

*TEACHING RECEPTIVE NAMING OF CHINESE
CHARACTERS TO CHILDREN WITH AUTISM
BY INCORPORATING ECHOLALIA*

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The facilitative effect of incorporating echolalia on teaching receptive naming of Chinese characters to children with autism was assessed. In Experiment 1, echoing the requested character name prior to the receptive naming task facilitated matching a character to its name. In addition, task performance was consistently maintained only when echolalia preceded the receptive manual response. Positive results from generalization tests suggested that learned responses occurred across various novel conditions. In Experiment 2, we examined the relation between task difficulty and speed of acquisition. All 3 participants achieved 100% correct responding in training, but learning less discriminable characters took more trials than learning more discriminable characters. These results provide support for incorporating echolalia as an educational tool within language instruction for some children with autism.

DESCRIPTORS: autism, echolalia, Chinese characters, receptive naming, generalization

Language delay and persistent deviant language characteristics are generally believed to constitute two of the principal diagnostic features of autism (e.g., Carr, Schreibman, & Lovaas, 1975; Howlin, 1989; Rutter, 1978). Among the commonly exhibited deviant language patterns, echolalia is probably the most common. Echolalia is defined as a meaningless repetition or echoing of verbal utterances made by another person (Fay & Schuler, 1980; Schuler, 1987). Echoic behavior has been characterized as interfering with language acquisition, communication, and social interaction processes. Thus, behavioral treatment programs (Foxy & Faw, 1990; Goldstein & Hockenberger, 1991; Schreibman & Carr, 1978) are often designed to eliminate echolalia from the verbal repertoire of persons who exhibit this speech pattern.

Research that has examined autistic lan-

guage from a functional perspective, however, has suggested that echolalia may serve various social and communication purposes (e.g., Fay & Butler, 1971; McEvoy, Loveland, & Landry, 1988; Prizant & Duchan, 1981; Prizant & Rydell, 1984; Roberts, 1989; Wakabayashi, Mizuno, & Nishimura, 1977). Carr et al. (1975), for example, suggested that children may echo when they do not understand what is being said to them or when they want to extend a conversation.

Some researchers have used echoic behavior as a tool for teaching language. Charlop (1983) incorporated echolalia into teaching receptive labeling of common objects to children with autism. In Charlop's receptive labeling procedure, the experimenter put two objects (e.g., horse and boat) in front of the child and then verbally requested one object. The task was to choose the correct object and hand it to the experimenter. The receptive labeling task could be considered to be a matching task in which the child chose one of two objects corresponding to the requested label. In the experiments, children with autism learned the receptive task

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if they echoed the label of the requested object prior to the task; however, responses became erratic if the receptive task had not incorporated echoing or if the echo was irrelevant to the label of objects being trained.

One potential advantage of incorporating echolalia into instructional programs is that this behavior tends to increase in unfamiliar settings (Carr et al., 1975; Schreibman & Carr, 1978) and with new teaching conditions (Charlop, 1986). This characteristic of echolalia may enhance generalization of some types of learned behaviors (Stokes & Baer, 1977). Indeed, children with autism in Charlop's (1983) study performed the labeling task with good accuracy across unfamiliar persons and settings.

Charlop's (1983) approach, incorporating echolalia into instruction, is simple and attractive because few effective and practical methods exist for enhancing the language skills of children with autism. After careful deliberation, we realized that the same procedures were adaptable to the instruction of Chinese, which has been considered to be a relatively difficult language to teach and learn. Chinese is a logographic system consisting of over 10,000 characters, of which 3,000 are in common daily use. To master the Chinese language, one must learn to discriminate the visual symbols of the characters. Matters are further complicated by the fact that a character often provides few or no direct cues with respect to its pronunciation or phonetic name. Consequently, novice readers of Chinese often rely on rote learning of the one-to-one equivalence between symbols and sounds. For this reason and others, teaching Chinese characters to children with low language ability is a formidable task.

The present study examined the applicability of Charlop's (1983) training procedures for teaching receptive naming of Chinese characters to children with autism who also exhibited echolalic responses. Children

learned receptive naming or matching character symbols with their corresponding phonetic names. The effectiveness of this approach was assessed in two experiments. The first experiment examined the effects of echolalia on the acquisition of Chinese character naming by a child with autism and on generalization of performance across a number of novel conditions. The second experiment assessed the relationship between task difficulty (the discriminability between two training stimuli) and speed of acquisition.

