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ORIGINAL PAPER

Decreasing Echolalia of the Instruction "Say" During Echoic Training Through Use of the Cues-Pause-Point Procedure

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Abstract Echolalia is common in children with autism and may interfere with the development of functional language. Given the variety of vocal stimuli included in teaching language to children with autism, it is possible that discrimination between instructions and targeted responses may not always occur. Thus, children may engage in very high rates of echolalia during language training because it is unclear which vocalizations produced by an instructor should be echoed. The cues-pause-point (CPP) procedure has been effective in decreasing echolalia and increasing specific correct responses to unknown questions in adults with intellectual disability. The current investigation applied the CPP procedure to the echoic repertoire with 1 child with autism who consistently echoed the instruction "say" during language training. Results indicated that echolalia of the instruction "say" decreased, and correct responding of the targeted vocalization increased for all targeted words. Implications for the use of the procedure in educational settings are discussed, and areas for future research are provided.

Keywords Echolalia · Echoic · Vocal imitation · Cues-pause-point · Autism

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Introduction

Estimates indicate that up to 50 % of individuals with autism spectrum disorder (ASD) will not develop functional vocal language (Graziano 2002). Thus, it is very important to address functional vocal language in this population. Accordingly, early intensive behavioral intervention (EIBI) programs often prioritize increasing functional language when working with children with ASD. EIBI programs may incorporate the conceptual analysis from B.F. Skinner's *Verbal Behavior* (1957) into their intervention strategies (Love et al. 2009). In this approach, language or verbal behavior is categorized into several verbal operants with specific controlling variables in terms of stimulus control and reinforcement.

The six elementary verbal operants include the *mand*, *tact*, *echoic*, *intraverbal*, *textual*, and *transcription*. The *tact*, *echoic*, and *intraverbal* are of particular importance to the current investigation and thus warrant a more detailed description. The *tact* is controlled by a nonverbal stimulus and maintained by generalized reinforcement (i.e., a nod, smile, praise, or continued conversation). For example, as an airplane flies in the sky (nonverbal stimulus), an individual may emit the label "airplane" followed by praise or other reinforcement not specific to the label. The *echoic* is controlled by a matching verbal stimulus and maintained by generalized reinforcement. The echoic and preceding verbal stimulus are of the same topography. For example, an individual may say "hi" and another individual may in turn engage in echoic behavior by responding "hi" followed by continued conversation, praise, or other generalized reinforcement. Finally, like the *echoic*, the *intraverbal* is controlled by a verbal stimulus and maintained by generalized reinforcement. Unlike the *echoic*, the *intraverbal* and preceding verbal stimulus do not correspond topographically. For example, a teacher may say "what is four plus four?" and an individual may in turn engage in intraverbal behavior by responding "eight" followed by continued conversation and instruction, praise, or other generalized reinforcement.

EIBI programs may focus on developing the echoic (also known as "vocal imitation") because if an individual echoes, echoic-transfer-of-stimulus control procedures can then be used to transfer stimulus control from the vocal model to the verbal antecedent (Watkins et al. 1989). In addition, a strong echoic repertoire may lead to self-prompting, a skill thought to be important in developing more complex verbal behavior (Sautter et al. 2011). For example, in order to remember a list of items needed at the grocery store or retain academic material, an individual may recite the list or information covertly. Due to the practicality of the skill and its use in language acquisition, establishing a strong echoic repertoire is often an important goal in early language intervention with children with autism.

During echoic training, it may be common for individuals teaching children with autism to include an instruction such as "say" in an attempt to teach the child that only the word following the instruction "say" should be echoed. For example, in order to improve articulation or prompt a correct academic response, an instructor may tell a child "say boat," or "the answer is boat" to which the child is expected to respond "boat." A problem exists when discrimination between these two stimuli does not occur, and the student repeats both the instruction and the targeted response ("say boat"). Esch (2008) suggests removing the "say" altogether to avoid the development or persistence of this problem. Though it could be argued that including the instruction "say" changes the stimulus control for the echoic, excluding an instruction such as "say" may result in an over-generalized echoic repertoire, during which the child echoes most (if not all) vocal verbal behavior. Excessive echoing of verbal behavior may have undesirable consequences such as stigmatization (e.g., if the child echoes other children's vocal questions) or difficulties establishing other verbal operants (e.g., if the child echoes instructions during a conversation that relies on intraverbal exchanges). Thus, it is important that a child's vocal imitative behavior be evoked under conditions when the "say" instruction is present and when it is absent.

