percentage of control selections remained relatively low, with no more than 8% control selections in all sessions.

The mean percentage of choice selections made by Susan across all sessions was 48.4% (range, 10% to 75%). In contrast with Mary's high percentage of choice selection, Susan's percentage of choice selections did not differ from her percentage of no-choice selections across all sessions, except for sessions 14 and 19 in which her choice and no-choice selections, respectively, were at least 75%. Although Susan's percentage of control selections was at 42% in the first session of the high preference choice phase, it tapered off to 0% by the fourth session, and remained at a low percentage throughout the remaining phases. The experimenter attributes this pattern to the participant's growing understanding of the contingencies associated with each card.

The overall pattern of Mary's high choice selection percentage suggests that she held choosing among similarly preferred edibles (e.g., fruit snack and Cheeze-It) as more valuable than being given one of these edibles by the experimenter. This preference for choice remained when she chose between two relatively lowly preferred edible items; however, during these low-preference choice sessions, Mary's percentage of control selections was slightly higher. This effect may have been due to a decrease in interest in the relatively lowly preferred edibles. In contrast with Mary's high percentage of choice selections, Susan's ambivalent pattern of selection suggests that choosing among similarly preferred edibles is of little value to her.

#### *Choice-Making versus Differential Consequences Preference Assessment*

After identifying which participants displayed a preference for choice-making opportunities, we attempted to determine the strength of this preference relative to conditions associated with access to more preferred stimuli. The procedures of this preference assessment were similar to those procedures of the choice-making

opportunities preference assessment. Each participant initially experienced a phase in which choice selections resulted in the delivery of low- preference items only, while no-choice selections resulted in the delivery of both Hp & Lp items (termed Lp choice/Hp & Lp no-choice). An Lp stimulus was delivered during one half of trials, and an Hp stimulus was delivered during the other half of the trials. The experimenter used a coin toss to determine randomly the delivery of either the Hp stimulus or Lp stimulus for each trial of these sessions. If preference for the choice condition persisted in the Lp choice/Hp & Lp no-choice phase, we then conducted an Lp choice/Hp no-choice phase in which Hp stimuli would be delivered during 100% of trials with a no-choice selection. Again, the experimenter described the contingencies associated with selections of each card and prompted the participant to select each card and experience the associated consequence twice prior to each session to facilitate the participant's sampling of each consequence. Throughout all sessions, the colored cards were rotated after each trial so that no card remained in the same position (e.g., left, middle, right) for two consecutive trials. We recorded the position of each initial link selection made by each participant for all trials.

### *Results and Discussion*

The data collected from the choice-making versus differential consequences preference assessment are shown in Figure 2. Throughout all phases of this assessment, Mary's percentages of choice and no-choice selections did not differ. Moreover, she selected the control condition more than she did during the previous assessment, averaging 7.8%. In the first three sessions of the Lp choice/Hp no-choice phase, Mary seemed to develop a preference for the no-choice condition, which granted her access to the more highly preferred edible; however, in the following three sessions, her percentage

of no-choice selections did not differ from her percentage of choice selections, indicating no clear preference for either condition. Given Mary's ambivalent pattern of selection throughout the first two phases (i.e., the Lp choice/Hp&Lp no-choice and the Lp choice/Hp no-choice phases) of this assessment, the experimenter decided to include an additional phase in which choice selections resulted in access to highly preferred and lowly preferred stimuli and no-choice selections resulted in access to lowly preferred stimuli, termed the *Hp&Lp choice/Lp no-choice* phase. The purpose of this phase was to determine whether Mary would track the movement of her more highly preferred edible (e.g., fruit snack) to the choice condition, but her similar percentages of choice and no-choice selections suggest she did not.

There are a number of possible explanations for Mary's ambivalent pattern of selection. For example, she may have been unable to discriminate between the two initial links associated with reinforcement, given the subtle differences between the two and the frequent changes in these contingencies throughout the various phases. Second, exposure to reinforcement outside the sessions may have influenced her selection (i.e., she may have been exposed to similar snacks at home or in the classroom). Third, Mary may have developed a self-generated rule related to switching back and forth between conditions. To verify whether this pattern of ambivalence was the result of an unknown variable, we included a final phase of high preference choice sessions in which both choice and no-choice selections resulted in access to highly preferred edible items (e.g., fruit snack and Cheeze-It). Sessions of this phase were identical to the high preference choice sessions of the previous choice-making opportunities preference assessment. Upon comparing the data obtained in these identical phases, we observed that Mary's previous robust

preference for the choice condition throughout the first assessment did not persist through the second assessment. The data collected in this final phase suggest that an unknown variable was likely influencing Mary's responding; however, our data clearly show that her responding was not influenced by the quality of the reinforcer, the opportunity to choose, or a side preference of the initial link. We believe that no side preference existed given that Mary made roughly equal initial link selections from the left, middle, and right positions.

