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Refining the Stimulus Pairing Observation Procedure for Tact and Listener Responding

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Refining the Stimulus Pairing Observation Procedure for Developing Tact and Listener Responding Repertoires

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Abstract

The stimulus pairing observation procedure (SPOP; e.g., Byrne et al., 2014) and the stimulus-stimulus pairing procedure (SSP; e.g., Esch et al., 2009) both involve training early language skills (i.e., tacts and listener responding in SPOP; vocalizations in SSP) by contriving social interactions that typically take place in the natural environment. In an analysis of the many procedural variations to increase the effectiveness of SSP, da Silva and Williams (2020) reviewed autoshaping research outcomes and suggested a variety of ways to increase the salience of the stimuli being paired to enhance learning. The present study followed the recommendation to vary the ITI to make stimuli more salient and pairings less predictable, recommended for stimulus pairing procedures, to observe the effects on tact and listener responses (da Silva and Williams, 2020). In the present study, all participants have a diagnosis of autism spectrum disorder (ASD) and scored within Level 1 of the VB-MAPP. Listener responding increased relative to baseline, but tact responses remained near zero following SPOP instruction. Our procedural modification increased listener responding, but there was no change for tact repertoires. This research will add to the burgeoning research on increasing the effectiveness and efficiency of stimulus pairing procedures for language acquisition.

Keywords: stimulus pairing, SPOP, tact, listener responding, verbal behavior, reinforcement

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The absence of verbal behavior is a significant concern for many caregivers and parents of children with developmental disabilities. This deficit is particularly common in individuals with autism spectrum disorder (ASD). Another symptom of ASD is a decreased interest in social interaction (American Psychiatric Association, 2013). These two symptoms are correlated because of the integral role social interactions play in the development of language. When a child lacks interest in social interactions or does not attend to social stimuli, as is commonly observed among individuals with ASD, difficulties in forming the respondent relations necessary for the emergence of speech sounds can occur (Shillingsburg et al., 2015). Previous researchers e.g., Dawson et al. (1998; Mundy & Crowson, 1997) found that children with ASD are typically exposed to social stimuli around the same frequency as their typically developing peers but do not actively interact with the stimuli. This may explain why speech sounds do not develop for them as they do for other children.

Sundberg and Michael (2001) described the two-stage process of respondent conditioning that typically occurs when children are young. In Stage 1, a neutral stimulus (caregiver vocalization) is repeatedly paired with an unconditioned stimulus (such as warmth or milk) during the natural process of caregiving, eventually becoming a conditioned stimulus. In Stage 2, those caregiver vocalizations (conditioned stimuli) elicit vocalizations by the child (conditioned responses) like those of the caregivers. At that point, operant contingencies begin exerting control, and vocalizations are further shaped through interactions in the environment, including the effects of automatic reinforcement of vocalizations for the learner. This, then, increases the future frequency of the learner repeating the vocalizations under similar conditions.

Stimulus-stimulus pairing (SSP) is a systematic respondent conditioning procedure for increasing vocalizations by individuals for whom the above-described relations in the natural setting do not result in vocalizations being elicited (Shillingsburg et al., 2015). SSP mimics the two-stage process described above by systematically and repeatedly pairing instructor vocalizations with preferred stimuli (i.e., Stage 1; Sundberg & Michael, 2001). The main objective of SSP is to elicit enough vocal behavior for speech sounds to eventually be brought under the control of their consequences as operants (Esch et al., 2009; Petursdottir & Lepper, 2015), which Sundberg and Michael (2001) identified as Stage 2. The initial stages of SSP begin with the instructor repeatedly vocalizing a specific speech sound and immediately delivering a highly preferred reinforcer to the learner, regardless of any responding (Petursdottir & Lepper, 2015), simulating Stage 1 of language acquisition in the natural environment (Sundberg & Michael, 2001). For example, the instructor says “ah” while holding up the preferred reinforcer and immediately provides the highly preferred item to the learner. These pairings occur repeatedly over time with the pairing of a neutral stimulus (NS) and an already established conditioned stimulus (CS), mimicking the natural environment of early language learners. Additionally, the presentation of visual and auditory stimuli simultaneously results in a compound stimulus in that the auditory sound of the instructor is presented simultaneously with the movement of the instructor’s mouth (da Silva & Williams, 2020).