In some cases, differential reinforcement of alternative behavior (DRA), specifically, of responses not containing echolalia of the "say" instruction, may enhance discrimination. However, in other cases, DRA alone may not be sufficient to increase discrimination between vocal instructions and targeted responses, or children may engage in low levels of correct responding without echolalia, leaving little to no correct behavior to shape and reinforce. Thus, it may be important to establish alternative procedures to enhance discrimination between vocal instructions and targeted responses when establishing an echoic repertoire.

To date, there exists a paucity of research on interventions designed to decrease echolalia when it interferes with functional verbal behavior development, and when echolalia results in faulty stimulus control when teaching various verbal operants to children with autism; yet, echolalia remains a defining characteristic of the disorder. Overall, echolalia appears to be quite understudied. Much of the research that does exist was produced over 15 years ago (e.g., Leung and Wu 1997). However, the topic remains relevant, and many questions remain unanswered. Given the limited research that exists, a brief review of research related to decreasing echolalia and increasing functional verbal behavior follows.

Some research has focused on the use of differential reinforcement and prompt fading to replace echolalia with general responses (e.g., "I don't know") to questions in order to teach intraverbal behavior (Schreibman and Carr 1978). However, this procedure resulted in limited progress in increasing verbal behavior repertoires because participants were taught the same general response to every question. In 1986, McMorrow and Foxx investigated the use of a novel procedure they called "cues-pause-point" (CPP) that was successful in decreasing echolalia and increasing correct responding to questions with one adult with intellectual disability. The original CPP procedure utilized a finger cue, a pause following instructions, a point prompt, the verbal stimulus "shh" or "no" contingent on echolalia, positive reinforcement, and textual cues embedded in the learning environment. The results were replicated with two other adults with intellectual disability, utilizing pictures of objects and actual objects rather than written words, and with observed generalization of treatment effects to novel intraverbal stimuli (McMorrow et al. 1987). These generalization effects were replicated under greater experimental control with three more adults with intellectual disabilities (Foxx et al. 1988). Finally, a long-term follow-up conducted by Foxx and Faw (1990) showed that echolalia remained low and correct responding remained high for six participants from previously published studies.

Given the success of the CPP procedure for decreasing echolalia with adults during intraverbal responding, further investigation of the procedure with children with autism during echoic training seems warranted. The CPP procedure was chosen in the current study because other procedures such as DRA for correct responses had been attempted with the participant with little success. The purpose of the current study was to examine the effectiveness of the CPP procedure in decreasing echolalia of the instruction “say” during echoic responding with one child with autism.

Method

Participant, Setting, and Materials

Thomas was a 3-year-old male diagnosed with autism. He was diagnosed with autism at the age of 20 months by a developmental pediatrician at a large children’s healthcare system. Thomas attended a clinic-based intensive behavioral intervention program 3 h per day, 5 days per week. The program focused on 1:1 instruction using the principles of applied behavior analysis, and specifically targeted the mand, tact, intraverbal, echoic, and listener repertoires according to Skinner’s (1957) functional classification of language. Prior to the start of the study, Thomas received approximately 1 year of behavioral intervention and had gained many language skills since his admission. The assessment of basic language and learning skills-revised (ABLLS-R; Partington 2008) was administered at the beginning of his admission and again prior to the initiation of the study. The ABLLS-R indicated progression from communicating solely with sign language to communicating with vocal speech across the verbal operants. Additionally, Thomas developed a strong listener repertoire allowing him to follow many instructions and identify multiple objects in his environment. At the start of the study, Thomas imitated most motor movements and his tact (i.e., labeling) repertoire consisted of over 75 common items, people, and body parts. Thomas engaged in early intraverbal language including fill-ins to songs, animal sounds, and filling in the function of some items. His echoic repertoire consisted of spontaneous imitation of phrases, repetition of messages, and imitation of tone. However, he was included in the present study because his echolalia of the instruction “say” consistently occurred during echoic training, which was included in his EIBI programing to address articulation. Given persistent echolalia of the instruction “say” and the practical importance of including the “say” during training as discussed above, an intervention to decrease echolalia of the instruction was warranted. All sessions were conducted in a classroom with a table, chairs, preferred item(s), and teaching materials.