EXPERIMENT 1

Experiment 1 was designed to assess the effectiveness of incorporating echolalia in the teaching of receptive naming of Chinese characters. There were three objectives. First, we attempted to demonstrate the facilitative effects of echoic responses on the acquisition of matching Chinese characters to their names. Second, we wanted to evaluate the role of echolalia in maintaining correct responses after matching had been acquired. A third objective was to assess generalization across novel conditions.

METHOD

Participant and Setting

A Chinese boy (S1), who had been diagnosed with autism (*DSM-III-R*, American Psychiatric Association, 1987), participated in this experiment. He was 9 years 5 months old with a mental age of 4 years 5 months. Teachers reported that his recognition of Chinese characters was poor; however, he clearly pronounced names of characters he knew. According to both teachers and parents, he displayed immediate echolalia frequently. The experiment was conducted in a quiet classroom, in which the child sat across a table from the experimenter.

Stimulus Characters and Interrater Agreement

A pair of simple Chinese characters unknown to the child were chosen as training

stimuli. Both characters consisted of seven strokes, but they were discriminable from each other. Each character was printed in black ink on a white card (12 cm by 12 cm), leaving a margin of 2 cm on each side of the card. For generalization tests, three more stimulus cards were also prepared, two for the training characters (printed in red ink) and one for the distracter character (printed in black ink).

The discriminability of the character pairs used in the entire study was established by independent ratings from proficient Chinese readers. Twenty college students rated each pair of characters on a 10-point scale from 1 (*highly similar*) to 10 (*highly distinguishable*). The average score for a low-discriminability pair was 3 or below, and the average score for a high-discriminability pair was 7 or above.

The performance criterion for receptive naming of a pair of Chinese characters was set at 90% correct responses within 20 consecutive trials (Charlop, 1983). The child who performed up to this level of accuracy was considered to have learned that pair of characters. Interrater agreement checks were conducted on 40% of the trials. Percentage agreement on a trial-by-trial basis was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100%. Interobserver agreement was 99% across all conditions.

Design

An ABAC design was employed that included the following phases: Baseline 1, Training 1, Baseline 2, and Training 2. Each phase consisted of 50 trials. To assess generalization, pretraining and posttraining generalization tests were also administered. All phases of the experiment were completed during the same day, with a 5-min break between two consecutive phases.

Procedures

General procedures. The receptive naming task involved matching a character name to its designated character symbol. It began when the child sat quietly and attended to the experimenter. Two stimulus cards were put on the table in front of the child, one on the left side and the other on the right side. The position of stimulus cards and the character being requested were changed on a semirandom basis. Thus, a character was neither placed on the same side nor requested by the experimenter in more than three trials in a row. After positioning the cards, the experimenter extended her hand, said the name of one of the characters, and waited for a response. The child was to pick up the requested character card and give it to the experimenter. A correct response was followed by verbal praise (on a continuous schedule) and a food reward (on a variable-ratio 4 schedule). The experimenter said "no" when the response was incorrect or when no response was made within 5 s of the request. In either case, the cards were removed immediately.

Baseline 1. Fifty trials of the receptive naming task were conducted in a trial-and-error manner as described above. Feedback for correct and incorrect responses was delivered accordingly.

Training 1. In this phase, the experimenter incorporated echolalia into the receptive naming task for the same pair of Chinese characters. A training trial consisted of two steps: echo prompting and receptive naming. In each trial, the experimenter first prompted the child to echo by saying one of the two character names; if the child did not echo the name immediately, the experimenter repeated the character name again until echoing occurred. Then the receptive naming task, described above, was conducted. A trial ended after the child handed a stimulus card to the experimenter upon re-

