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# *AN EVALUATION OF CHOICE ON INSTRUCTIONAL EFFICACY AND INDIVIDUAL PREFERENCES AMONG CHILDREN WITH AUTISM*

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The current study compared the differential effects of choice and no-choice reinforcement conditions on skill acquisition. In addition, we assessed preference for choice-making opportunities with 3 children with autism, using a modified concurrent-chains procedure. We replicated the experiment with 2 participants. The results indicated that choice-making opportunities increased treatment efficacy for 2 of the 3 participants, and all 3 participants demonstrated a preference for choice-making opportunities.

*Key words:* autism, choice, concurrent-chains arrangement, instructional efficacy, skill acquisition

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Providing students with choice-making opportunities appears to be beneficial during instructional programs, because it may result in decreases in problem behavior and increases in academic engagement (Dunlap et al., 1994). In addition, research suggests that the provision of choice increases the frequency of academic responding (Tiger, Toussaint, & Roath, 2010).

Although the provision of choice has been shown to increase academic engagement, it has not been demonstrated to improve skill acquisition. In an attempt to address this question, Newman, Needelman, Reinecke, and Robek (2002) evaluated whether providing choice-making opportunities influenced the rate of skill acquisition and disruptive behavior during discrete-trial instruction for children with autism. Newman et al. either allowed participants to select the task order and reinforcer at the beginning of an instructional session (i.e., choice) or the experimenter selected both the task and reinforcer (i.e., no choice). Results demonstrated no difference in instructional efficacy. However, the effects of choice on acquisition may be more pronounced by providing opportunities to choose during the consequence portion of instruction rather than as an antecedent manipulation (Fenerty & Tiger, 2010).

Thus, one purpose of the current study was to evaluate the effects of choice-making opportunities when they are provided as a consequence. The current analysis also was designed to replicate and extend previous findings that demonstrate preschool children with and without developmental disabilities prefer choice-making opportunities (Brigham & Sherman, 1973; Fisher, Thompson, Piazza, Crosland, & Gotjen, 1997; Thompson, Fisher, & Contrucci, 1998; Tiger, Hanley, & Hernandez, 2006).

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The design and data-collection portions of this research were conducted while the investigators were at the University of Nebraska Medical Center's Munroe-Meyer Institute.

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## METHOD

*Participants*

Three preschool-aged children with autism, who attended a university-based early intervention program, participated in the evaluation. Samuel was a 5-year-old boy who used simple sentences to mand and frequently engaged in simple social exchanges. Ethan was a 4-year-old boy who used short phrases to label and request items; he engaged in limited social conversation. Patrick was a 3-year-old boy who used a combination of short phrases and simple sentences to engage in tacting, manding, and social exchanges.

*Settings and Materials*

We conducted all sessions in the participants' typical learning environment, a room (5 m by 5 m) that contained a child-sized table, chairs, and relevant session materials. We conducted three sessions daily for 3 to 4 days per week. The child sat at the table, and the experimenter sat next to the participant. A secondary observer sat behind and to one side of the participant during some sessions.

*Measurement, Interobserver Agreement, and Procedural Integrity*

Observers recorded session data on a trial-by-trial basis. We collected data on *unprompted correct responses,* defined as vocalization of the targeted response before the delivery of the model prompt. Observers also collected data on *initial-link selections,* defined as participants touching a card, during the concurrent-chains arrangement.

A second observer independently recorded data for a minimum of 32% of all sessions. Agreement for unprompted correct responses was scored if both observers independently recorded the same target responses in a trial. Agreement for initial-link selections was scored if both the experimenter and the second observer independently recorded the same initial-link selection. We calculated interobserver agreement by dividing the number of agreements by the total number of trials and converting the result to a percentage. Mean agreement for unprompted correct responses was 99% (range, 83% to 100%) for Samuel and 100% for both Ethan and Patrick during the first evaluation. Initial-link selection agreement was 100% across all participants.

A second observer also collected procedural integrity data for a minimum of 22% of sessions. We calculated procedural integrity for each session by dividing the number of correctly implemented trials by the total number of trials and converting this ratio to a percentage. Mean procedural integrity score was 99.4% (range, 90% to 100%) for Samuel, 100% for Ethan, and 99.8% (range, 95% to 100%) for Patrick.

*Preference Assessments*

We conducted a paired-item preference assessment (Fisher et al., 1992) with small edible items (e.g., M&Ms) and larger items (e.g., Cheetos) broken into small pieces, approximately 1 cm in diameter. We used the top three items associated with the highest selection percentage. We also conducted a preference assessment for colors and used the three colors associated with the lowest selection percentage to serve as initial-link stimuli in the concurrent-chains arrangement.