Response Measurement and Interobserver Agreement

Four mutually exclusive behaviors were recorded. A *correct response* was recorded when Thomas’s response matched the targeted word without echoing “say” (e.g., Thomas responds “boat” when presented with the instruction, “say boat”). An *incorrect response* was defined as a vocalization that contained a stimulus-irrelevant word regardless of whether the target response was also given. Any combination of correct and incorrect verbiage was scored incorrect (e.g., Thomas responds “cat” or "cat boat" when presented with the instruction "say boat"). *Echolalia* was defined as any response that included "say" (e.g., Thomas responds "say boat" when presented with the instruction "say boat"). If a response included a correct or incorrect answer but also included echolalia of "say," it was scored as echolalia. A *correct too soon* response was coded if Thomas emitted the correct response without echolalia (e.g., "boat" when asked to "say boat") but prior to the presentation of the targeted word (e.g., "boat"; see CPP procedures described below).

For each session, interobserver agreement (IOA) was recorded using paper and pencil. Data collectors consisted of a doctoral level psychologist and several bachelor level clinicians trained to work with Thomas. Prior to conducting sessions, the psychologist reviewed operational definitions, provided examples, and reviewed the data sheet with the other clinicians. IOA was calculated on a trial-by-trial basis by dividing the number of agreements by agreements plus disagreements and multiplying by 100 %. An agreement was defined as both collectors recording the same response. Mean IOA for Thomas was 99.1 % (range, 80–100 %) and was collected during 90.8 % of sessions.

Experimental Design and Conditions

A multiple probe design across responses (Horner and Baer 1978) was used to evaluate treatment effects. Four echoic targets were chosen for Thomas. The targets were "boat," "ball," "keys," and "puppy." These four targets were chosen because they were deemed common items Thomas would come into contact with during instruction with books and other educational materials. In addition, echoing these words was deemed a valuable goal because the words could be used in other programming (e.g., when teaching the intraverbal "what says woof woof?," an echoic prompt could be used to teach Thomas the response "puppy"). Between 3 and 5 sessions were conducted daily, and each session lasted approximately 2 min.

Preference Assessment

Prior to each session during all treatment phases, a single stimulus preference assessment (Pace et al. 1985) was conducted to identify preferred items used for reinforcement. Items typically included small portions of edible items (e.g., bits of chips, cookies, pretzels, or sips of juice). The item was presented immediately prior to a session and if Thomas approached the item (gestured toward, grabbed for, or consumed) within 5 s, it was used as reinforcement. If Thomas did not approach the item within 5 s, the item was removed, and another item was presented until approach behavior occurred.

Pre-intervention Tact Training

Prior to baseline, tact assessment and training were conducted to determine whether Thomas emitted the one-word tact for pictures that would be included as prompts in the CPP teaching sessions. Five-trial sessions were conducted. The therapist pointed to the picture on the table, and no instruction was provided. Responses were scored correct and reinforced with praise and access to a preferred item if Thomas vocally labeled the picture. An incorrect or no response was recorded if Thomas emitted a stimulus-irrelevant word or did not say anything within 3 s of the stimulus presentation. If Thomas emitted an incorrect or no response, the therapist moved to the next trial. Correct responding at 80 % or above was required before moving into baseline. If 80 % correct responding during the tact assessment did not occur, errorless teaching was used to teach the tact, and the tact assessment was re-conducted. The errorless teaching procedure consisted of re-presentation of the picture on the table, the therapist pointing her index finger to the picture, and an immediate vocal prompt of the word corresponding with the picture (e.g., "boat"). Following the immediate vocal prompt, the therapist briefly removed the picture from the table, re-presented the picture on the table, and pointed to it. Following a correct response from Thomas, the picture was again removed from the table, and 2–3 motor imitation and listener tasks were interspersed. Next, the picture was re-presented on the table while the therapist pointed to it. Contingent upon correct responding, preferred items and praise were provided. If Thomas responded incorrectly at this time, the therapist re-presented the picture, pointed to it, provided an immediate vocal prompt, provided reinforcement for correctly responding to the vocal prompt, and terminated the session. If Thomas would have responded incorrectly to the vocal prompt, the trial would have been terminated, but this never occurred.

