

A Comparison of Procedures for Teaching Receptive Labeling of Sight Words to a Child with Autism Spectrum Disorder

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Abstract We compared the effectiveness and efficiency of a modified simple-conditional method and the conditional-only method for teaching receptive labeling of sight words. Jon, a 6-year-old boy diagnosed with autism spectrum disorder, participated. Across three comparative evaluations, the conditional-only method resulted in fewer sessions to mastery than a modified simple-conditional method. Textual responses emerged after Jon mastered the sight words as receptive labels. Practitioners should avoid teaching component simple discriminations as a strategy for facilitating conditional discrimination training in clinical practice.

Keywords Sight words · Conditional discrimination · Textual relation · Verbal behavior

Implications for Practice • Compares the effectiveness and efficiency of a modified simple-conditional method and the conditional-only method for teaching receptive labeling of sight words (i.e., listener skills, conditional discriminations)

- Demonstrates the emergence of textual responses after teaching receptive labeling of sight words
- Describes how instructors can increase textual responses by teaching receptive labeling skills
- Highlights the clinical usefulness of the conditional-only method for teaching receptive labeling skills

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There are several instructional strategies used in clinical practice to teach receptive labeling skills (i.e., listener behavior) to children with autism spectrum disorder (ASD; Grow & LeBlanc, 2013). The authors of several early intervention manuals recommend the simple-conditional method for teaching receptive labeling skills (e.g., Lovaas, 2003). During the simple-conditional method, the instructor uses nine steps to teach a 3-array receptive labeling skill. The steps include (a) teaching each auditory-visual stimulus pair in isolation, (b) teaching each auditory-visual stimulus pair as a simple discrimination in the presence of an incorrect comparison stimulus, and (c) teaching the auditory-visual stimulus pairs as a conditional discrimination (i.e., the correct visual stimulus varies based on the instructor-delivered sample stimulus). Green (2001) recommends teaching receptive labeling skills using a conditional-only method. During the conditional-only method, the instructor teaches more than one auditory-visual stimulus pair as a conditional discrimination in a single step.

Recent research has compared the simple-conditional method and the conditional-only method for teaching receptive labeling skills to children with ASD (Grow, Carr, Kodak, Jostad, & Kisamore, 2011; Grow, Kodak, & Carr, 2014; Holmes, Eikeseth, & Schulze, 2015; Vedora & Grandaleski, 2015). The overall results across studies have indicated that the conditional-only method may be more effective and efficient than the simple-conditional method. However, across the studies, the simple-conditional method was as efficient and sometimes slightly more efficient than the conditional-only method in a few comparisons. It is possible that the simple-conditional method can be refined to increase its efficiency and clinical usefulness. For example, teaching simple discriminations in isolation does not enhance future conditional discrimination training but may foster errors suggestive of faulty stimulus control such as win-stay responses (Grow et al., 2011). Therefore, the purpose of the current study was to

compare a modified simple-conditional method without the isolation training to the conditional-only method for teaching receptive labeling of sight words.

Method

Participant and Setting

Jon was a 6-year-old boy who had been previously diagnosed with ASD by a licensed psychologist. Jon spoke in complete sentences as a primary means of communicating. He had approximately 2 years of early intervention before the study. At the time of the study, Jon was receiving approximately 10 h of behavioral intervention services at home. Jon did not have history of instruction with sight words or reading. Jon had a history of using token economies in his early intervention program. Sessions were conducted at the kitchen table in Jon's home. The experimenter met with Jon three to four times per week and conducted three to five sessions in each meeting.

Measurement and Dependent Variables

Trained data collectors recorded the dependent variables using a paper-and-pencil method. An *independent correct receptive sight word* was defined as pointing to the correct comparison stimulus within 5 s of the delivery of the sample stimulus. A *prompted correct receptive sight word* was defined as pointing to the correct comparison stimulus within 5 s of the experimenter-delivered prompt. An *incorrect receptive sight word* was defined as the participant selecting an incorrect comparison stimulus, rapidly switching between two sight words in the array, or not selecting a sight word within 5 s of the delivery of the sample stimulus. The dependent variable most critical for answering the research question was the number of sessions to meet the mastery criterion in the training set. The mastery criterion for all of the training sets was two consecutive sessions with 100 % independent correct responses.

