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Using Video Modeling to Teach Parents to Use the Natural Language Paradigm

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USING VIDEO MODELING TO TEACH PARENTS TO USE THE NATURAL LANGUAGE PARADIGM

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There is paucity of research examining the use of video modeling to train parents to implement formats of early intervention such as Naturalistic Environmental Training (NET). The purpose of the current study was to evaluate the efficacy of video modeling to train parents to implement the Naturalistic Language Paradigm (NLP), a specific format of NET, with their children diagnosed with or suspected of having autism spectrum disorder. All three parents demonstrated accurate performance of the components of NLP with an adult confederate and met the mastery criterion in two or three video modeling sessions. We measured the parent's accurate implementation of each NLP step across phases of the study. Results showed that video modeling did not teach all steps to mastery. We also measured the generalization of the parents' NLP implementation to their child in the clinic and the home settings. Generalization of the NLP procedures to sessions with their child in the clinic was observed for all three participants, and generalization to the home was observed for two of the three participants. Maintenance probes conducted one and three weeks after generalization sessions showed continued high levels of accurate implementation of NLP for two parents. In addition, we assessed if parent-implemented NLP led to improvements in the child's vocalizations, inappropriate behavior, and appropriate play behavior.

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The parents of children with developmental disabilities or autism spectrum disorder (ASD) play an important role in their children's early education (Neef, 1995). Although professional services are not always available upon an initial diagnosis of a developmental disability or ASD, children have more opportunities to acquire new skills if parents are able to provide some instruction prior to the provision of services. Nevertheless, few parents are familiar with efficacious training strategies to teach their child new skills (Schultz, Schmidt, & Stichter, 2011).

There are three behavioral parent-training strategies that have been evaluated in the extant literature. Behavioral Skills Training (BST) combines instruction, modeling, guided rehearsal, and feedback on performance to train individuals. Numerous studies show the effectiveness of BST implemented with parents (e.g., Gianoumis, Seiverling, & Sturmey, 2012; Miles & Wilder, 2009; Rosales, Stone, & Rehfeldt, 2009). However, BST may be labor-intensive because a professional must be available to provide repeated training and practice opportunities. In addition, Rosales et al. (2009) found that remedial training was required before trained skills generalized to treatment implemented with a novel learner in a novel setting.

Another strategy that has been investigated to train parents is pyramidal training. This strategy involves training one person to serve as a trainer for subsequent people. That is, a professional trains one person, who trains another, who trains another. Although pyramidal training has been used to successfully train parents (Kuhn, Lerman, & Vorndran, 2003; Neef, 1995), prior studies evaluated only a few levels of training (e.g., trained parents taught another family member), and the length of time needed to train parents to train others is unknown. It is also unclear whether the skills the participant acquired in one setting generalized to other settings (Kuhn et al., 2003).

A third strategy for parent training is video modeling. This strategy may be particularly useful if it is not possible for a professional to provide training in person. Video modeling is considered to be a relatively economical and inexpensive form of training (Catania, Almeida, Liu-Constant, & Reed, 2009; Moore & Fisher, 2007; Vladescu, Carroll, Paden, & Kodak, 2012), because once the video has been created, many people can watch and benefit from it. However, this training strategy is currently the least frequently investigated of the three strategies for use with parents. The majority of the studies examining video modeling trained teachers or professionals (e.g., Catania et al., 2009; DiGennaro-Reed, Codding, Catania, & Maguire, 2010; Lavie & Sturmey, 2002; Moore & Fisher, 2007). To our knowledge, no studies have evaluated the efficacy of video modeling to train parents to implement behavioral interventions with their children.

A common focus of video modeling studies has been to evaluate how to train professionals to implement early intervention. Specifically, prior studies taught professionals to accurately implement trial-based interventions (e.g., Discrete Trial Training; DTT). DTT is a highly structured intervention in which instructional trials have a discrete beginning and ending. For example, Catania et al. (2009) used video modeling to train staff to successfully implement DTT with students with autism. Although DTT is a component of most children's early intervention services, other formats of instruction are prevalent during early intervention and may be utilized often in the initial stages of training (McGee, Krantz, & McClannahan, 1985).

Natural Environmental Training (NET) is another common format for early intervention, which is a less-structured and child-directed training procedure than is DTT (Kodak & Grow, 2011; LeBlanc, Esch, Sidener, & Firth, 2006). NET is typically conducted in natural settings

such as in the child's home and school, which makes parents ideal candidates for the implementation of this particular format of training.

One type of NET is the Natural Language Paradigm (NLP). NLP is a more structured, child-directed way to teach vocalizations using a play approach with a dual emphasis on play and vocalizations. Charlop-Christy and Kelso (1997) described NLP as being comprised of four basic components. The first component includes direct reinforcement of child vocalizations. The adult models an action with a child's preferred toy while providing the child with an opportunity to engage in an independent vocalization related to the toy. If the child does not engage in a relevant vocalization, the adult tacts the toy and action (e.g., "frog hops") while simultaneously modeling the action with the toy again. Any relevant child vocalizations are reinforced with access to the preferred toy and praise. The criterion for reinforcement varies across children; any sound produced by a child with no vocal verbal behavior is reinforced, and an approximation of the modeled response (e.g., "frog") by a child who emits one-word vocalizations is reinforced. Thus, the more advanced the child's vocal verbal behavior, the more stringent the criterion for reinforcement.

The second component of NLP is turn taking with the toys. The adult takes a turn with the toy by modeling a play action that is relevant to the toy. When the child vocalizes, the child has a turn with the toy for approximately 10 s. Turn taking occurs quickly and repeatedly during play opportunities.

The third component of NLP is task variation and use of multiple exemplars. A variety of preferred toys and vocalizations relevant to the toys are presented during play opportunities (e.g. "whale swims", "whale jumps", "fish swims"). The purpose of varying toys and modeled

responses is to increase the child's motivation to respond and teach multiple exemplars of play behavior and vocalizations with each preferred item (Charlop-Christy & Kelso, 1997).

The last component of NLP is shared control. The child has the opportunity to choose the items used in the session. If the child emits a relevant or alternative vocalization than the one modeled by the adult, or if the child indicates that he or she would like to play with another object, the adult follows the child's lead. Thus, the child selects an item and receives access to naturally occurring reinforcement for engaging in vocalizations (Koegel, O'Dell, & Koegel, 1987).

Although NLP is described as having a dual focus on modeling play behavior and appropriate vocalizations (Charlop-Christy & Kelso, 1997), many of the studies investigating NLP have measured increases in children's vocalizations only. Koegel et al. (1987) evaluated the efficacy of NLP in a clinic setting with trained staff. The participants consisted of two children with ASD. Their results showed that both participants' vocal verbal behavior increased and generalized across settings following NLP instruction. Specifically, the children produced newly acquired sounds with familiar adults who were not their therapists in novel settings (i.e. other rooms in the school, the child's home). However, the participant's play skills were not measured or reported.

In a follow-up study, Laski, Charlop, and Schreibman (1988) investigated the use of parent-implemented NLP in a clinic setting with generalization to the home. Participants included eight parent-child dyads, and all of the children in each dyad had an ASD diagnosis. The parent-training procedures consisted of a discussion of NLP procedures, direct observations of trained therapists conducting NLP with a child, and in-vivo training to teach the parents to implement NLP with their child. The results showed that parents provided more frequent vocal

models, and vocalizations increased for all child participants. However, play skills were not measured or reported. Thus, although NLP occurs within the context of play and includes modeling of play behavior, previous studies rarely measured an improvement in play skills.

One notable exception was a study conducted by Gillett and LeBlanc (2007) who trained parents to implement NLP and measured play behavior. The participants were three parent-child dyads, and all of the children were diagnosed with ASD. The authors reported the occurrence of each child's appropriate play skills during baseline and intervention. Appropriate play skills increased for two of the three child participants, and spontaneous vocalizations increased for all three children. Nevertheless, the data-collection measures for play behavior were not clearly specified in the manuscript, which prevents close replication of the study procedures. More research is needed to explicate the procedures for measuring play behavior during NLP in training and generalization settings.

The purpose of the current study was to evaluate the efficacy of video modeling to train parents of children diagnosed with or suspected of having ASD to implement NLP and to extend the current literature on NLP. Specifically, we used video modeling to train parents to implement NLP to teach their child vocal verbal behavior and play skills, and we measured the generalization of accurate implementation of NLP to the child in the clinic and the home settings. We also conducted maintenance probes one and three weeks following generalization sessions. We extended prior research by developing specific definitions of play behavior and by measuring play behavior prior to and following parent training.

Method

Participant, Setting, and Materials

Three parent-child dyads participated in the study. Participants were recruited through the Autism Society of Southeastern Wisconsin (ASSEW) and local diagnostic clinics. The parent participants were all mothers between the ages of 32 and 40. All three of the parent participants were married and had two or three children (including the child participant). One parent also reported that her children who did not participate in the study had other types of cognitive impairments. Christy was the mother of Chris, Alison was the mother of Alan, and Jamie was the mother of James. The highest level of education completed was a bachelor's degree (Alison and Jamie) or a master's degree (Christy). All parent participants reported having some psychology undergraduate coursework; however, they had not received any applied behavior analysis training prior to this study.

To participate in the study, child participants needed a minimum score of 90 on Gilliam Autism Rating Scale – Third Edition (GARS-3; Gilliam, 2013) and a minimum score of 3 on the Early Echoic Skills Assessment (EESA; Esch, 2008) from the Verbal Behavior Milestone Assessment and Placement Program (VB-MAPP; Sundberg, 2008) during the preliminary assessment. All three of the child participants were four years old, and had ASD-like symptoms as confirmed by the GARS-3 that was completed by each of the parent participants prior to participation. Chris and James each received an autism index score of 103 on the GARS-3, and Alan received a score of 90 indicating that it was *very likely* that all three individuals had autism.

Chris was four years old and obtained a score of 3 points on the EESA. Alan was four years and three months old and obtained a score of 13 points on the EESA. James was four years and six months old and obtained a score of 11.5 points on the EESA. All child participants were observed to engage in cause-and-effect play (i.e., dumping toys in a bucket, pushing buttons on a

light toy, pressing levers to release doors of a pop-up toy). They engaged in one-word vocalizations.

