# COMPARISON OF SIMULTANEOUS PROMPTING AND NO-NO PROMPTING IN TWO-CHOICE DISCRIMINATION LEARNING WITH CHILDREN WITH AUTISM

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This study compared no-no prompting procedures to simultaneous prompting procedures for 3 children with autism. Using a parallel treatments design, researchers taught rote math skills, receptive labels, or answers to "wh–" questions with both prompting systems. Results indicated that no-no prompting was effective in teaching all skills. By contrast, simultaneous prompting was effective in teaching only one pair of skills to 1 participant in the same amount of teaching time and trials. Researchers conducted a preference assessment to determine which of the two prompting procedures the 3 participants preferred. The participants showed mixed preferences for the two procedures.

*Key words:*　autism, discrete-trial teaching, no-no prompting, simultaneous prompting

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Discrete-trial teaching (Catania, Almeida, Liu-Constant, & Reed, 2009) is a systematic and effective method of teaching children with autism various skills (Chavez-Brown, Scott, & Ross, 2005; Fisher, Kodak, & Moore, 2007; Lovaas, 1987; Smith, 2001). Discrete-trial teaching consists of three components: (a) an instruction (discriminative stimulus), (b) a response by the learner, and (c) a consequence following the child's response. If the learner responds correctly, the teacher provides positive reinforcement immediately following that response; if the learner does not respond within a specified time period or responds incorrectly, teachers typically provide no consequences or corrective feedback. As a common addition to discrete-trial teaching, teachers may provide a prompt after the initial instruction that also serves as an antecedent

stimulus that increases the likelihood of a correct response by the learner.

Teachers give prompts in a variety of ways. Two commonly implemented prompting systems for children with autism are simultaneous prompting and no-no prompting. Simultaneous prompting is a procedure designed to minimize errors. It involves the use of a controlling prompt (i.e., a prompt that results in the learner making a correct response 100% of the time) immediately following the instruction. Thus, the learner has no opportunity to err and always accesses reinforcement. Textbooks on prompting have endorsed the use of simultaneous prompting (Wolery, Ault, & Doyle, 1992), and there is empirical support for its effectiveness for teaching an array of skills to children with autism, such as hand washing (Parrott, Schuster, Collins, & Gassaway, 2000), using expressive labels (Akmanoglu-Uludag & Batu, 2005), receptive language skills (Akmanoglu & Batu, 2004), leisure skills (Kurt & Tekin-Iftar, 2008), and dressing (Sewell, Collins, Hemmeter, & Schuster, 1998). Studies also have shown simultaneous prompting to be effective for typically developing children and children with intellectual disabilities (Birkan, 2005; Dogan & Tekin-Iftar, 2002; Tekin & Kircaali-Iftar, 2002; Wolery, Holcombe, Werts, & Cipolloni, 1993).

Researchers have compared simultaneous prompting to the constant prompt-delay procedure in several studies for children diagnosed with an intellectual disability. Investigators found mixed results in terms of effectiveness and efficiency. For example, Schuster, Griffen, and Wolery (1992) compared the effectiveness of a 4-s constant prompt delay to simultaneous prompting to teach 4 children with mental retardation to say words printed on a card. Both simultaneous prompting and constant prompt delay used verbal models as prompts. Results indicated that both procedures were effective, although simultaneous prompting required fewer teaching trials. Riesen, McDonnell, Johnson, Polychronis, and Jameson (2003) taught 4 participants with various intellectual disabilities to state words listed on cards. Results demonstrated that 3 of the 4 participants learned to name all of the words presented during both simultaneous prompting and constant prompt delay in approximately the same number of teaching trials. One participant, however, only learned words taught with constant prompt delay.

A second commonly implemented prompting procedure is no-no prompting. No-no prompting involves the delivery of the instruction followed by a period of time during which the child has the opportunity to respond independently. Teachers provide positive reinforcement following correct responses and corrective feedback (e.g., ''no'' or ''try again'') for incorrect or no responses, and then repeat the trial. After two consecutive errors, teachers deliver a controlling prompt with the instructions. Therefore, the third trial of no-no prompting is identical to simultaneous prompting. Thus, no-no prompting may not minimize errors but, instead, may correct errors once two errors in a row occur. Results of previous research indicate that there are three important components in this procedure. The first component is error correction; when the learner makes an incorrect response, the teacher provides corrective feedback. Investigators have shown that error correction can be effective in helping to teach new skills (Barbetta, Heward, Bradley, & Miller, 1994; Goodson, Sigafoos, O'Reilly, Cannella, & Lancioni, 2007; Smith, Mruzek, Wheat, & Hughes, 2006). Second, when the learner is incorrect on two consecutive trials, no-no prompting provides the learner with an opportunity to repractice on the next trial (remedial trial), with the same set of stimuli, although the stimuli may be placed in different positions. Researchers have demonstrated that remedial trials may be useful in teaching verb usage (Schumaker & Sherman, 1970), matching-to-sample tasks (Rodgers & Iwata, 1991), and expressive labeling of sight words (Worsdell et al., 2005). Third, the combination of error correction and remedial trials provides the opportunity for the child to learn from exclusion (Carr, 2003). Although clinicians have implemented no-no prompting in educational settings with children with autism and professionals have recommended its use in curriculum books and descriptive articles (Harris & Weiss, 1998; Kates-McElrath & Axelrod, 2006; Leaf & McEachin, 1999), researchers have evaluated the procedure only within a larger teaching package (e.g., Jones, Feeley, & Takacs, 2007), thus making it difficult to assess its effectiveness (Burk, 2008; Lund, Kidd, & Hallam, 2005).

