EFFECTS OF COMBINING ECHOIC AND PICTURE

PROMPTS DURING RECEPTIVE

TRAINING WITH CHILDREN

by

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INTRODUCTION

Receptive language refers to the comprehension of spoken words and sentences. Typically developing children acquire receptive language skills, such as recognizing people and objects by their names and following spoken instructions through early interaction with caregivers. However, this process does not occur naturally in children with Autism Spectrum Disorder (ASD). Language impairments are one of the core diagnostic aspects of ASD and result in delays in learning and in social interaction (American Psychiatric Association, 2000). Hudry et al., (2010) found that the language ability of children with ASD was, on average, lower than typical age norms and receptive ability was more impaired than expressive ability. This indicates that children with ASD understand fewer words than expected on the basis of their expressive language.

As a result of these impairments, early intervention programs for children diagnosed with ASD place a great emphasis on establishing receptive language skills (Lovaas, 2003). Receptive identification programs aim to teach children to respond to spoken language in everyday life. Early intervention texts and treatment manuals (e.g. Lovaas, 2003; Maurice, Green, & Luce, 1996) describe detailed procedures for teaching receptive language skills that are based on decades of research and clinical experience. Receptive identification training is used to teach a variety of language-related skills that range from simple to complex, and include identifying objects based on their names or based on descriptions of their functions or features, as well as identifying actions, people, colors, shapes, numbers, and letters of the alphabet (Maurice et al. 1996). To teach the student to receptively identify objects, the teacher needs a number of common household items (e.g. cup, shoe, cookie) with which the student has frequent contact. Lovaas (2003)

describes the early stages of receptive identification training as follows. If possible, the teacher should begin teaching with an object that the student can identify by touching it, pointing to it, or going to get it when asked to do so before formal instruction. The teacher begins each learning trial by displaying the object (e.g. shoe) while simultaneously verbalizing the name of the object (i.e. "shoe"). If the student fails to respond, the teacher should prompt a correct response by modeling pointing to the object or by gently physically guiding the student's hand to the object. Once the student responds accurately by touching the object without prompts (correct in 5 out of 9 trials), a second object (e.g., a ball) is brought in. In each trial, the teacher now shows both objects to the students and verbalizes the name of one of them ("ball" or "shoe"), and the student must respond by selecting the correct object. From the third object name on, the student is given three objects to choose from in each trial.

When children have difficulty acquiring receptive identification through these procedures, research has shown that using picture prompts (instead of pointing prompts) can lead to acquisition. In a single-case design experiment with two participants diagnosed with ASD, Fisher, Kodak, and Moore (2007) examined the use of picture prompts to remediate acquisition when pointing prompts had failed. In each trial, the experimenter first presented a vocal instruction ("point to shoe") and allowed the participant to respond independently by selecting one of four pictures. If the child did not select the correct picture independently, the experimenter presented a picture that was identical to the correct picture and repeated the vocal instruction (e.g. "This is shoe. Point to shoe"). If the participant did not respond correctly to the picture prompt, than he or she was physically guided to the correct response. This condition was compared to a control

condition in which no feedback was given on correct or incorrect responses and a prompting condition in which incorrect responses resulted in the teacher modeling pointing to the correct picture. Results revealed that acquisition occurred only in the picture prompting condition. Carp, Peterson, Arkel, Petursdottir, & Ingvarsson (2012) replicated the study by Fisher et al. (2007) with four additional participants diagnosed with ASD. Their results also revealed enhanced acquisition for all participants in the picture prompt condition, regardless of whether they were beginning learners with previous histories of failure in receptive identification training, or more advanced learners who already had extensive receptive vocabularies. Carp et al. (2012) hypothesized that children respond better to picture prompting procedures than pointing prompting procedures because a child can follow a pointing prompt without actually attending to the correct picture. For example, after a teacher models pointing to the far right stimulus, the learner may repeat the response of pointing to the stimulus in that position without observing the characteristics of the stimulus itself. To provide a correct response to a picture prompt, the child must observe characteristics of the positive comparison (e.g. picture of shoe) stimulus and discriminate it from the negative comparison stimuli (e.g. picture of cup and dog).

