

THE EFFECTS OF PROVIDING A BRIEF TRAINING PACKAGE TO DAYCARE
TEACHERS TO TEACH A CHILD A SIGN FOR SOCIAL ATTENTION

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Behavioral skills training (BST) packages have been successful in increasing change agents' correct implementation of various procedures. The current study evaluated the effects of a brief BST package to train daycare teachers to implement incidental teaching procedures with toddlers. The brief BST consisted of a set of written instructions, a two-minute video model, rehearsal, and feedback during session. Results demonstrated that teachers increased their correct implementation of incidental teaching procedures following training. In addition, two of the three toddlers increased the frequency of signs to request attention.

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THE EFFECTS OF PROVIDING A BRIEF TRAINING PACKAGE TO DAYCARE TEACHERS TO TEACH A CHILD A SIGN FOR SOCIAL ATTENTION

Approximately 25% of preschoolers are cared for in an organized facility such as a daycare center, nursery, or preschool and spend an average of 23 hours per week in child care (U.S. Census Bureau, 2013); therefore, in addition to parents, daycare teachers often function as a primary facilitator for much of a child's social interactions and daily activities. Undoubtedly, daycare teachers play an important role in a child's learning and early development.

Daycare teachers are expected to complete annual training that includes providing age-appropriate activities and promoting positive interactions for children (Texas Department of Family and Protective Services, 2014). Administrators typically provide training to teachers through written materials, such as brochures and newsletters, and occasionally a didactic component is involved (Texas Department of Family and Protective Services, 2014). However, previous research suggests that training methods that rely on written instructions are ineffective methods of promoting behavior change (Ward-Horner & Sturmey, 2012).

Behavior skills training (BST) packages, in contrast to traditional training methods, are an effective and efficient teaching method to provide training to individuals. BST packages typically involve a combination of modeling, rehearsal and feedback (Miles & Wilder, 2009). Modeling involves providing the learner with an example of the correct implementation of the target skill through a live model or through the use of a video-model. Rehearsal provides the opportunity for the learner to practice the new skill(s) in a role-play scenario as the trainer provides feedback. The trainer may provide additional feedback components before, during or after the implementation of the skill in the natural environment (e.g., with target population, in the target setting). In addition, a competency-based training performance criterion, in which the

learner must demonstrate the skill at a mastery level, separates BST from typical staff training services (Parsons, Rollyson, & Reid, 2013).

BST has been effective for teaching a wide range of skills for change agents. For example, BST packages have been effective in training a variety of individuals including training parents to implement feeding protocols (Seiverling, Williams, Sturmey, & Hart, 2012), medical staff to perform oral care exams (Graudins, Rehfeldt, DeMattei, Baker, & Scaglia, 2012), students to successfully implement functional analytic procedures (Lund & Ganz, 2011), and teachers (Gianoumis, Seiverling, & Sturmey, 2012) to use guided compliance procedures; the training typically continues until the trainee demonstrates the skill at competency levels.

Although BST has shown to be effective across many populations and skill sets, there is limited research in providing BST packaged to daycare teachers— individuals who require effective and efficient annual training. In addition, Hsieh, Wilder, & Abellon (2011) provided BST to parents and respite-care staff members, with no previous history with behavior analysis or behavior skills training procedures, to correctly utilize incidental teaching procedures with children diagnosed with Autism Spectrum Disorder. Children were taught to request leisure activities. The current evaluation extends the literature by teaching caregivers (i.e. daycare teachers) to utilize incidental teaching procedures to teach toddlers to request social attention.

Incidental teaching procedures have been used to teach a variety of social-communicative behaviors with children of typical development as well as children with autism and related disabilities (Hart & Risley, 1975; McGee, Krantz, Mason, & McClannahan, 1983). Incidental teaching procedures are naturalistic teaching methods that capitalize upon a learner's interest by providing teaching opportunities when the learner demonstrates interest in an item or activity. The instructor provides the item or activity of interest contingent upon correct or appropriate

responding. Therefore, incidental teaching procedures teach new behaviors in a child's natural environment and uses natural reinforcers; that is, reinforcers that are directly relevant to the task. Although incidental teaching procedures have been effective across populations, research has yet to evaluate the use of incidental teaching with nonvocal toddlers of typical development.