Simultaneous prompting and no-no prompting are procedurally different in two additional ways. First, there is a different rate of prompting. Teachers provide a prompt during every trial with simultaneous prompting, whereas in no-no prompting teachers provide a prompt only after the learner makes two incorrect responses. Second, the rate of reinforcement is different. Simultaneous prompting results in the learner receiving reinforcement for every trial; no-no prompting, however, can result in the learner receiving either reinforcement or corrective feedback, depending on the learner's response to the instruction.

The current study (a) compared the effectiveness of simultaneous prompting and no-no prompting in teaching 3 children with autism to point to objects, numbers, or pictures on cards when asked a question or given an instruction and (b) assessed participants' preferences for the two prompting procedures.

## METHOD

### Participants

To be included in this study, participants had to meet the following criteria: (a) have a formal diagnosis of autism from an outside agency, (b) be between 3 and 8 years old, (c) have receptive language skill deficits that were not being targeted currently as a part of their regular intervention, and (d) have parental consent to participate in the study. Based on these criteria, investigators selected 3 children. All 3 participants had a history of educational intervention that used a prompting system similar to the simultaneous prompting procedure implemented in this study, and this intervention continued outside the experimental sessions throughout the study. Also, all 3 participants had no known history of prompting procedures that involved error correction.

Brady was a 5-year-old boy. At the beginning of the study, he had received a mean of 40 hr of discrete-trial teaching each week for the previous 13 months. His educational intervention focused on academic tasks (e.g., writing and sight words), decreasing aberrant behaviors (e.g., self-stimulatory behaviors and noncompliance), and increasing appropriate play skills. He spoke in full sentences, answered questions, and engaged in simple conversations. Due to his high level of noncompliance (e.g., yelling, task refusal, and flopping), the researchers implemented a token system throughout the study in which he received tokens for every 5-min period that he was compliant with teaching instructions. At the end of the day, he exchanged his tokens to receive certain privileges at home.

Ashley was a 3-year-old girl. At the beginning of the study, she had received a mean of 30 hr of discrete-trial teaching per week for the previous year. Her behavioral and educational interventions focused on increasing compliance (e.g., responding to her name), decreasing aberrant behavior (e.g., self-stimulatory behavior and self-injury), and improving basic academic skills (e.g., eye contact and receptive labeling). She displayed no expressive language and less than 30 words receptively.

Jeremy was a 4-year-old boy. At the beginning of the study, he had received a mean of 15 hr of discrete-trial teaching per week for the past 2 years. His educational intervention focused on academic tasks (e.g., writing and sight words), decreasing aberrant behaviors, and increasing appropriate play skills. He spoke in full sentences, answered questions, and engaged in simple conversations. He exhibited self-stimulatory behavior, which included delayed and immediate echolalia and acting as if he were an animal or a food item.

### Setting

Sessions were conducted in a small research room (3 m by 1.5 m) for Brady and Ashley. The room contained a table, three chairs, and two cabinets, and had a one-way observation window that allowed the participants' parents to observe the sessions. Additional sessions for Ashley were conducted at her home, and all of Jeremy's sessions were conducted in his home. Home therapy rooms contained a table, two chairs, and a variety of toys.