During the presentation of the tact prompt for the word "ball," Thomas engaged in 80 % correct responding during three consecutive sessions, and thus, errorless teaching was not required. For the words "boat" "keys," and "puppy," errorless teaching was required. Six teaching sessions were required for "boat," three for "keys," and eight for "puppy." For words requiring teaching, the average number of teaching trials required was six (range, 3–8).

Echoic with Tact Prompt Baseline

Five trials per session were conducted for each target, interspersed with five trials of echoic baseline (described below) within 10-trial sessions. The picture was placed on the table. The therapist presented the verbal instruction and the targeted word (e.g., "say boat") and allowed 3 s for a response. If Thomas responded correctly, verbal praise was provided. If he responded incorrectly or echoed the "say," the therapist moved to the next trial. Motor imitation and listener tasks were interspersed between trials to increase compliance.

Echoic Baseline

Sessions were conducted identically to echoic with tact prompt baseline, but with the picture card removed.

Cues-Pause-Point

Each session consisted of five echoic with tact prompt trials and five echoic trials for a total of 10 trials. One target was taught during each session, and each session began with an echoic with tact prompt trial immediately followed by an echoic trial. This sequence continued for a total of 10 trials. Tact prompts were used in accordance with the methods described by McMorrow and Foxx (1986). The purpose of including echoic trials following the tact prompt trials was to transfer stimulus control from the nonverbal stimulus (i.e., the picture) to the verbal instruction (e.g., "say boat"). That is, instead of having the picture control the response, the procedures focused on ensuring that the instruction only (e.g., "say boat") controlled the response. At the start of each session, the therapist held her right index finger at eye level midway between the participant and herself and paused for 1 s. Any vocalizations emitted by the participant at this time were ignored. The therapist then presented the instruction "say" and paused for 2 s. Contingent upon echolalia of the instruction "say," the therapist replied "shh" and re-presented the instruction. Contingent upon correct-too-soon responding, the therapist simply re-presented the instruction. In order to prevent significant problem behavior from developing, the trial was terminated following 10 presentations of the "shh" or 10 presentations of the instruction "say." After presenting the instruction "say," the finger cue, and the 2-s pause without echolalia and without correct-too-soon responding from the participant, the therapist moved her finger so it touched the picture and said the targeted word (e.g., "boat"). If Thomas provided an incorrect response or no response following the point and presentation of the targeted word, the therapist moved to the next trial. Praise and a tangible item were provided if Thomas responded correctly following the point and presentation of the targeted word. In order for Thomas' behavior to to contact reinforcement, praise and preferred tangible items were provided even if the instruction "say" had to be presented multiple times.

Next, the picture was covered (the echoic trial). The above procedures were repeated, except that the therapist pointed to a blank card instead of the picture. Mastered tasks were interspersed, but never between an echoic with tact prompt trial and echoic trial. Mastery criteria consisted of correct responding to 80 % or more of the echoic trials across 3 consecutive sessions.

Removal of Treatment Components

For the targets "keys" and "puppy," components of the treatment were removed in varying combinations in an attempt to fade out intervention. Each component was evaluated with the use of positive reinforcement for correct responses. Therefore, for each component described below, correct responses were reinforced with a tangible item and praise. Incorrect and echolalia responses resulted in no programed consequences and the presentation of the next trial. The order in which the components were removed was determined based on ease of implementation. That is, those components considered most difficult to implement were removed first, followed by those considered easier to implement. The rationale for fading in this way was to simplify the treatment to a level that would be easy to implement for educators and instructors.