Toddlers can be taught to communicate via signs and gestures before vocal-verbal language is acquired (Bonvillian, Orlansky, & Novack, 1983). In addition, acquiring a non-vocal mode of communication, such as sign language, may enhance the child's vocal-verbal repertoire and facilitate the emergence of an earlier vocal-verbal repertoire (Bondy & Frost, 2002; Charlop-Christy, Carpenter, Le, LeBanc, & Kellet, 2003; Goodwyn, Acredolo, & Brown, 2000; Schwartz, Garfinkle, & Bauer, 1998).

Research on sign language procedures suggests that infants and toddlers can quickly acquire a functional sign with effective prompting procedures. For example, Thompson, McKerchar, and Dancho (2004) demonstrated that infants (ages 6-13 months) can acquire a sign to request more food or access to a toy in under 4 hours of instruction using a progressive prompt delay procedure. In addition, infants' crying and whining decreased following instruction suggesting that the sign functioned as an appropriate, alternative form of communication to negative vocalizations. Normand, Machado, Hustyi and Morley (2011) extended these procedures by conducting a functional analysis of the signed response and demonstrated the signs did indeed function as a mand. The results of Normand suggest that sign training may produce appropriate manding for preferred items (e.g. attention) for infants and toddlers.

The purposes of the current evaluation were to (a) extend the current literature on behavioral skills training and incidental teaching procedures and (b) evaluate a brief training package to teach incidental teaching methods to daycare teachers. To our knowledge, this is the

first evaluation utilizing incidental teaching methodology with typically developing toddlers who have yet to acquire vocal language.

METHOD

Participants and Setting

Three dyads of daycare teachers and toddlers participated. An additional child (Allie) participated but was not part of a training dyad and only participated in generalization measures; therefore, a total of three teachers and four children participated in the current study. Declan was 16 months old at the beginning of the study, Emily was 15 months old, Melissa was 18 months old, and one child, Allie, who participated in the generalization probe was 19 months old. All child participants attended the daycare full-time. Daycare teachers who worked with the children on a regular basis participated. All adult participants (Tessa, Kelly, and Candice) were female, undergraduate students that were hired privately by the daycare; the students had no affiliation with the experimenters.

All experimental sessions were conducted at a private daycare in a classroom for young toddlers (12-18 months). The classroom was equipped with a carpeted play area with toys and books on one side of the room and a tiled floor with tables on the other side. The researchers conducted experimental sessions on the carpeted play area with one teacher-child dyad at a time. The experimenter stood near both participants and video recorded all sessions. Minimal overlap occurred in the training of the adult participants due to work scheduling.

The administration at the daycare center encouraged teachers to provide sign language to infants and toddlers; however, none of the teachers had received any prior training or instruction on sign language instructional procedures or behavior analysis. All teachers and children had a minimal sign language repertoire at the beginning of the study and some of the children signed “more” and “please” prior to participation, but this was the extent of their signs.

Data Collection and Design

A non-concurrent multiple baseline across three teacher-child dyads was used to assess the effectiveness of the brief training package. The treatment conditions were staggered across the dyads after three, five and six baseline data points.

The primary dependent variable was the percentage of steps the teacher implemented correctly per session. Each trial included 5-9 steps depending on the child's behavior and if the teacher was required to prompt the correct sign. Each session was terminated after 10 trials or until 5 minutes elapsed, whichever came first. The percentage of steps implemented correctly was calculated by dividing the total number of steps implemented correctly in the session by the total number of possible steps in the session and multiplied by 100. The researcher recorded a step as correct if the teacher implemented the step correctly in the correct sequence and an error was scored if the teacher implemented the step incorrectly or missed a step. The step was recorded as not applicable if the step was not necessary based on child behavior (e.g., child spontaneously signs so the teacher did not need to model the correct sign) or the step was not able to be fully assessed due to being off camera.

