

2005

A Comparison of Two Prompting Procedures on Tacting Behavior

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A Comparison of Two Prompting Procedures on Tacting Behavior

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts in Applied Behavior Analysis
College of Graduate Studies
University of South Florida

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Date of Approval:
April 15, 2005

Keywords: behavior, autism, tacting, prompting, verbal

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Kelley Gardner

ABSTRACT

The focus of the current study was to determine the most effective way to teach tacts, or labels, to children with autism who have a language deficit. Two participants were included in the study, which compared two prompting procedures, the verbal prompting condition and the gestural prompting condition.

The verbal prompting condition included presenting a target picture and the verbal prompt, "What is it?" In the gestural prompting condition, a picture was presented, but rather than the verbal prompt, a pointing prompt was offered. Approximately 32 sessions were conducted 2-3 times per week. The effects of the two interventions were evaluated using an alternating treatment design.

The results showed that both participants could effectively gain new tacts, or labels, regardless of the prompting condition. Although, participant 1 showed higher percentages of skill acquisition with the verbal prompting condition while participant 2 showed higher percentages with the gestural prompting condition. Therefore, this study has implications for the design and implementation of future language programs for children with autism or similar disorders.

Literature Review

The following literature review will describe strategies that have proven to be effective in teaching children with autism to engage in verbal behavior. The strategies that will be described have increased the tacting, or labeling behavior, as well as the manding, or requesting, behavior of the participants. Following the literature review will be a study that compared two prompting procedures to determine the most effective way to teach children with autism to label pictures of items in their environment.

Children with disabilities, specifically autism, often engage in inappropriate or disruptive behaviors due to their difficulties in acquiring communication (Koegel, Koegel, Kellegrew, & Mullen, 1996). It is noted that these behaviors are a direct result of lack of communication and, if taught to communicate effectively, these behaviors would diminish. For example, because they are often unable to say that they need a break in the classroom or other similar setting, they will tantrum to avoid completing a task. Therefore, several studies have been conducted to determine the best practices in developing spontaneous verbal behavior and verbal initiations in children with autism. Once functional language is a part of the child's repertoire, problem behaviors decrease and the likelihood that the child will be integrated successfully into the community with typical peers increases. Community integration is extremely important because it prepares the child to be as independent as possible later in life, it prevents the individual from relying on services that may not be available, and it increases the quality of life

for the particular individual. Interventions that focus on increasing a child's verbal repertoire are consistent with Positive Behavioral Support, which is the "application of behavioral principles within the context of community norms to reduce problem behaviors and build appropriate behaviors that result in durable behavior change" (Marquis et al., 2000).

Verbal Behavior

Verbal behavior is defined as "behavior, which is effective only through the mediation of other persons" and "cannot be distinguished from behavior in general" (Skinner, 1957). In *Verbal Behavior*, Skinner identifies six types of functional relations in verbal behavior: echoic, textual, intraverbal, audience, mand, and tact.

The echoic, textual, and intraverbal responses are all determined by a prior verbal stimulus. For example, in the echoic response, the prior verbal stimulus is auditory. In this situation, a vocalization would be made and the appropriate response would be to imitate the vocalization. In a textual response, the verbal stimulus is written or printed, which includes academics such as reading and writing. In an intraverbal response, the stimulus is auditory and/or written or printed. This can include filling in blanks or answering questions. The intraverbal response is the verbal operant that is most similar to having a conversation.

Skinner describes the audience response as a verbal operant in which a prior stimulus, usually nonverbal, controls groups of responses. When two or

more responses are under the control of the same stimulus, the audience acts to select one of them.

For example, the mand is “a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation” (Skinner, 1957). The manding response has no specified relation to a prior stimulus (Michael, 1988) and is quite different from the other verbal operants in that it benefits the speaker rather than the listener. To put it in layman terms, a mand is simply a request for an object, action, information, etc.

Tacting is a verbal operant in which the “stimulus which controls the form of response is usually nonverbal” (Skinner, 1957). It may also be simply stated as labeling. A tacting response could include labeling pictures, objects, actions, emotions, etc.

Interventions/Research of Communication Development for Children with Autism

Several researchers have examined different interventions for increasing manding behavior in children with autism. One procedure for increasing manding behavior includes the use of a graduated time delay (Charlop, Schreibman, & Thibodeau, 1985). This procedure includes increasing the time between the presentation of the reinforcing stimulus and the modeled vocalization as the child imitates the vocalization. This was done in an attempt to transfer the stimulus control from the modeled vocalization to the reinforcing stimulus. Another intervention that has proven to be effective in increasing manding behavior includes the preference of the reinforcer (Dyer, 1989). This study shows that a

child is more likely to mand in the presence of a preferred stimulus rather than a stimulus that was not preferred. A third procedure for increasing manding behavior includes the interruption of a behavior chain (Hunt & Goetz, 1988). This includes allowing the child to engage in a behavior chain (i.e., washing their hands) and preventing them from completing the chain without an appropriate mand (i.e., soap). Visual cue fading is a procedure that utilizes a visual cue such as a flashcard that has the target word or phrase printed on it. In this study, the flashcard was faded by decreasing its size until the card was eliminated completely (Matson, Sevin, Box, & Francis, 1993). The final procedure for increasing manding behavior is modeling and reinforcement (Hung, 1980). In this procedure, the target response was modeled by the experimenter and the appropriate response of the participant was then reinforced. All of these procedures have research support for their effectiveness in increasing spontaneous responding or initiations in children with autism and have shown to be maintained over time and generalized to different behaviors and environments.

Researchers have also examined different interventions for increasing spontaneous speech, or tacting behavior, in children with autism. Research has included the use of a graduated time delay procedure (Charlop et al., 1985; Ingenmey & Van Houten, 1991; Matson, Sevin, Fridley, Love, 1990), use of a tactile prompt (Taylor & Levin, 1998), positive reinforcement (Stark, Giddan, & Meisel, 1968), response cost (Paniagua & Saeed, 1987), prompting and correction procedures (Sundberg, Endicott, & Eigenheer, 2000; Partington,

Sundberg, Newhouse, & Spengler, 1994), and training tacts using sign language, speech, the combination of sign and speech, or alternating between the two (Layton, 1988). Research has also supported the effectiveness of these procedures in increasing verbal initiations and/or tacting behavior in children with autism and have shown to be maintained over time and generalized to different behaviors and environments.

Research on Tacting Behavior using Time-Delay

Several studies have been conducted to address the acquisition and generalization of spontaneous speech in children with autism. A study conducted by Charlop et al. (1985) utilized a time delay procedure to increase the spontaneous speech of seven children with autism. This study was modeled after a study conducted by Halle et al (1979). In this study, a single subject design was used and replicated across seven children with multiple-baseline control. Two pretests were administered. The first was to determine whether the seven children could properly label four preferred items and the second was to determine if the phrase “I want” was in each child’s verbal repertoire. Two stimuli were concurrently trained using a time-delay procedure in which the time delay started at 2 seconds and then increased in increments of 2 until it reached 10 seconds. All seven children learned to request spontaneously for preferred items and the spontaneous verbalizations generalized to unfamiliar persons, places, and stimuli (Charlop et al., 1985).

Another study conducted by Matson et al. (1990) was a replication of the previous study conducted by Charlop et al. (1985). The participants included

three children with autism and a time delay procedure was used to increase spontaneous speech. In this study, the children were trained to engage in two spontaneous phrases, “please” and “thank you” and one verbally prompted phrase, “you’re welcome.” As in the previous experiment, the time delay started at 2 seconds and then increased by 2 seconds until it reached the maximum at 10 seconds. A multiple-baseline design across behaviors was conducted and the results indicated that the spontaneous use of all three phrases improved for all three participants. All three children showed improvement during follow up, as well.

Similar to the studies conducted by Charlop et al. (1985) and Matson et al. (1993), another study was conducted by Ingenmey and Van Houten (1991) to determine the effects of a time delay procedure in increasing spontaneous language. The participant was a 10-year-old male with autism who was asked to carry out a motor response while drawing or playing with a car. After he carried out the motor response, he was asked a question regarding the response. Data were collected using multiple-baseline design across behaviors and the time delay varied from 2 seconds to 10 seconds depending on the trial number. As in the previous studies, the child’s spontaneous speech immediately increased and was maintained at high levels.

Research on Tacting Behavior using Sign language and/or Speech

Research has been conducted on using sign language as well as speech to increase the tacting, or labeling, behavior of children with autism. A study conducted by Layton (1988) was designed to examine whether comprehension,

production, and spontaneous use of language were greater following training by sign alone, speech alone, simultaneous training using sign and speech, or alternating between sign and speech. The study also examined whether children that were good verbal imitators compared with children who were poor imitators benefit from the same type of treatment and whether the maintenance of the language learned depended on the treatment condition. Sixty participants with moderate to severe autism were randomly assigned to one of the four treatment conditions, but were divided into high- and low- verbal imitators based on their imitation performance. The experimental treatment conditions included 90 individual 40- minute daily sessions and the training consisted of seven parts including affected objects (i.e., food and toys), action-related words (i.e., want or eat), attributes, and nominals. The training included shaping, fading, independent production, generalization, and retention. The only variable that changed from each condition was the use of verbal prompts compared to the use of sign-language prompts, combining the two, or alternating between the two. To the researchers surprise, not all of the children in this study preferred the sign training compared to the speech training. The results showed that the low-verbal imitators did well on all three conditions with the exception of the speech alone condition, while the high-verbal imitators did equally well in all four treatment conditions. Although the high-verbal imitators performed better than the low-imitators in all treatment conditions, the items learned in the training sessions maintained for the three month follow up for both groups of participants.