Another related procedure that also attempts to mimic the natural process of language learning is the stimulus pairing observation procedure (SPOP; Smyth et al., 2006), which is used for training tact and listener responding. SPOP may be appropriately considered an extension of SSP (but for increasing tact or learner responding, as opposed to vocalizations in general.) as it relies on “respondent-type training” (Clayton & Hayes, 2004; Leader et al., 1996), which

incorporates the repeated pairing of visual and auditory stimuli (i.e., a compound stimulus; da Silva & Williams, 2020) without requiring any response by the learner. In another similarity with some SSP procedural variations (Esch et al., 2008; Lepper et al., 2013; Miliotis et al. 2012), SPOP also requires the learner to attend to the stimulus (i.e., a picture card) while the instructor emits the vocal tact (Byrne et al., 2014). This is similar to SSP procedural variations where a pairing trial does not begin until the learner is looking at the instructor or makes another "observing" response, such as pressing a button (response contingent pairing or RCP; Lepper & Petursdottir, 2017). In an SSP trial, the instructor holds the preferred item at the learner's eye level while simultaneously emitting the target vocalization. After the target vocalization is emitted by the instructor, the reinforcer is delivered to the learner within 1 s. Esch et al. (2009) suggested requiring an observation component increases stimulus salience, making SSP more effective. The benefit of this component in SPOP is to simulate the incidental learning that takes place in the natural environment from children's observations of individuals naming items in the environment or responding appropriately to named items as listeners (Byrne et al., 2014).

Byrne et al. (2014) investigated SPOP with participants scoring within Level 1 of the Verbal Behavior Milestones and Assessment Placement Program (VB-MAPP; Sundberg, 2008), meaning they displayed 2-to-3-word phrase echoic repertoires. Before each session, participants were given instructions to look at the pictures, listen to the experimenter, and tokens would be provided for appropriately attending (i.e., feet down, eyes oriented toward the stimulus) that could be exchanged for a reinforcer after the learner earned all their tokens. Tokens were provided on a VI 30 s schedule of reinforcement. Before beginning, instructors ensured participants' eyes were directed toward the stimulus. The experimenter then presented the stimulus while stating the name of the item (e.g., stating "marker" while presenting a picture of a

marker). Each trial consisted of a 2-s presentation of the stimulus and the name of the stimulus dictated. Overall, within a single instructional session, five 9-trial blocks were conducted for a total of 45 trials per session. The order of presentation was randomized within each 9-trial block and an inter-trial interval (ITI) of 2-3 s separated each trial. If at any time the participant appeared not to be attending, the experimenter provided a vocal prompt ("look") while pointing to the stimulus and putting the stimulus into the participant's line of vision. In this study (Byrne et al., 2014), one SPOP session was conducted with the original set of three stimuli for each participant to evaluate if tact and listener responding (in the form of pointing to the card picturing the named object) would emerge with this procedure alone but they did not.

Byrne et al. (2014) implemented multiple exemplar instruction (MEI) for the acquisition of tact and listener responding when SPOP alone was ineffective. MEI is a procedure that quickly and arbitrarily presents a stimulus while targeting different verbal operants (LaFrance & Tarbox, 2020). Results depicted SPOP with MEI established some tact and listener responding, but tacts were consistently lower than listener responding. The lesser outcomes for tacts compared to listener behavior may be due to the presence of the MEI procedure, however, and differential effects may not occur if SPOP alone (without MEI) is used. Interestingly, Byrne et al. also collected data on the percentage of trials where participants emitted echoic responses for pretest, posttest, SPOP, and MEI sessions. Results indicated echoic responding was highest during SPOP instruction for all participants.