First, the finger cue was used in isolation. The therapist presented the "say" with her right index finger at eye level midway between the participant and herself, then removed her finger and presented the targeted word (e.g., "boat"). Next, the pause was evaluated. The therapist presented the "say," paused for 2 s, and then presented the targeted word. The point in isolation was also evaluated. The therapist presented the "say" and pointed to the table while simultaneously presenting the targeted word. Only echoic trials were conducted for these three stages of treatment component removal; tact prompts were not utilized. Finally, the point combined with the picture cue was evaluated. The therapist presented the "say" and pointed to the picture of the target while simultaneously presenting the targeted word.

Maintenance Probes

Probes of each targeted word were conducted 3 months after mastery. Maintenance probes were conducted with all components of the procedure in place, with the exception of the tact prompt. From the end of treatment until the 3-month maintenance probe, echoic targets were included in Thomas' regular programing with all components of the CPP procedure in place, with the exception of the tact prompt.

Results

Figure 1 shows baseline, treatment, and treatment component removal conditions for echoic trials only, since the echoic was the primary behavior of interest. Any gaps in session numbers represent sessions that contained only echoic with tact prompt trials, which are presented separately in Fig. 2. During the echoic baseline (Fig. 1, Panel 1) for "boat," Thomas emitted echolalia during 100 % of trials. Once treatment was implemented, echolalia decreased to 0 % and correct-too-soon responding increased to 100 %. Within eight sessions, correct-too-soon responding decreased to 0 %, and correct responding increased to 100 % while echolalia remained at 0 %. Baseline probes of "ball," "keys," and "puppy" showed continued echolalia.

Once treatment was implemented with the target "ball" (Fig. 1, Panel 2), echolalia immediately decreased, and correct responding increased. Continued probes of the target "boat" with the treatment in place showed continued high percentages of correct responding.

Once echolalia decreased in treatment for the targets "boat" and "ball," attempts were made to remove components of the treatment with the targets "keys" and "puppy" (Fig. 1, Panels 3 and 4). Upon implementation of the finger-cue-only for the target "keys," echolalia initially decreased, but then increased to 60 %. For "puppy," with the finger-cue-only, echolalia remained between 60 and 80 %. Therefore, the pause in isolation was evaluated. During the pause-only for the target "keys," echolalia decreased to 40 %, and correct responding occurred at 60 %. A similar pattern was observed for "puppy." When the point prompt only was evaluated, Thomas engaged in 100 % echolalia and 0 % correct responding for both targets. Finally, during implementation of the point with picture cue, Thomas responded with 100 % echolalia and 0 % correct responding for both targets. Following attempts to remove components of treatment, a reversal to baseline was conducted with "keys" and "puppy" and revealed 100 % echolalia and 0 % correct