Research on Tacting Behavior using a Tactile Prompt

Another study in which research was conducted on verbal initiations with children with autism was performed by Taylor and Levin (1998). This study examined the effects of a tactile prompt to increase the verbal initiations of a 9-year-old with autism about his play activities. The tactile prompt utilized in this study was called the “Gentle Reminder.” This unobtrusive device is a programmable vibrating beeper that vibrates for several seconds at specific intervals. A multiphase multi-element design was used to show the prompt’s effectiveness in initiating language during three activity phases. The three activity phases included playing with trains, playing with tractors, and playing with dinosaurs. The three experimental conditions in this study were: (1) the no prompt condition, (2) the verbal prompt condition, and (3) the tactile prompt condition. The results showed that the tactile prompt was effective in producing verbal initiation during all three play phases and was more effective than the verbal prompt condition.

Research on Tacting Behavior using Response Cost

To increase productive labeling and functional language, Paniagua and Saeed (1987) conducted a study with an 11-year-old with normal social and academic functioning. The child spoke within the normal range until she was five years old. At that time, her verbal interactions progressively decreased to zero. The productive labeling treatment package used with this child consisted of presenting a common picture and giving the child 30 seconds to label or tact the picture. Verbal instructions, imitative procedures, praise and response cost were

given. For the response cost intervention, tokens were given to the participant freely prior to each training session and were removed for her failure to label the picture card. The criterion to maintain her tokens on the table was gradually increased during the study. If the participant kept all of the tokens at the end of the training session, she was allowed to purchase a snack at a designated time each day.

In the functional language treatment package, the child was again presented with a picture as well as questions corresponding to the pictures and personal information. Once again, praise and response cost were used. The final treatment package consisted of having the child ask the therapist questions regarding the pictures. In this case, response cost, modeling, and verbal instruction were used. The results showed that the child began to properly label the items presented and also answered questions presented by the therapist or her parents. The child began using more words with her interactions with other people, which suggests that the intervention generalized to other settings and individuals.

Research on Tacting Behavior using Positive Reinforcement

Stark, Giddan, and Meisel (1968) conducted a study to increase verbal behavior in a child with autism. The participant included a five-year-old child with autism who was virtually unresponsive to all types of environmental stimuli prior to the intervention. The experimenters saw the child four days a week for approximately one-and-a-half hour periods. The experimenters focused their attention of non-vocal imitation, vocal imitation, verbal labeling, and then verbal

discrimination. The behavioral procedures used to train the child included prompting, fading the prompts, and positive reinforcement. Reinforcement was provided by praising the child (i.e. “good boy”) and offering the child a piece of candy or cereal. The results showed that, after 8 months, the vocal imitation of the child improved as well as the child’s ability to label and discriminate. The child can now reproduce new words that have four phonemes and training sessions can now be conducted without the use of a candy reward. There was no design reported for this study.

Research on Tacting Behavior and the use of Prompting and Correction

Procedures

A study was conducted to increase the tacting behavior of a 6-year-old non-vocal child with autism by Partington et al. (1994). The child had repeatedly failed to acquire tacts, but had acquired several signs as mands, simple intraverbals, and imitative responses. The study was composed of three phases in an ABACADA design. The first phase compared imitative versus intraverbal correction. In this phase, nine stimuli were randomly divided into three sets of objects. The experimenter did not ask the participant “What is it?” but pointed to the object in a box. The first set received an imitative correction procedure (the experimenter modeled the correct sign), the second set received the intraverbal correction procedure (the experimenter would say, “sign _____”), and the third set remained untreated in which no correction procedure was used. The results of this phase indicated that the child acquired tacts using both corrective procedures while eliminating the verbal prompt “What is that?”

Verbal versus pointing prompts were compared in the second phase. In this phase, nine pictures were used and again divided into three sets. The first set received the verbal prompt “What is that?” A pointing prompt was used for the second set and the third set was again left untreated. The results show that both prompting procedures produced correct tacting. However, criterion was met in four sessions during the verbal prompt procedure compared to nine sessions in the pointing procedure. In addition, fewer prompts were needed during the verbal prompting phase.

The final phase of this study compared the acquisition of pictures versus objects as tacts. All factors remained the same in this phase with the exception of the stimuli used to elicit the tacting response. In this phase, the experimenter compared objects versus pictures. The results for this phase show that tacts were rapidly acquired for both sets, although the participants achieved the criterion on objects before doing so for pictures.

A similar study was conducted by Sundberg, Endicott, & Eigenheer (2000) in which two, non-vocal children with autism also had acquired a few signs as mands, but again repeatedly failed to acquire tacts. Two procedures were compared to determine the most effective approach to training tacts. The first procedure (the standard condition) used the verbal prompt “What is that?” The second procedure (the intraverbal condition) used a specific intraverbal prompt “Sign [the spoken word].” A within-subjects design with a between-subjects replication was used. “The within-subject comparisons were achieved by the use of a multi-element design that included a reversal design” (Sundberg et al.,

2000). Objects were selected based on their lack of reinforcing properties. To qualify as a target tact, the child had to be able to imitate the sign for the object, fail to tact the object, and fail to emit the sign given only the spoken English word. The results showed that participant 1 performed slightly better with the standard procedure while participant 2 acquired tacts during both conditions, but did substantially better in the intraverbal condition. Approximately 1 year after the start of the study, both participants had acquired over 50 tacts and receptive discriminations. Both participants also successfully responded to the verbal prompt and no longer needed the intraverbal prompt procedure.

Conclusion

The studies reviewed show that there are several procedures that are often effective in eliciting verbal initiations by children with autism. Successful procedures have included a time delay procedure, the utilization of a tactile prompt, training tacting using sign language, speech, the combination of the two, or alternating between the two, response cost, positive reinforcement, and the use of prompting and correction procedures.

Purpose of Study

The purpose of this study was to replicate research conducted by Sundberg et al. (2000) to determine the most effective prompting procedure for the acquisition of tacts for children with autism. In his study, two prompting procedures were compared to determine which was most effective for training tacts to non-vocal children who had acquired a few mands using sign language. A verbal prompt condition (“What is it?”) was compared to an intraverbal

prompting condition in which the experimenter prompted by saying “Sign “target tact.”

The current study was conducted with vocal participants so the intraverbal prompting condition was not appropriate. Therefore, the verbal prompting condition was compared with a gestural prompting condition in which the investigator pointed to the picture rather than provided the verbal prompt “What is it?”

This study adds to the literature regarding the most effective way to teach tacts, or labels, to children with autism or other related disabilities who are vocal.

Research Questions

Do verbal children with autism acquire tacts more effectively using a verbal prompt or a gestural prompt?

Which correction procedure is more effective, an imitative corrective procedure or intraverbal correction procedure?

Do children with autism acquire objects or pictures as tacts more effectively?

Method

The current study was a systematic replication of the Sundberg et al. (2000) study in which the effectiveness of an intraverbal prompt was compared with the effectiveness of a verbal prompt on the acquisition of tacts with 2 non-vocal children with autism. The current study compared the effectiveness of two prompting procedures on the acquisition of tacts for two children with autism that are vocal. A verbal prompting condition (i.e. “What is it?”) was compared with a gestural prompting condition (i.e. pointing prompt). The participants, dependent and independent variables, procedure, and reliability procedures are described below.

Participants and Setting

Participant 1 was a 5-year-old male who was diagnosed with autism at the age of 13 months. He had been in a 40-hour per week in-home verbal behavior training program for approximately 3 years. During this time, he had acquired approximately 250 tacts, which included objects, pictures, actions, body parts, people, etc. The child also had approximately 50 mands, several intraverbals, and could receptively discriminate nearly 250 items and pictures. The child had previously been trained to tact, or label, items using the standard verbal prompting procedure, “What is it?” although gestural prompts as well as no prompts were used with the child to increase his spontaneous tacting, or labeling.

Participant 2 was a 4-year old male who had been diagnosed with autism. He had received a few hours of therapy per week for approximately 2 years,

although his therapy hours had been inconsistent. For the 6 months prior to the start of the study, he consistently received 6-10 hours per week of language training. During this time, he had acquired approximately 15 tacts, or labels, 10 mands, or requests, and could receptively discriminate approximately 15 items. This participant learned to acquire tacts through the use of verbal prompts, gestural prompts, and the absence of prompts.

The study took place in a secluded area in each child's home. Approximately two to three sessions per week were conducted with the child at a table that had previously been used for verbal behavior training and was familiar to the child. The sessions lasted between 10 and 20 minutes.

Dependent and Independent Variables

Data were collected during the probing and training sessions on the data sheet attached (see appendix A). During the pre- and post- session probes, data were collected on the cumulative number of correct tacts as well as the total percentage correct for each prompting condition. During the training sessions, data were collected on the number of error corrections that were provided to each participant and the percentages correct on the initial trial (the first trial) and the total percentage correct (all three trials) for each participant in each prompting condition.