Solares and Fryling (2018) systematically replicated the procedure of Byrne et al. (2014) by presenting additional SPOP instruction (if initial exposure was not effective) and including participants with additional prerequisite skills (i.e., one participant scored in Level 2 of the VB-MAPP for tact and listener responding, whereas another participant scored beyond what VB-

MAPP assesses). Additionally, participants were included if they did not engage in challenging behavior. Identical to Byrne et al. (2014), two 9-trial blocks were conducted to probe tact and listener responses during the pretest condition. During SPOP instruction, the same instruction and attending checks were conducted as in Byrne et al. as well. Following SPOP instruction, a posttest condition was conducted which was identical to the pretest condition. If the participant did not reach mastery criterion (89%) for tact and listener responding (dependent variables) at the end of posttest, additional SPOP instruction and posttest conditions were conducted. All participants reached mastery criteria and MEI was never implemented as it was by Byrne et al. Another addition to Solares and Fryling's (2018) study was the inclusion of maintenance probes to assess how behavior change endures over time. Their results suggested learning through SPOP was indeed effective for individuals with little to no language delay.

Given the abovementioned similarities in the SSP/SPOP procedures and goals, it may behoove researchers to consider incorporating SPOP into some of the SSP recommendations made by da Silva and Williams (2020) based on basic respondent conditioning research. One of their recommendations was to vary the time between respondent conditioning trials, or the ITIs. Cariveau et al. (2016) assessed various ITIs for skill acquisition during discrete-trial instruction for individuals with ASD. The study compared short ITIs, progressively increasing ITIs, and long ITIs in a varied- or massed-trial format to determine which schedule would be the most efficient. Short ITIs were 2 s, progressive ITIs ranged from 2 s to 20 s, and long ITIs were 20 s. Results showed that all the participants acquired the target skills under all three ITI variations, but instruction using shorter ITIs required fewer trials for the learners to reach the criteria. Although this appears to be inconsistent with the recommendations by da Silva and Williams (2020) to increase stimulus salience by implementing longer ITIs, it must be pointed out that the

ITIs in Cariveau et al. (2016) were used in operant rather than respondent conditioning trials. Also, if the ITIs are varied, some of them will be longer than others by default. Therefore, implementing variable ITIs will necessarily incorporate some longer ITIs as well as follow another recommendation by da Silva and Williams to increase salience, and consequently the effectiveness of conditioning, by making the occurrence of the stimulus less predictable.

The current study sought to further test the SPOP procedure that Byrne et al., (2014) implemented by recruiting participants that display similar, severe language delays as Byrne et al., (2014) and include varying ITIs to increase the salience of the stimuli and potentially improving the effectiveness of SPOP for increasing tact and listener responses by early language learners. During all listener responding trials and SPOP, each occurrence of echoic responding was recorded by writing a checkmark next to each target stimulus that the participant echoed immediately after hearing the instructor tact the item, much like in Bryne et al., (2014).

Method

Participants

Two children diagnosed with ASD and who exhibited severe language delays participated in this study. All participants were already receiving applied behavior analysis (ABA) services and demonstrated verbal operant skills that fell within Level 1 of the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008). Participant 2 (Luna) dealt with medical problems (i.e., severe constipation) that impacted sessions throughout the entirety of the study and were actively being treated by pediatrician prescribed medicine.

Setting and Materials

A specific location within each of the participant's current ABA therapy environment was determined by the caregiver(s) and instructor before the beginning of the study to remain consistent across sessions (Byrne et al., 2014). Session materials consisted of three laminated 3-in. by 3-in. picture cards per participant, depicting items whose names were not already a part of the participant's tact or learner response repertoires.

Dependent Variables and Response Measurement

The dependent variables were the percentage correct of tacts and listener responses during the baseline and posttest conditions, consistent with Byrne et al. (2014). Data were collected using pen and paper. A tact is defined as being one of the elementary verbal operants that is under the control of a non-verbal discriminative stimulus and once a response is emitted, is followed by generalized conditioned reinforcement (Skinner, 1957). An example of a tact is seeing a bird in the sky and saying, "bird!" and the mother saying "yes, that is a bird!!" Tacts were considered correct if responding accurately to the stimulus card occurred within 5 s of being asked, "What is it?" Tacts that did not occur within 5 s of presentation were considered incorrect. Likewise, responses that did not correlate with the presented demand were considered incorrect. For example, if the instructor held up a card with a lion on it and said, "What is it?" and the participant responded "frog" within 5 s, the response was marked incorrect. Listener responding requires the listener to respond to the speaker's verbal behavior (i.e., receptive language). Listener responses were considered correct if the learner correctly touched the stimuli card after hearing the discriminative stimulus (e.g., "Touch the ____").