### Toy Preference Assessment

A paired-stimulus preference assessment (Fisher et al., 1992) was conducted prior to baseline to determine the participants' preferences among 10 toys. These toys were selected based on interviewing the participants' parents and directly observing the participants. The five toys that were chosen most frequently were used as reinforcers for correct responding throughout

Table 1
Skills Taught

| Participant | Procedure | Pair 1 | Pair 2 | Pair 3 | Pair 4 |
|---|---|---|---|---|---|
| Brady | No-no prompting | 1 + 3 and 2 + 8 | 1 + 6 and 2 + 7 | 2 + 3 and 1 + 9 | 1 + 7 and 2 + 4 |
| | Simultaneous prompting | 2 + 6 and 2 + 2 | 1 + 4 and 1 + 2 | 2 + 5 and 1 + 5 | 2 + 9 and 1 + 8 |
| Ashley | No-no prompting | Baby and spoon | Banana and sock | Plate and pizza | |
| | Simultaneous prompting | Cow and fork | Dog and marker | Keys and cat | |
| Jeremy | No-no prompting | Red light and green light | Baseball and golf | Cold and hot | |
| | Simultaneous prompting | Scissors and marker | Sad and happy | Wake up and fall asleep | |

the study; participants were allowed to play with the other five toys during break periods.

## Skills Taught

We taught each participant to discriminate between two items presented together as a pair. The researchers randomly assigned item pairs to be taught using either no-no prompting or simultaneous prompting. Brady was taught to touch an index card that displayed the correct sum when asked (e.g., "touch the sum of 15 plus 10"), Ashley was taught to touch an object when asked (e.g., "touch the dog"), and Jeremy was taught to touch a picture card when asked "wh–" questions (e.g., "touch when cars stop"). Table 1 shows the item pairs that were taught to each participant using each prompting procedure. At the beginning of the study and before each set of item pairs was taught, baseline measures of performance were taken on all item pairs during full probe sessions.

## Controlling Prompt Assessment

Prior to baseline, we conducted a controlling prompt assessment to assess each participant's accuracy of responding across four prompt types that ranged from the least to most intrusive prompts (i.e., positional prompt, model prompt, gestural prompt, and full physical prompt). The assessment consisted of the teacher placing two index cards with Japanese letters on a table and providing the participant with an instruction to touch one of the cards; this was immediately followed by one of the four prompt types. Any response resulted in praise. Each prompt type was tested five times; the least intrusive prompt type that resulted in 100% accuracy was used as the controlling prompt throughout the study. For Brady and Ashley, a full physical prompt was the controlling prompt; for Jeremy, the controlling prompt was a gestural prompt (pointing to the correct picture).

## General Procedure

Sessions were conducted 3 or 4 days per week. For Brady and Ashley, the length of the sessions ranged from 20 to 30 min, depending on the preschool schedule and when they arrived at the research room. The researchers tested the prompting procedures using cards or objects presented in a field of two (e.g., two cards with different pictures, two cards with different numbers, two different objects). During each trial, the researcher placed two pictures, two number cards, or two objects side by side about 10 cm apart on the table in front of the participant. The positions of the stimulus items were determined randomly so that the target item was placed equally on the right and left sides. After the researcher placed the two stimulus items on the table, he gave an instruction to touch one of the items (e.g., "touch the banana") and provided praise and a preferred toy that the participant could play with for 5 s following a correct response. Because the participants attended a university-based preschool program, the length of each teaching session varied depending on their classroom schedule. The number of teaching trials varied across teaching sessions from 15 to 30 per session but was always equal for both

prompting procedures. For example, if we conducted a session with 30 teaching trials, each prompting procedure received 30 trials; if, however, we conducted a shorter session with only 15 trials, both prompting procedures received 15 trials. On approximately 10 occasions, participants indicated that they wanted to leave the teaching session early; this resulted in fewer trials than planned for that teaching session. The researchers later provided the same number of teaching trials for the second prompting procedure once participants indicated they were ready to begin working again.

Each session consisted of a probe to test ongoing learning (see below) followed by a teaching session using one prompting method and then a second teaching session using the other prompting method. The researchers randomly determined the order of teaching sessions each day. A teaching trial for both simultaneous prompting and no-no prompting began with the teacher putting two cards or objects on the table and asking the participant to touch one of the objects or cards. There was approximately 3 s between the end of one teaching trial and the beginning of the next trial.

## Full Probe Sessions

Full probe sessions were conducted prior to the teaching of any new stimulus items to determine current baseline performance. In addition, after the participant met mastery criterion (i.e., 100% correct on all daily probe trials for three consecutive daily probes) on at least one stimulus pair, a full probe on all stimulus pairs was administered to evaluate whether correct responding on previously taught pairs was maintained. Full probe trials were identical to teaching trials, except that no prompting procedures were used during probe trials, no programmed consequences were provided, and the task items were presented in an unsystematic order regardless of whether a pair of cards or objects was being taught using

simultaneous prompting or no-no prompting. Full probe sessions consisted of 64 trials for Brady and 48 trials for Jeremy and Ashley. All stimulus items were evaluated four times each during full probe sessions, and the order for presentation was randomly determined during these sessions.