The data sheet consisted of listing the target tacts down the left column grouped by their prompting procedure. The dates were listed across the top as well as three categories, one for the pre-session probe, one for the training session, and one for the post-session probe.

In the probe columns, a “Y” and an “N” was listed. The experimenter circled the “Y” if the participant correctly labeled the item within 5 seconds of its presentation and an “N” if the participant failed to respond or incorrectly labeled the target tact within 5 seconds of its presentation. During the probes, the target item was presented in a random order without any prompts and reinforcement was withheld.

In the training session columns, there were three spaces in which the experimenter either wrote a “Y” or an “N”. The three spaces allowed for the three opportunities the participant had to respond to the target tact. For the standard or the verbal prompting condition, the participant was presented with a picture and asked “What is it?” If the child responded correctly within 5 seconds, the experimenter wrote a “Y” in the first column and verbal praise was given as well as a primary reinforcer. If the participant responded incorrectly or failed to respond, a correction procedure was implemented and an “N” was placed in the first column. During the correction procedure, an imitative prompt was presented and the experimenter waited for the child to echo the appropriate word. Then the verbal prompt “What is it?” was presented again. For a correct response, only verbal praise was offered while a “Y” was placed in the second column. For an incorrect response or no response, another imitative prompt was offered and an “N” was placed in the second column. The prompt was then presented a third time. A correct response was followed by verbal praise and a “Y” was placed in the third column and an incorrect response or a failure to respond was followed by an error correction procedure and an “N” was placed in the third column. The

prompt was not again presented at this time. The gestural condition was similar to the verbal prompting condition except a gestural prompt (pointing prompt) was given rather than a verbal prompt (What is it?).

The independent variable included the manipulation of the two types of prompts that were used to elicit the tacting responses: the verbal prompt (“What is it?”) and the gestural prompt (pointing prompt).

Experimental Design

An alternating treatments design was implemented to compare the effects of the different prompting procedures on tacting behavior. This design was chosen to prevent sequence effects. Baseline data were collected over 5 sessions to show that the target tacts were not initially a part of the participant’s tacting repertoire prior to the beginning of the study. The intervention, the manipulation of the gestural or verbal prompt, was then conducted with each participant for a total of 32 sessions. Therefore data were collected for a total of 37 sessions for each participant.

Procedure

Pre-Assessment. A pre-assessment was conducted with each participant to ensure that the participant could respond to both gestural and verbal prompts. This was conducted by presenting 10 known pictures of items and allowing the child to respond to both prompting procedures that were presented in a random order. Both participants were able to correctly label the pictures that were presented while given verbal and gestural prompts.

Word selection. Ten pictures of items were chosen that had not previously been trained and received incorrect or no responses during a baseline assessment. Prior to the item being chosen as a target tact, the child had to be able to correctly approximate the word for the tact. An approximation for a target tact was determined by having each child echo the word for the tact (e.g., “say ball”) and ensuring that the child could vocalize at least a consonant-vowel combination included in the tact (eg. “ba” for “ball”).

Baseline included the experimenter presenting the target picture to the child without presenting any prompts. If the child did not respond correctly or failed to respond within 5 seconds, a gestural prompt (pointing prompt) was presented. After the presentation of the gestural prompt, if the child failed to respond or did not respond correctly within 5 seconds, a verbal prompt was then presented (“What is it?”). The participant was again given 5 seconds to respond correctly. If the child did not respond correctly at this time, the item was included in the study as a target tact. If, at any time during the initial assessment, the child responded correctly to the target item within 5 seconds, the item was not to be included in the study as a target tact. The data sheet for baseline data can be found in Appendix B and the target tacts are listed in Table 1.

Table 1

Target Tacts for Participant 1 and 2

Participant 1		Participant 2	
Verbal	Gestural	Verbal	Gestural
Hanger	Celery	Book	Grass
Printer	Pot	Chair	Fry
Dishwasher	Cooler	House	Fish
Dustpan	Picture	Duck	Pillow
Vase	Stapler	Crayon	Bear

Probes and intervention. Two probes were conducted during each training session. The pre-session probe was conducted prior to the start of each session and the post-session probe was conducted at the end of each training session. The data collected during these probes consisted of calculating the cumulative number of correct tacts for each training session.

During the probe sessions, the target pictures were presented to the participant without the researcher presenting any prompts. The pictures were presented in an alternating order during each session by utilizing a random number table. A correct response consisted of the participant correctly tacting the item within 5 seconds of the presentation of the picture without saying any other words or sounds. There was no reinforcement or prompts provided during this time. With each response, either incorrect or correct, the experimenter would present the next target stimulus until all ten pictures had been presented. After each probe session, the cumulative number of correct tacts was calculated as well as the total percentage correct for each prompting condition.

For the training sessions, the ten stimuli were divided into two sets of 5. The first set received the standard, or the verbal prompt condition, while the

second set received the gestural, or pointing prompt condition. The order of training was alternated between the two conditions during each training session by again using a random number table. For the standard or the verbal prompting condition, the participant was presented with a picture and asked “What is it?” If the child responded correctly within 5 seconds, verbal praise was given as well as a primary reinforcer, such as food, chosen by the participant prior to the start of the training session. If the participant responded incorrectly or failed to respond, a correction procedure was implemented. During the correction procedure, an imitative prompt was presented (e.g., the experimenter would say “say sun”) and the experimenter waited for the child to echo the appropriate word (e.g., “sun”). Then the verbal prompt “What is it?” was presented again. For a correct response, only verbal praise was offered and for an incorrect response or no response, an imitative prompt was offered. A third prompt was then presented. Once again, if the child responded correctly, verbal praise was offered. If the child responded incorrectly or failed to respond, another error correction procedure was implemented but it was not again followed by the verbal prompt.

The gestural prompt condition consisted of presenting the picture of the target item to the participant and only pointing to the picture without presenting any verbal prompts. A correct response emitted within 5 seconds of the gestural prompt was reinforced with verbal praise as well as a reinforcing item chosen by the participant. If the participant did not respond or incorrectly responded, a correction procedure similar to the one stated above was implemented. The

experimenter offered an imitative prompt but returned to the gestural prompt rather than the verbal prompt. Once again the gestural prompt was presented with a target tact three consecutive times similar to the verbal prompting condition.

To keep the interaction time constant, each participant had 3 opportunities to respond correctly to the target stimulus. For example, the experimenter presented the target tact as well as a prompt to the participant. If the child responded correctly on the first trial, praise and a primary reinforcement was provided. If the child did not respond correctly on the first trial, an imitative prompt was offered and reinforcement was withheld. A second prompt was offered to the participant regardless of whether the child correctly or incorrectly labeled the item during the first trial. If the child responded correctly at this time, praise was provided and followed by a third prompt. If the child failed to respond correctly on the second trial, an error correction procedure (an imitative prompt) was implemented and followed by a third prompt. If the child responded correctly to the third prompt, only praise was provided. If the child failed to respond correctly to the third prompt, an imitative prompt was offered but was not followed with another prompt. This allowed the child 3 teaching trials for each target item and allowed the interaction time to be constant for each target tact.

Procedural Reliability. Inter-observer agreement data was collected during approximately 33% of the training sessions as well as 33% of the pre- and post- session probes. For participant 1, reliability was conducted over 12 of the 32 sessions (37.5%). For participant 2, reliability was conducted for 28.1% of the

sessions (9 out of 32). Approximately every third probe and training session was taped and viewed by a therapist with experience teaching facts, or labels, to children with autism. She collected data on an identical data sheet and received a verbal explanation of the data collection procedures as well as an opportunity to practice collecting reliability data via role-playing. For each session, the experimenter collected data on the 10 pre-session trials, the 10 post-session trials, and the 30 trials that were conducted during the training sessions (3 opportunities for each of the 10 target facts). Therefore, inter-observer reliability was taken by dividing the total number of agreements by 50 for each session in which reliability data were calculated. For participant 1, the number of agreements was 595 out of a total of 600. Therefore, inter-observer reliability for participant 1 was 99.167%. For participant 2, the Inter-observer reliability was 96.88%, which included 436 agreements out of a total of 450.

An observer “re-fresher” training was conducted a minimum of three times during the study. During this time, a review of the definition of the independent variable as well as the treatment plan to be followed was reviewed with the observer. The observer again received an explanation of the data collection procedures as well as an opportunity to practice collecting accurate data by reviewing previous tapes with the experimenter. A checklist was utilized to ensure that the experimenter had reviewed the correct data collection procedures with the observer. This process allowed those that were collecting data to be sure that the treatment plan was being followed and that the data collected were

an accurate measure of what actually occurred. The observer training checklist can be found in Appendix D.

Results

During this study, data were collected for each participant during the pre- and post-session probes and the training sessions. During the pre- and post-session probes, the percentage of correct tacts as well as the cumulative number of correct tacts was calculated. For the training sessions, data were collected on the initial percentage correct (the first trial) and the total percentage correct (across all 3 trials) for each participant for each prompting condition. The number of error corrections required for each participant was also calculated. The results from the data are explained below.

Baseline

An initial baseline was conducted with each participant to be sure that the target tacts were not a part of the child's repertoire prior to the start of the intervention. During baseline, each participant was presented with all 10 target tacts over 5 different sessions. Both participants either failed to respond or responded incorrectly to the target tacts during all three prompting conditions: the no prompt condition, the gestural prompt condition, and the verbal prompt condition.