Interobserver agreement (IOA) was calculated for 35% of sessions for all participants. All sessions without a BCBA present were recorded, and secondary observers took take trial-by-trial reliability data to measure reliability during each phase. During sessions with a BCBA

present, in situ IOA and data collection occurred. IOA was calculated by dividing the number of agreements by the total number of agreements and disagreements then multiplying by 100. Data indicate a 95% mean for IOA (range: 83-100%).

Treatment integrity was also calculated for 35% of sessions. Treatment integrity included phase-specific checklists that were completed by the author via video to determine the accuracy of the instructor is following the procedure. For example, if the instructor was delivering the tokens appropriately based on the VI 30-s schedule, they received a plus sign (+) meaning accurate responding. Treatment Integrity data indicate treatment integrity at 100% across sessions where treatment integrity checks were conducted.

Pre-experimental Assessments

A VB-MAPP assessment was conducted with each potential participant prior to the start of the experiment. Any participant scoring above a Level 1 was thanked for their willingness to participate and referred to their primary Board-Certified Behavior Analyst (BCBA) for any further questions concerning their child.

Before the study began, caregivers for the selected participants completed the Reinforcer Assessment for Individuals with Severe Disability (RAISD; Fisher et al., 1996) with the experimenter. Results from the RAISD then served as the reinforcers available via token exchange from the token economy (see baseline).

Target Stimuli and Varying ITI Selection

Target stimuli were arbitrarily selected, were not in the participant's current repertoire, and required lower response effort to emit (e.g., oboe). Prior to the study, the experimenter went through a language acquisition box and excluded all target cards that the participants might come into contact with in the natural environment. Additionally, cards were excluded if the client

previously demonstrated the stimulus to be in their repertoire. Cards were included if the participant did not naturally encounter it and if there was not a previous history of being able to identify the card. This occurred until the entire box of cards were sorted into two piles (excluded vs. included). Once the piles were complete, the experimenter randomly selected three target stimuli from the included pile and tested to see if the participants already had the target stimuli in their repertoires. The cards were selected based on the participants' current language repertoires and the absence of the selected target stimuli in their day-to-day environments. Target stimuli were tested by asking the participant to tact or receptively identify the target stimulus. If participants were able to identify the target stimuli either by tacting or listener responding, the card would have been removed and a new target stimulus would have been selected; however, this did not occur. Approximations of the target response were considered correct if the participant was unable to produce the full response. Additionally, the participants' ABA team and caregivers were provided the names of the three stimuli selected to control for confounding variables to the study.

Before the study began, a pre-determined varying ITI was established for each 9-trial block that averaged 3-s within each 9-trial block. Each session was assigned to a specific ITI and manually inputted into a runner's app that beeped to signal moving onto the next trial. The experimenter wore an earpiece (i.e., Apple AirPod) so that only she heard the beep. Additionally, when imputing the pre-determined varying ITI, each 9-trial block imputed was saved in a single 9-trial block and labeled. For example, the first 9-trial block was labeled "1st 9-trial block" and the second 9-trial block was labeled "2nd 9-trial block" for ease of implementation for the experimenter.

Experimental Design

A concurrent multiple-probe design across participants was conducted. As in Byrne et al. (2014), tact trials were presented before listener responding trials. Tacts preceded listener responding trials to control for possible carry over effects. To clarify, if listener responding trials occurred before tact trials then the participant would be exposed to the target response in close proximity to the presented Sd. Baseline data were conducted prior to SPOP instruction, which was then followed by posttest trials. If participants' responding met mastery criteria, participants were scheduled for a 1-week follow-up.

Procedure

Baseline

The baseline sessions consisted of two 9-trial blocks of presentations of three target stimuli. The first 9-trial block targeted tacts and the second 9-trial block targeted listener responding using the same target stimuli. A 9-trial block consisted of 9 trials for tacts where each of the three target stimuli were presented in a pre-determined random order three times. A 9-trial block for listener responding consisted of the three stimulus cards being placed in an array directly in front of the participant in a pre-determined order and being told to touch the target card. This occurred until each target stimulus card was targeted three times (i.e., three cards + three presentations = 9 trials). Participants were given the following verbal instructions: "I am going to ask you a few questions but am not able to tell you if you answered correctly. You may earn tokens for sitting with your feet on the ground, having your hands still, and looking at the cards. Once the session is over, you may exchange earned tokens for a prize or activity. Let's begin." Trials began once the participant appeared to be attending. Attending was defined as observing the participant sitting upright with feet on the ground, hands still, and eyes oriented

toward the stimuli. Tact trials were then presented, one stimulus card at a time, at eye level with the participant.