An *independent correct textual response* was defined as the participant vocally naming the sight word within 5 s of the experimenter-presented sight word. An *incorrect textual response* was defined as the participant vocally naming a sight word that did not correspond to the word printed on the card or not responding within 5 s of the presentation of the sight word.

Interobserver Agreement

The experimenter calculated interobserver agreement (IOA) by comparing the data collected by two trained, independent observers. An agreement was defined as both data collectors recording an independent or prompted correct receptive sight word. A disagreement was defined as any differences in data

collected by the observers on a given trial. Point-by-point agreement was calculated by dividing the number of agreements by the number of trials (i.e., nine) and multiplying the proportion by 100. Across the three evaluations, IOA was assessed for a minimum of 26 % of sessions and met or exceeded 97 % (range, 89 to 100 %).

Treatment Integrity

An independent data collector recorded the accuracy of the experimenter's implementation of the experimental conditions. The data collector scored the experimenter's delivery of the auditory sample, the location of each comparison stimulus, the response interval following prompts, the timing and appropriateness of response prompts, and the consequences for correct and incorrect responses. A data collector scored the trial as correct if the experimenter implemented the trial with all of the components specified by the research protocol. A data collector scored the trial as incorrect if the experimenter incorrectly implemented or omitted any of the trial components specified in the research protocol. Across the three evaluations, treatment integrity was assessed for a minimum of 26 % of sessions and met or exceeded 96 % (range, 79 to 100 %).

Reinforcer System

To identify potential reinforcers to use during sessions, the experimenter used the Reinforcer Assessment for Individuals with Disabilities (RAISD) to interview Jon's mother about his preferences (Fisher, Piazza, Bowman, & Amari, 1996). After accumulating nine tokens, the experimenter provided Jon with an opportunity to exchange the tokens for the items and activities endorsed by Jon's mother during RAISD to account for session-by-session fluctuations in preference.

Experimental Design

An adapted alternating treatments design was used to compare the effectiveness and efficiency of a modified simple-conditional method and the conditional-only method (Sindelar, Rosenberg, & Wilson, 1985). One training set of three sight words was randomly assigned to the modified simple-conditional and conditional-only methods. Table 1 shows the training sets in each condition across the three evaluations. In the first two comparisons, the experimenter made the sight words in the training set as distinct as possible. In the third evaluation, the experimenter increased the difficulty of training sets by including words with similar beginning and ending letters.

Table 1 The sight words selected for the training sets in the modified simple-conditional and conditional methods for each evaluation

Evaluation	Modified simple-conditional method	Conditional-only method
Evaluation 1	Have, them, over	Each, from, very
Evaluation 2	Are, but, can	Did, may, one
Evaluation 3	Come, could, some	Here, when, where

Baseline Probes

The experimenter conducted baseline probes for the training sets of receptive labeling skills and textual relations before teaching the skills using either the simple-conditional method or the condition-only method. During baseline probes for receptive sight words, the experimenter presented the antecedents stimuli similarly to the *sample-first procedure* described by Petursdottir and Aguilar (2015). The experimenter covered the array of visual stimuli before the trial. The experimenter presented the sample stimulus (e.g., experimenter said, “Here”), uncovered the array of sight words printed 3” by 5” index cards, and re-presented the sample stimulus. The experimenter re-presented the sample stimulus every 2 s until 5 s had elapsed or the participant pointed to a sight word. The experimenter did not provide prompts or consequences for independent correct or incorrect responses. The experimenter delivered tokens approximately every other trial (e.g., sitting appropriately in the chair) to maintain Jon’s responses. The experimenter used a data sheet with a predetermined counterbalancing for the sample stimuli and location of the sight words in the array across trials based on recommendations from Grow and LeBlanc (2013). Sight words were excluded from the training sets if the participant’s responses were correct during 50 % or more of the trials (i.e., above chance levels of responding in a three-array conditional discrimination).

During baseline probes for the textual relations, the experimenter presented a printed sight word on a 3” by 5” index card and waited up to 5 s for a response. The experimenter did not deliver prompts or consequences during baseline probes of textual responses.