Another way to enhance performance in receptive identification training is to add an echoic response requirement to each trial as has been demonstrated by Charlop (1983). The research examined the effects of incorporating echolalia into receptive identification tasks by requiring an echoic response before a stimulus was selected from the array. For example, an experimenter would say "yak", the child would then echo "yak." The experimenter would then present two objects (yak and horse) before the child and ask for

"yak" and the child would respond by handing the experimenter a picture of the yak.

Their results suggested that echoing the name of the correct stimulus

facilitated performance.

The type of discrimination that is required in receptive identification tasks is

known as an auditory-visual conditional discrimination (e.g., Green, 2001). Difficulty

with acquisition of these types of discriminations is not limited to children who are

diagnosed with ASD or who have language delays. They can also prove difficult to teach

young children or children with intellectual disabilities (Zygmont, Lazar, Dube,

&McIllvane, 1992). A number of studies have documented difficulties in teaching

conditional discriminations in the absence of special training procedures for both

typically developing children and individuals with developmental delays (Pilgrim,

Jackson, & Galizio, 2000). Because the difficulties encountered by typically developing

children in auditory-visual conditional discrimination tasks are similar to those

encountered by children with ASD during receptive training, research on improving the

performance of typically developing children in such tasks may inform strategies for

teaching children with ASD. In a recent study, picture prompting procedures were found

to enhance acquisition of receptive identification by a typically developing 3-year-old

(Miller, 2012) suggesting that young typically developing children and children with

ASD may respond to similar intervention strategies.

There have been no published studies on the effects of echoic response

requirements on acquisition of receptive identification tasks in typically developing

children. Also, no research has investigated the effects of adding an echoic response

requirement to picture prompts during receptive identification training in either typically

developing children or children with ASD. The purpose of the present single-case design study was to evaluate whether acquisition would be enhanced in typically developing children by adding an echoic response requirement to the use to a picture prompting procedure. The evaluation was conducted in the context of teaching Japanese nouns to preschool-age children who did not have any prior knowledge of Japanese.

<div align="center">METHOD</div>

Participants and Setting

The participants were two typically developing children. Sally and Greg were both three years old. Both were recruited from a daycare program at a local church.

Sessions were conducted in the church library, away from noise and distractions. Participants were seated in age-appropriate chairs by a low table. The experimenter met with each participant three times per week. Each meeting lasted approximately 20 min and included three brief training sessions and a brief period of toy play with the experimenter. The experimenter sat next to the participant, and a secondary observer, if present, sat behind the participant. If a second observer was not present, the session was video recorded.

Materials

There were 12 visual stimuli in total, four per condition. Visual stimuli consisted of color photographs of animals depicted against a white background, obtained from the Picture This ® CD-ROM. The stimuli were presented on laminated pages in a binder, 64 pages per condition. Each page contained four horizontally aligned pictures of animals. The order of stimuli on the page was counterbalanced, such that each stimulus appeared equally often in each position (far left, middle left, middle right, far right). For the picture prompt condition and the echoic + picture prompt condition, the experimenter also had

eight small laminated cards containing pictures of animals that were identical to those associated with those conditions.

A pretest was conducted to ensure that the participants already knew the English names of each of the 12 stimuli. The stimuli were then divided into three sets and randomly assigned to one of three conditions: (a) picture prompt, (b) echoic + picture prompt, and (c) trial and error (the control condition)(see Table 1).

Table 1
Stimuli Used in the Experiment

	Sally		Greg	
	Animal	Japanese Name	Animal	Japanese Name
Picture Prompt	Pig	Buta	Bear	Kuma
	Dog	Inu	Cat	Neko
	Squirrel	Risu	Cow	Ushi
	Turtle	Kame	Snake	Hebi
Echoic + Picture Prompt	Bear	Kuma	Monkey	Saru
	Cat	Neko	Turtle	Kame
	Cow	Ushi	Bird	Tori
	Snake	Snake	Giraffe	Kirin
Trial and Error	Giraffe	Kirin	Horse	Uma
	Monkey	Saru	Squirrel	Risu
	Horse	Uma	Pig	Buta
	Bird	Tori	Dog	Inu