*Procedure and Design*

We evaluated the effect of contingent choice on correct responses using a nonconcurrent multiple baseline design embedded within a multiple schedule design. Instructional stimuli previously assigned to the control condition served as acquisition targets during the preference phase of the evaluation. We conducted the experiment twice with Samuel and Patrick for replication purposes. Ethan was no longer enrolled in the program at the time of replication.

There were six targets in each condition in the initial evaluation, and each target was presented twice. For Patrick and Samuel, targets consisted of intraverbal responses to common "wh–?" questions and questions about functions of objects. Ethan's targets were tacting pictures of common objects. During replication of the evaluation, we included 20 targets that were presented once in each condition; these targets consisted of tacting pictures of popular people or characters (e.g., George Washington, Scooby Doo). We attempted to equate targets across conditions by creating sets that contained targets with a similar number of syllables.

During the treatment efficacy portion of the evaluation, we conducted a series of three sessions per day. We set the mastery criterion at two consecutive sessions with correct, unprompted responses at or above 90%. We presented conditions in a pseudorandom and counterbalanced order with one exception; all participants experienced a choice session before a no-choice session during the first series of the evaluation. We yoked the reinforcers selected by the participant in the choice condition to the subsequent no-choice condition. As a result, it is possible that the selections made in a choice session were yoked to two subsequent no-choice sessions if a no-choice session randomly preceded a choice session in a given series. We arranged for at least 10 min between each condition to account for satiation associated with food items. We paired each instructional condition with a colored index card, which served as the discriminative stimulus during the instructional efficacy evaluation. Colored cards later served as initial links of a concurrent-chains arrangement in the instructional preference evaluation. Previous research suggests that an effective method for identifying consumer preference for instructional conditions is to measure selection among concurrently available responses (selection of initial links) that determine the contingencies in place in the terminal link (choice, no choice, or no reinforcement; Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997).

### *Efficacy Evaluation*

*Baseline.* The experimenter presented the antecedent stimulus and allowed the participant 5 s to respond. No consequences were provided for correct or incorrect responses.

*Choice.* The experimenter physically guided the participant to touch the relevant initial-link stimulus and then presented the antecedent stimulus. After a correct response, the experimenter presented an array of three edible items and prompted the participant to select one (the experimenter blocked attempts to select multiple items if this occurred). The experimenter provided instructions using a progressive prompt delay to a vocal model prompt (e.g., the experimenter said, “spoon”), and we set prompt delays at 0 s, 2 s, 5 s, 7 s, and 10 s. All participants first experienced one session with trials at a 0-s prompt delay, and the second session included trials at a 2-s delay. We increased the prompt delay (5 s, 7 s, 10 s) during the subsequent session if at least 50% of unprompted incorrect responses were errors of omission in an instructional session. The experimenter delivered reinforcement after both unprompted and prompted correct responses until the participant demonstrated two consecutive sessions with at least 50% unprompted correct responses. Thereafter, reinforcement was provided only for unprompted correct responses. Instruction continued until performance reached mastery criterion.

*No choice.* This procedure was identical to the choice condition except that after a correct response, the experimenter delivered an edible item that was yoked to selections in the previous choice condition. In the event that there were more reinforced trials in a no-choice session than in the previous choice session (due to discontinuation of reinforcement for prompted responses after the preset criterion), the experimenter repeated the delivery of items based on the sequence of item selections.

*Control.* The control condition was identical to baseline except that the therapist presented the relevant initial-link stimulus.

### *Preference Evaluation*

During the subsequent instructional preference evaluation, the experimenter placed the three initial-link stimuli in front of the participant and provided the instruction, "pick one." After an initial-link selection, the experimenter presented the antecedent stimulus, and responding resulted in access to the respective terminal-link contingencies for that session.