Pre- and Post-Session Probes

The data from the pre- and post-session probes are represented in Figures 1.1 and 2.1. Both the verbal and gestural prompting conditions were effective in increasing the tacting behavior of both participants. Both participants showed a steady increase in percentages correct for the pre- and post-session

probes in both prompting conditions. In addition, the percentages correct for the post-session probes were either the same or slightly higher than the pre-session probes for both participants in both prompting conditions.

It is important to note that participant 1 did not acquire 2 target tacts (1 in each prompting condition) while participant 2 did not acquire 3 target tacts (1 in the verbal prompt condition and 2 in the gestural prompt condition). The fact that both participants failed to label items from both prompting conditions implies that this was not related to the prompting condition or the skill level of the participant. Because each participant failed to ever label these items correctly during the study, they failed to receive tangible reinforcement for doing so. Without reinforcement, the probability of each participant to correctly label these items did not increase.

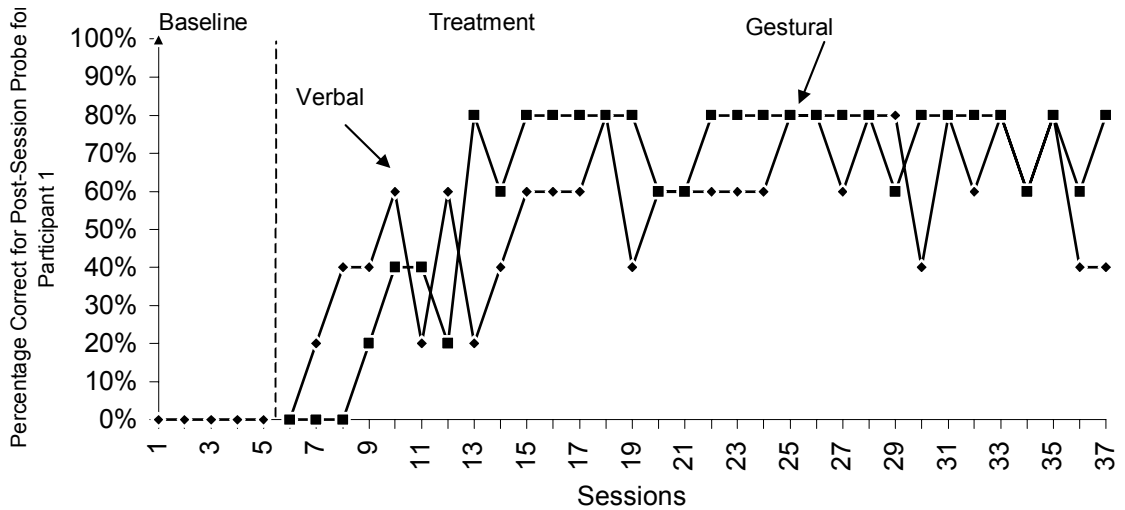
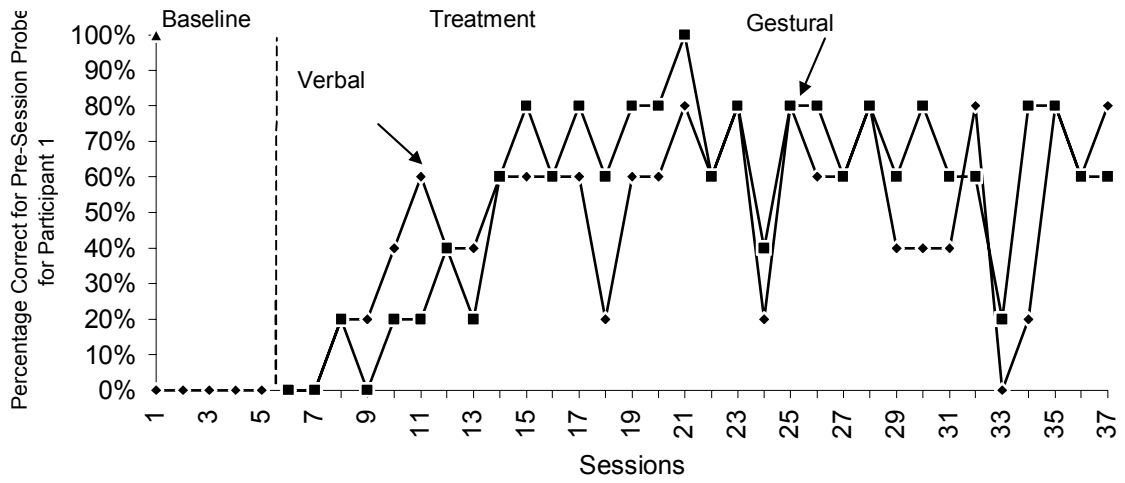


Figure 1.1. Percentage Correct during Probes for Participant 1 for Gestural and Verbal Prompting Conditions.

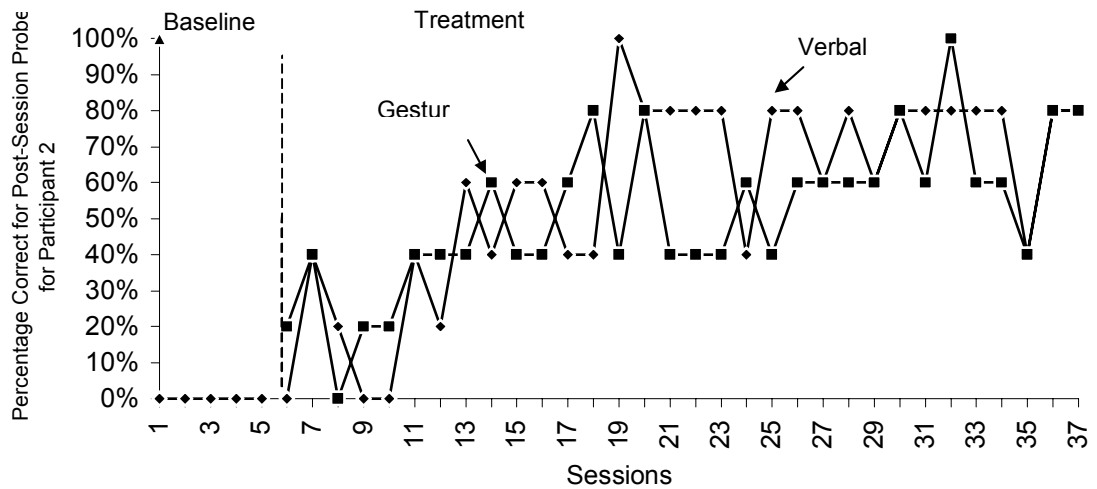
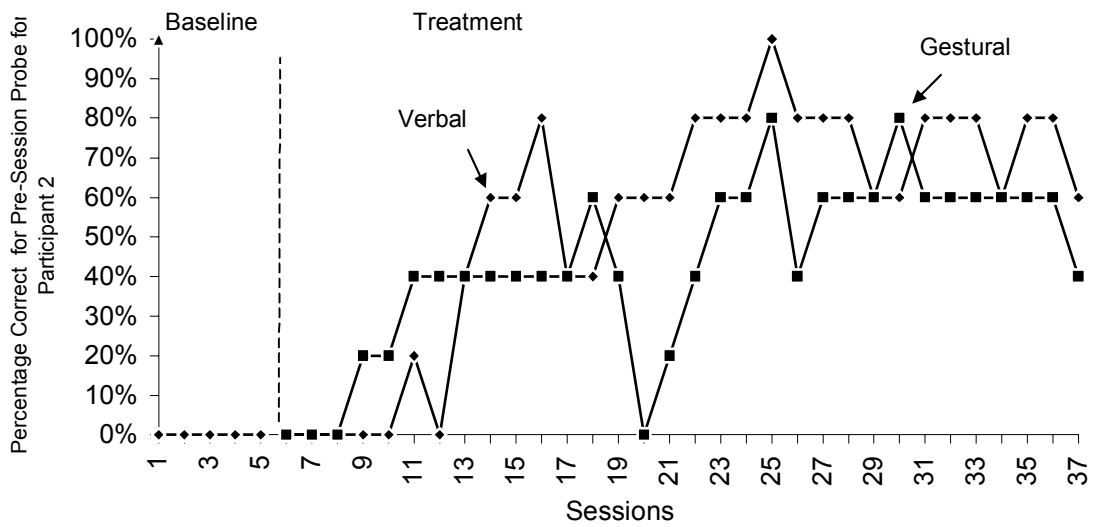


Figure 1.2. Percentage Correct during Probes for Participant 2 for Gestural and Verbal Prompting Conditions.

The cumulative number of correct facts across sessions is represented in figures 2.1 and 2.2 and listed in table 2. During the pre-session probe, participant 1 correctly labeled 78 target facts in the verbal prompt condition (48.75%) and 87 target facts in the gestural prompt condition (54.37%) out of 160 trials. Participant 2 correctly labeled 87 target facts from the verbal prompt condition (54.37%) and 69 from the gestural prompt condition (43.13%). For the post-session probes, participant 1 successfully labeled 88 facts from the verbal prompt condition (55%) and 100 from the gestural prompt condition (62.5%). Participant 2 correctly labeled 92 facts from the verbal prompt condition (57.5%) and 82 from the gestural prompt condition (51.25%) (see table 2).