General Procedure

During both the modified simple-conditional method and the conditional-only method, the experimenter presented the antecedent stimuli in the same manner as the baseline probes with a few exceptions. The experimenter used progressive prompt delay to transfer stimulus control from the model prompt (i.e., pointing to the correct comparison stimulus) to the relevant antecedent stimuli (i.e., the auditory-visual stimulus pair). Each step of the modified simple-conditional method that taught a simple discrimination was initiated by one session with a 0-s prompt delay (i.e., steps 1 and 2). The experimenter conducted a minimum of two sessions with a

0-s prompt delay for steps involving conditional discrimination training (i.e., steps 3, 4, and 5 of the modified simple-conditional method and the conditional-only method). Following two sessions with at least 90 % independent correct responses during 0-s prompt delay, the experimenter increased the prompt delay to 5 s. Contingent on an incorrect response, the experimenter re-presented the sample stimulus simultaneously with a model prompt. The experimenter delivered praise and one token for each independent and prompted correct response. The participant exchanged tokens for 5 min of access to highly preferred leisure items after accumulating nine tokens.

Modified Simple-conditional Method

The *modified simple-conditional method* was similar to the procedures described by Lovaas (2003) and Grow et al. (2011) with one exception. The steps with simple discrimination training in isolation were eliminated from the procedure. That is, the modified procedure consisted of six steps instead of nine to teach a 3-stimuli array conditional discrimination. During step 1, the experimenter taught one sight word in the presence of one distractor sight word in a massed-trial format. Step 2 was identical to step 1 except the sight word that functioned as the distractor stimulus in step 1 functioned as the discriminative stimulus (i.e., a reversal of the discrimination taught in step 1). During step 3, the experimenter taught the sight words taught in steps 1 and 2 in a conditional discrimination. Step 4 was similar to step 3 except that the experimenter taught the sight word taught in step 1 and introduced the third and final sight word. Step 5 was similar to steps 3 and 4 except that the experimenter taught the sight word taught in step 3 and third sight word. During step 6, the experimenter taught all three sight words in a conditional discrimination format. In steps 3, 4, and 5, one of the sight words was taught once more than the other sight word due to the 9-trial session. Therefore, the experimenter created two versions of the data collection sheet to ensure that each sight word was targeted the same number of times across sessions.

Conditional-Only Method

The *conditional-only method* was identical to step 6 of the modified simple-conditional method. That is, receptive labeling of three sight words was trained from the onset of training (see Green, 2001 and Grow & LeBlanc, 2013 for a detailed

description of the procedure). The three auditory-visual stimulus pairs were taught three times in each 9-trial session.

Follow-up

The experimenter conducted baseline probes immediately after each training set was mastered and 1 month after the mastery criterion was met to assess the emergence of textual responses and the maintenance of the receptive labeling skills over time.

Results and Discussion

Figure 1 displays the results of the three comparisons of a modified simple-conditional method and the conditional-only method. The most efficient condition is determined by identifying the condition that resulted in mastery first in Fig. 1. The conditional-only method was a more efficient and effective procedure than a modified simple-conditional method for