Sessions were conducted at an early intervention research laboratory and in the participants' homes. Sessions in the early intervention laboratory took place in a private therapy room. Sessions in the home took place in a room with minimal distractions (e.g. no television). Session materials included a computer for viewing the video model, written instructions of NLP (Appendix B), example toys for the practice opportunities with adult confederates, each child participant's highly preferred toys during generalization sessions, and materials for data collection (data sheets and laptop computers). All sessions were recorded using a video camera on a tripod for data collection purposes.

Ten scripts were used in training during practice opportunities to provide a variety of scenarios to parents (Appendix C). Each script included trials in which the adult confederate (a) chose a toy and engaged in an independent or prompted vocalization during three to five trials, (b) did not choose a toy during one or two trials, (c) did not engage in a vocalization during one or two trials, and (d) engaged in inappropriate behavior during one or two trials.

Response Measurement and Interobserver Agreement

Observers measured the frequency of each parent participant's correctly implemented steps of the NLP procedures during all sessions of baseline, training, generalization with the child in the clinic, generalization in the home, and maintenance. Performance of the NLP steps were measured as the occurrence or non-occurrence of each of the ten steps listed in Table 1. The occurrence of the ten steps were recorded for each trial of the NLP procedures and were included in the measure of parent integrity. A parent implemented NLP with integrity if at least eight out of the 10 steps occurred during a trial in the correct order (see Table 1 for a list of NLP steps). A

trial began when the parent participant presented the child or adult confederate with a choice of toys and ended when the target toy was removed or a new choice was presented. We measured the number of sessions required to reach the mastery criterion of at least 90% of trials with correctly implemented NLP steps for two consecutive sessions, as well as the parent's generalization of correctly implemented NLP steps to structured play with their child in the clinic setting and in their home.

One or two independent observers collected data on all parent dependent variables throughout the session and from video recordings following each session. A secondary observer collected data during at least 35% of the sessions. We calculated trial-by-trial IOA for the parent's dependent variables by dividing the number of trials in which both observers agreed on the occurrence and nonoccurrence of all dependent variables by the total number of trials in the session, and converted the ratio to a percentage. Mean IOA was 94% (range, 74% to 100%) for Christy, 95% (range, 88% to 99%) for Alison, and 92% (range, 85% to 98%) for Jamie.

In addition, observers collected data on five dependent variables for child behavior using real time and trial-based recording. Observers scored the child's (a) independent vocalizations, defined as any vocalizations occurring prior to an adult's prompt that could be heard from a distance of at least 1 m; a new instance occurred following the absence of the behavior for 3 s, (b) prompted vocalizations, defined as any vocalizations that occurred within 5 s of an adult's prompt to vocalize that could be heard from a distance of at least 1 m; a new instance occurred following the absence of the behavior for 3 s, (c) inappropriate behavior, defined as aggression (e.g., contact between the adult's body and the child's closed fist or open hand), disruption (e.g., projecting a toy into the air a distance of 7.62 cm or greater), and screaming or crying (i.e., any vocal verbal behavior above conversation level), (d) appropriate play, defined as using the toy in

the manner in which it is intended to be used with their hand(s) (e.g., pushing a toy car on the floor, bouncing or rolling a ball, pressing the buttons of a sounds or light toy), with no instances of inappropriate behavior, and (e) imitative play, defined as imitating the adult's behavior with a toy in a topographically similar way (i.e., point-to-point correspondence) within 15 s.

Observers collected data on the frequency of vocalizations, inappropriate behavior, and imitative behavior from video recordings following each session. These data were converted to rate by dividing the frequency of the behavior by the total session duration. We calculated proportional IOA for these dependent variables by adding the number of trials in which both observers agreed on the frequency of occurrences of behavior and the trials in which there was a partial agreement between the observers (the smaller recorded frequency divided by the larger recorded frequency). The sum was then divided by the total number of trials and converted to a percentage. Mean IOA was 93% (range, 73% to 100%) for Chris, 88% (range, 78% to 97%) for Alan, and 86% (range, 71% to 100%) for James.

The data collectors also scored the child's appropriate play behavior during play opportunities from video recordings following each session. Appropriate play behavior was converted to a percentage by diving the duration of appropriate play by the total duration of access to the toy, multiplied by 100. The experimenter calculated the mean duration per occurrence IOA for appropriate play behavior by calculating the average percentage of agreement of the durations reported by the two observers for each occurrence of appropriate play behavior. Mean IOA was 94% (range, 80% to 100%) for Chris, 92% (range, 60% to 100%) for Alan, and 89% (range, 70% to 100%) for James.

Preliminary Assessments

Echoic assessment. The EESA was administered to all child participants to provide a measure of the child's echoic behavior for different vowel and consonant sounds. The experimenter presented each of the targets sounds or words in the EESA with a prompt to "say (target sound or word)" and waited up to 5 s for a response. The experimenter conducted up to three trials of each targeted sound or word to provide the opportunity for the participant to receive the maximum score for a response (i.e., one point), as indicated in the instructions for the assessment. Each child participant scored at least 3 points on the simple and reduplicated syllables section of the EESA (i.e., Group 1) with at least one consonant sound. The assessment was used to identify specific sounds, blends, or words that would be appropriate vocalizations during NLP. For example, children who echoed short sound blends (e.g., "ma") during the EESA were expected to produce individual sounds or sound blends during each phase.

Preference assessment. The parent completed the Reinforcer Assessment for Individuals with Severe Disabilities (RAISD; Fisher, Piazza, Bowman, & Amari, 1996). This structured interview has a range of questions to identify preferred stimuli. From the items identified by the RAISD as potential reinforcers, the experimenter conducted a free-operant preference assessment based on the procedures described by Roane, Vollmer, Ringdahl, and Marcus (1998) during each of the child play probes. Twenty items were placed on the floor, and the child could manipulate any of the items for any duration of time. The experimenter scored the percentage of intervals the child manipulated each items using a 30 s partial-interval recording procedure for three 10-min sessions.

Child play probe. Three to five probe sessions were conducted. During each probe session, the child had the opportunity to play with 20 toys without adult interactions for 10 min in the child's home in an area with minimal distractions (e.g. no television). Each minute of the

session was considered a trial for the purpose of data collection. The 20 toys were selected from those identified by the completed RAISD. The experimenter collected data on the child's frequency of vocalizations and inappropriate play and the duration of appropriate play.

Dyad play probe. Parent participants were asked to act as they normally would when playing with their child for 10 min in the same location in the home as the child play probe. Three to five dyad play probes were conducted. The toys and data-collection procedures were similar to those in the child play probe with the exception that the parent was present. The experimenter also collected data on the frequency of imitative play.

General Procedure

The study evaluated the effects of video modeling on parent participants' accurate implementation of NLP and increases in child participants' vocalizations, imitative play behavior, and appropriate play behavior as well as decreases in inappropriate behavior within a non-concurrent multiple baseline design across participants. Two to three sessions were conducted per day, two to three days per week.

Baseline. Three to five baseline sessions were conducted at the participants' home and at the early intervention clinic with the child participant. Sessions were up to 10 min in duration. Each new choice opportunity that the parent gave to their child was considered a new trial (see Step 1 in Table 1). The session continued until 10 trials occurred or 10 min elapsed, which ever occurred first. The experimenter gave the parent written instructions with steps on how to conduct NLP, and the parent had 3 min to read through the instructions prior to the start of each session. The experimenter did not provide any additional information related to the written instructions. The session began when the experimenter indicated that the parent should begin playing with her child.

Training. All training sessions were conducted at the early intervention clinic. Parent participants were given the NLP written instructions to review for 3 min prior to sessions, as in baseline. Training included a video model followed by an opportunity to practice implementing the intervention with an adult confederate. Parents watched the video model of NLP on a computer in the clinic. The video was 9 min and 4 s long and included models of the NLP procedures with four child confederates. The child confederates were aged two to four and included one boy and three girls. The video described each step of NLP using voiceover instructions (Appendix D) and highlighted the location of the step on the written instructions followed by one model of the adult performing that step with a child. Once all 10 steps were reviewed, the video provided two non-examples and examples of parent responses to inappropriate behavior. The video ended with six complete NLP trials with examples of appropriate independent vocalizations, adult vocal model prompts, inappropriate behavior, no vocalization emitted by the child confederate, and varying levels of vocal verbal behavior (e.g., "du", "ball", "duck floats"). This video was created for the purposes of this project using iMovie (version 10.0.5, 2001-2014) and required 17.2 hrs to complete (i.e., setting up equipment, capturing video models, creating voiceover instructions, and editing the final video).

The experimenter provided a brief break (up to 5 min) following the video, although she did not answer questions or provide any additional information about NLP during the break. Thereafter, the parent had the opportunity to perform the skills modeled in the video with the written instruction and an adult confederate. Refer to Table 1 for a list and operational definitions of NLP steps.

Each practice opportunity consisted of 10 NLP trials. The adult confederate pseudo-randomly selected a script to implement from 10 available scripts (Appendix C). During the

practice opportunities, the parent did not receive feedback on her performance. After completing a training session, the parent had a brief break (up to 5 min) prior to repeating another training session, which was comprised of watching the video and practicing the intervention. Two training sessions were conducted each day, two to three days a week. Training sessions continued until the parent reached the mastery criterion for NLP implementation (two consecutive sessions with at least 90% correctly implemented NLP trials).

Generalization. The experimenter assessed the parent participant's generalization of NLP procedures to (a) playtime with her child in the clinic, and (b) playtime with her child in the home setting. The parent participant performed NLP procedures during playtime in each setting. Following a demonstration of mastery of NLP procedures with their child in the clinic, the parents performed NLP with their child in their home. Similar to sessions conducted in the clinic, parents did not receive feedback on her performance of the intervention during or following sessions in the home setting.

Maintenance. One week and three weeks after the mastery of NLP, maintenance probes were conducted to assess the parent participant's accurate implantation of NLP and the child's behavior. The parent participants performed the NLP procedures during playtime in their home. The experimenter did not provide any feedback on parent performance during or following each session.