Response Measurement and Interoberver Agreement

During training, the experimenter recorded correct, incorrect, prompted, and physically guided responses on a data sheet. A correct response was defined as touching the target visual stimulus within 5 s of the presentation of its Japanese name. An incorrect response was defined as touching any of the three other visual stimuli on the binder page, or not touching a stimulus within 5 s. A prompted response (picture prompt and echoic +

picture prompt conditions) was defined as touching the target visual stimulus within 5 s of the experimenter presenting a picture that was identical to the target stimulus. A physically guided response was defined as touching the target visual stimulus with hand-over-hand guidance from the experimenter. Observers also recorded echoic responses in all conditions, defined as vocally repeating the Japanese name presented by the experimenter any time before selecting a visual stimulus. During oral naming probe trials, the observers recorded correct and incorrect responses on data sheets. Correct oral naming was defined as vocalizing the Japanese name associated with a visual stimulus, whereas an incorrect response was defined as any other vocal response or failure to respond within 5 s.

An independent observer collected interobserver agreement data on 55% of all sessions. Agreement was reached in each trial if both observers scored the participant's response identically as unprompted, prompted, or physically guided. Interoberserver agreement was calculated by dividing the number of agreements by the number of trials and converting the results to a percentage. Mean agreement was 83% (range, 87% to 100%) during training and 100% during oral naming probe sessions.

Procedure

Experimental Design. Following baseline assessment, acquisition during the picture prompt, echoic + picture prompt, and trial-and-error conditions was compared in an adapted alternating-treatments design. Each day that the experimenter met with the participant, one session was conducted in each condition, in a randomized sequence. Each session consisted of a total of 16 trials that included four 4-trial blocks, each consisting of one presentation of each stimulus. The order of stimulus presentation was

identical across sessions but differed across trial blocks within a session according to a pre-randomization scheme.

Baseline. During baseline sessions, the children earned tokens for "working hard" and once a certain number of tokens were earned, the children were rewarded with a prize. The experimenter initiated each trial by saying the Japanese name associated with one of the four visual stimuli, and presenting a binder sheet that contained all four stimuli. The experimenter did not give feedback on any correct or incorrect responses and simply presented the next trial following each response or failure to respond within 5 s.

Picture Prompt Condition. In the picture prompt condition stimulus presentation was identical to the baseline condition. In each trial, if the participant touched the correct stimulus from the four picture options, praise and a token were delivered. The tokens could later be exchanged for a prize and play time. If the participant made an incorrect response, the experimenter presented a picture that was identical to the correct response option and stating, "This is [Japanese name]" (while holding up a picture and pointing to it) "point to [Japanese name]" (while gesturing to the visual stimuli). If the participant pointed to the correct stimulus after being prompted, he or she received praise but no token. If the participant pointed to a different picture, the experimenter was to repeat the instruction "Point to [Japanese name]" and physically guide the participant to touch the correct picture, but physical guidance prompts were not necessary because the participants never responded incorrectly after the first prompt.

Echoic +Picture Prompt Condition. The procedures were identical to the picture prompt condition except for the addition of an echoic requirement following the incorrect response. If the participant pointed to the incorrect picture, the experimenter instructed,

"Say [Japanese name]". After the participant repeated the Japanese name of the target stimulus, the experimenter presented the picture prompt in a manner identical to the picture prompt condition.

Trial and Error Condition. Prompts were not provided in this condition. If the participant made an incorrect response, no actions were taken and the experimenter went on to the next trial. Correct responses were rewarded with praise and a token as in previous conditions.

Oral Naming Probes. Oral naming probes were conducted under extinction following every eighth session. Probes consisted of 12 trials in which the 12 comparison stimuli were randomly presented. The experimenter presented a visual stimulus to the participant with the instruction, "What is this in Japanese?" while pointing at the stimulus. Following a verbal response, either correct or incorrect, the experimenter proceeded to the next trial. No feedback was provided on either correct or incorrect responses.

RESULTS

Figure 1 shows the percentage of unprompted correct response in each session for both participants. Greg met the acquisition criterion (14 out of 16 correct responses) after 48 trials in the picture prompt condition and 112 trials in the echoic picture prompt condition. Performance in the trial-and-error condition remained at a chance level throughout the evaluation. Physical guidance was not used.

Sally met the acquisition criterion in the picture prompt condition after 112 trials. After 160 trials, her performance was stable at 56% correct in the echoic picture prompt

condition. Performance in the trial-and-error condition remained at a chance level
throughout the evaluation. Physical guidance was not used.