The nine steps were as follows: (1) Present/engage the child with a preferred item/activity (2) Wait for the child to make eye contact/show interest with item/activity (3) Allow up to 5 seconds for the child to independently sign and/or say "play" (4) If the child signs or says "play" provide item/activity within 2-3 seconds (5) If the child does not sign or say "play", model the sign while saying "play" (only once) (6) Wait up to 5 seconds for the child to make the sign and/or say "play" (7) If the child does not imitate, physically guide the child to make the sign while saying "play" (8) Immediately deliver the preferred item/activity after the child signs

and/or says “play” (9) If the child incorrectly or approximates the sign, physically guide the correct response.

Dependent measures were also collected on toddlers’ independent and prompted signs. The target sign for all children was a modified form of the American Sign Language (ASL) sign “play.” Specifically, the sign for play was defined as a brief swipe of fingers from one hand across the facing up palm of the other hand. We defined independent signs as the child demonstrating correct implementation of the hand movement in the absence of any prompts. We defined modeled signs as the child demonstrating correct implementation of the hand movement following the experimenter modeling the sign and we defined physical signs as the child engaging in the correct sign behavior with physical assistance from the experimenter.

Interobserver Agreement and Treatment Integrity

A second observer recorded data for a minimum of 33% of sessions for each condition per dyad. Interobserver agreement (IOA) was calculated on a trial-by-trial basis by dividing the number of agreements by the total number of agreements and disagreements multiplied by 100. For teacher participants, an agreement was scored if both independent observers scored a correct, incorrect or not applicable (N/A) for a given step of each trial. Mean agreement was 85% for Tessa (range, 78% to 91%), 87% for Kelly (range, 44% to 100%) and 86% for Candice (range, 78% to 97%). For child participants, an agreement was scored if both independent observers recorded an independent, modeled, or physically-guided sign as having occurred or not occurred on each trial. Mean agreement was 94% for Declan (range, 88% to 100%), 98% for Emily (range, 90% to 100%) and 96% for Melissa (range, 80% to 100%).

A second observer recorded treatment integrity data for 44% of sessions for each experimental condition, including the brief training sessions. A checklist of necessary steps was

used to score and calculate treatment integrity of the researcher. Four steps were necessary during the recording of the sessions: (1) Videographer did not provide any feedback during the session [during baseline and follow-up sessions only] (2) Videographer provided vocal feedback on or about every third trial [during feedback sessions only] (3) Videographer recorded the session from no more than 15 feet away from the teacher and child (4) Videographer did not obstruct the view of the teacher or the child at any point during the session. Percentage of treatment integrity was calculated by dividing the number of correctly implemented steps by the total possible number of steps multiplied by 100. Treatment integrity was 100% for all sessions.

Procedure

Baseline. At the beginning of the first baseline session, the researcher read a script to the teacher: “We’re going to just watch you for a brief period of time while you interact with (child). This is the sign we’re going to use for ‘play’ (*researcher modeled sign*) and you can work on it while you play”. Each session lasted a total of 5 minutes or until 10 trials were completed, whichever came first. No feedback was given before, during, or after baseline sessions.

Training. The treatment included a brief training session which lasted an average of 13 minutes ($M = 13$) for each participant. The training occurred at the daycare in a separate room outside of the classroom and the experimenter provided: written instructions, a video model, and a role-play rehearsal with feedback. The training session began with the experimenter giving the participant an instruction sheet (see Appendix) that included the steps of the instructional procedures as well as additional ‘tips’ on being successful (e.g. “Say ‘play’ whenever making the sign for ‘play’”). Next, the experimenter showed a two-minute video that demonstrated examples of the experimenter and a confederate correctly implementing the instructional procedures. The video included a toddler of similar age to the toddlers in the classroom. Finally,

the experimenter and the teacher rehearsed the procedures during a role-play scenario with the researcher taking the role of the toddler while the teacher practiced the target skills as the instructor. During rehearsal, the experimenter provided immediate feedback and practiced until the teacher implemented the steps correctly several times independently.