For the gestural condition, participant 1 received a mean score of 55% during the pre-session probe (range=100) and 62.5% for the post-session probe (range=80). Participant 2 received a mean score of 43.125% (range=80) during the pre-session probe and 51.25% (range=100) for the post-session probe. Participant 1 scored a mean of 48.75% (range=80) during the pre-session probe and 55% (range=80) for the post-session probe in the verbal prompting condition. A mean score of 54.375% (range=100) was received by participant 2 in the pre-session probe and 57.5% (range=100) during the post-session probe for the verbal prompting condition.

Therefore, participant 1 performed better in the gestural prompting condition for the pre- and post-session probes while participant 2 performed better in the verbal prompting condition.

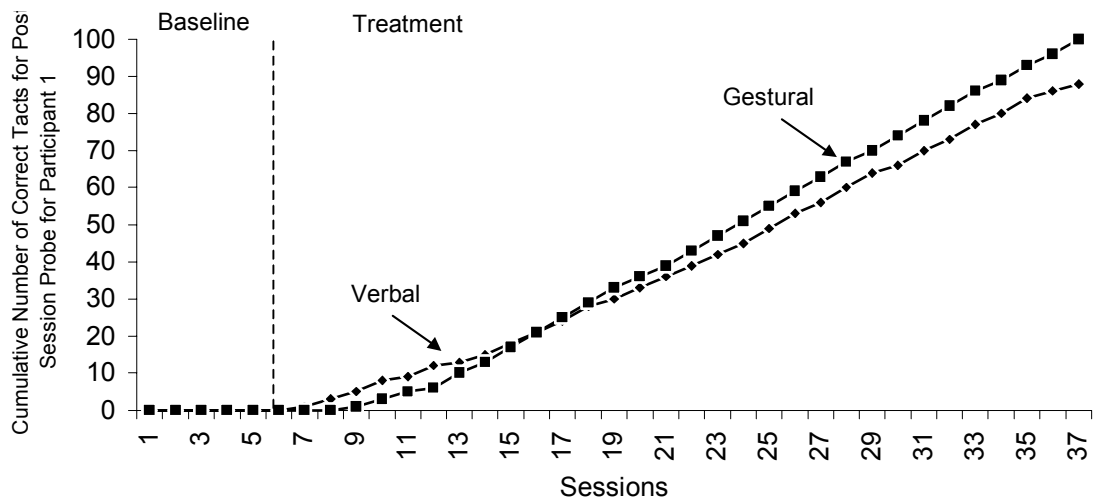
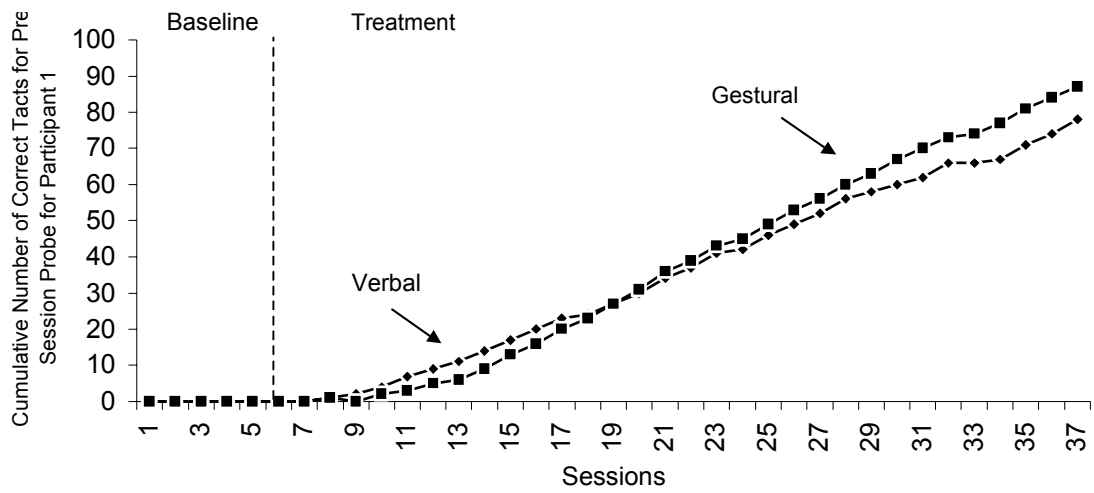


Figure 2.1. Cumulative Number of Correct Tacts for Participant 1.

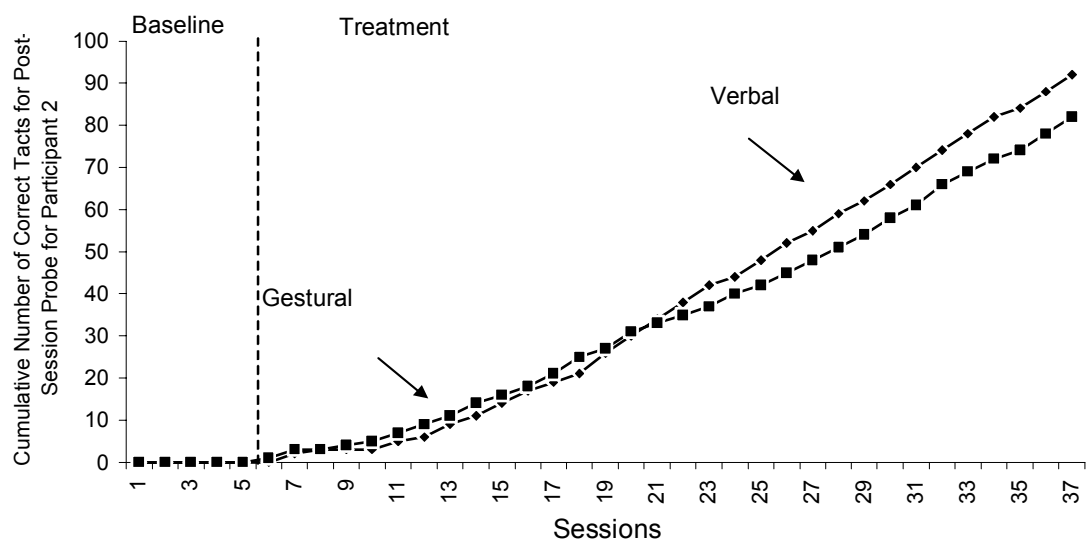
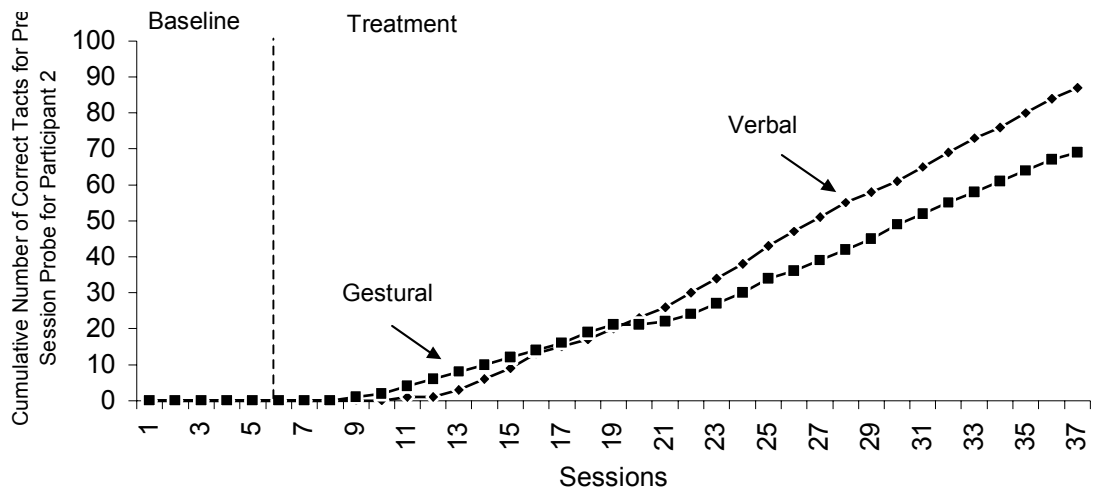


Figure 2.2. Cumulative Number of Correct Tacts for Participant 2.