Figure 2 shows the number of correct response in each oral naming prompt
session for both participants. Neither Greg nor Sally made a correct oral naming
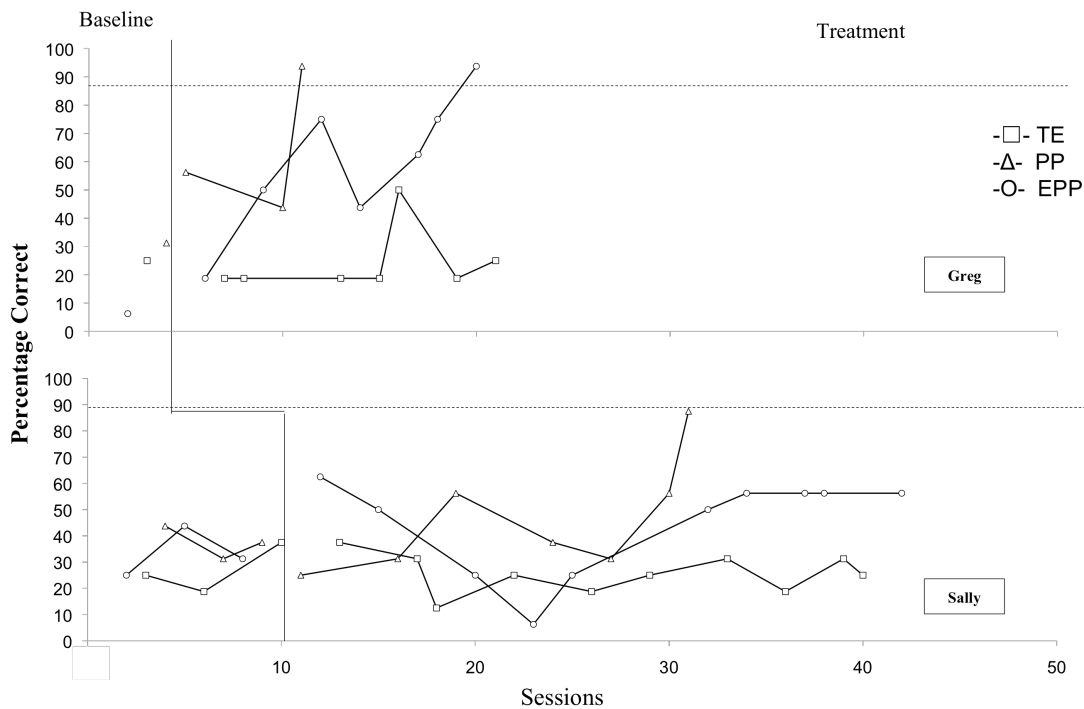throughout the procedure.

Figure 1. Percentage of correct responding in each session during baseline and during
training in the picture prompt condition (PP), the echoic + picture prompt condition (PP),
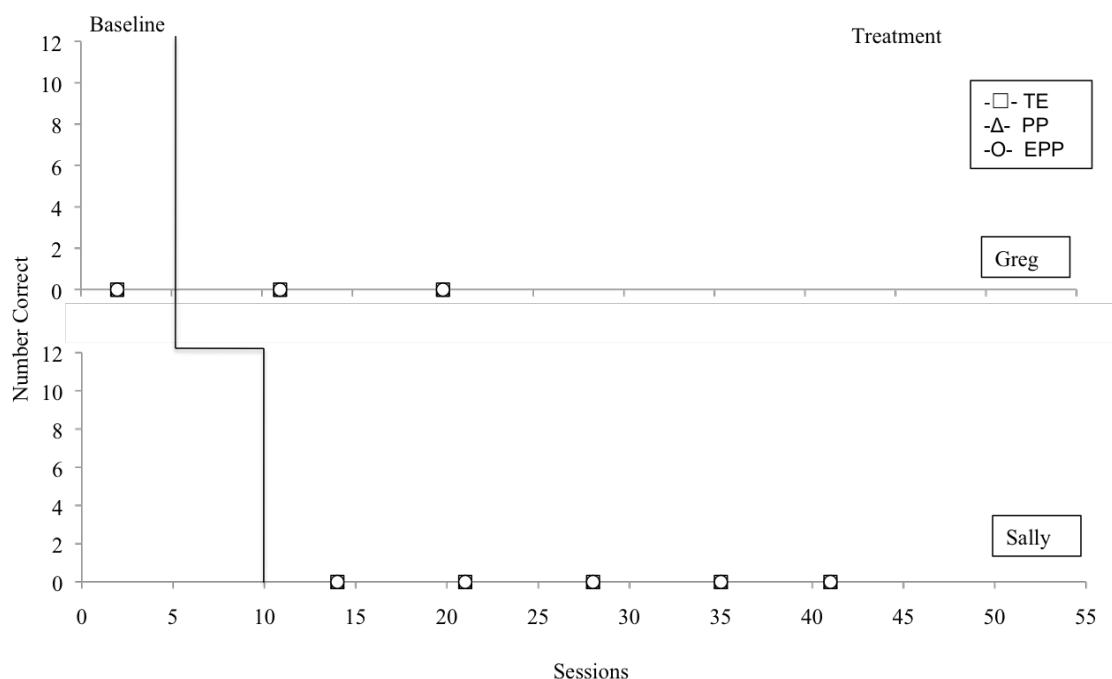and the trial-and-error (TE) condition