## RESULTS AND DISCUSSION

The results of the differential efficacy portion of the evaluation are presented in the first two panels of Figure 1. All participants demonstrated low levels of correct responding during baseline sessions, and correct responding increased for all participants after implementation of the instructional procedures. Samuel demonstrated mastery-level responding in the choice condition in five training sessions compared to 14 training sessions in the no-choice condition. Differential efficacy was replicated, in that Samuel met mastery criterion in one fewer session in the choice condition than in the no-choice condition in his second evaluation. Ethan's performances in

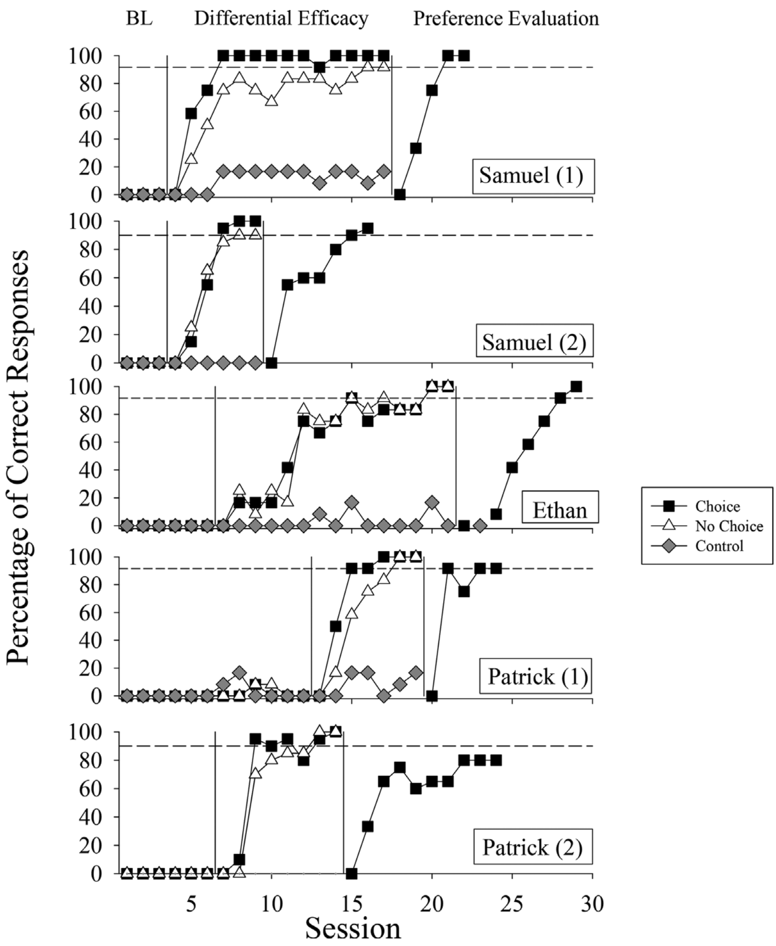


Figure 1. The percentage of correct responses during baseline (first phase) and instructional conditions (second phase) for Samuel (first and second panels), Ethan (middle panel), and Patrick (fourth and bottom panels) during the instructional efficacy evaluation. The dashed line represents the mastery criterion. The percentage of unprompted correct responses and condition selection during the instructional preference evaluation are shown in the third phase. The number in parentheses denotes the first or second evaluation for Samuel and Patrick.

the choice and no-choice conditions were equal; he met mastery criterion within an equal number of choice and no-choice sessions. Patrick's correct responding reached the mastery criterion in three fewer training sessions in the choice condition than in the no-choice condition in the first evaluation and in four fewer training sessions in his second evaluation.

We saw a distinct advantage, in that two of three participants (Samuel and Patrick) required fewer instructional sessions to reach the mastery criterion under choice conditions. Efficiency ranged from a savings of one to nine instructional sessions per instructional comparison, which may be viewed as relatively minor. However, this practice may yield a substantial time savings if implemented across several instructional programs over longer periods of time.

All participants demonstrated a preference for choice-making conditions (Figure 1, third panel). Samuel showed an exclusive preference for the choice condition. Ethan demonstrated preference for the choice condition by selecting the choice condition for seven of eight sessions. Patrick exclusively selected the choice condition during both evaluations. His correct responding did not reach mastery criterion in the preference evaluation phase of his replication evaluation because his family relocated and he left the program midevaluation.

A yoking procedure was used in an attempt to isolate choice as a variable and control for item preference. However, it is possible that our current results may still be attributed to the differential consequences associated with choosing. That is, a selected item in the choice condition may have served as the most preferred item at the moment it was selected but not other moments, such as when it was provided in the no-choice condition (Fisher et al., 1997). One solution has been to use identical reinforcers in both conditions (Thompson et al., 1998). However, we elected to provide a choice among different items to mimic an arrangement that is more likely to occur during clinical practice.

Previous research has demonstrated that individuals with typical and atypical development prefer choice-making opportunities (Tiger et al., 2006). Providing choice of reinforcement is one of many ways in which therapists may provide choice-making opportunities and promote personal liberties for individuals with autism and related developmental disabilities (Bannerman, Sheldon, Sherman, & Harchik, 1990).

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