Post training/feedback sessions. The first feedback session occurred within two hours of the brief training session. The feedback sessions were identical to the baseline sessions except: (a) feedback was given to the teacher on or about every third trial and (b) the instruction sheet was available to the teacher as needed. Feedback included both specific praise (e.g., “that was great modeling the sign and pairing it with the vocal”) and corrective feedback (e.g., “remember to give the child an opportunity to sign by him/herself before providing the model”). The experimenters continued to provide feedback until performance reached mastery criteria - 85% of steps implemented correctly across two consecutive sessions.

Follow-up. Sessions were identical to baseline. That is, at the beginning of the first maintenance session, the researcher read the same script to the teacher: “We’re going to just watch you for a brief period of time while you interact with (child).” Feedback was no longer provided and the instruction sheet was removed from the sessions during the maintenance checks. The first maintenance sessions occurred two to four days following the last feedback session and continued approximately once a week afterwards.

RESULTS

Figure 1 depicts the percentage of steps implemented correctly by the teachers. Tessa implemented about 40% of the steps correctly in baseline and the other teachers responded similarly in baseline. Following the brief training session, each teacher improved their implementation of the steps to over 85% within one or two sessions. Tessa spent 11 sessions in the post-training/feedback condition before reaching mastery criterion, Kelly spent only 3 sessions in the post-training/feedback condition, and Candice spent 5 sessions receiving feedback. All teachers responded near or above the 85% criterion mark in the three weekly follow-up probes following the feedback phase.

Table 1 displays the amount of time each teacher spent in training, which varied due to each teacher reaching mastery criterion at different times. Tessa spent 67 minutes receiving training, Kelly received 27 minutes, and Candice received 40 minutes. The average time spent in the brief training session was 13 minutes ($M = 13$). The average total time spent in training for each teacher was 45 minutes ($M = 45$).

The number of instructional trials provided by each teacher varied across participants as we terminated sessions after 5 minutes elapsed or after 10 instructional opportunities were provided. The cumulative number of instructional trials provided per session is depicted in Figure 2. In summary, Tessa provided an average of 5.8 (range = 3-10) instructional trials per session, Kelly provided an average of 5.5 (range = 4-7) instructional trials, and Candice provided an average of 7.9 trials (range = 6-10) instructional trials.

Figure 3 depicts the frequency of independent, modeled, and physically guided signs for the child participants. In baseline, neither Declan nor Emily emitted the sign; Melissa emitted the sign several times. Following intervention, signing increased for each child. Melissa's first

occurrence of a spontaneous sign was during the third instructional session (after 19 instructional trials). She continued to engage in both spontaneous and modeled signs throughout the instructional and follow-up phases. Declan spontaneously emitted the sign during the third instructional session (after 15 instructional trials). Subsequently, Declan primarily emitted signs following the model prompt and independent signs increased during the follow-up phase. Emily required a physical prompt for the majority of the signs following instruction; her first and only occurrence of a sign following the model did not occur until the follow-up phase.

DISCUSSION

The primary purpose of this evaluation was to evaluate the effects of a brief skills training package on training daycare providers to teach non-vocal toddlers to appropriately request attention using incidental teaching procedures. There are limited studies within the current literature to apply BST to daycare teachers. Results suggest that BST was both an effective and efficient teaching procedure. Daycare teachers' correct implementation of incidental teaching procedures increased following training and the total amount of training was an average of 45 minutes, including all feedback sessions. The current results replicate an emerging body of research that demonstrates individuals with limited experience with behavior analytic techniques can be taught to implement these techniques, such as incidental teaching procedures, via BST packages (Sieverling, Williams, Sturmey, & Hart, 2012; Graudins, Rehfeldt, DeMattei, Baker, & Scaglia, 2012; Lund & Ganz, 2011; Miles & Wilder, 2009).