Social validity. Following the final maintenance session, the experimenter distributed the Treatment Evaluation Inventory Short Form (TEI-SF; Kelley, Heffer, Gresham, & Elliott, 1989) questionnaire to the participating parents. The parents rated NLP for the following nine items: (1) the treatment is an acceptable way of dealing with this person's behavior; (2) the treatment is acceptable to use without a person's consent; (3) likeability of the procedure used; (4)

effectiveness of the treatment; (5) level of discomfort the person experiences during the treatment; (6) permanent improvements resulting from treatment; (7) use of treatment with individuals who cannot chose treatments; (8) overall reaction to the treatment; and (9) recommend the intervention to others. Each item was scored on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Results

Parent Behavior

None of the parent participants had any instances of accurate implementation of NLP in baseline (Figure 1). All three of the parent participants demonstrated accurate performance of the steps of NLP with the confederate following training. Christy and Jamie met the mastery criterion following two video modeling training sessions (Figure 1, top panel and bottom panels, respectively), and Alison met the mastery criterion following three video modeling training sessions (Figure 1, middle). Generalization of the NLP procedures to sessions with their child occurred for all three parent participants, and generalization to the home occurred for two of the three parent participants (Christy and Alison). Jamie withdrew from the study before she met the mastery criterion in the home setting. Maintenance probes conducted one and three weeks after generalization sessions (Christy and Alison only) showed continued high levels of accurate implementation of NLP.

We also measured the parent participant's accurate implementation of each NLP step across all phases of the study. Results show that video modeling did not teach all steps of NLP to mastery although the overall implementation of NLP met the mastery criterion. Figure 2 depicts Christy's percentage of correct implementation of NLP steps across each condition. During baseline sessions, Christy's mean percentage of correct implementation of NLP steps was 31.2%

(range, 6.3% to 85.1%) in baseline compared to 95.0% during treatment conditions (range, 80.0% to 100%). Christy had the highest percentage of implementation for steps one and two (provides a choice to the child and sits within 1 m of the child) in baseline sessions. During training, Christy had high percentages of correct implementation for all 10 steps; however, step one and five (provides a choice to the child and models an action with the toy for 3 to 5 s before modeling a vocalization) were only implemented at 80.0%. Christy's mean of correct implementation for generalization and maintenance sessions were 86.1% and 88.8%, respectively. Steps one and five (providing a choice to the child and models an action with the toy for 3 to 5 s before modeling a vocalization) continued to have the lowest levels of correct implementation during generalization with percentages at 22.8% and 57.1%, respectively. Although correct implementation of step five remained low during maintenance (i.e., 58.3%), correct implementation of step one increased to 85.0% during maintenance.

Figure 3 displays Alison's percentage of correct implementation of NLP steps across each condition. During baseline sessions, her mean percentage of correctly implemented NLP steps was 25.4% (range, 0% to 67.8%). The highest level of correct implementation occurred for steps one and two (provides a choice to the child and sits within 1 m of the child) during baseline. Alison's mean percentage of correct implementation during treatment sessions was 91.3% (range, 60.0% to 100%). Although correct implementation all of the steps improved during treatment, steps three and five (removes all unselected items and models and action with the toy for 3 to 5 s before modeling a vocalization) were inconsistently implemented during 73.3% and 60.0% of the sessions, respectively. Nevertheless, correct implementation of these steps increased to above 85.0% during generalization and maintenance. Alison's mean

percentage of correct implementation for all steps during generalization and maintenance sessions was 93.2% and 96.0%, respectively.

Jamie's mean percentage of correct implementation of NLP steps (Figure 4) was 27.6% (range, 0% to 83.7%) during baseline sessions. Consistent with the findings of other parent participants, her highest percentage of correct implementation were for steps one and two (provides a choice to the child and sits within 1 m of the child) during baseline. Jamie's mean percentage of correct implementation of NLP steps was 89.0% (range, 35.0% to 100%) during treatment and 85.8% (range, 62.5% to 98.3%) for generalization sessions. Although accurate implementation of all of the steps increased during treatment, steps five and six (models and action with the toy for 3 to 5 s before modeling a vocalization and presents a vocal model prompt) were inconsistently implemented at 35.0% and 70.0% of the sessions respectively. Correct implementation of these steps improved during generalization sessions to 62.5% and 85.8%, respectively.

Child Behavior

Independent and prompted vocalizations and inappropriate behavior for the three child participants are shown in Figure 5 and Figure 6 respectively. Appropriate play is shown in Figure 7 and imitative play behavior is shown in Figure 8. During the pre-assessment, baseline, and generalization to child conditions, Chris engaged in low rates of independent and prompted vocalizations (Figure 5, top panel), and inappropriate behavior (Figure 6, top panel). During the generalization to home and maintenance conditions, Chris' prompted vocalizations increased. Prompted vocalizations were highest during the three-week maintenance sessions. We also observed an increase in the rate of inappropriate behavior during several generalization sessions in the home and during the first three-week maintenance session. Chris had variable levels of

appropriate play across all conditions with the highest percentage during pre-assessment conditions and the lowest percentage during generalization to the home sessions (Figure 7, top panel). However, Chris had increasing rates of imitative play from the pre-assessment dyad probes to the three-week maintenance sessions (Figure 8, top panel).

Alan engaged in high rates of prompted vocalizations across all conditions (Figure 5, middle panel). He engaged in similar rates of independent vocalizations across all conditions except baseline. During baseline, Alan had low and near-zero rates independent vocalizations and increased levels of prompted vocalizations. He had increased rates of inappropriate behavior during the generalization to home and three-week maintenance sessions (Figure 6, middle panel). Alan had variable levels of appropriate play across all conditions with the highest percentage during baseline and generalization sessions and the lowest percentage during the three-week maintenance sessions (Figure 7, middle panel). Alan also had increased rates of imitative play from the pre-assessment dyad probes to the one-week maintenance sessions (Figure 8, middle panel).

James engaged in variable rates of independent vocalization and prompted vocalizations (Figure 5, bottom panel), and inappropriate behavior across all conditions (Figure 6, bottom panel). James' prompted vocalizations were consistently high across phases, and moderate but variable levels of independent vocalizations occurred in all phases except baseline; James had low levels of independent vocalizations in baseline. We observed several sessions with higher rates of inappropriate behavior during baseline and the first generalization session in the clinic. However, he engaged in lower rates of inappropriate behavior during the pre-assessment and generalization sessions in the home. James had variable levels of appropriate play across all conditions with the highest percentage during pre-assessment and baseline conditions and the

lowest percentage during the generalization to home sessions (Figure 7, bottom panel). James had variable rates of imitative play across phases, as well (Figure 8, bottom panel).

Overall, there were variable rates of independent and prompted vocalizations across phases for the three child participants (Figure 5). The rate of problem behavior also varied across phases (Figure 6). All three of the participants also engaged in varying levels of appropriate play across phases (Figure 7) and increased rates of imitative play (Figure 8) from the pre-assessment dyad play probe to maintenance sessions for two of the three participants (Chris and Alan). Thus, NLP did not lead to substantial changes in the child participants' target behavior, although we did observe small increases in specific target behavior for two participants.

Social Validity

The TEI-SF questionnaire was completed by two of the parent participants. They reported that the treatment was an acceptable way of dealing with their child's behavior and that the treatment was acceptable to use without their child's consent. One participant strongly disagreed that the child would experience a level of discomfort during the treatment while the other participant agreed with this statement. Finally, both parents agreed that there is likely to be permanent improvements resulting from this treatment, that it is appropriate to use with individuals who cannot chose a treatment, they had a positive reaction to the treatment, and they would recommend this treatment to others.

Discussion

Overall the three parent participants demonstrated a rapid increase in accurate performance of the NLP steps from the baseline condition to treatment, generalization, and maintenance conditions. Correct implementation of the NLP procedures during maintenance

sessions may have remained high because the two parents who completed maintenance sessions (Christy and Alison) reported ongoing implementation outside of scheduled sessions. Christy reported that she conducted NLP with Chris two to five times per week, and Alison reported conducting NLP about once per week with Alan following generalization sessions in the home setting. These findings suggest that the procedure was feasible for parents to use and was socially valid (which also was confirmed by the their ratings on the TEI-SF).

Although the NLP trials met the criterion for accurate implementation, parents inconsistently executed one or more of the intervention steps. Step five (models an action with the toy for 3 to 5 s before modeling a vocalization) was implemented with accuracy during only 35.0% to 86.7% of the trials across the three parent participants' treatment sessions. It is important to note that if the parent modeled an action for fewer than 3 s or longer than 5 s the step was scored as incorrect. Low levels of accurate implementation of step five may have occurred because of the stringent criterion for the duration of the modeled action, and the video may not have sufficiently addressed how to correctly perform this step. Nevertheless, parents' accurate implementation of step five improved during generalization and maintenance sessions. It is possible that child participants' latency to an independent vocalization decreased during generalization and maintenance trials, which could lead to improved performance on this step for parents who consistently modeled the action for longer than 5 s. Future studies evaluating video modeling should carefully measure participant performance to identify any gaps in the efficacy of the video modeling intervention.

The current investigation extended prior research on NLP by using video modeling to teach parents to implement NLP with their children. The parents in the current investigation mastered NLP following only two to three viewings of the video. These results are similar to

Gianoumis, Seiverling, and Sturmey (2012) who used BST to teach staff to implement NLP to the mastery criterion in two to three sessions. However, other studies required more training sessions to meet the mastery criterion when teaching parents this intervention (e.g., Gillett & LeBlanc, 2007; Laski, Charlop, & Schreibman, 1988). The video in the current study also produced mastery of the steps of NLP without the need for additional intervention components (e.g., feedback). Our results are consistent with prior studies that found video modeling to be effective as a stand-alone procedure without feedback (e.g. Catania et al., 2009; Vladescu et al., 2012). Nevertheless, a video modeling intervention created by Howard and DiGennaro Reed (2014) required supplemental instruction in the form of performance feedback and modeling for shelter volunteers to reach the mastery criterion for trained skills.

The discrepant outcomes across video modeling studies may relate to the type or length of the skill being trained or components of the video. The present investigation included 10 training steps and a video that was 9 min 4 s in duration which is comparable to Catania et al. (2009) who taught discrete-trial instruction in 10 steps and a video that was 7 min 15 s long. In comparison, Howard and DiGennaro Reed (2014) taught shelter volunteers to teach dog compliance using 9 training steps in a video that was 14 min 14 s in duration. Thus, the Howard and DiGennaro Reed video contained the fewest training components but had the longest video. It is possible that the intervention steps were more complex than those in prior studies, which necessitated longer clips of each step. Also, the videos in the current investigation, Vladescu et al. (2012), and Catania et al. (2009) included voiceover instructions. Vladescu et al. and the current study also included a sequence of uninterrupted trial procedures without voiceover instruction in the last portion of the video to display the steps of intervention as they occur during implementation. Due to the variations in video components in prior studies on video

modeling, more research is needed to identify the effective and necessary components of modeling to produce successful training outcomes without the need for additional intervention (e.g., performance feedback).