Table 2

Participant 1 and 2 Pre- and Post- Session Cumulative Data

Participant 1 Sessions	Gestural Prompt Pre-Session Probe	Gestural Prompt Post-Session Probe	Verbal Prompt Pre-Session Probe	Verbal Prompt Post-Session Probe
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	1
8	1	0	1	3
9	0	1	2	5
10	2	3	4	8
11	3	5	7	9
12	5	6	9	12
13	6	10	11	13
14	9	13	14	15
15	13	17	17	18
16	16	21	20	21
17	20	25	23	24
18	23	29	24	28
19	27	33	27	30
20	31	36	30	33
21	36	39	34	36
22	39	43	37	39
23	43	47	41	42
24	45	51	42	45
25	49	55	46	49
26	53	59	49	53
27	56	63	52	56
28	60	67	56	60
29	63	70	58	64
30	67	74	60	66
31	70	78	62	70
32	73	82	66	73
33	74	86	66	77
34	77	89	67	80
35	81	93	71	84
36	84	96	74	86
37	87	100	78	88

Participant 2 Sessions	Gestural Prompt Pre-Session Probe	Gestural Prompt Post-Session Probe	Verbal Prompt Pre-Session Probe	Verbal Prompt Post-Session Probe
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	1	0	0
7	0	3	0	2
8	0	3	0	3
9	1	4	0	3
10	2	5	0	3
11	4	7	1	5
12	6	9	1	6
13	8	11	3	9
14	10	14	6	11
15	12	16	9	14
16	14	18	13	17
17	16	21	15	19
18	19	25	17	21
19	21	27	20	26
20	21	31	23	30
21	22	33	26	34
22	24	35	30	38
23	27	37	34	42
24	30	40	38	44
25	34	42	43	48
26	36	45	47	52
27	39	48	51	55
28	42	51	55	59
29	45	54	58	62
30	49	58	61	66
31	52	61	65	70
32	55	66	69	74
33	58	69	73	78
34	61	72	76	82
35	64	74	80	84
36	67	78	84	88
37	69	82	87	92

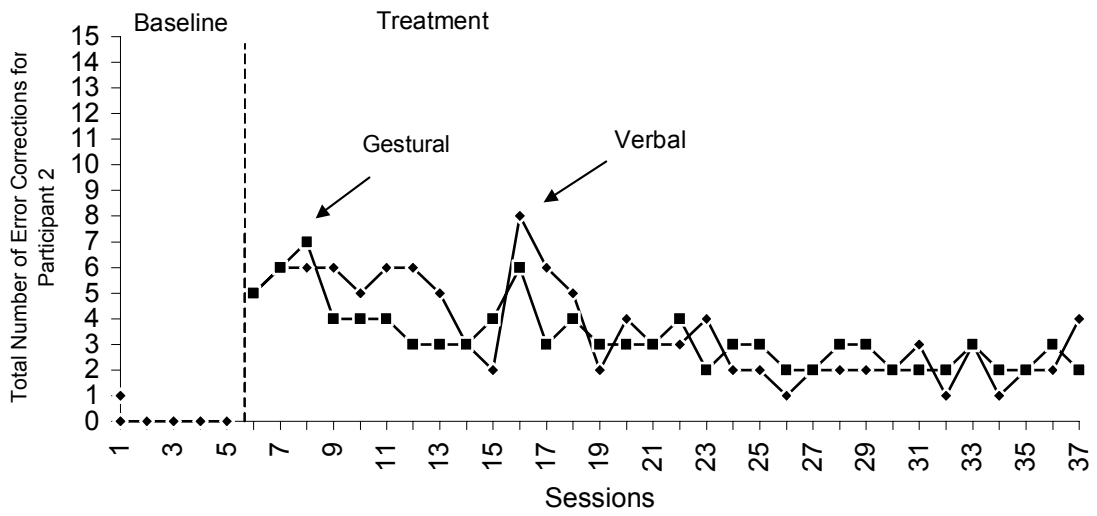
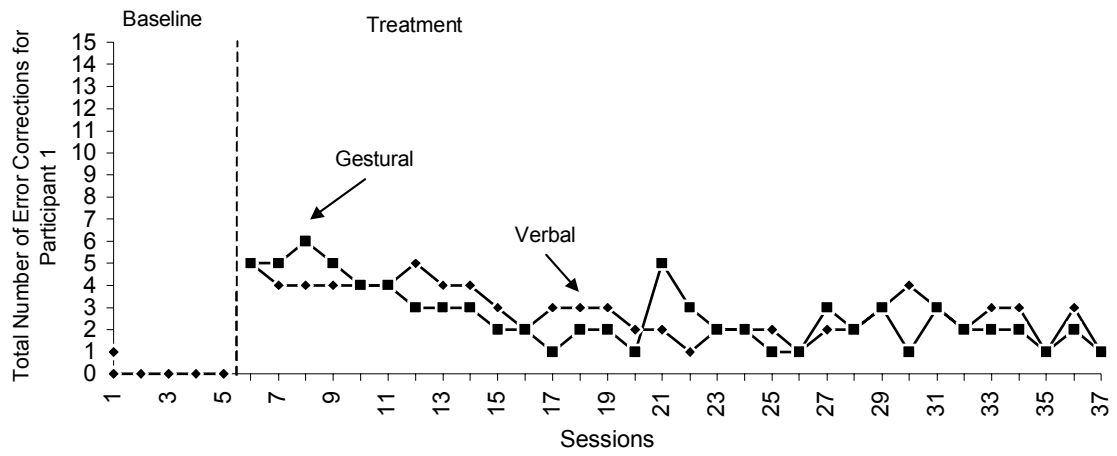


Figure 3.1. Total Number of Error Corrections for Participant 1 and 2 for both Prompting Conditions.

Training Sessions

During the training sessions, each participant was presented with the target tact as well as a prompt, either a verbal or gestural prompt, three consecutive times. If the child did not correctly label the item, an error correction procedure was implemented. The number of error corrections required for each participant during each prompting condition was calculated and is represented in table 3.1.

In addition to the error correction data, data were collected on the percentage correct for each participant during each prompting condition. The data from the training sessions is represented in figures 4.1 and 4.2. Both participants show a high percentage correct during the training sessions. For example, if an error correction procedure was implemented on the initial teaching trial (i.e. the participant was given an echoic prompt, “say sun”), in most cases, both participants correctly labeled the target tact during the following two trials due to their echoic tendency. So, although they may have correctly labeled the target tact 2 out of 3 times, it may not have been because they had finally learned the appropriate label for the item. To prevent the data from being skewed, the data from the teaching trials was separated by the percentage correct during the initial teaching trial and the total percentage correct during all three teaching trials (see figures 4.1 and 4.2).

Participant 1 correctly labeled 55% of the tacts from the gestural prompting condition and 53.75% of the tacts from the verbal prompting condition during the initial teaching trial. The total percentage correct for participant 1 was

82.22% for the gestural prompt condition and 80.75% for the verbal prompt condition.

During the initial teaching trial, participant 2 correctly labeled 41.88% of the tacts from the gestural prompt condition and 51.88% of the tacts from the verbal prompt condition. The total percentage correct during the gestural prompt condition was 77.88% for participant 2 and 76% during the verbal prompt condition.

The data from the teaching trials was consistent with the data from the pre- and post-session probes for both participants and is represented in tables 3 and 4. For the teaching trials, participant 1 had a higher initial and total percentage correct for tacts that were assigned to the gestural prompt condition while participant 2 had a higher initial and total percentage correct for tacts from the verbal prompt condition.

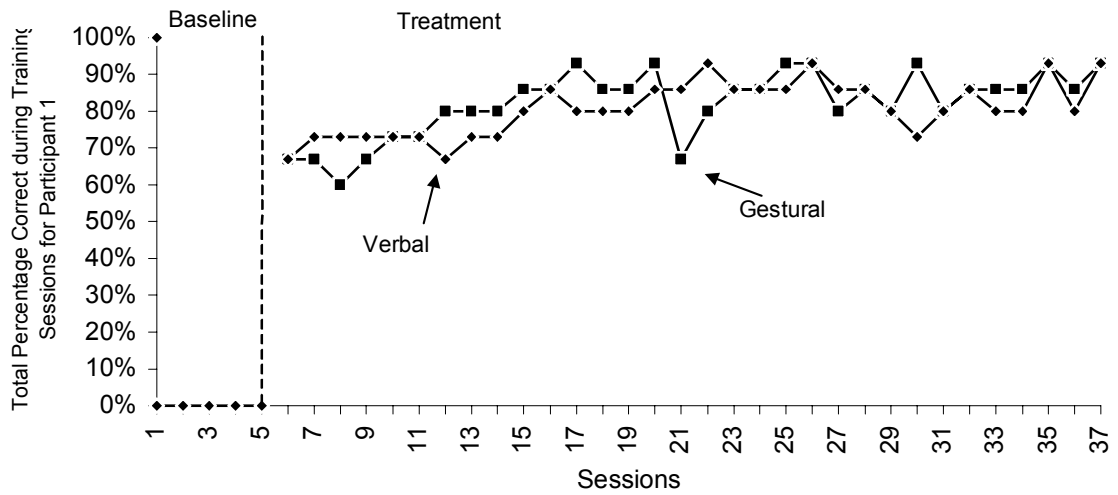
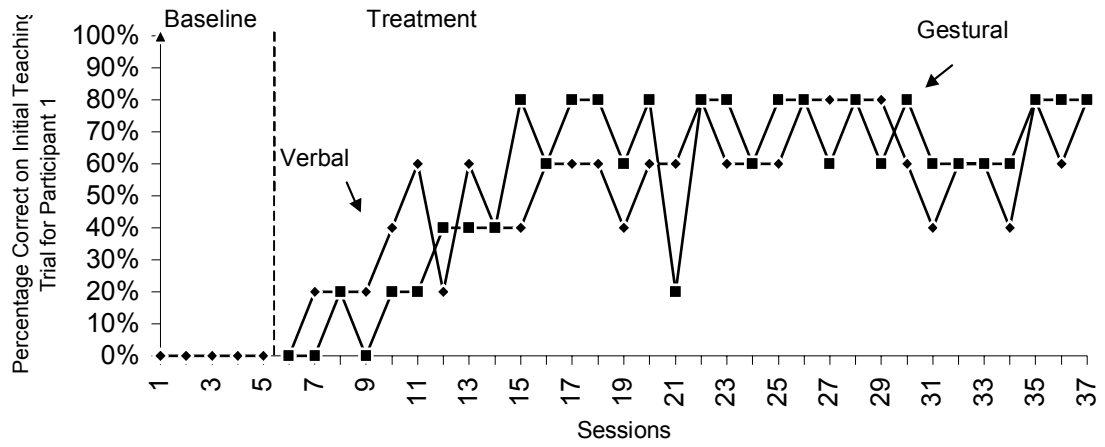


Figure 4.1. Initial and Total Percentage Correct during Training Sessions for Participant 1.