Although Susan did not demonstrate a clear preference for choice in the choice-making opportunities preference assessment, we proceeded to the choice-making versus differential consequences preference assessment to determine whether she would track the movement of her most highly preferred edible item (i.e., from the choice to the no-choice condition). Throughout all sessions of the Lp choice/Hp&Lp no-choice phase, Susan's percentage of no-choice selections was higher than her percentage of choice selections, suggesting that she identified no-choice selections as a means of accessing her most highly preferred edible item (e.g., fruit snack). As expected, in the following Lp choice/Hp no-choice phase, Susan's percentage of no-choice selections remained greater than her percentage of choice selections given that no-choice selections granted her access to her most highly preferred edible item 100% of the time. Next, we included an additional phase (Hp&Lp choice/Lp no-choice) in which choice selections resulted in access to highly preferred and lowly preferred stimuli and no-choice selections resulted in access to lowly preferred stimuli. In the first two sessions of this phase, Susan's percentage of no-choice selections was greater than her percentage of choice selections. However, over the next six sessions, Susan's percentage of choice selections increased

quickly, reaching 100%. This increase in choice selections indicates that Susan tracked the movement of her most preferred edible item to the choice condition.

We then conducted a reversal in which selections of the no-choice condition resulted in access to highly preferred and lowly preferred stimuli, and choice selections resulted in access to lowly preferred stimuli. Again, the experimenter used a coin toss to determine randomly the delivery of either the Hp stimulus or Lp stimulus for each trial of these sessions. As expected, Susan's percentage of no-choice selections increased to over 66% indicating that she once again tracked the movement of her highly preferred edible item to the no-choice condition. Finally, we conducted one more reversal which supported the data collected in previous phases and demonstrated clearly that Susan tracked her most highly preferred edible item, and that her edible preference hierarchy maintained throughout the course of the experiment. Throughout all sessions of the choice-making versus differential consequences preference assessment, Susan's percentage of control selections remained at 0%, suggesting that she understood the contingencies associated with each card.

### General Discussion

The previous research of Tiger et al. (2006) and Fisher et al. (1997) suggests that some children value choice-making opportunities, and according to Tiger et al. (2006), some children will work harder to access the opportunity to choose. Mary's high percentage of choice selections throughout the choice-making opportunities preference assessment supported our hypothesis that typically developing children will more frequently select the choice condition when both the choice condition and no-choice condition provide access to the same reinforcement. However, Susan's ambivalent



pattern of selection in this same assessment did not support our hypothesis (i.e., her choice selections did not differ from her no choice selections). Because each participant appeared to value choice-making opportunities differently, we believe that including a larger number of participants may have allowed us to identify any general preferences for choice in the typically developing pre-school age population. Furthermore, we may have been able to identify any gender differences or similarities if males had been included in the study.

Although Mary preferred the choice condition in the initial assessment, we were unable to determine whether she would surrender the opportunity to choose to gain access to a more highly preferred item given her ambivalent pattern of selection in the second assessment. If this ambivalence had been due to a change in Mary's preference hierarchy, this problem may have been remedied by conducting a brief, edible preference assessment before the first session of each day. However, with no data supporting this assumption, no conclusions can be made.

Susan, however, did surrender her opportunity for choice to gain access to her more preferred edible item, supporting our hypothesis that typically developing, preschool-aged children will more frequently select the no-choice condition when it provides greater access to preferred reinforcement. Furthermore, we found that Susan was more likely to select the choice condition when it was associated with a better consequence. The same preference for choice among differential consequences emerged in the research conducted by Dyer et al. (1990), which did not control for participants' preferences across conditions, and the participants' preferences for choosing were simply attributed to access to better outcomes. However, in the choice-making opportunities

preference assessment of the present study, in which the consequences of choice and no-choice selections were equated through a yoking system, Susan did not demonstrate a preference for choice. Although these consequences were equated, choosing always resulted in access to two different consequences while not choosing resulted in access to one. Isolating the effects of choosing among numerous stimuli by holding the consequences of choosing constant (e.g., choosing one of five identical red jellybeans), as was done in the 2006 Tiger et al. study, may have resulted in more choice selections in our choice-making opportunities preference assessment. Therefore, systematically evaluating differential preferences may be less effective in isolating an individual's preference for choice than holding the consequences of choosing and not choosing constant.