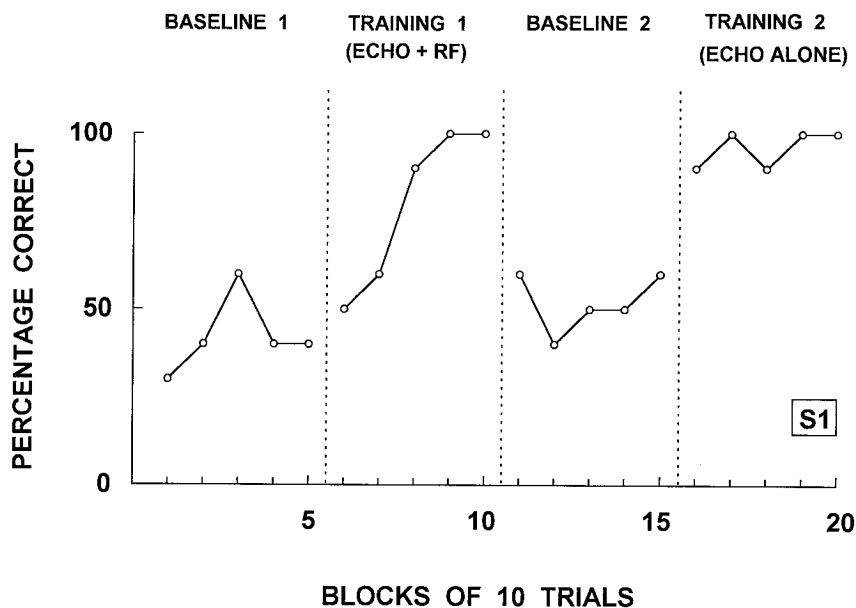


Figure 1. For Experiment 1, the percentage of correct responses, over blocks of 10 trials, in receptive naming of Chinese characters during Baseline 1, Training 1 (echolalia plus response feedback), Baseline 2, and Training 2 (echolalia only) phases. ECHO = echolalia; RF = response feedback.

quest or made no response within 5 s of the request, and the experimenter gave appropriate feedback.

Baseline 2. The procedures were the same as for Baseline 1.

Training 2. The procedures were the same as used in Training 1, except that no feedback was provided for performing the receptive naming task.

Generalization tests. To assess the effects of training across different conditions, generalization tests were conducted, first prior to Baseline 1 (pretest) and then after Training 2 (posttest). Each generalization test consisted of 20 trials and was conducted with the procedures used in the baselines, except that no response feedback was provided. The four test conditions were (a) tester, another person in the same room; (b) location, the same experimenter in another room; (c) color, with characters written in red ink instead of black ink; and (d) task, using three instead of two characters, with the third character being a distracter (never correct).

RESULTS AND DISCUSSION

The results are presented in Figure 1. During Baseline 1, performance fell below chance level (50%) for four of five 10-trial blocks. The low correct response percentages were partly due to the lack of responding in a few trials, and trials with no response were counted as incorrect. The poor performance indicated that acquisition of receptive Chinese character naming was not achieved in a trial-and-error manner. However, performance on the receptive task improved over baseline with training. In Training 1, the percentage of correct responses reached 90% within the first 30 trials, and the criterion (90% within 20 trials) was met within 40 trials of training. The participant matched characters and their names with 100% accuracy during the last 20 trials. Hence, results from the first two phases suggested that echolalia facilitated acquisition.

During Baseline 2, echolalia was no longer a prerequisite for receptive naming, and

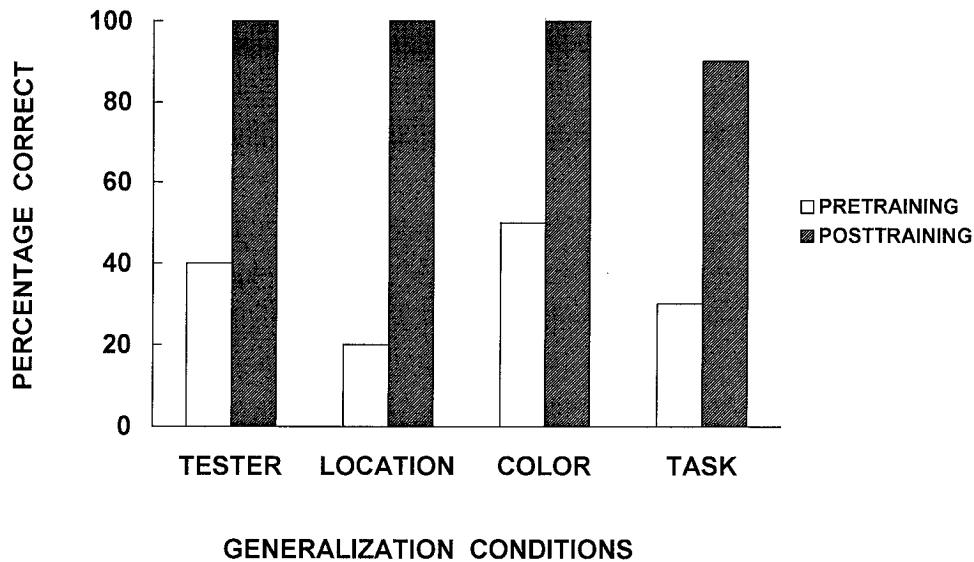


Figure 2. For Experiment 1, percentage of correct responses for the pretraining and posttraining generalization tests.