This study is distinct from previous applications of behavioral skills training in that teachers implemented incidental teaching techniques with a varying reinforcer; that is, in previous research change agents have typically been taught to withhold tangible reinforcers (i.e., edible items or leisure items) and to deliver that reinforcer contingent upon correct responding from the learner (Hsieh, Wilder & Abellon, 2011; Normand, Machado, Hustyi, & Morley, 2011; Gianoumis, Seiverling, & Sturmey, 2012; Thompson et al., 2007; Weldy, Rapp, & Capocasa, 2014). In this evaluation, it was necessary for teachers to demonstrate response variability while maintaining accuracy with their teaching procedures. That is, teachers had to solicit interest in a social interaction and that social interaction naturally varied on a trial-by-trial basis. It is possible that teaching a skill with a type of varying reinforcer is a more difficult skill to acquire, and this may be a consideration for future research.

We also assessed the generalization and maintenance of correct implementation of incidental teaching procedures. We measured generalization for one teacher, Kelly, and results suggest that the skill generalized to a novel child during probe trials in the absence of direct training. We recommend evaluating generalization across additional teachers. In addition, future research may assess response generalization and evaluate if caregivers can teach a novel sign, including signs that may be controlled under other establishing operations compared to the sign originally taught (e.g., edible item vs. social interaction). Also, generalization on the part of the child should be assessed to ensure the child can use the sign across other teachers and caregivers.

All of the daycare teachers demonstrated that the skill maintained over a three-week period without feedback. Although the teachers demonstrated maintenance of the skill, anecdotal reports and the lack of increase in child signs over the three-week maintenance period suggest that the teachers did not adopt its usage in their daily routines. These results highlight that measuring maintenance of a change agent's skill over time does not necessarily equate into the change agent's implementation of a skill or procedure over extended periods of time (Boyce & Geller, 2008).

A second purpose of this study was to evaluate if non-vocal toddlers' appropriate requesting would increase as a result of daycare providers' implementation of incidental teaching procedures. This is also the first evaluation using incidental teaching procedures to teach non-vocal toddlers to request attention. Results for two participants, Melissa and Declan, showed that signing (specifically, independent signing, or signing following the model prompt) increased following the introduction of incidental teaching procedures. These results support previous research that suggests children can develop a sign repertoire before acquiring vocal-verbal language (Bonvillian, Orlansky, & Novack, 1993). However, results for Emily show that the

procedure did not increase requests for attention through sign language. One potential reason for this difference is that Emily was the youngest participant (15 months), and perhaps her relatively briefer general learning history played a role in these results. In contrast, the oldest participant, Melissa (18 months) demonstrated the largest increase in spontaneous signs. Another potential reason is that Emily was exposed to the fewest instructional trials (33) in comparison to the other participants (Melissa and Declan, 63-81 respectively) because her teacher, Kelly, met mastery criterion in the shortest amount of instructional sessions. Future research could evaluate child behavior over an extended instructional period to better evaluate the effects of incidental teaching procedures on teaching requests for attention via sign language.

Previous studies that have provided infant sign language instruction have utilized a progressive-time-delay (Thompson, 2004/2007) with a maximum delay of four minutes. Although previous research indicates that both progressive- and constant-time-delay strategies are equally effective, we elected to use a 5-s constant-time-delay as the instructional strategy for practical reasons (Ault, Gast, Wolery, 1988; Walker, 2008). The first reason was to increase the likelihood that the child would maintain interest in receiving attention from the teacher. It was possible that the child would have sought attention from others teachers or peers in the classroom if the teacher withheld attention during an extended delay. We also elected to use a constant time delay procedure for greater simplicity in staff training. With progressive-time-delay procedures, it is necessary for the change agent to determine when to increase the time delay until a prompt is delivered. In contrast, the time delay is consistent (e.g., 5 s) in constant-time-delay procedures resulting in relatively fewer training requirements.

Future research may consider the implementation of these procedures as a classroom wide intervention. It is possible that providing the initial training as a classroom wide

intervention would increase teachers' adoption of the set of procedures. It is possible that addition, un-programmed contingencies were in effect that might have hindered the teachers from implementing the procedures when we were not present. In addition, child responding may increase as a result of multiple teachers providing learning opportunities and with multiple peers providing a model of requesting attention through sign.