Stimulus cards were pictures of the target stimulus. For example, if the target stimulus was a ball, then a picture of a ball was on the laminated index card. A verbal instruction (i.e., "What is it?") was given once attending was established. A varying ITI (ranging from 1 s to 5 s and averaging 3 s overall) within each 9-trial block determined the timing of each of three target stimulus presentations. To decrease the chance of temporal predictability across sessions, a different sequence of ITIs was implemented for each 9-trial block.

Following the tact-baseline trials, listener responding baseline trials were conducted. The verbal instruction given was "Touch the ___". Each of the same target stimuli were presented individually in a randomized order for a total of 18 trials per session (two 9-trial blocks). During this condition, no feedback, error correction, or prompting occurred. Additionally, the participant was able to earn tokens for appropriate attending on a VI 30 s schedule throughout all baseline sessions.

SPOP Instruction

As in Byrne et al. (2014), 9-trial blocks consisting of 3 stimuli each were presented using the same protocol as described in the baseline condition with the following exceptions. As previously described, an attending check was conducted before each session, and tokens were provided contingent on the participant orienting to and looking at the instructor. If the participant was not attending, the instructor redirected the participant using a verbal prompt to either look toward the stimulus or to sit appropriately. This continued until the participant was attending according to the operational definition previously provided. Five 9-trial blocks were conducted for both tact and listener responses in this phase rather than just one 9-trial block, as was the case

in baseline. Thus, five 9-trial blocks equaled one session rather than two 9-trial blocks. All sessions were recorded to allow for IOA data to be collected unless the participant's BCBA was present, then in situ data were collected). Once attending was established, one stimulus card was presented for 2 s, during which time the instructor verbally labeled the item. After the first stimulus card was presented, the procedure repeated until each stimulus was presented three times during the 9-trial block.

During SPOP instruction, tact and listener responding data were not collected because responding is not required in this condition. However, all vocalizations by the participant were recorded. Extending from previous research, five 9-trial blocks were conducted each session for a total of 45 trials (15 trials with each stimulus card).

Posttests

Following SPOP instruction, a posttest was conducted identically to baseline. Mastery was met if correct responding for 8 out of 9 (89%) target stimuli across three consecutive 9-trial blocks for tacting occurred; for the same criteria were used for listener responding (Byrne et al. 2014). If mastery criteria were not met after three 9-trial blocks and an upward trend was not present, the study was considered complete for the participant. This is because we were testing the effectiveness of the procedure, which we would know after one SPOP instruction. If the participant met mastery, the study was considered complete for the individual and they were asked to come back for a 1-week follow-up in which posttest trials were again conducted.

Results

Figure 1 illustrates tact and listener responses following SPOP instruction. During baseline for both participants, neither correctly responded for tact or listener responding. Additionally, during this condition (baseline), there was a one-week pause for both participants

due to participant 2 unexpectedly being unavailable. Both participants were placed on a brief one-week pause to maintain a true multiple-probe design. Following SPOP instruction, participants met mastery criteria during the first three posttest trials. Tact responding remained at zero for participant 2 (Luna) indicating initial SPOP was ineffective. Participant 1 (Wanda) failed to meet mastery for tacts, but during the second posttest trial scored at 20%. An additional posttest was conducted to be certain a stable rate of responding was present. Both participants met mastery criteria for listener responding in the posttest sessions. At the 1-week follow-up, listener responses continued to meet mastery criteria. No follow-up was conducted for tacts, as they were never acquired.