## Daily Probe Sessions

Daily probes were conducted prior to each teaching session to evaluate whether participants were learning to touch items correctly and independently. Daily probes were similar to full probes. The daily probe sessions consisted of 16 interspersed trials, with eight trials of each pair of stimuli currently being taught with either prompting procedure. The criterion for learning a pair of stimulus items was that a participant touched each item of a pair correctly on all probe trials across three consecutive daily probes. After participants met mastery criterion for a pair of stimuli, teaching on that pair stopped. Daily probes continued until at least three more daily probe sessions were completed or the second stimulus pair reached mastery criterion. Following daily probes, the participant was given a 3-min break prior to beginning the first teaching session.

## Teaching Sessions

*No-no prompting.* In the no-no prompting session, the learner had two trials to make a correct response before implemention of a controlling prompt on the third trial. If the participant touched the correct item within 3 s, the researcher provided praise and a toy. If the participant did not touch either of the stimulus items within 3 s after the instruction or touched the incorrect stimulus item, the researcher said "no" in a neutral voice and provided him or her with a remedial trial, during which the researcher gave the same instruction (e.g., "touch ball"). If the participant touched the incorrect stimulus item or did not touch any stimulus item within 3 s on this remedial trial, the researcher said "no" in a neutral voice and

picked up the two stimulus items. The researcher then provided a third trial and used the controlling prompt to get the participant to touch the correct item.

*Simultaneous prompting.* In simultaneous prompting, the researcher gave the instruction and provided the controlling prompt on each trial. He delivered praise and a toy when the child identified the correct item.

## Participants' Preference for the Two Prompting Procedures

To assess participants' preference for the two prompting procedures, a concurrent-chains arrangement was implemented (Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997; Hanley, Piazza, Fisher, & Maglieri, 2005). The investigators placed different color mats on the table during teaching and probe sessions so that the participants could discriminate among daily or full probe sessions (blue mat), no-no prompting sessions (red mat), and simultaneous prompting sessions (yellow mat). During every third teaching session after the daily probe, the investigator placed both the red and yellow mats on the table and asked the participant to touch the mat that he or she wanted to work with first. The prompting procedure that corresponded with the mat that the participant selected was in effect for the first teaching session; if, however, the participant did not make a selection, we randomly selected one of the two prompting procedures to be implemented first.

## Response Definitions

During probes and teaching trials, we recorded a correct response if a participant touched only the requested item within 3 s of the researcher's instruction. We also recorded whether the response was prompted or not; thus, each trial was scored as correct, correct prompted, incorrect, incorrect prompted, or no response (if the participant did not touch a card or object within 3 s of the instruction). We measured the number of stimulus pairs that

reached mastery criterion (i.e., 100% correct responding across three consecutive daily probe sessions). Finally, we recorded the participant's preference for the two teaching conditions.

Observers measured correct instructor behaviors during the simultaneous prompting condition, including (a) delivering a correct instruction (e.g., saying "touch [item]") to begin the teaching trial, (b) delivering a controlling prompt immediately following the instruction, (c) providing praise following a correct prompted participant response, and (d) providing the participant with access to a toy for 5 s following praise. Correct instructor behaviors measured for no-no prompting were (a) delivering a correct instruction (same as above) to begin the teaching trial, (b) stating "no" following each incorrect or no response, (c) delivering a prompt immediately following the instruction only after two consecutive incorrect responses, (d) providing praise following a correct response, and (e) providing the participant with access to a toy for 5 s following praise.

## Interobserver Agreement and Treatment Fidelity

The instructor and an observer simultaneously and independently recorded participant behaviors during 52% (range, 38% to 66% across participants) of the daily probe sessions, 48% (range, 36% to 68% across participants) of the full probe sessions, and 52% (range, 22% to 94% across participants) of the teaching sessions. Interobserver agreement was calculated by totaling the number of agreements (i.e., trials in which both observers scored the same behavior) on each type of response divided by the number of agreements plus disagreements (i.e., trials in which the two observers scored different behaviors) and converting this ratio to a percentage. Percentage agreement across all responses was 96% (range, 85% to 100%) for full probe trials, 96% (range, 81% to 100%) for daily probe trials, and 99% (range, 75% to 100%) for teaching trials summed across all 3 participants.

To assess treatment fidelity, the instructor recorded his implementation of correct instruc-

tional behavior on every teaching trial. The instructor reported that he implemented correct instructor behavior on 99.7% (range, 99.3% to 99.8%, across participants) of the simultaneous prompting teaching trials and 99% (range, 98% to 100%, across participants) of the no-no prompting teaching trials. A second observer independently and simultaneously recorded the instructor's behavior during 57% (range, 52% to 63% across participants) and 59% (range, 39% to 93% across participants) of all teaching trials for the simultaneous and no-no prompting conditions, respectively. Interobserver agreement was calculated by comparing the two records and examining each component of the teaching trials (described above), totaling the number of agreements (i.e., trials in which both observers scored the same behavior) of instructor behavior, dividing by the number of agreements plus disagreements (i.e., trials in which the two observers scored different behaviors), and converting this ratio to a percentage. Results showed that the second observer agreed 100% of the time with the instructor's recording of his own instructional behavior.