Again, had Mary's preference hierarchy maintained throughout the second assessment, we believe that her preference for her most preferred edible item may have prevailed over her preference for choice-making opportunities. Nonetheless, no conclusions can be made until further research is conducted.

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Figure Captions

*Figure 1.* Percentage of selections of the choice, no-choice, and control cards during the choice-making opportunities preference assessment for Mary (top panel) and Susan (bottom panel).

*Figure 2.* Percentage of selections of the choice, no-choice, and control cards during the choice-making versus differential consequences preference assessment for Mary (top panel) and Susan (bottom panel).

Figure 1.

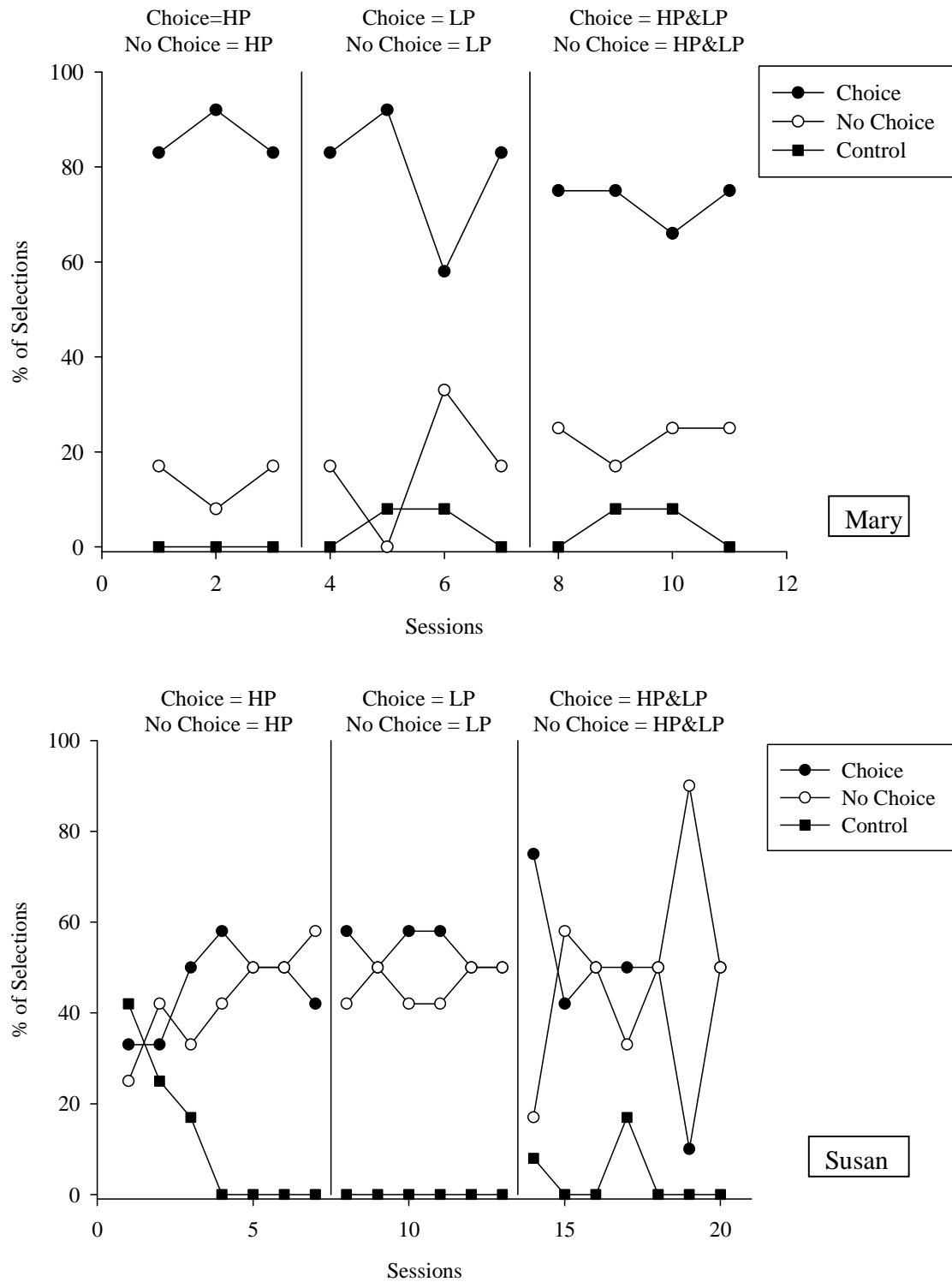


Figure 2.