Discussion

It should be noted that both participants engaged in frequent tantrums and elopement throughout the study which, at times, challenged the speed at which this procedure could be implemented. However, results for both participants displayed an increase in independent listener responding relative to baseline performance but did not display an increase in independent tact responding relative to baseline performance. Additionally, during SPOP instruction, both participants emitted echoics at a high frequency. Participant 1 (Wanda) emitted 26 echoics across 45 trials and Participant 2 (Luna) emitted 39 echoics across 45 trials. This is important to note because echoic behavior typically leads to language development and echoics increased and, unlike previous research (Byrne et al., 2014), remained nearly consistent following SPOP instruction (see Table 1). During Byrne et al. (2014)'s study, echoic responding increased during SPOP but decreased during the posttest condition. It should be noted that Byrne et al., (2014) had differences in their procedure and implemented remedial SPOP when mastery

was not met. This means more opportunities for echoic responding were presented and it is unclear if the percentages would be different if displayed differently.

Byrne et al. (2014) had inconsistent results in both their posttests and additional posttests after remedial SPOP. Adopting the recommendation of da Silva and Williams (2020), in the present study, by varying the ITI appears to have led to meeting mastery criteria almost immediately following SPOP instruction for listener responding. This could be due to the varying ITI's decreasing the temporal predictability and increasing the stimulus salience and thus increasing the pairing of unconditioned to conditioned stimuli for this procedure. However, Solares and Fryling (2018) found that the typically developing participants in their study all reached mastery criteria following SPOP instruction and maintained 89%-100% correct responding at the one-week follow-up. It is important to note, however, that this difference between the results of the two studies might have been due to the participants studied by Solares and Fryling already had larger tact and listener responding repertoires**.**

The current study involved participants with prerequisite skill levels like those of Byrne et al (2014) and we obtained similar results with regard to tacting following initial SPOP instruction. However, as was the case for Solares and Fryling's (2018) participants, increases in listener responses occurred and the 1-week follow-up proved near identical to the posttest trials conducted. Although tacting did not occur following SPOP, we did not conduct remedial SPOP like previous researchers because we were attempting to increase the effectiveness of the initial procedure. However, remedial SPOP instruction might be necessary for individuals who have emerging tact and listener responding repertoires.

Despite neither participant meeting mastery criteria during posttest for tacts, they did acquire listener responses as a result of SPOP. This indicates the variable ITIs in the SPOP

procedure were helpful because none of the participants in Byrne et al. (2014) acquired listener responses after initial SPOP training. Participants failing to meet mastery criteria for tacting following SPOP could be an indication that, as suggested by Solares and Fryling (2018), additional pre-requisite skills are necessary to successfully learn tacting under SPOP instruction.

Additionally, it is difficult to conclude whether the varying ITI alone led to an increase in listener responding or if other factors were at play. For example, simultaneous prompting is a procedure that is similar to SPOP in that it utilizes a consistent controlling prompt during teaching trials, but no prompt during probe trials (or baseline, posttest, and the one-week follow up in this study). It is possible that holding up the target stimulus card and simultaneously dictating the name of the target stimulus during SPOP instruction served as a controlling prompt and mimicked simultaneous prompting procedure, which has been demonstrated to be effective numerous times (Vedora and Barry, 2016; Fisher et al., 2019).

Future research is needed to determine the effectiveness of the SPOP procedure. One suggestion is to increase the inclusion requirements to individuals who display emerging language, but also have general table compliance, and that do not engage in high rates of maladaptive behaviors. Another suggestion is to further break down previous research that has data demonstrating an increase in tact and listener responding (i.e., Byrne et al., 2014) to further pinpoint the variables causing SPOP to be effective. This could include remedial SPOP for individuals who do not meet mastery criteria after one SPOP instruction or testing to see if MEI is necessary for SPOP to be effective. A final suggestion is to investigate more suggestions from basic research (e.g., da Silva & Williams, 2020) and adopt more of their suggestions into this procedure.

These results add to burgeoning research on SPOP and illustrate the importance of incorporating respondent conditioning research outcomes and reconceptualization of the issues involved in language learning for individuals, regardless of diagnoses. This study should also assist practitioners in better improving stimulus pairing procedures and create more appropriate plans for individuals displaying signs of severe language delay. Additionally, it is the hope that the present study will overall assist in improving the ABA services provided relative to emerging verbal behavior in the form of tact and listener responding.