Figure 2. Number of correct responses in oral naming probes for stimuli from the picture prompt condition (PP), the echoic + picture prompt condition (PP), and the trial-and-error (TE) condition

DISCUSSION

Prior to the experiment, we had expected that the echoic response requirement would enhance attention to the spoken word and therefore lead to more accurate performance, as was seen in the Charlop (1983) study. In the Charlop (1983) study, participants were required to make the echoic response in every trial, whereas in the current study participants were only required to make an echoic response following errors, because the echoic response requirement was being combined with the picture prompts. It is possible that to aid performance, the echoic response must be made more frequently. Nevertheless, slower acquisition in the echoic + picture prompt condition than in the picture prompt condition was unexpected.

Several explanations are possible. One possibility is that the requirement of an echoic response resulted in a delay between the child selecting the incorrect picture and

being presented with corrective feedback in the form of the correct picture. This delay may have slowed the acquisition process.

Another possible explanation is that the echoic response may have evoked extraneous verbal behavior between the presentation of the auditory stimulus and the prompted selection of the correct picture. That is, the act of echoing the Japanese word, may have prompted the participants to start talking out loud or under their breath, which may have interfered with the association between the word and the picture. However, unsolicited verbal responses were not recorded during the experiment, so it is unknown if the participants actually talked more in the echoic + picture prompt condition than in the picture prompt condition.

Future research could address these first two possibilities by examining the effects of delaying the echoic response requirement until after the picture prompt is presented, or after the participant has made a prompted selection.

A third possible explanation is that due to an accident of randomization, both participants' first teaching session was in the picture prompt condition. It is possible that the words that the participants learned in the first teaching session interfered with acquisition of words that were introduced in the second and the third session, and that this interference had a lasting effect throughout the experiment. This possibility should be addressed by adding additional participants who experience the echoic + picture prompt condition or the trial-and-error condition first.

Although the results did not support the prediction, they provide further support for the use of picture prompt to enhance acquisition of auditory-visual conditional discriminations in typically developing children, because both children acquired the

target discrimination faster in both of the picture prompt conditions than in the trial-and-error condition. In other words, it appears that typically developing preschoolers and children with ASD may benefit from similar attention-enhancing strategies during language instruction. If this is the case, it suggests that laboratory research on typically developing children's acquisition in discrimination tasks may provide useful information on how to more effectively teach children with ASD.

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ABSTRACT

Using a single case design, the present study evaluated the addition of an echoic response requirement to picture prompts during receptive training. Receptive training addresses a child's comprehension of spoken language and occupies a large proportion of early intervention curricula for children with autism and young typically developing children (e.g., Lovaas, 2003). Earlier research shows that receptive training can be facilitated through the use of picture prompts (Carp, Peterson, Arkel, Petursdottir, & Ingvarsson, 2012; Fisher, Kodak, & Moore, 2007) or by requiring the child to echo the verbal prompt before selecting a stimulus (Charlop, 1983). This study aimed to evaluate the effects of combining picture prompts and echoic response requirements in two typically developing preschoolers. An alternating treatments design was used to evaluate three conditions: (a) an echoic response plus picture prompt, (b) a picture prompt, and (c) a trial and error control. Surprisingly, acquisition of receptive vocabulary was fastest in the picture prompt condition. Potential reasons for this finding are discussed.