Although our results show that video modeling was an efficacious intervention that required little instructional time (i.e., two to three sessions; 18.1 to 27.2 min) to teach parents to implement NLP, it is important to consider the amount of time required for the experimenter to create the video model as well as the number of participants that might receive training with the video. A total of 17.2 hours (1,033 minutes) was necessary for the experimenter to create the video model in the present investigation. This duration included setting up the video equipment, reviewing consent forms with the child confederate's parent, and capturing videos (80 min), uploading recorded files to a computer (10 min), creating the voiceover instructions (317 min), and editing the final video (626 min). Considering the amount of time it took to create the video model in relation to the number of participants (i.e., 344 min per participant), the video modeling procedures may not be as efficient for practitioners as other procedures (e.g., BST) for training only three parents. However, video modeling could be more economical for training larger populations of parents. For example, if we implemented the video model in the current investigation with 50 parents, the putative video creation time could be 20.7 min per parent.

One advantage of using video modeling is that a trained practitioner does not need to be present to implement intervention. However, practitioners who decide to use a video model must allocate time to creating the video. Most prior research on video modeling did not report the length of time required to create the video. A notable exception is the video modeling intervention developed by Howard and DiGennaro Reed (2014) who reported the duration of time needed to create a video to train shelter volunteers to teach dog compliance. The duration to

create the video model in their study (1080 min) is comparable to the duration required to make the video model in the present investigation (1033 min). Studies that seek to evaluate the efficiency of video modeling could report data on the duration of time to create the video and conduct training with participants in order to more accurately generate conclusions about the efficiency of intervention. These data will enhance the conclusions that can be drawn regarding the potential time savings of using video models to teach others how to implement behavioral interventions.

Prior studies on NLP as an intervention for children with developmental disabilities measured inappropriate play or maladaptive behavior prior to and during intervention. For example, Gillett and LeBlanc (2007) measured inappropriate play, which included inappropriate behavior (i.e., aggressive or destructive use of an object and use of a toy in a stereotyped manner). They found that inappropriate play was consistently low across baseline, treatment, and home probe conditions (i.e., average of 0% to 11% of the intervals across participants). Gianoumis et al. (2012) also assessed maladaptive behavior which included crying, screaming, lying on the floor, elopement, aggressive behavior, any non-contextual vocalization, and repetitive motor movements unrelated to the toys. Six participants had variable levels of maladaptive behavior during baseline sessions, and there were reductions in maladaptive behavior for four of the six participants during intervention. In comparison, the current study included a different measure of inappropriate behavior because we did not include stereotypic behavior in our definition. We did observe some stereotypy during play; however, this behavior was removed from our measure of appropriate play behavior (i.e., if a child was engaging in stereotypy, appropriate play was not recorded). Because the definitions of inappropriate behavior varied across studies, and only two prior studies included measures of this type of behavior

during training, it is unclear how stereotypic, aggressive, and disruptive behavior impacts the efficacy of NLP procedures.

Two of the child participants in the present investigation (Chris and Alan) engaged in inappropriate behavior more often during the three-week maintenance sessions and in the home setting. Problem behavior may have been more prevalent in these conditions and settings because the parents were required to restrict access to other items in their environment when correctly implementing NLP procedures. Other items were not present in the clinic setting because the room only contained the materials necessary for sessions. In addition, correct implementation of the NLP procedure requires parents to remove toys and present a new choice contingent on problem behavior. Thus, problem behavior leads to the removal of the toys in the preceding trial. We did not conduct an assessment to determine the function of the participant's problem behavior prior to the study. Thus, it remains unclear whether one or more of the participants engaged in tangibly maintained problem behavior and whether the intervention may have arranged contingencies that aligned with differential reinforcement of alternative behavior (i.e., reinforcement for appropriate behavior only, extinction for problem behavior).

This study extended the current literature on NLP by assessing child participants' appropriate play behavior as well as imitative behavior. We did not observe clinically significant differences in play behavior from the pre-assessment conditions (child play probe and dyad play probe) to the maintenance sessions; however, there were differences in the rate of imitative play behavior during intervention. For example, although Chris engaged in some imitative behavior during the pre-assessment dyad play probe, we observed higher rates of imitative behavior in the maintenance sessions. That is, Chris imitated play actions that his mother modeled during intervention, a portion of which were novel play actions with toys. Furthermore, Chris often

chose to play with one toy for the entire duration of the pre-assessment sessions in a repetitive manner (e.g., opening and closing the doors of a popup toy). In comparison, Chris chose a variety of toys and varied the actions performed with those toys (e.g., snake slithers, shark chomps) during maintenance sessions. Therefore, measuring the percentage of appropriate play behavior rather than instances of novel or varied play may mask potential qualitative improvements in play behavior produced by NLP. Future studies could include other measures of play behavior that may better capture improvements in play behavior during intervention.

There were several limitations of the present study. One limitation is that Jamie and James did not complete the generalization sessions in the home setting. Although Jamie demonstrated higher levels of accurate implementation of the NLP steps when compared to baseline sessions, she did not meet the mastery criterion in the generalization to home condition. She also did not complete the maintenance condition and the TEI-SF questionnaire. It is unclear whether additional sessions would have resulted in mastery level responding in these conditions or improvements in child behavior for James.

Another limitation to the current study was that we did not observe increases in vocalization or appropriate play behavior for the three child participants. This may have been a result of the short amount of time that we observed the parent accurately implementing the NLP procedures. Although, the parent participants reported that they used NLP one to three times a week outside of the observed sessions, we completed data collection 4 to 23 days following training in the clinic with the adult confederate. The treatment period may have been too short to observe any clinically significant changes in vocalizations and appropriate play.

Our child outcomes may also be attributed to the way in which vocalizations were measured. We did not record the length of vocalizations or categorize the vocalizations by verbal

operants. For example, we do not know whether the vocalizations that occurred during the pre-assessment were similar to the vocalizations during generalization and maintenance sessions (e.g. same sounds, letter blends, or whole words). Parents were not taught to shape their child's vocalizations during NLP. Prior studies reported increases in parent's prompts during NLP as a clinically significant intervention outcome rather than emphasizing independent child vocalizations (Laski et al., 1988). Additional research is needed to evaluate the length of vocalizations and the types of verbal operants that occur prior to and following intervention to determine if NLP leads to improvements in the complexity of vocal verbal behavior or the emergence of novel verbal operants.

Our child vocalization results match those of two participants in Gianoumis, Seiverling, and Sturmey (2012) who engaged in high levels of maladaptive behavior. This is important to note, as it is unclear how NLP impacts independent and prompted vocalizations for children who engage in higher levels of inappropriate and maladaptive behavior throughout intervention. It is possible that in order for these children to benefit from this type of instruction, interventions to reduce inappropriate behavior must occur first.

Finally, parents used prompts during the pre-assessment and baseline sessions. Parents continued to prompt their child during treatment, generalization, and maintenance sessions. Nevertheless, the efficacy of the prompts could have changed during intervention, which is not shown in the figures. For example, Alison emitted nonspecific prompts during baseline (e.g., "Do you want to play?") with a short latency between prompts. The prompted vocalizations reported in Alan's graph (Figure 5, middle panel) show vocalizations that occurred following numerous prompts from Alison. Thus, Alison may have provided multiple, nonspecific prompts prior to the occurrence of a single prompted response from Alan. During treatment,

generalization, and maintenance sessions, anecdotal observations indicted that the type and frequency of prompts changed. For example, Alison used vocal model prompts to which Alan engaged in a prompted vocalization. Our measure of prompted vocalizations did not capture changes in types of prompts, intervals between prompts in each phase of the study, or child compliance to prompts. Future studies could collect data on the frequency and types of prompts used by parents across phases to capture these qualitative changes that could have an impact on the likelihood of improvement in targeted behavior during NLP.

The results of this study support the use of video modeling to teach parents to implement NLP with their children. Continued research on NLP may help identify specific child outcomes produced by long-term use of this intervention by parents. In addition, future research on video modeling may help identify specific video components that are necessary to produce successful training outcomes.