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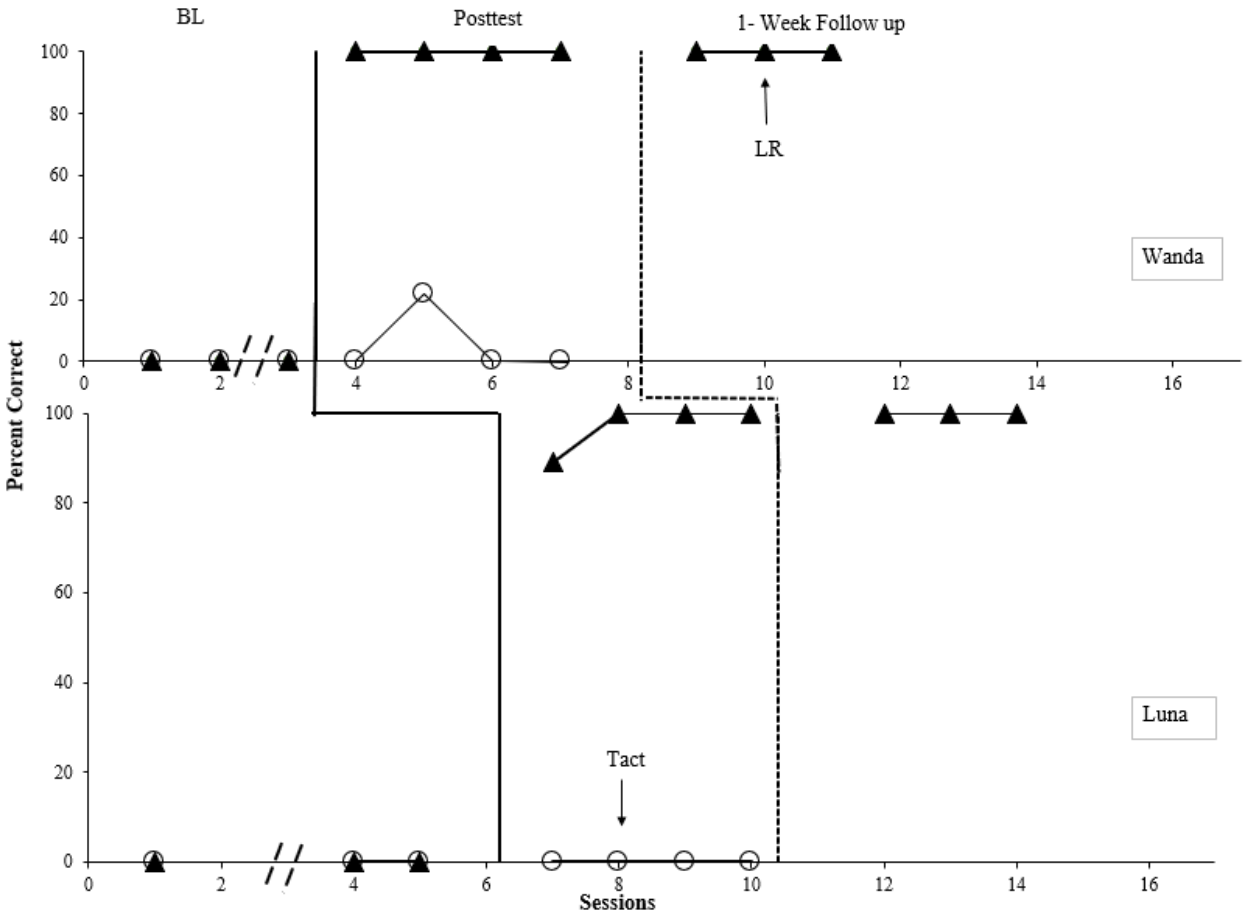
Figure 1

Percent Correct Responding using Stimulus Pairing Observation Procedure



Note. Percent correct tact and listener responding (LR) for baseline, posttest, and a one-week follow up, following SPOP instruction. Sessions consisted of two 9-trial blocks (i.e., one 9-trial block of tacts and one 9-trial block of listener responding) of target stimuli presentations.

Table 1. Mean percentage of trials in which participant echoed the experimenter's vocalization.

	Wanda	Luna	Mean
Listener Pretest	33%	17%	25%
SPOP	58%	87%	73%
Listener Posttest	55%	67%	61%
Listener Follow-up	50%	67%	58%

Note. The mean percentage is an average across the two participants.