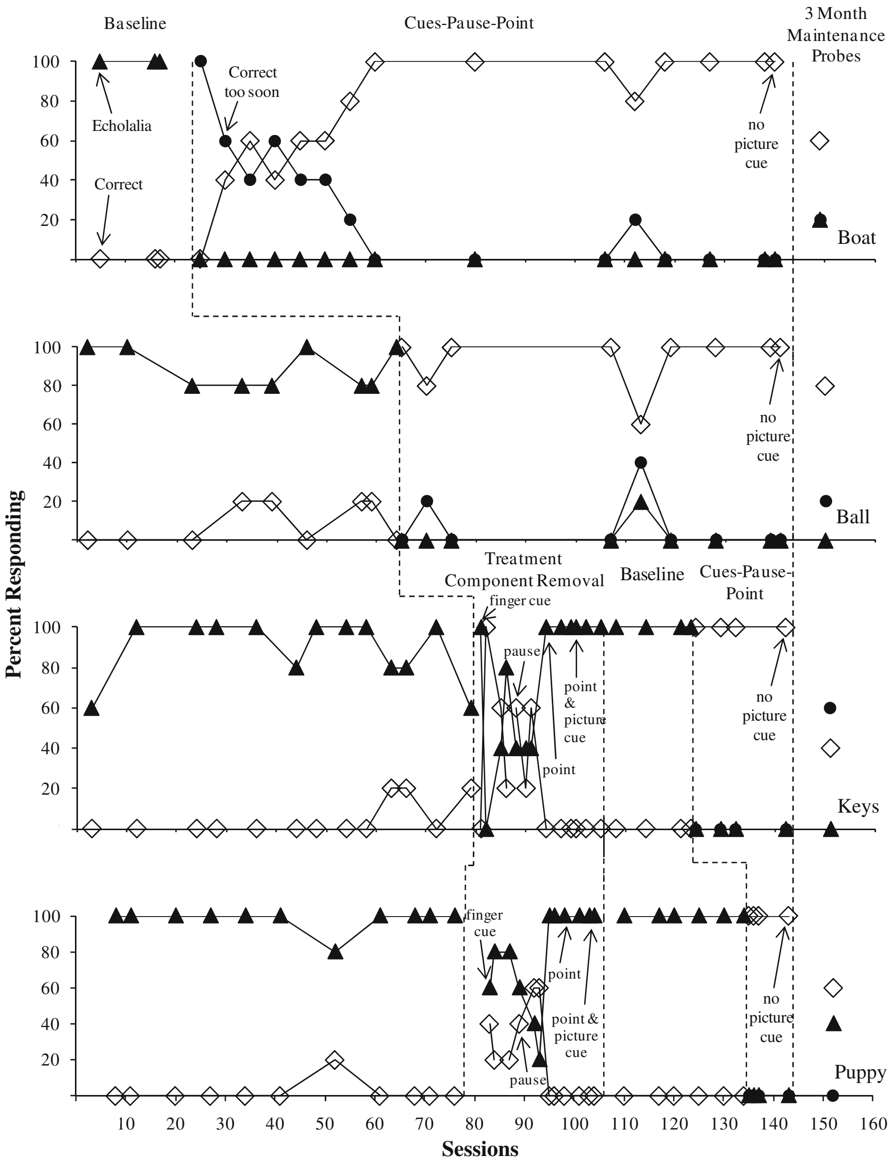

Fig. 1 Thomas' percentage correct responding and percentage echolalia during baseline, treatment, and treatment removal sessions are depicted for echoic trials only

responding. Therefore, the entire procedure was implemented, first with "keys" and subsequently with "puppy." Once the entire procedure was implemented with the target "keys," echolalia decreased to 0 %, and correct responding increased to 100 %. Baselines of "puppy" (Fig. 1, Panel 4) showed continued echolalia. Once the entire procedure was implemented with "puppy," echolalia decreased to 0 % and correct responding increased to 100 %.