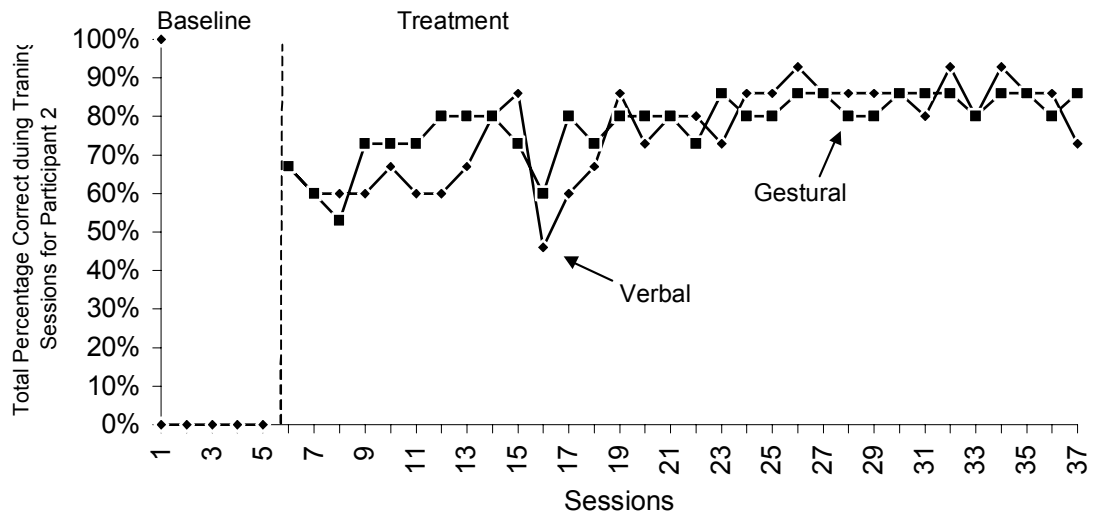
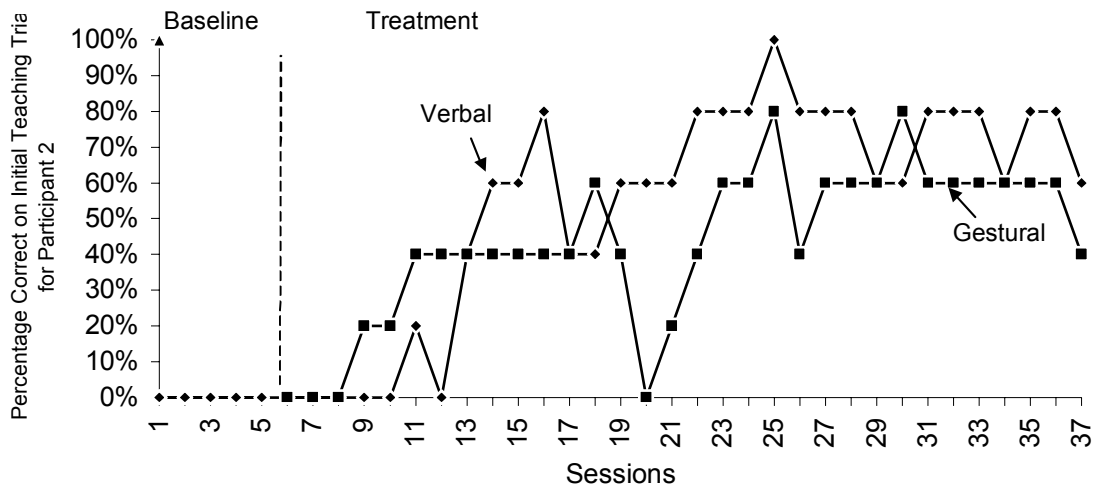


Figure 4.2. Initial and Total Percentage Correct during Training Sessions for Participant 2.

Table 3

Percentile Data for Probe and Training Sessions for Participant 1

Gestural Sessions	Percentage Correct for Pre-Probe	Training Session Initial Correct	Training Session Total Correct	Percentage Correct for Post-Probe
1	0	0	67	0
2	0	0	67	0
3	20	20	60	0
4	0	0	67	20
5	20	20	73	40
6	20	20	73	40
7	40	40	80	20
8	20	40	80	80
9	60	40	80	60
10	80	80	86	80
11	60	60	86	80
12	80	80	93	80
13	60	80	86	80
14	80	60	86	80
15	80	80	93	60
16	100	20	67	60
17	60	80	80	80
18	80	80	86	80
19	40	60	86	80
20	80	80	93	80
21	80	80	93	80
22	60	60	80	80
23	80	80	86	80
24	60	60	80	60
25	80	80	93	80
26	60	60	80	80
27	60	60	86	80
28	20	60	86	80
29	80	60	86	60
30	80	80	93	80
31	60	80	86	60
32	60	80	93	80

Verbal Sessions	Percentage Correct for Pre-Probe	Training Session Initial Correct	Training Session Total Correct	Percentage Correct for Post-Probe
1	0	0	67	0
2	0	20	73	20
3	20	20	73	40
4	20	20	73	40
5	40	40	73	60
6	60	60	73	20
7	40	20	67	60
8	40	60	73	20
9	60	40	73	40
10	60	40	80	60
11	60	60	86	60
12	60	60	80	60
13	20	60	80	80
14	60	40	80	40
15	60	60	86	60
16	80	60	86	60
17	60	80	93	60
18	80	60	86	60
19	20	60	86	60
20	80	60	86	80
21	60	80	93	80
22	60	80	86	60
23	80	80	86	80
24	40	80	80	80
25	40	60	73	40
26	40	40	80	80
27	80	60	86	60
28	0	60	80	80
29	20	40	80	60
30	80	80	93	80
31	60	60	80	40
32	80	80	93	40

Table 4

Percentile Data for Probe and Training Sessions for Participant 2

Gestural Sessions	Percentage Correct for Pre-Probe	Training Session Initial Correct	Training Session Total Correct	Percentage Correct for Post-Probe
1	0	0	67	20
2	0	0	60	40
3	0	0	53	0
4	20	20	73	20
5	20	20	73	20
6	40	40	73	40
7	40	40	80	40
8	40	40	80	40
9	40	40	80	60
10	40	40	73	40
11	40	40	60	40
12	40	40	80	60
13	60	40	73	80
14	40	40	80	40
15	0	40	80	80
16	20	40	80	40
17	40	20	73	40
18	60	60	86	40
19	60	60	80	60
20	80	60	80	40
21	40	60	86	60
22	60	60	86	60
23	60	40	80	60
24	60	40	80	60
25	80	60	86	80
26	60	60	86	60
27	60	60	86	100
28	60	60	80	60
29	60	60	86	60
30	60	60	86	40
31	60	40	80	80
32	40	60	86	80

Verbal Sessions	Percentage Correct for Pre-Probe	Training Session Initial Correct	Training Session Total Correct	Percentage Correct for Post-Probe
1	0	0	67	0
2	0	0	60	40
3	0	0	60	20
4	0	0	60	0
5	0	0	67	0
6	20	0	60	40
7	0	0	60	20
8	40	20	67	60
9	60	40	80	40
10	60	60	86	60
11	80	40	46	60
12	40	80	60	40
13	40	40	67	40
14	60	60	86	100
15	60	60	73	80
16	60	80	80	80
17	80	60	80	80
18	80	80	73	80
19	80	80	86	40
20	100	80	86	80
21	80	80	93	80
22	80	80	86	60
23	80	60	86	80
24	60	60	86	60
25	60	60	86	80
26	80	80	80	80
27	80	80	93	80
28	80	100	80	80
29	60	80	93	80
30	80	60	86	40
31	80	80	86	80
32	60	60	73	80

Discussion

The current investigation evaluated the most effective way to teach labels to children with autism. The study compared a verbal prompting procedure with a gestural prompting procedure to teach 10 picture labels to 2 vocal children with autism. The results show that both prompting procedures were effective although, participant 1 acquired more tacts in the gestural prompting condition while participant 2 acquired more tacts in the verbal prompting condition. It should also be noted that both participants generalized their skills and responded correctly to target labels during the probes when no prompt was presented. It is extremely important that a child have the ability to spontaneously utilize language in his/her environment. If a child only elicited language after the presentation of a prompt, the child would not be able to function or become integrated into the community without another form of communication (sign language or picture exchange).

The results from this study replicate the findings of Partington et al. (1994) in which a non-vocal child with autism acquired tacts (signs) during the verbal prompting condition and the gestural prompting condition. The summary of the findings, limitations, and implications for future research are described below.