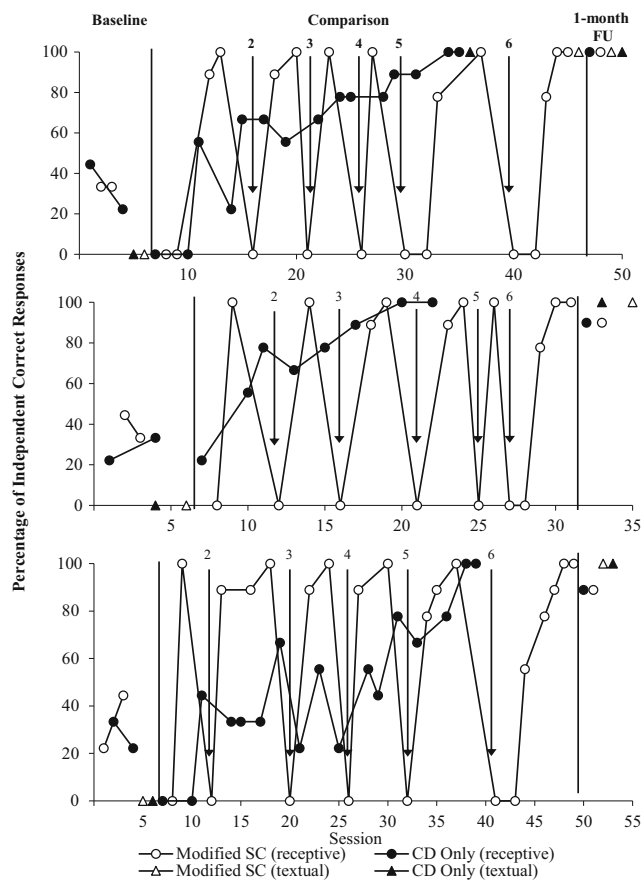


Fig. 1 The percentage of independent correct receptive labeling of sight words and textual responses during baseline, the comparison, and follow-up for evaluation 1 (*top panel*), evaluation 2 (*middle panel*), and evaluation 3 (*bottom panel*). Note. SC simple-conditional method, CD conditional-only method. The *numbered arrows* indicate when the experimenter implemented the steps of the simple-conditional method

all three comparisons. During the 1-month, follow-up probes, the receptive labels of sight words and the textual responses were maintained at 100 % in both conditions. Figure 2 displays the number of sessions to meet the mastery criterion in the training sets across experimental conditions. The conditional-only method resulted in fewer sessions to mastery than a modified simple-conditional method across all three comparative evaluations.

Despite removing three steps from the simple-conditional method, the conditional-method was more efficient in terms of the number of sessions to meet the mastery criterion. One limitation of the study is the inclusion of only one measure of efficiency. It is possible that including additional measures of efficiency such as total instructional time to mastery may have yielded different conclusions regarding the efficiency of the instructional strategies (Yaw et al., 2014). Researchers might consider including multiple measures of efficiency during future comparisons of instructional strategies.

The findings from the current study are consistent with previous studies in that the conditional-only method was more effective and efficient for teaching receptive labeling skills (Grow et al., 2011, 2014; Holmes et al., 2015; Vedora & Grandesleski, 2015). Practitioners should avoid teaching component simple discriminations as a strategy for facilitating conditional discrimination training in clinical practice.

Participants of previous studies have demonstrated emergent speaker behavior after receptive labeling instruction (e.g., Kobari-Wright & Miguel, 2014). One interesting finding is that textual responses emerged after Jon learned to receptively label the sight words. Anecdotally, Jon frequently echoed the sample stimulus during teaching sessions. The emergence of textual responses may be unsurprising because Jon engaged in echoic responses in the presence of the corresponding visual stimulus (i.e., a topographically similar response to tacting).

The current study is one of many that address the need for improving the efficiency of instructional strategies used in

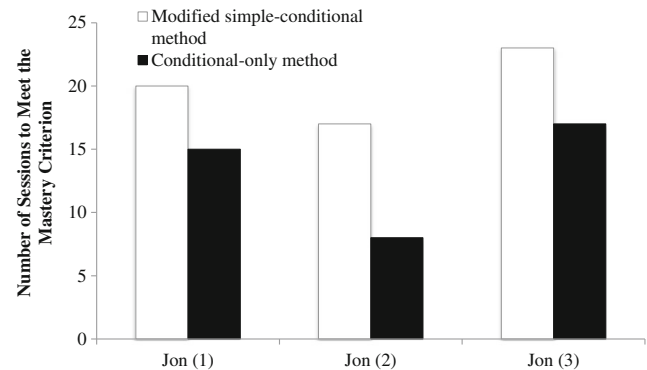


Fig. 2 The number of sessions to meet the mastery criterion in each comparative evaluation in the modified simple-conditional and conditional-only methods

clinical practice (e.g., Vedora & Grandeleski, 2015). Comparative evaluations are useful for assessing the relative effectiveness and efficiency of two or more interventions that may (a) clinically indicated and (b) highly recommended but under-researched (Shabani & Lam, 2013). Practitioners might use comparative evaluations in practice when two or more interventions are clinically indicated for a client as a means of answering the question “What works best for this learner?”. A potential avenue of future research is to evaluate a model for integrating comparative evaluations in clinical practice to increase the efficiency of interventions over time.

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