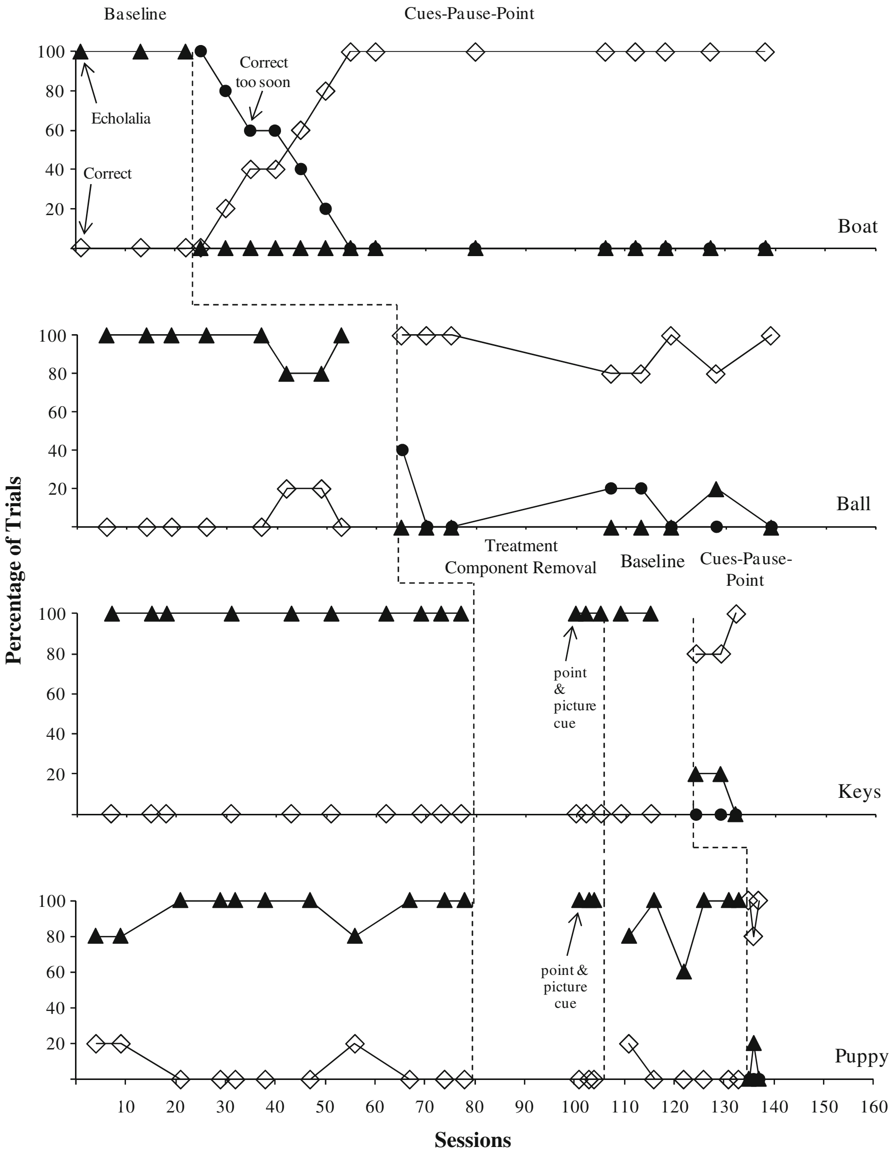

Fig. 2 Thomas' percentage correct responding and percentage echolalia during baseline, treatment, and treatment removal sessions are depicted for echoic with tact prompt trials only

For the final data point of the CPP phase for each target, the echoic with tact prompt trials were discontinued, and only echoic trials with the CPP procedure in place were conducted. For all targets, echolalia remained at 0 %, and correct responding remained at 100 %. A 3-month follow-up with CPP in place revealed 40–80 % correct responding.

Figure 2 shows baseline, treatment, and treatment component removal conditions for echoic with tact prompt trials only. Any gaps in session numbers represent sessions that contained echoic trials only. Results obtained from the echoic with tact prompt trials were very similar to those observed on echoic trials. Note that the gap between sessions 80 and 100 for “keys” and “puppy” reflects the fact that these component removal sessions did not contain tact prompts.

Discussion

The purpose of the current study was to examine the effectiveness of the CPP procedure in decreasing echolalia of the instruction “say” during echoic responding with a child with autism. The results indicated that the CPP procedure could be applied to effectively reduce echolalia of verbal instructions during echoic training and increase correct responding. Additionally, the results were obtained in a short period of time. Correct responding increased to 100 % with the target “boat” following eight sessions of treatment, and the implementation of the full treatment package on subsequent targets (i.e., “ball,” “keys,” and “puppy”) resulted in an immediate increase to 100 % correct responding. These results suggest that once effectiveness is established with one target, the CPP procedure can produce immediate behavior change when implemented with subsequent targets. This finding has important implications regarding the ease of implementing this procedure in educational settings.

When treatment was implemented with “boat,” echolalia immediately decreased to 0 %, and correct-too-soon responding immediately increased to 100 %. This result is interesting for two reasons: (1) the immediate suppression of echolalia suggests that the constellation of antecedent stimuli involved in the CPP procedure exerted an abative effect on echolalia and that this abative effect may have been due to prior history with some or all of these stimuli and (2) in the absence of echolalia, a novel behavior (i.e., correct-too-soon responding) emerged, but appeared to extinguish within eight sessions of CPP treatment. With regard to the abative effect of CPP stimuli, Thomas never engaged in echolalia during CPP treatment, and therefore never contacted the “shh” consequence, until the treatment component removal was initiated with “keys” and “puppy.” Thomas’ behavior contacted the “shh” stimulus during 124 trials in the treatment component removal phases, but only during five trials out of all sessions involving the full CPP treatment. These five trials were during CPP treatment sessions that occurred following the treatment component removal phases. Thus, the initial observed decrease in echolalia could not have been due to a punishing effect of the “shh” stimulus, nor could the stimuli associated with CPP have become conditioned as discriminative stimuli for punishment (S^{Dp}s; O’Donnell 2001) during the current study prior to the treatment component removal. Since the finger cue used in CPP is a common social stimulus that may be associated with quiet behavior, it is possible that such a function may have existed due to Thomas’ learning history outside of the present study. However, the emergence of echolalia during the component removal, when the finger-cue-only was present, suggests that the finger cue alone did not exert stimulus control in reducing echolalia.