response accuracy dropped to a chance level of around 50%. However, when echolalia was reintroduced in Training 2, performance improved markedly, reaching the 90% criterion within the first 10 trials. Results from Baseline 2 and Training 2 suggested that echolalia alone was sufficient to maintain good task performance in the absence of response feedback.

One might ask why performance returned to chance levels during Baseline 2 if receptive naming had been acquired during Training 1. One possible reason is that the child emitted a reduced number of echoic responses. However, the recorded rate of echolalia remained roughly constant (60% to 70%) for all baseline and training phases. A more plausible explanation relates to the temporal relationship between echoic and receptive (manual) responses (Charlop, 1983). Under training conditions, the child always echoed the character name before he handed the character card to the experimenter. In contrast, the timing of echolalia during baseline phases was not controlled, and an echo could be emitted before or after the manual response. Thus, echolalia was

not a reliable discriminative stimulus for the manual response it preceded during either baseline condition.

Finally, it is possible that the experimenter's two presentations of a character name in a training trial, compared to the single presentation in a baseline trial, was an active variable. Although the present experiment did not test this hypothesis systematically, Charlop's (1983) results suggest that this hypothesis is unlikely. In the first of two experiments, Charlop (1983) included a two-stimulus condition in which the experimenter presented two object labels, one right after the other, to prevent the child from echoing in between. Performance in this condition was as poor as in the other non-training conditions.

The results of the pretraining and posttraining generalization tests are presented in Figure 2. As hypothesized, echolalia facilitated learning in novel conditions. Under novel circumstances, the child almost always echoed the character name before picking up the requested character. Posttraining performance improved over that of pretraining across all four conditions, with posttraining

percentages reaching 100% in three conditions (tester, location, and color) and 90% in the task condition. Generalization across tasks was perhaps of most interest, because the child continued to emit a high level of accurate responses despite the addition of a distracter character.

Overall, this experiment replicated Charlop's (1983) findings regarding the facilitative effects of echolalia on acquisition, maintenance, and generalization of receptive tasks. Specifically, we found that echolalia was useful for teaching receptive naming of Chinese characters. However, in this experiment, positive results were obtained from training only 1 child; thus, additional supportive data were required for establishing the efficacy of this approach for teaching Chinese.

EXPERIMENT 2

The objectives of this experiment were (a) to replicate the findings of Experiment 1 with 3 more children and (b) to assess the effects of character discriminability on the acquisition speed of receptive naming of Chinese characters.

METHOD

Participants

Two boys (S2 and S3) and 1 girl (S4), who had been diagnosed with autism by a child assessment clinic, were the participants. They displayed the major characteristics of autism as delineated in *DSM-III-R*, including language and communication disturbances, ritualistic and compulsive behaviors, and social withdrawal. The chronological ages of S2, S3, and S4 were 9 years 8 months, 8 years, and 10 years 2 months, respectively. Their mental ages on the Merrill-Palmer were 4 years 5 months, 3 years 8 months, and 4 years 2 months, respectively. They each echoed over 60% of the instructions given by the experimenter during a

30-min screening session. Apart from immediate echolalia, S3 also exhibited delayed echolalia, and S2 and S4 had problems in pronoun reversal and stereotypic tones. In school, these children learned to read and write Chinese characters, but progress was slow.

Stimulus Characters

Procedures for character selection and making stimulus cards were the same as specified in Experiment 1. For each child, two pairs of characters, a high-discriminability (HD) pair (similar to that used in Experiment 1) and a low-discriminability (LD) pair, defined in the same manner as in Experiment 1, were selected for training. Like the HD characters, each of the LD characters consisted of seven strokes, but there were only minor or subtle differences between characters within each LD pair.

Design and Procedures

A multiple baseline design across subjects, combined with an alternating treatments design (HD vs. LD), was employed. To compare performance between LD and HD character pairs, the type of training stimuli was alternated every 10 trials (e.g., LD, HD, HD, etc.), but no character pair of the same difficulty was presented three times consecutively. A break of 5 min was given after 30 trials. For all children, training was completed within 2 days.