*Experimental Design*

The researchers used a parallel treatments design (Gast & Wolery, 1988) to evaluate the effectiveness of the two prompting procedures on each participant's acquisition of different skills. A parallel treatments design compares the effects of two or more independent variables on different dependent variables. Experimental control is established when one of the dependent variables that is assigned to a particular independent variable increases more rapidly than the other. The parallel treatments design begins with an initial probe condition (i.e., full probe) that is implemented directly prior to the implementation of the independent variable. After this initial probe condition, both independent variables (i.e., simultaneous prompting and no-no prompting) are implemented on the same day, and once a participant reaches

mastery criterion during the implementation of one (or both) of the independent variables, another probe condition is conducted. This process is repeated across the different dependent variables. An important feature of the parallel treatments design is that the implementation of the independent variables must be counterbalanced across time, people, or settings.

## RESULTS

*Skill Acquisition, Mastery Criterion, and Maintenance*

Brady was taught four stimulus pairs using no-no prompting and simultaneous prompting (Figure 1). He reached mastery criterion for all of the stimulus pairs taught using no-no prompting and one of the stimulus pairs taught using simultaneous prompting. Although his correct responding increased from baseline levels on the other three stimulus pairs taught using simultaneous prompting, they did not reach mastery. During the assessment of maintenance (full probe trials), his mean correct responding on the stimulus pairs was 88% (range, 50% to 100%) with no-no prompting and 58% (range, 12% to 100%) with simultaneous prompting.

Ashley was taught three stimulus pairs using no-no prompting and simultaneous prompting (Figure 2). Ashley reached mastery criterion for all of her stimulus pairs taught using no-no prompting. She did not reach mastery criterion for any of her stimulus pairs taught using simultaneous prompting, although correct responding on these stimuli increased from baseline levels. During the assessment of maintenance (full probe trials), her mean correct responding on the stimulus pairs taught was 96% (range, 87% to 100%) with no-no prompting and 55% (range, 25% to 87%) with simultaneous prompting.

Jeremy was taught three stimulus pairs using no-no prompting and simultaneous prompting (Figure 3). He reached mastery criterion for all of his stimulus pairs taught using no-no
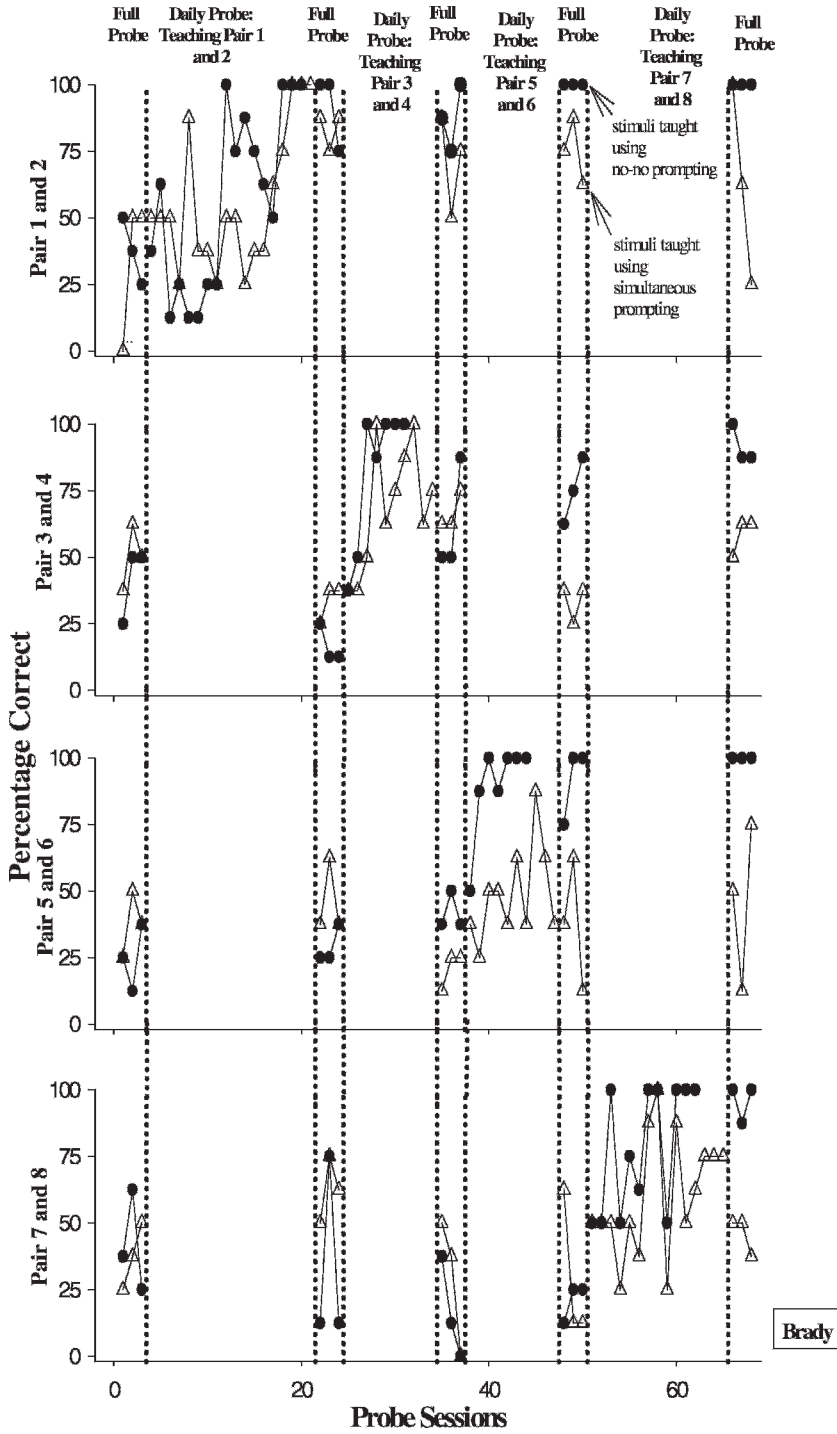
Figure 1.    Percentage of probe trials correct during full probes and daily probes across four stimulus pairs for Brady using no-no and simultaneous prompting.