Attempts to remove components of the CPP treatment demonstrated that the finger-cue-only and the pause-only did result in some decrease in echolalia; however, the results were not as substantial as the results observed with the entire treatment package. In contrast, the point in isolation and the point with the picture cue in isolation did not result in any decrease in echolalia. Furthermore, echolalia remained low and correct responding remained high for each target when the echoic trials were run in isolation at the end of the study. Thus, it is difficult to determine the necessity of the tact prompts. It is possible that order effects related to the specific sequences of component removal, and the fact that they were only removed briefly at the end of the study, may have influenced the degree to which various components of treatment appeared to be necessary and effective.

The results of the current study are notably different from those of prior studies applying CPP to the intraverbal (McMorrow and Foxx 1986; McMorrow et al. 1987; Foxx et al. 1988) in which generalization to untreated targets and maintenance of results in the absence of the full procedure were observed. Future research applying CPP to the echoic may better address these questions by conducting a thorough component analysis to determine which components of treatment are critical. Future research may also examine whether extended contact with the "shh" stimulus during such an analysis may condition different S^{Dp}s, and thus facilitate the removal of other CPP treatment components, or if it is possible to promote generalization of treatment through additional procedures (e.g., fading, training additional stimuli).

With regard to Thomas' correct-too-soon responding, one explanation may be that this novel response only had an opportunity to occur during CPP sessions (i.e., during the 2-s pause), but was placed on extinction by the CPP procedures used in the current study, and therefore decreased to zero rates in a short amount of time. We suggest that extinction was in effect due to the re-presentation of the S^D "say" contingent on correct-too-soon responding; reinforcement was only provided contingent on a correct response that occurred following the point and presentation of the targeted word. This finding is especially significant since this response form (i.e., correct too soon) was not observed, and thus was not addressed, in the original body of CPP literature. Thus, the current investigation extends the effectiveness of the CPP procedure by adding procedures to address this novel response form that may emerge when targeting echoic responses.

Though it certainly would have been possible to avoid the inappropriate echolalia of the instruction "say" by excluding it from echoic programing, it did not seem clinically appropriate for Thomas. Specifically, he engaged in high rates of echolalia of most verbal behavior of other individuals across many operants. Given his advanced verbal behavior at such a young age, it was anticipated that he would likely be part of a regular education setting. Although the treatment team could have recommended exclusion of the instruction "say," the likelihood of Thomas never contacting the "say" during instruction in the natural environment seemed quite low. Therefore, it was most clinically relevant to enhance his ability to attend to the appropriate instructions without echoing them and to provide a strategy that would be effective when the instruction "say" was used.

There are some limitations to the current study which warrant further investigation. First, the study was conducted with one participant, and thus, there is an absence of replication across participants. Future research should replicate this study's findings in order to increase the overall external validity of the CPP procedure when applied to the echoic repertoire. In addition, future research may wish to include direct observation of generalization of the procedure outside the training setting. Finally, although the results of the treatment component removal tentatively suggest that the tact trials used in CPP treatment may not have been necessary, it is still unknown whether similar results would have been obtained had tact prompts been excluded from the outset of CPP training. Future research may wish to evaluate an initial CPP package that does not include trials with tact prompts. Such an evaluation would be particularly valuable to determine whether CPP would be effective with children who engage in problematic echolalia during echoic training but do not have existing tact repertoires, and for whom pre-experimental tact training is not an option.

In summary, the CPP procedure has a documented history of successfully reducing echolalia during intraverbal training with adults with intellectual disability, and the current study has extended this procedure to children with autism during echoic training. In this context, it is possible that a novel response form (i.e., correct-too-soon responding) may emerge, and the current study proposes an addition to the CPP procedures that may reduce this form of responding as well as echolalia. Furthermore, this procedure has applied clinical relevance and educational utility, given the difficulties that persistent echolalia may present for educators who work with children with autism.

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