Baseline. Baseline was the same as for Experiment 1. For each character pair, the numbers of trials for S2, S3, and S4 were 40, 60, and 70, respectively.

Training. The procedures were the same as for Training 1 of Experiment 1 and were used for teaching both LD and HD character pairs. Thus, in each trial, the experimenter waited for participants to echo the target character name before conducting the receptive naming task. Training continued

until performance reached criterion for both LD and HD characters.

RESULTS AND DISCUSSION

The percentages of correct responses over blocks of 10 trials during baseline and training phases for all 3 children are presented in Figure 3. During baseline, children (a) responded at approximately chance level and (b) performed equally poorly across LD and HD pairs. Except for S4, whose percentages for HD characters exhibited a seemingly upward trend, other baseline performances were consistent with those expected from a trial-and-error performance. Task performance improved with training for HD and LD characters, replicating the results of Experiment 1. These findings provided further support that echoic responses facilitated the acquisition of receptive naming of Chinese characters. Overall, LD characters required twice as many trials to reach criterion as did HD characters. Thus, speed of acquisition was related to task difficulty. There was no obvious carryover or interaction effect between the two types of stimuli trained. Hence, the learning of one pair of characters did not appear to either promote or inhibit learning of the other pair.

GENERAL DISCUSSION

The two experiments supported our supposition that echolalia was the active component contributing to the acquisition and maintenance of receptive naming of Chinese characters. When an echoic response consistently preceded the matching task, performance improved (during acquisition) or reached criterion (during maintenance). We also found that task difficulty or the discriminability between characters affected the acquisition speed of correct naming. The LD characters needed more trials to learn than the HD characters did. Thus, the present study replicated Charlop's (1983) findings

and extended them to teaching receptive naming of Chinese characters.

The significance of the present work was not just a change of language context from English to Chinese; we also developed a new area of application to more complex language skills. Obviously, the naming of Chinese characters required subtle discriminations among symbols, and it was a much more difficult skill to teach than the labeling of real objects. Whereas Charlop (1983) trained with three-dimensional stimuli (real objects), we extended the procedures to teaching two-dimensional stimuli (printed characters), which lack spatial and color cues. We showed that echolalia was equally facilitative for the acquisition of simple and complex naming.

On a conceptual level, the echolalia that preceded the matching task might have functioned as a self-echoic prompt (cf. Skinner, 1957), which was used to strengthen intraverbal connections of desirable speech. In our case, the prompt was initially provided by the experimenter during training. At the acquisition stage of receptive naming, the prompted echo might have helped the child to read the character name and might have guided the child's attention toward the corresponding character symbol. We hypothesize that as training proceeded, the manual response (selection of a character stimulus card) was gradually controlled and guided by the echoic response. With successful acquisition, the production of receptive naming would be under the stimulus control of the phonetic properties of the echoed sound rather than other external stimuli (Rincover & Koegel, 1975).

Echoing might also have served as a specific orienting cue that prepared children for responding. This notion is consistent with results reported by Koegel, Dunlap, Richman, and Dyer (1981), who demonstrated that children with autism could produce more rapid acquisition of complex discrimination tasks if additional orienting cues were made available. However, the cues were useful only