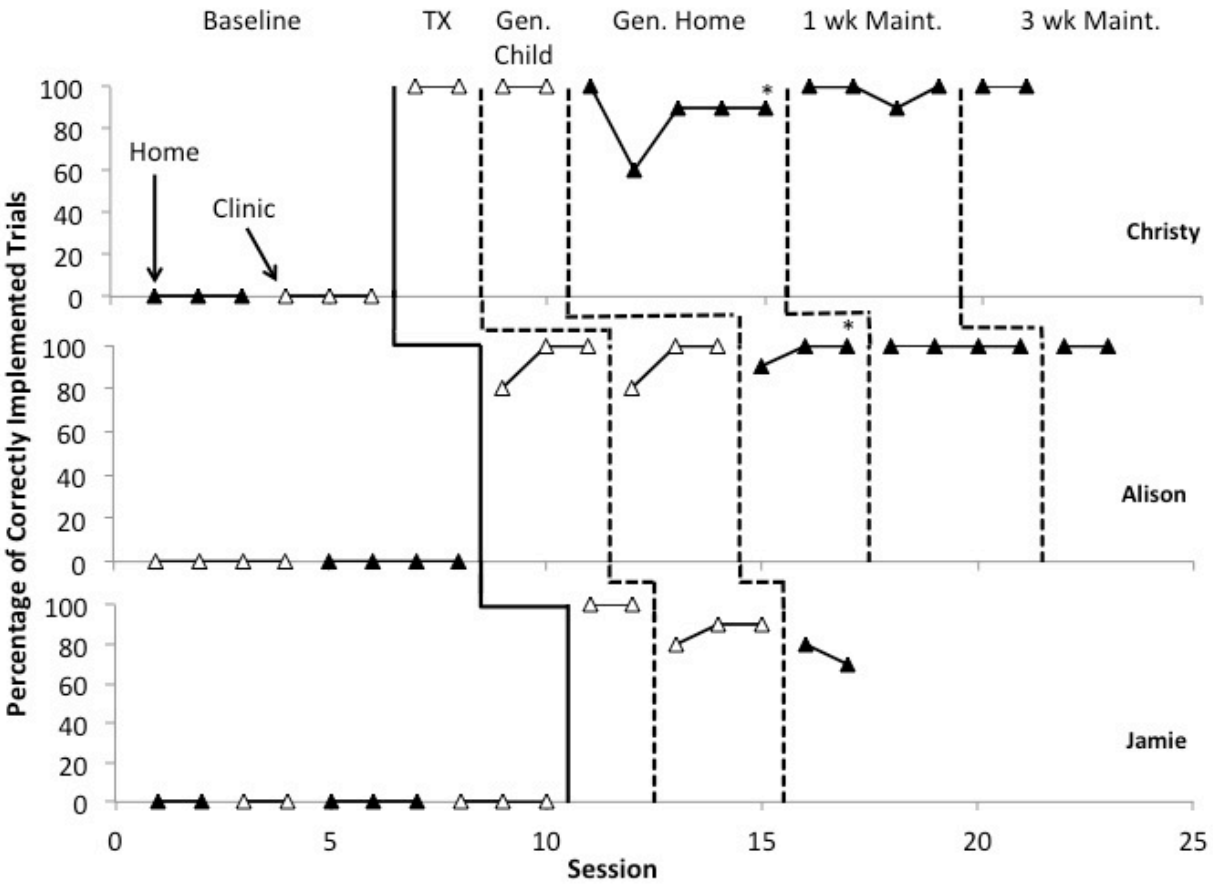

Figure 1. Percentage of correctly implemented trials of NLP steps by Christy (top), Alison (middle), and Jamie (bottom) in the home and clinic setting. TX=Training, Gen=Generalization, wk= week, and Maint.=Maintenance. The asterisk denotes a session in which toys from the participant's home were used.

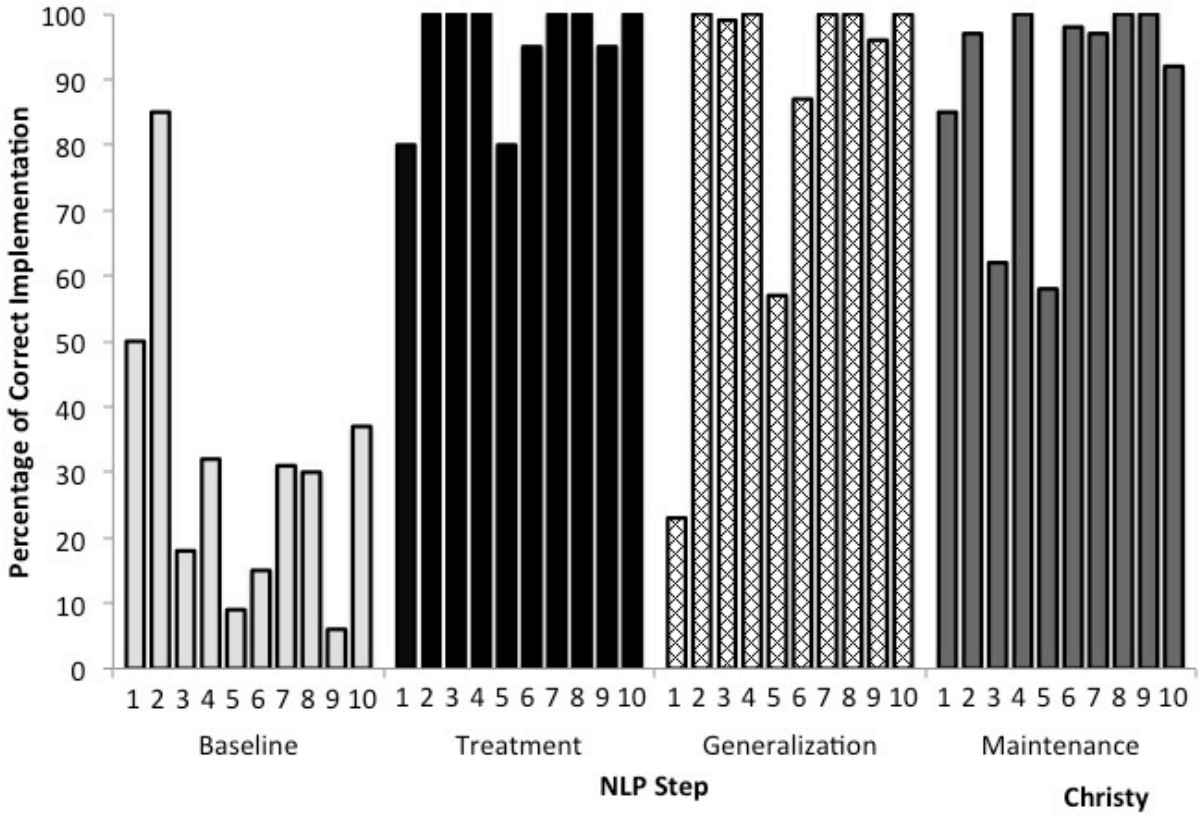

Figure 2. Christy's percentage of correct implementation of NLP steps across each condition.

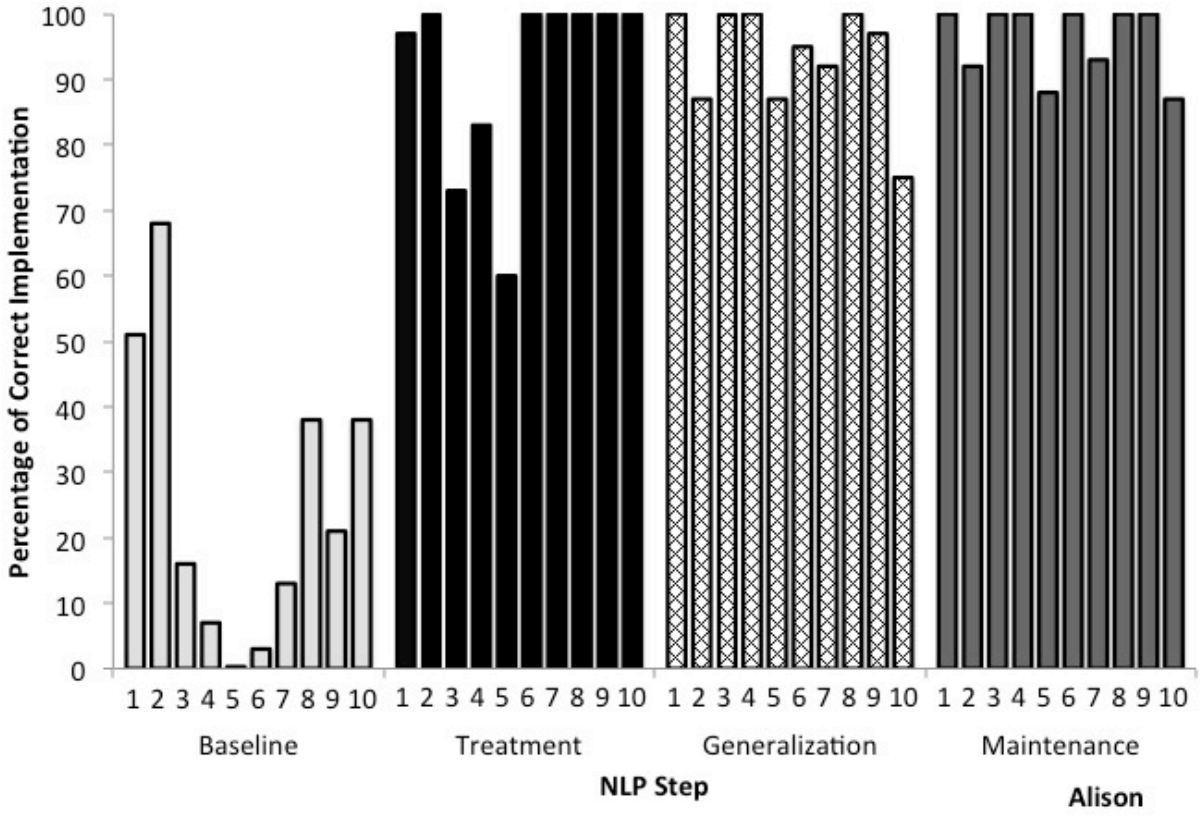

Figure 3. Allison's percentage of correct implementation of NLP steps across each condition.

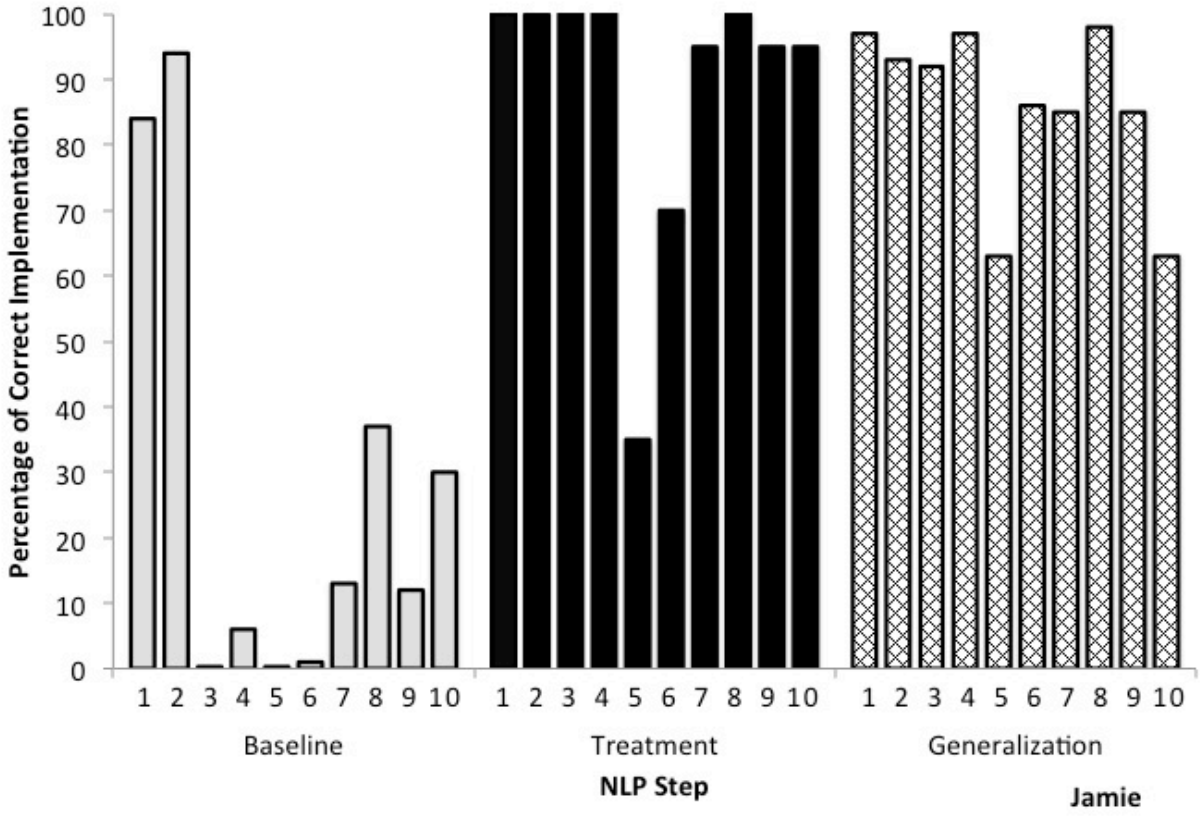

Figure 4. Jamie's percentage of correct implementation of NLP steps across each condition.