Figure 2.    Percentage of probe trials correct during full probes and daily probes across four stimulus pairs for Ashley using no-no and simultaneous prompting.
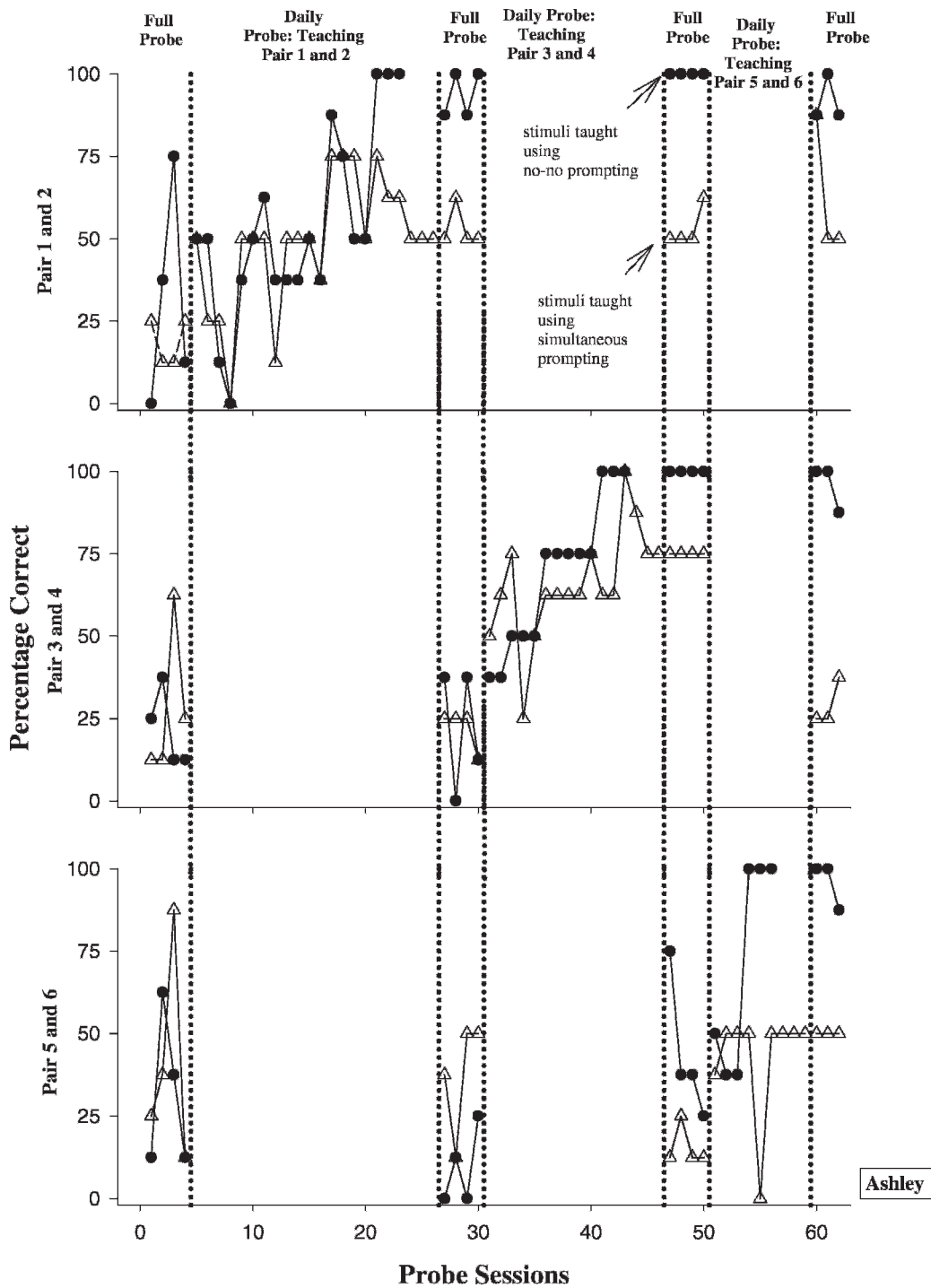
Figure 3.    Percentage of probe trials correct during full probes and daily probes across four stimulus pairs for Jeremy using no-no and simultaneous prompting.