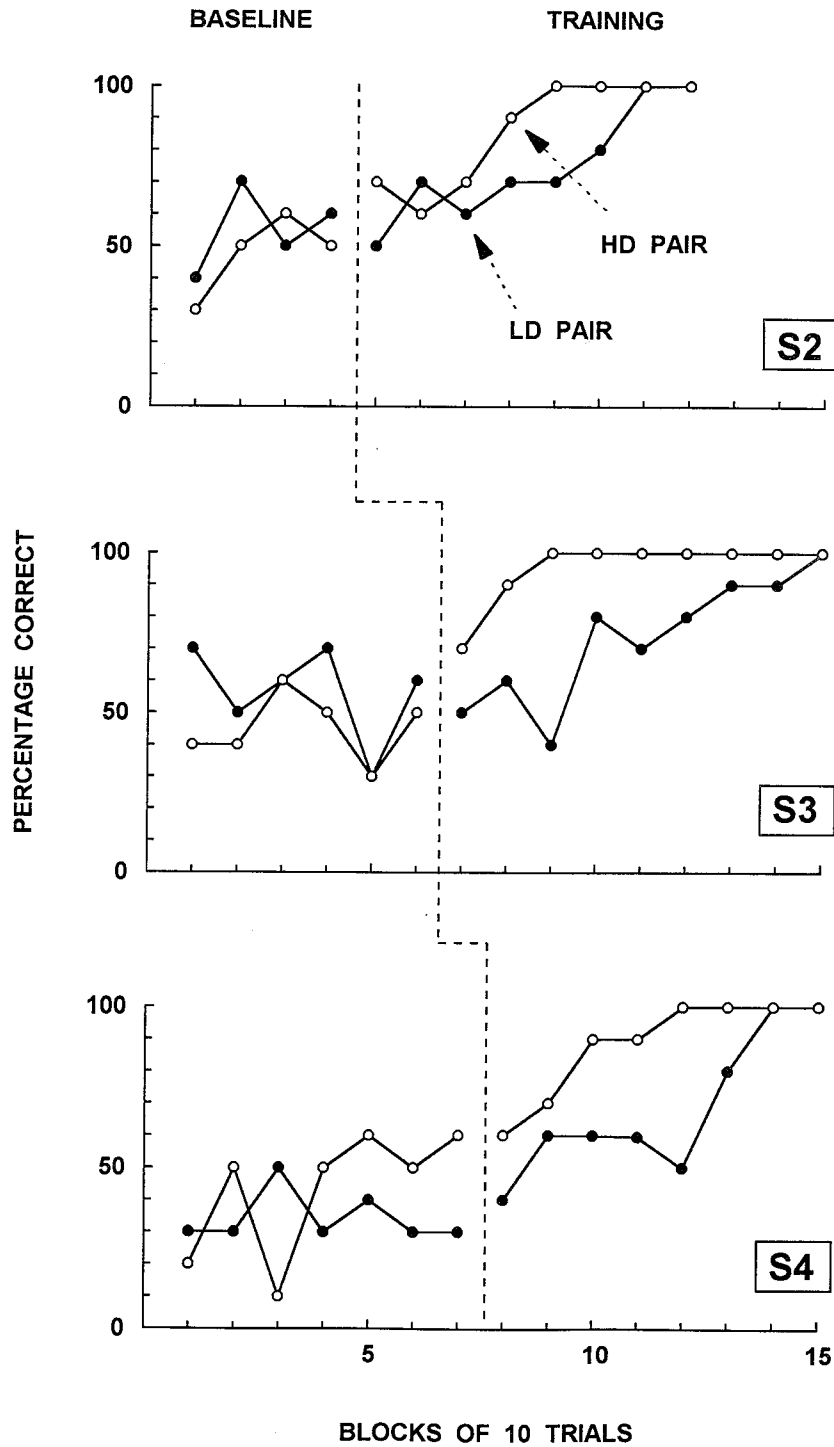


Figure 3. For Experiment 2, percentage of correct responses over blocks of 10 trials for S2, S3, and S4 in receptive naming of Chinese characters during baseline and training phases. HD = high discriminability; LD = low discriminability.

if they were highly specific and attractive to the learner. In the present experiments, the echoed character names might have possessed these properties and, if so, constituted a convenient orienting cue for these children. We propose that the auditory stimulus produced by self-imposed echolalia of the requested character directed the children's attention toward specific graphic features of printed characters, thus enhancing the accuracy of matching.

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STUDY QUESTIONS

1. What is echolalia, what problems does it present, and how do the authors suggest that echolalia may facilitate language?
2. What were the purposes of the two experiments?
3. Briefly describe the receptive naming task and the general procedures that were implemented during the two training phases.
4. How did the authors determine the discriminability of the character pairs used in the study?
5. How were the stimulus conditions altered during the generalization test?
6. How did the authors explain the fact that during the second baseline of Experiment 1, performance returned to chance levels even though receptive naming had been acquired during training? What additional data could have been provided to support their explanation? Also, given the reversal effect observed, what is unusual about the generalization data?
7. How were the effects of training and stimulus difficulty evaluated in Experiment 2, and what results were obtained?
8. What are some implications of the results for shaping other types of responses in individuals with autism? How might incorporating echoic responses be problematic if speech is the response?

Questions prepared by SungWoo Kahng and Eileen Roscoe, University of Florida