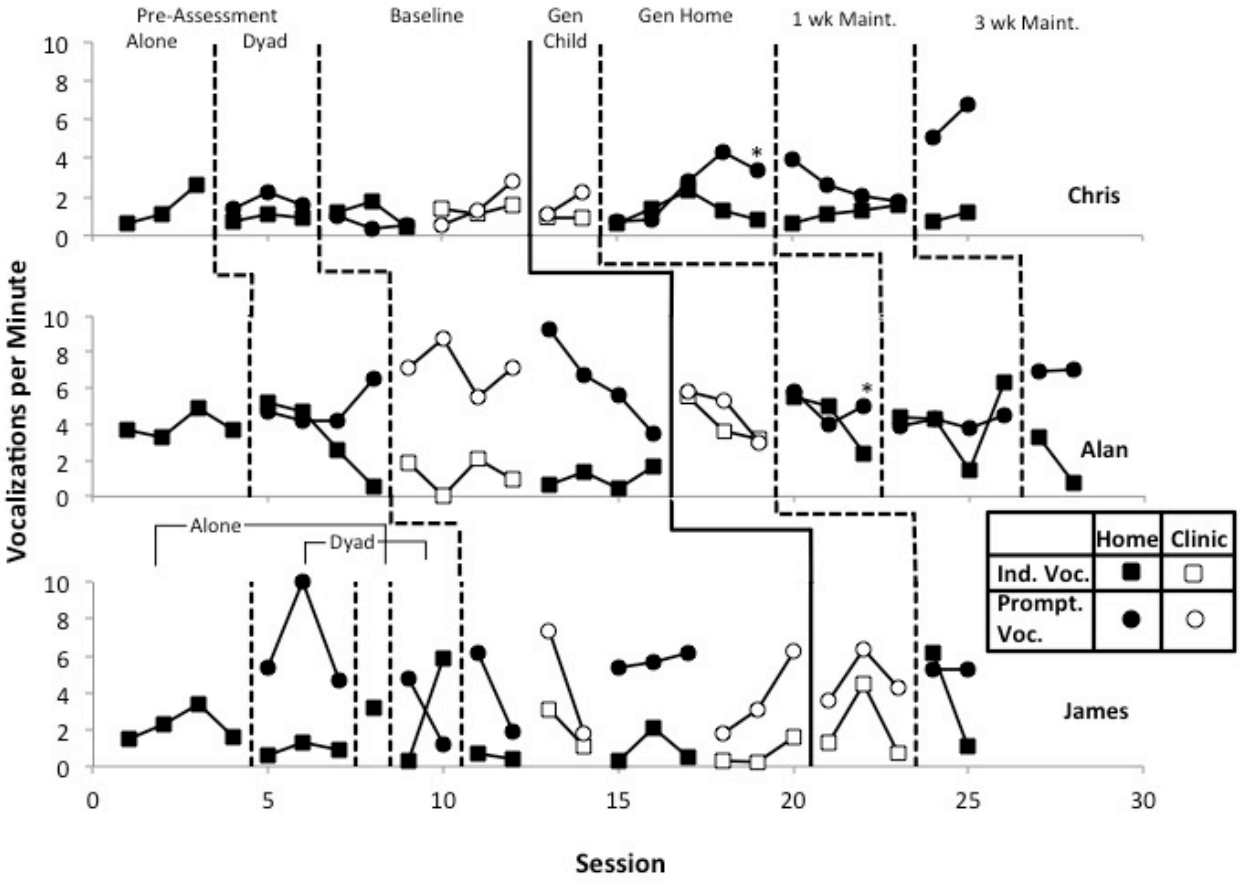

Figure 5. Independent vocalizations and prompted vocalizations per minute for Chis (top), Alan (middle), and James (bottom). Closed data paths represent sessions conducted in the home setting and open data paths represent sessions conducted in the clinic setting. TX=Training, Gen=Generalization, wk= week, and Maint.=Maintenance. The asterisk denotes a session in which toys from the participant's home were used.

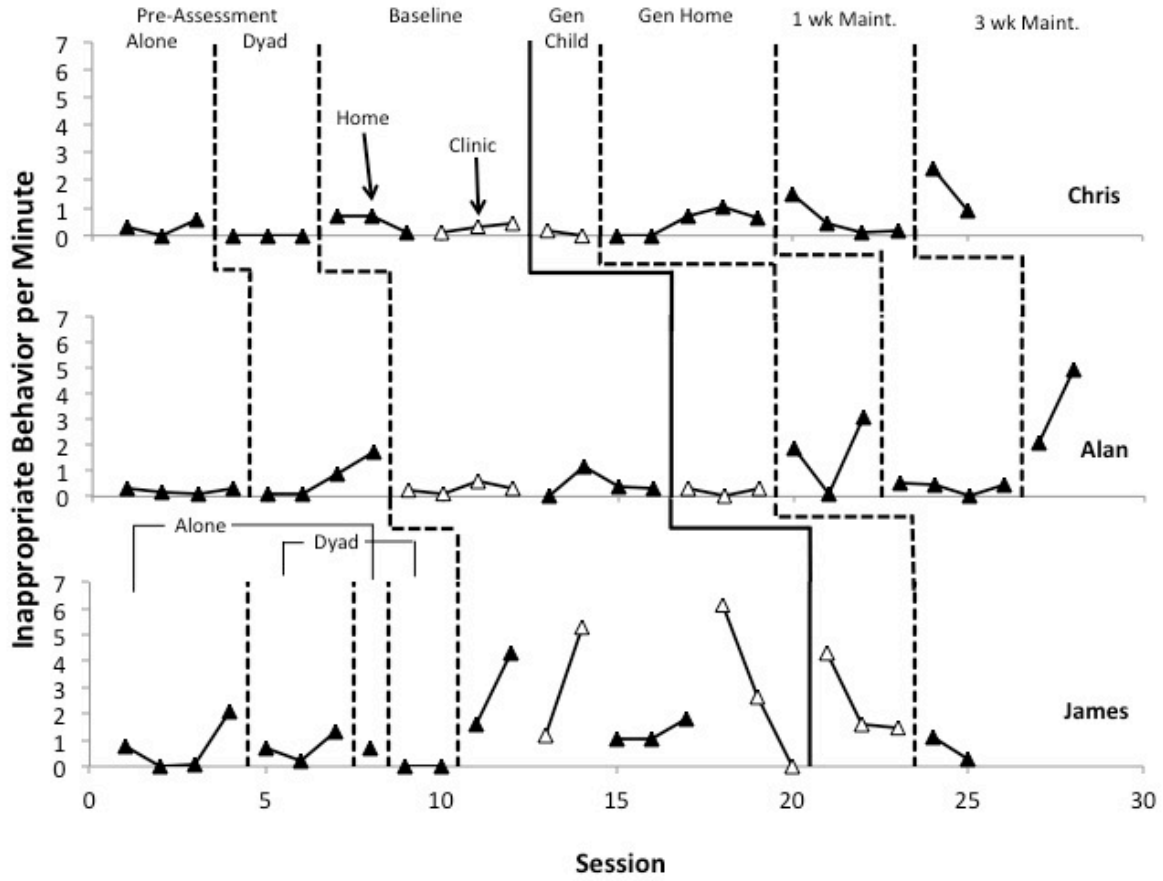

Figure 6. Inappropriate behavior per minute for Chis (top), Alan (middle), and James (bottom). Closed data paths represent sessions conducted in the home setting and open data paths represent sessions conducted in the clinic setting. TX=Training, Gen=Generalization, wk= week, and Maint.=Maintenance. The asterisk denotes a session in which toys from the participant's home were used.