prompting. He did not reach mastery criterion on any of his stimulus pairs taught using simultaneous prompting, although correct responding on these stimuli increased from baseline levels. During the full probe trials, his mean correct responding on the stimulus pairs taught was 94% (range, 75% to 100%) with no-no prompting and 36% (range, 0% to 75%) with simultaneous prompting.

### Participants' Preference for Prompting Procedures

The participants showed mixed preference for the two prompting procedures. Brady selected the mat that corresponded to no-no prompting 11 times and the mat that corresponded to simultaneous prompting twice on the 13 choice opportunities. Ashley selected the mat that corresponded to no-no prompting six times and the mat that corresponded to simultaneous prompting twice; she did not make a choice four times. This either meant that she had no preference or failed to make the discrimination between the two conditions. Jeremy selected the mat that corresponded to no-no prompting twice and the mat that corresponded to simultaneous prompting eight times.

### Number of Teaching Trials During No-No Prompting

For 2 participants (Brady and Ashley), the proportion of trials that were correct (with no prompts) increased as successive stimulus pairs were taught. Brady increased overall correct responding from 46% during the teaching of the first stimulus pair to 75%, 87%, and 87%, respectively, on subsequent stimulus pairs using no-no prompting. In conjunction with this increase, there was a decrease in the total number of teaching trials required across the four pairs of stimuli taught (450, 102, 70, and 102, respectively), the percentage of incorrect responses (39%, 20%, 11%, and 12%, respectively), and the percentage of prompted trials (15%, 5%, 1%, and 1%, respectively) during teaching. Ashley also increased correct respond-

ing from 27% during her first stimulus pair to 48% and 57% on subsequent stimulus pairs. In conjunction with this increase, there was a decrease in the total number of teaching trials (540, 255, and 75, respectively), the percentage of incorrect responses (51%, 37%, and 35%, respectively), and the percentage of prompted trials (21%, 15%, and 8%, respectively) during teaching. This suggests that these 2 participants became more efficient in learning as they were taught new pairs using no-no prompting. No such pattern was evident in Jeremy's performance. His correct responding on no-no prompting teaching trials was 80%, 52%, and 59% across three subsequent stimulus pairs. His incorrect responding on no-no prompting teaching trials was 20%, 39%, and 33%. Trials that were prompted as part of no-no prompting teaching trials were 0%, 9%, and 7% across the three stimulus pairs taught, and the total number of teaching trials were 45, 180, and 135 across the three stimulus pairs.

### Number of Teaching Trials with Simultaneous Prompting

Across all participants, the number of teaching trials with no-no prompting was equal to or less than the number of teaching trials using simultaneous prompting. Brady had a total of 480, 195, 160, and 195 teaching trials on stimulus pairs using simultaneous prompting. Ashley had a total of 660, 327, and 135 teaching trials on stimulus pairs using simultaneous prompting. Jeremy had a total of 105, 240, and 180 teaching trials on stimulus pairs using simultaneous prompting.

## DISCUSSION

In this study, participants increased correct responding with both the no-no prompting and simultaneous prompting stimulus pairs, but no-no prompting was generally more effective and efficient, allowing participants to reach mastery criterion more quickly. In addition, 2 participants showed more rapid learning with subse-

quent pairs of stimuli with no-no prompting. Participants also were able to maintain correct responding at levels similar to the levels reached after teaching with both no-no prompting and simultaneous prompting. Finally, 1 participant showed a clear preference for no-no prompting, 1 showed a preference for simultaneous prompting, and 1 showed no clear preference for either procedure.