Summary of the Findings

At the time of the study, both participants were functioning at different verbal and cognitive levels. Participant 1 labeled hundreds of items and had been in a language-training program for about 3 years. Participant 2, on the

other hand, labeled only about 15 items and had been in a language-training program for only 5-6 months. The results show that, although both participants acquired facts from both prompting conditions, participant 1 had higher percentages during the pre- and post-session probes as well as during the training sessions.

As stated previously, participant 1 performed better in the gestural prompting condition while participant 2 performed better in the verbal prompt condition. Participant 1 has learned to label items in a teaching setting as well as in the natural environment with verbal and gestural prompts. He also spontaneously labels items throughout his day when no prompts are given. Participant 2 has learned to label items in a teaching setting as well as in the natural environment with verbal and gestural prompts, but is not at the level to spontaneously label items in his environment when prompts are withheld. These differences in their learning history may have affected the acquisition of labels for both participants in each prompting condition.

During the study, both participants failed to acquire a few facts, each from different prompting conditions. Participant 1 failed to acquire the label for pot and hanger. He continued to call the hanger a “banjo” and he called the pot a “teapot”. It is still unknown to the experimenter why this participant failed to gain these two items as labels, although, without ever labeling the target fact correctly during the study, the participant never received a tangible reinforcer related to this behavior. In turn, the behavior of correctly labeling these specific target facts was never reinforced which did not increase the probability of that behavior in the

future. When teaching language to children with autism, the target behavior (labeling the item correctly) must come into contact with some form of reinforcement to increase the probability that the child will effectively learn that item as a tact.

Participant 2 failed to correctly label the pillow, crayon, and grass although he acquired the correct labels for the other 7 stimuli. The labels for the pillow and the crayon are 2 syllables while the labels for 7 of the target stimuli are only 1 syllable. With this information, a conclusion may be drawn that this participant can acquire labels that are only 1 syllable more effectively than labels that have more than 1 syllable.

The results also show that both participants had high percentages of correct tacts during both training sessions, even at the beginning of the study. This finding may be due to the fact that children with autism tend to repeat the last word that was heard or spoken. During a majority of the training sessions, if the participant incorrectly labeled or failed to label a target tact on the initial trial, he correctly labeled the target tact on the following two trials. Due to this echoic tendency, data were collected on the initial teaching trial (the first out of the three opportunities to respond) as well as the total percentage correct during all three teaching opportunities.

The cumulative number of correct tacts for each participant is represented in figures 2.1 and 2.2. The data show that participant 1 was more successful gaining target tacts from the verbal prompting condition prior to sessions 16 or 17 while the gestural prompting condition proved to be more effective after session

20. The data from participant 2 show that the gestural prompting condition was more effective prior to session 17 while the verbal prompting condition was more effective after session 20. It is unknown to the experimenter why the data from both participants shift from one condition to the other after session 20 since the data were not collected during the same time period.

Limitations

Although the findings suggest that both prompting procedures were effective in teaching children with autism to label items, several limitations were discovered. First, inter-observer agreement was conducted on approximately 33% of the probe and training sessions. The observer reviewed the tapes of the probe and training sessions and collected data on similar data sheets as the investigator. During this time, the observer may have been prompted to record the same responses as the investigator. For example, when the child responded correctly during the training session, the investigator provided reinforcement. When the participant responded incorrectly or failed to respond, the investigator conducted an error correction procedure. Therefore, the observer could determine the success of the participant due to the response of the investigator.

Second, some of the items being trained during the study may have received training in the natural environment regardless of the investigators efforts to prevent this from occurring. For participant 1, the investigator chose target items that were not common in his everyday environment. This approach was chosen due to the fact that he could already label most of the items that he sees on a regular basis. For participant 2, the investigator chose more functional,

common items because he was unable to label many items in his environment. Therefore, it was virtually impossible to prevent both participants from coming in contact with some of the target labels during times other than training sessions. It also may have been beneficial to add new target items once the participant had effectively gained an item as a fact. In the current study, once the child could successfully label an item, it was likely that he would correctly label it during each session. Therefore, it was unknown if the child was correctly responding due to the prompting procedure or because the item had become a part of the child's labeling repertoire.

Third, participant 1 was receiving many biological interventions during the study to treat his autism while participant 2 was not. Participant 1 was on a gluten-casein free diet, taking supplements and vitamins, and on medication that was prescribed for characteristics of attention deficit disorder. Some of the interventions appeared to improve his behavior while others appeared to worsen his behavior. These interventions may have affected his performance during the study compared to participant 2 whose behaviors were more consistent.

Fourth, during the study, participant 2 often repeated the labels several times after the initial presentation of the prompt predicting that I would ask him to respond again. Sometimes, he would repeat the label more than 3 times for each prompt presentation. This process allowed for some targets to have more teaching than others, which may have influenced the results.

In addition, it is unknown if the results from the study were a direct result of the prompting procedure that was used or another variable, such as the

reinforcement that was provided. Due to varying states of deprivation and satiation, it would not be possible to keep the reinforcement level consistent from session to session.

Finally, due to participant 2 having less language training than participant 1, he did not echo the correct response during the error correction procedures 100 percent of the time. When this occurred, the investigator repeated the correct response several times before he would echo it. This allowed for more teaching trials on these target facts than on ones that he echoed the correct response in the initial error correction procedure.

Implications for Future Research

The current study focused on teaching labels to children with autism, but did not focus on the clarity of the language. This issue is one area for future research. Because participant 2 recently began learning language, his labels were not always clear, although he did make an appropriate approximation. If he approximated the word, reinforcement was provided and he was again presented with another prompt. It may have been important to shape his language by reinforcing his approximation, but also providing an echoic prompt to model the appropriate response. It should be noted that this type of shaping procedure was effective in teaching him to appropriately label other items that were not a part of this study.

In addition, because of the echoic repertoire of children with autism, echoic prompts must immediately be faded to increase the probability of independent responding. For example, during this study, both children failed to

acquire a few of the target tacts even though they could echo the correct response. In the future, it would be ideal to fade the echoic prompts to only the first sound of the target tact rather than the entire response. Without doing this, the participant may have become prompt dependent, which prevented the tact from becoming a part of his labeling repertoire.

While participant 1 had received 3 years of language training and had acquired hundreds of labels, participant 2 had only received 6 months of language training and could label only 20 items. The participants in the current study have very different learning histories, which may have had an effect on the prompting procedure that was most successful in eliciting tacting behavior. This could be another area for future research.

Conclusion

The current study suggests that vocal children with autism can acquire tacts, or labels, using gestural and/or verbal prompts. The study also suggests that children with autism that have had previous language training and can elicit spontaneous language in the natural environment can effectively gain new tacts using either prompting procedure or in the absence of prompts. If a child can spontaneously label items in his/her environment, their vocal behavior would have been elicited by the non-vocal stimulus, the item. Children with autism who do not spontaneously label items in their environment, on the other hand, may be more likely to acquire tacts using a verbal prompting condition. Children who do not spontaneously label items, but do label items when requested to do so are responding to a stimulus, a verbal or gestural prompt, rather than the item being

labeled. Because a gestural prompt is a less restrictive prompting procedure than a verbal prompt, these children are more successful when presented with a verbal prompt.

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Appendices

Appendix A

Probe and Training Session Data Sheet

Target Tacts	Date			Date			Date		
Verbal Prompt	Pre-Probe	Training	Post-Probe	Pre-Probe	Training	Post-Probe	Pre-Probe	Training	Post-Probe
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
Number Correct		EC=			EC=			EC=	
Gestural Prompt									
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
	Y/N		Y/N	Y/N		Y/N	Y/N		Y/N
Number Correct		EC=			EC=			EC=	

Appendix B

Baseline Data Sheet

Date									
Target Tact	No prompt	Gestural prompt	Verbal prompt	No prompt	Gestural prompt	Verbal prompt	No prompt	Gestural prompt	Verbal prompt

Date									
Target Tact	No prompt	Gestural prompt	Verbal prompt	No prompt	Gestural prompt	Verbal prompt	No prompt	Gestural prompt	Verbal prompt

Appendix D

Observer Training Checklist

- ✓ Defined independent variable
- ✓ Explained differences between verbal prompting and gestural prompting
- ✓ Explained criteria for participant correctly and incorrectly labeling a target tact
- ✓ Reviewed data sheet and data collection procedures
- ✓ Allowed opportunity to practice collecting accurate data using previous tapes
- ✓ Answered any questions

Appropriate Data Collection Procedures

- ✓ The experimenter used a verbal or gestural prompt with the presentation of the target stimulus
- ✓ The experimenter waited 5 seconds for the participant to correctly respond to the target stimulus
- ✓ If the participant responded correctly within 5 seconds of the presentation of the prompt, the experimenter will circle a “Y” on the data sheet and reinforcement was provided
- ✓ If the participant did not respond correctly within 5 seconds or failed to respond, the experimenter circled a “N” on the data sheet and provided a correction procedure
- ✓ After the correction procedure, the experimenter again waited 5 seconds for the participant to respond correctly
- ✓ If the participant responded correctly, reinforcement was provided
- ✓ If the participant did not respond correctly, another correction procedure was implemented
- ✓ If the child responded correctly, praise was offered
- ✓ If the child did not respond correctly, the experimenter would begin a new trial on another object in the set