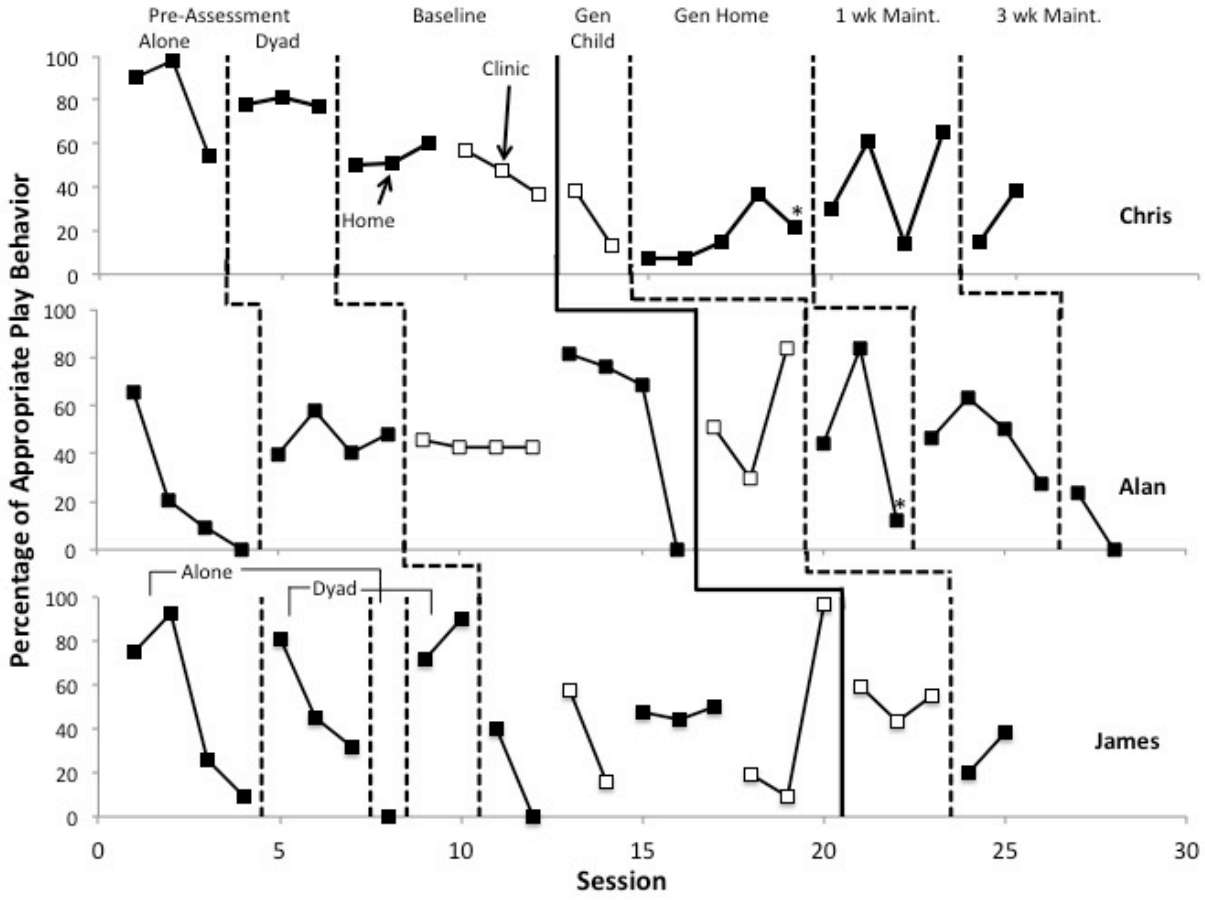

Figure 7. Percentage of appropriate play behavior for Chis (top), Alan (middle), and James (bottom). Closed data paths represent sessions conducted in the home setting and open data paths represent sessions conducted in the clinic setting. Gen=Generalization, wk= week, and Maint.=Maintenance. The asterisk denotes a session in which toys from the participant's home were used.

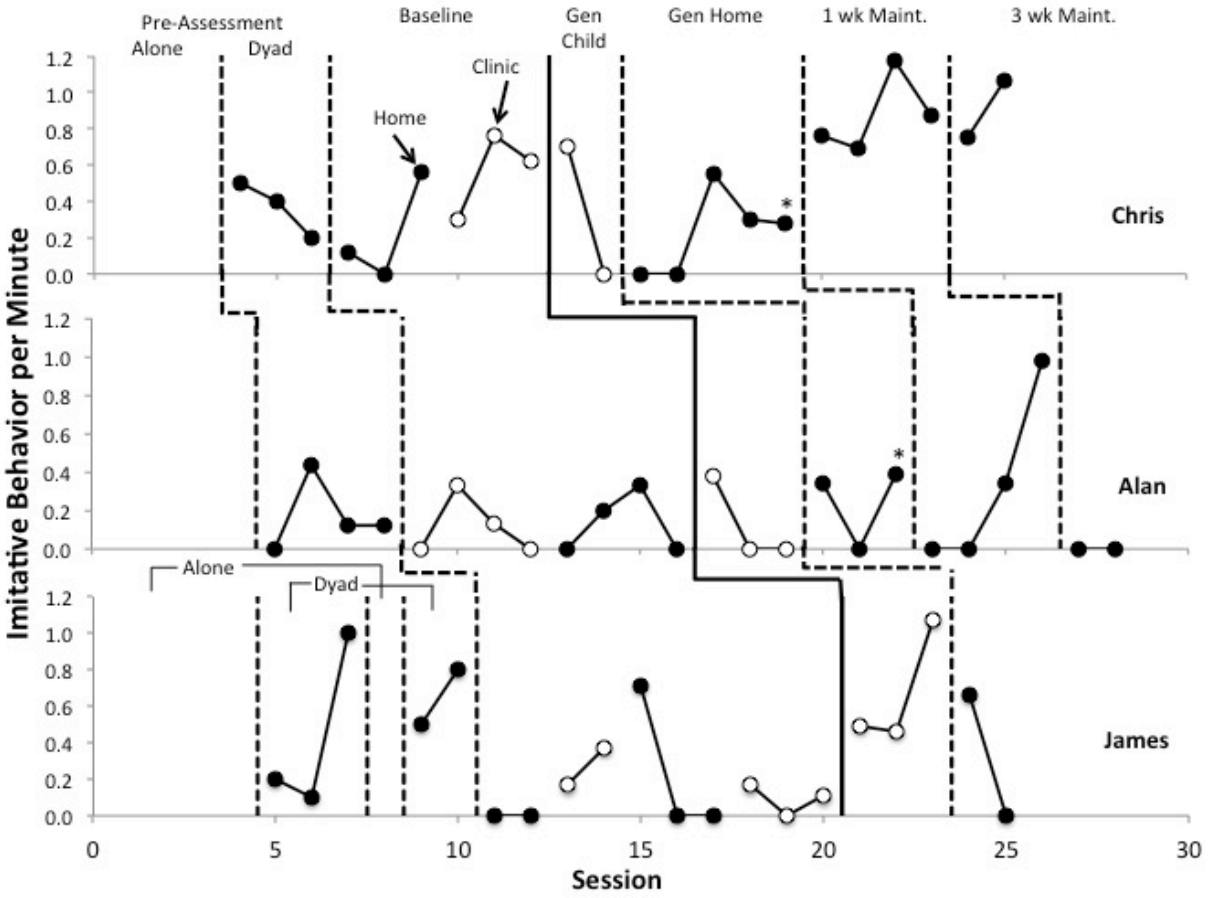

Figure 8. Imitative play behavior per minute for Chis (top), Alan (middle), and James (bottom). Closed data paths represent sessions conducted in the home setting and open data paths represent sessions conducted in the clinic setting. Gen=Generalization, wk= week, and Maint.=Maintenance. The asterisk denotes a session in which toys from the participant's home were used.

Table 1. Operational definitions for NLP steps.

1. **Provides a choice to the child**	Three toys are presented to the child. The adult waits up to 15 s for the child to point, touch, vocalize, or pick up an item to choose
2. **Sits within 1 m of child**	The adult sits within 1 m of the child at a child-sized table or on the floor
3. **Removes all unselected items**	The adult removes the toys not chosen and puts them out of the child's reach.
4. **Uses the chosen item for trials**	The adult takes the item chosen by child and uses this for the rest of the trial.
5. **Models an action with the item for 3-5 s before modeling a vocalization**	The adult models an appropriate play action with the item for 3-5 s such as activating the item or showing the child how to roll a car
6. **Presents a vocal model prompt**	The adult presents the same, clear SD up to 3 times pausing for 3-10 s between each model
7. **Reinforces relevant responses**	If the child makes an appropriate vocalization at any time during the trial, the adult provides praise within 3 s of the vocalization
8. **Says something about the toy during play**	The adult provides a relevant vocal model about the toy 2-3 times as the child plays with the item
9. **Child accesses item**	The adult allows the child to play with the toy for 10-30 s
10. **Removes item(s) at the end of a trial**	Criteria to end trial: If the child does not choose an item from the array within 15 s. When the child does not vocalize after 3 adult vocal models. When the child has had access to the toy. If the child engages in inappropriate behavior.

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Appendix A

NLP Training Data Sheets

Date: _____ Participant: _____ Confederate / Child

Session #: _____ Data Collector: _____ Primary / Reli

Parent Behavior

Trial	1. Choice	2. Sitting	3. Remove	4. Chosen toy	5. Model action	6. Vocal model	7. Reinforce	8. Say Something	9. Child Play	10. Remove Items
1	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
2	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
3	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
4	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
5	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
6	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
7	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
8	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
9	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
10	Y N	Y N	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a	Y N n/a
						Session Time:		**Total Integrity:**	/10	