There are several factors that may be related to why no-no prompting was more effective than simultaneous prompting in the present study. First, in the teaching sessions using simultaneous prompting, there were no differential consequences, because each response was a prompted correct response and produced positive consequences. In the no-no prompting procedure, however, researchers provided differential consequences for incorrect responses. Thus, "no" may have served to promote correct responses on the next trial because the participants learned from exclusion (Carr, 2003). If this were true, then adding more stimulus choices would reduce the informative value of "no" in direct proportion to the number of stimulus choices that were available. Additional research using tasks with three or more stimulus choices would be useful in addressing this issue.

A second factor that may have contributed to the greater effectiveness of no-no prompting is that it required a participant to look at and compare the visual stimuli to maximize the overall rate of reinforcement during teaching, whereas simultaneous prompting did not. Thus, to maximize the overall rate of positive reinforcement during no-no prompting, it was necessary for the participant to look at the stimulus choices to respond correctly and consistently on unprompted trials.

A final factor that may have contributed to the greater effectiveness of no-no prompting is the manner in which investigators conducted probe trials. In most previous research using simultaneous prompting, praise was provided for correct responding during probe trials, and

there were no consequences for incorrect responses (Akmanoglu & Batu, 2004; Riesen et al., 2003). During the current study, however no consequences for correct or incorrect responses were provided during probe trials. To be most effective, simultaneous prompting might require some consequences during probe trials, although using consequences during probe trials might increase performance on item pairs taught with both no-no prompting and simultaneous prompting.

There are also some issues that may relate to the effectiveness of no-no prompting in teaching new skills. One issue is the type of responses being taught. In the present no-no prompting procedure, there were two possible responses, only one of which could result in reinforcement, and the topography of the responses was highly similar (i.e., pointing to a card or item). A great deal of teaching, however, often is done to establish responses that have almost an infinite variety of topographies, such as vocal imitation, play skills, or social behavior. Whether no-no prompting would be more effective than simultaneous prompting (or other prompting systems) in addressing these types of skills is an open question and might be addressed through future research.

A second issue is the limited number and type of participants who were involved in this study, especially in light of the small amount of research on no-no prompting. Replications with additional participants both with and without autism are necessary. In addition, comparing other prompting methods with children with autism also may help us to understand under what circumstances certain prompting systems are more effective or efficient for children with autism.

Another issue for consideration involves the potential aversiveness of "no" that is used in no-no prompting. The intent of providing a "no" following incorrect responses in no-no prompting was simply to be informative or corrective rather than aversive. The "no" was delivered in

a neutral voice and at a volume that was the same as the instructions given to participants (e.g., "touch the ball") to start each learning trial. Whether "no" was an essential part of the greater effectiveness of no-no prompting is not known and will require additional research and component analysis. It is possible that some other type of corrective feedback following incorrect responses would produce the same learning benefits.

An additional issue in this study is whether the participants' preference for the two prompting procedures actually assessed preference for the procedures or whether the participants were selecting based on preferred color. The fact that no assessment of color preference was conducted prior to the condition preference assessment and that a control color mat was not added to the preference assessment makes it somewhat difficult to analyze the results of these assessments. Although it is possible that participants were selecting based on a color preference, both Brady and Jeremy verbally expressed on numerous occasions that they liked the prompting procedure that corresponded with their selection during preference assessments.

Finally, the present results do not include information regarding how many additional simultaneous prompting teaching trials would be required to meet the mastery criterion. If sessions were continued for a longer duration, it could be possible that stimulus pairs would have eventually reached mastery criterion; therefore, an analysis on relative efficiency of the two procedures could have been assessed. A related issue is that it took a large number of teaching trials (over 400) for both Brady and Ashley to learn their first two stimulus pairs using no-no prompting. Teaching subsequent stimulus pairs, however, required fewer trials. Because neither of these children had any history with an error-correction procedure, it is possible that it took both Brady and Ashley some time to learn from the error correction used during no-no prompting.

The results of this study indicate that no-no prompting was more effective than simultaneous prompting in teaching two-choice discrimination tasks requiring a simple pointing response for 3 children with autism. Educators might consider using no-no prompting when teaching similar two-choice discriminations. At the same time, we need considerable additional research to examine the effectiveness of the procedures in teaching additional children and with different numbers of choices and response topographies, as well as comparing these prompting procedures to other prompting procedures (e.g., constant prompt delay, progressive prompt delay, least-to-most prompting) currently being implemented for children with autism.

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