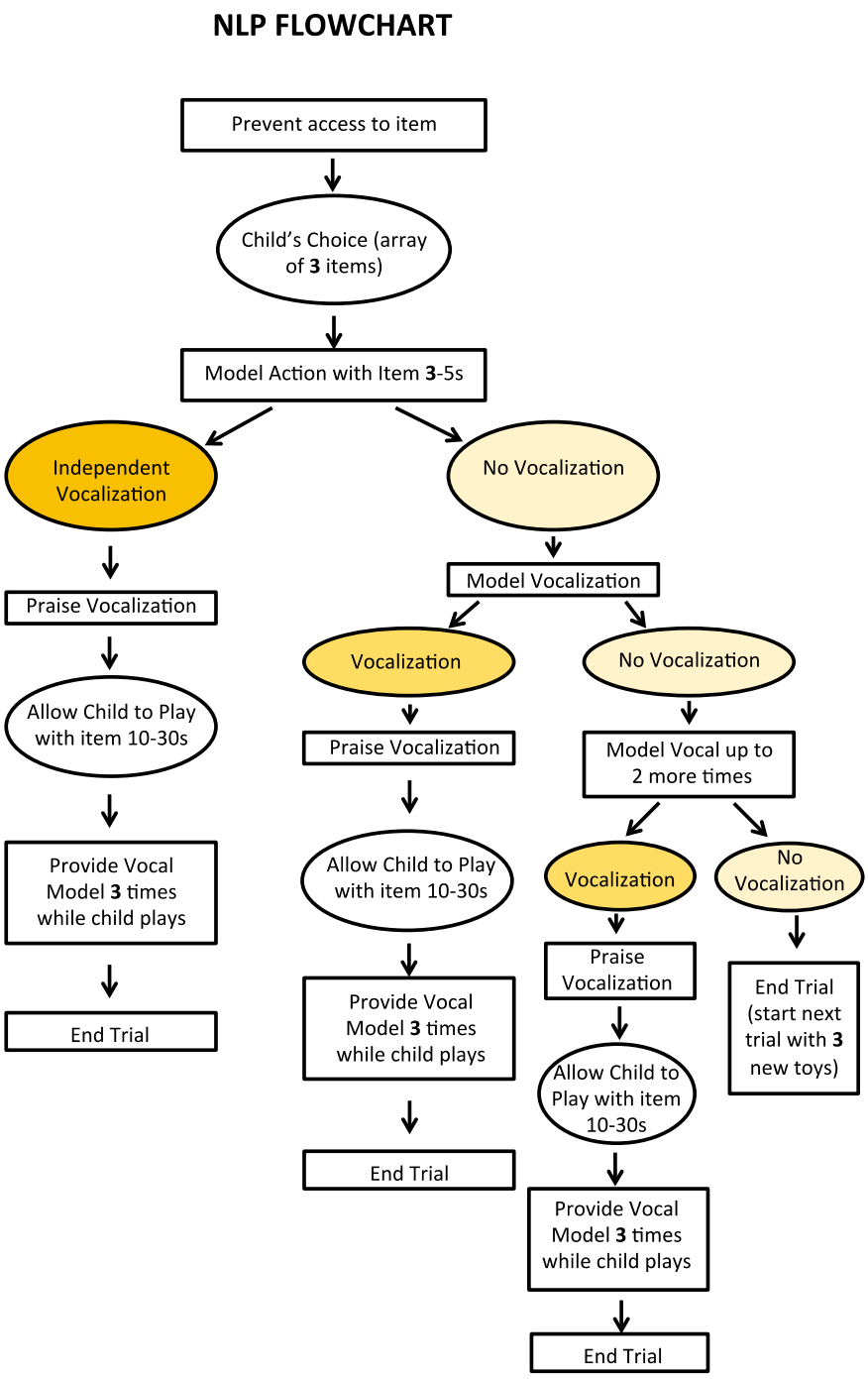
Date: _____ Participant: _____ Confederate / Child
Session #: _____ Data Collector: _____ Primary / Reli

	Confederate/Child Behavior							
Trial	Video time of trail	Prompted Vocalization	Independent Vocalization	Inappropriate Behavior	Session Duration (seconds)	Imitative Play	Appropriate Play Duration (seconds)	Duration with Toy (seconds)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
Total								

SESSION TIME:

Appendix B

NLP Written Instructions



Appendix C

Confederate Script 1

Trial 1: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 2: The confederate engages in inappropriate behavior prior to choosing a toy and does not vocalize.

Trial 3: The confederate does not choose a toy within 15 s of the parent presenting three toys nor does the confederate vocalize.

Trial 4: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model

Trial 5: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 6: The confederate engages in inappropriate behavior following the parent's first vocal model and does not engage in a vocalization.

Trial 7: The confederate chooses a toy and engages in an appropriate vocalization following the parent's third vocal model.

Trial 8: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Trial 9: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 10: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Confederate Script 2

Trial 1: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 2: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 3: The confederate chooses a toy and engages in an appropriate vocalization following the parent's third vocal model.

Trial 4: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 5: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 6: The confederate engages in inappropriate behavior following the parent's first vocal model and does not engage in a vocalization.

Trial 7: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 8: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 9: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 10: The confederate engages in inappropriate behavior prior to choosing a toy and does not vocalize.

Confederate Script 3

Trial 1: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model

Trial 2: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model

Trial 3: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 4: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 5: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 6: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 7: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 8: The confederate engages in inappropriate behavior prior to the parent's first vocal model and does not engage in a vocalization.

Trial 9: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 10: The confederate engages in inappropriate behavior following the parent's second vocal model and does not engage in a vocalization.

Confederate Script 4

Trial 1: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 2: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 3: The confederate engages in inappropriate behavior following the parent's third vocal model and engages in a vocalization.

Trial 4: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 5: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 6: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model

Trial 7: The confederate chooses a toy and engages in an appropriate vocalization following the parent's third vocal model.

Trial 8: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 9: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model.

Trial 10: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Confederate Script 5

Trial 1: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 2: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 3: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 4: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Trial 5: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model.

Trial 6: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 7: The confederate engages in inappropriate behavior following the parent's first vocal model and does not engage in a vocalization.

Trial 8: The confederate chooses a toy and engages in an appropriate vocalization following the parent's third vocal model.

Trial 9: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 10: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model.

Confederate Script 6

Trial 1: The confederate engages in inappropriate behavior following the parent's second vocal model and engages in a vocalization.

Trial 2: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model.

Trial 3: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 4: The confederate chooses a toy and engages in an appropriate vocalization following the parent's third vocal model.

Trial 5: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 6: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Trial 7: The confederate engages in inappropriate behavior following the parent's first vocal model and engages in a vocalization.

Trial 8: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 9: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 10: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Confederate Script 7

Trial 1: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 2: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 3: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 4: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 5: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Trial 6: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 7: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model.

Trial 8: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 9: The confederate engages in inappropriate behavior following the parent's third vocal model and does not engage in a vocalization.

Trial 10: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Confederate Script 8

Trial 1: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model.

Trial 2: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 3: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 4: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Trial 5: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 6: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 7: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 8: The confederate engages in inappropriate behavior following the parent's second vocal model and engages in a vocalization.

Trial 9: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 10: The confederate engages in inappropriate behavior following the parent's first vocal model and engages in a vocalization.

Confederate Script 9

Trial 1: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 2: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 3: The confederate chooses a toy and engages in an appropriate vocalization following the parent's third vocal model.

Trial 4: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 5: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 6: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 7: The confederate engages in inappropriate behavior following the parent's first vocal model and does not engage in a vocalization.

Trial 8: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 9: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 10: The confederate engages in inappropriate behavior following the parent's third vocal model and engages in a vocalization.

Confederate Script 10

Trial 1: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 2: The confederate chooses a toy and engages in an appropriate independent vocalization before the parent provides a vocal prompt.

Trial 3: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Trial 4: The confederate does not engage in a vocalization following each of the parent's 3 vocal models.

Trial 5: The confederate engages in inappropriate behavior following the parent's first vocal model and engages in a vocalization.

Trial 6: The confederate chooses a toy and engages in an appropriate vocalization following the parent's third vocal model.

Trial 7: The confederate does not choose a toy within 15 s of the parent presenting three toys.

Trial 8: The confederate chooses a toy and engages in an appropriate vocalization following the parent's second vocal model.

Trial 9: The confederate chooses a toy and engages in an appropriate vocalization following the parent's first vocal model.

Trial 10: The confederate engages in inappropriate behavior following the parent's third vocal model and does not engage in a vocalization.

Appendix D

Video Model Voiceover Script

The natural language paradigm or NLP is an intervention that promotes language, play skills, and turn taking. This video is designed to teach you specific skills to use NLP with your child. We will go through each step of NLP and provide examples as well as things to do and not to do. As we go through the video, you will also hear about the rule of 3. “Remember three! It’s a magic number!”

Before getting started you should set up your space so that your room is free of distractions, you are sitting across from your child, and all the toys are in a bucket or bin.

Use this sheet to help guide you through the steps of NLP. The words in the rectangles are thing you should do or say and the words in the circles are things your child might do.

Let’s start at the beginning. First you will make sure that there are no toys available to your child. You will then choose 3 toys from the bucket and place them between you and your child while saying, “pick one.” This is the first time you will use the rule of three!

Your child may point, touch, or pick up an item to make a choice. If your child doesn’t make a choice in 15 s, choose three different toys. If your child makes a choice, remove the other toys and put them back in the bucket.

Take the chosen toy and model an action with the toy for 3 to 5 s. Remember three, is the magic number.

Sometimes your child will say something while you are modeling an action. Tell your child, “great job!” and give them a turn with the toy. While your child is playing pick something to say about the toy and repeat it two to three times. Give your child 10 to 30 s to play, and then it is your turn again.

Some times your child won’t say something while you model an action with the toy. If they don’t, give them an example of what to say! If they repeat you, even if it is just a sound or two, tell them, “great work!” and it is their turn with the toy just like before.

Here’s a place we use the rule of three in two different ways. You may have to give an example of what to say up to three times. Every time you give your child an example, wait at least 3 s for your child. If your child says something, give them the toy and say, “nice job!” just like before. Sometimes your child won’t say something at all. Don’t get discouraged! If your child doesn’t say something after repeating an example 3 times, put away that toy and choose three new toys for your child to pick from.

Sometimes your child will do things we don’t want them to do. Here are some examples of what not to do and what you can do instead.

The adult gave the toy to the child, even though she didn’t say something and threw the toy. Don’t do this, do this. What you should do is give the child a new choice with three new toys. The adult gave the toy to the child after she got up and left the play area. Don’t do this, do this. You should give the child a choice of three new toys.

Now let’s look at some more examples. See if you can spot the steps we went over and look out for the rule of three.

Appendix E

TREATMENT EVALUATION INVENTORY SHORT FORM (TEI-SF)

Please complete the items listed below by placing a checkmark on the line next to each question that best indicates how you feel about the treatment. Please read the items carefully because a checkmark accidentally placed on one space rather than another may not represent the meaning you intended.

1. I find this treatment to be an acceptable way of dealing with this person's behavior.

strongly disagree	disagree	neutral	agree	strongly agree

2. I believe that it would be acceptable to use this treatment without a person's consent.

strongly disagree	disagree	neutral	agree	strongly agree

3. I like the procedure used in this treatment.

strongly disagree	disagree	neutral	agree	strongly agree

4. I believe this treatment is likely to be effective.

strongly disagree	disagree	neutral	agree	strongly agree

5. I believe the person will experience discomfort during the treatment.

strongly disagree	disagree	neutral	agree	strongly agree

6. I believe this treatment is likely to result in permanent improvement.

strongly disagree	disagree	neutral	agree	strongly agree

7. I believe it would be acceptable to use this treatment with individuals who cannot choose treatments for themselves.

strongly disagree	disagree	neutral	agree	strongly agree

8. Overall, I have a positive reaction to this treatment.

strongly disagree	disagree	neutral	agree	strongly agree

9. I would suggest this intervention to someone else.

strongly disagree	disagree	neutral	agree	strongly agree