Table 1

Training Time

Teacher	Brief Training Session	Post-Training Feedback Sessions	Total Training
Tessa	12 minutes	55 minutes	67 minutes
Kelly	12 minutes	15 minutes	25 minutes
Candice	15 minutes	25 minutes	40 minutes

Note. Table displays the amount of time each teacher spent in the brief training session (written instructions, video model, and rehearsal), post-training feedback sessions, and a total time spent in all training components.

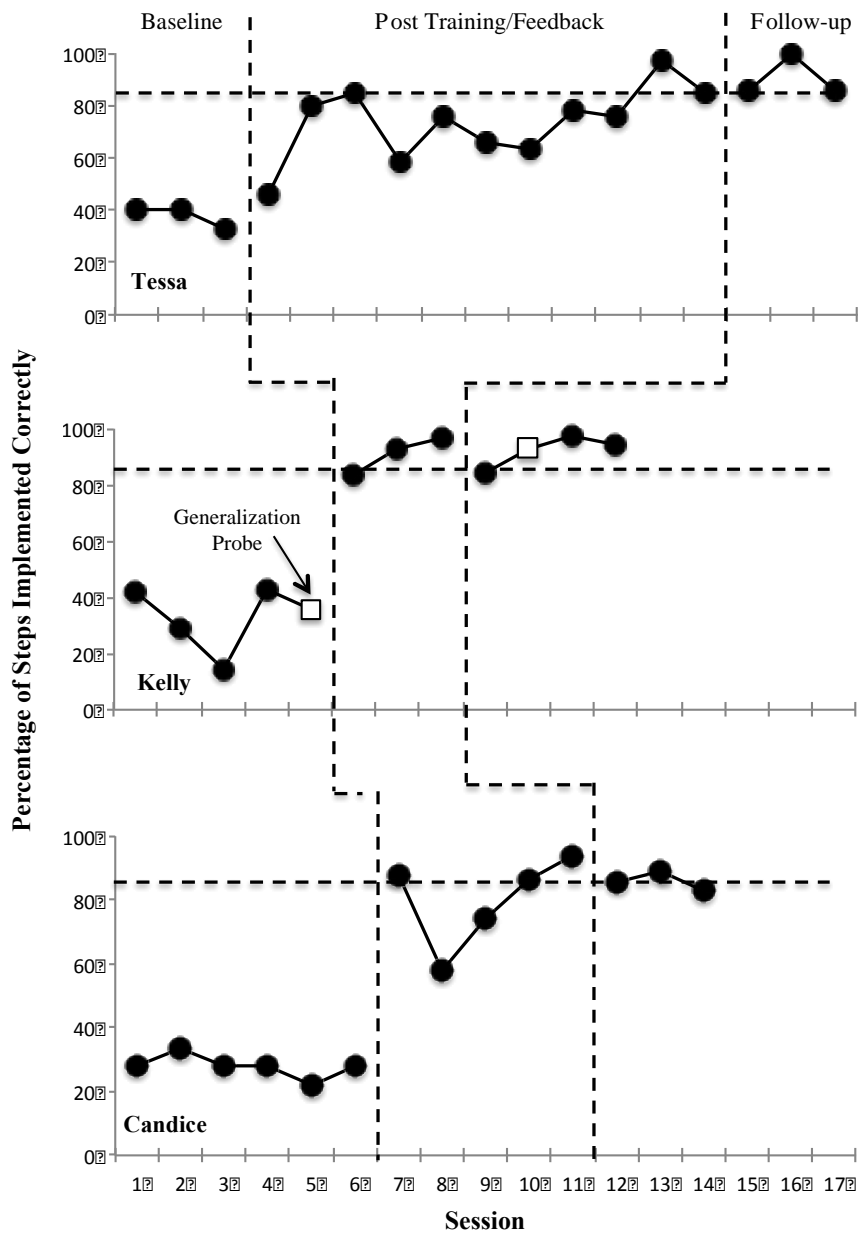


Figure 1. Percentage of steps implemented correctly for each teacher-child dyad. The brief training session occurred immediately before the first data point in the post-session/feedback phase. Maintenance sessions occurred a minimum of one week apart. The open squares denote generalization probe data.

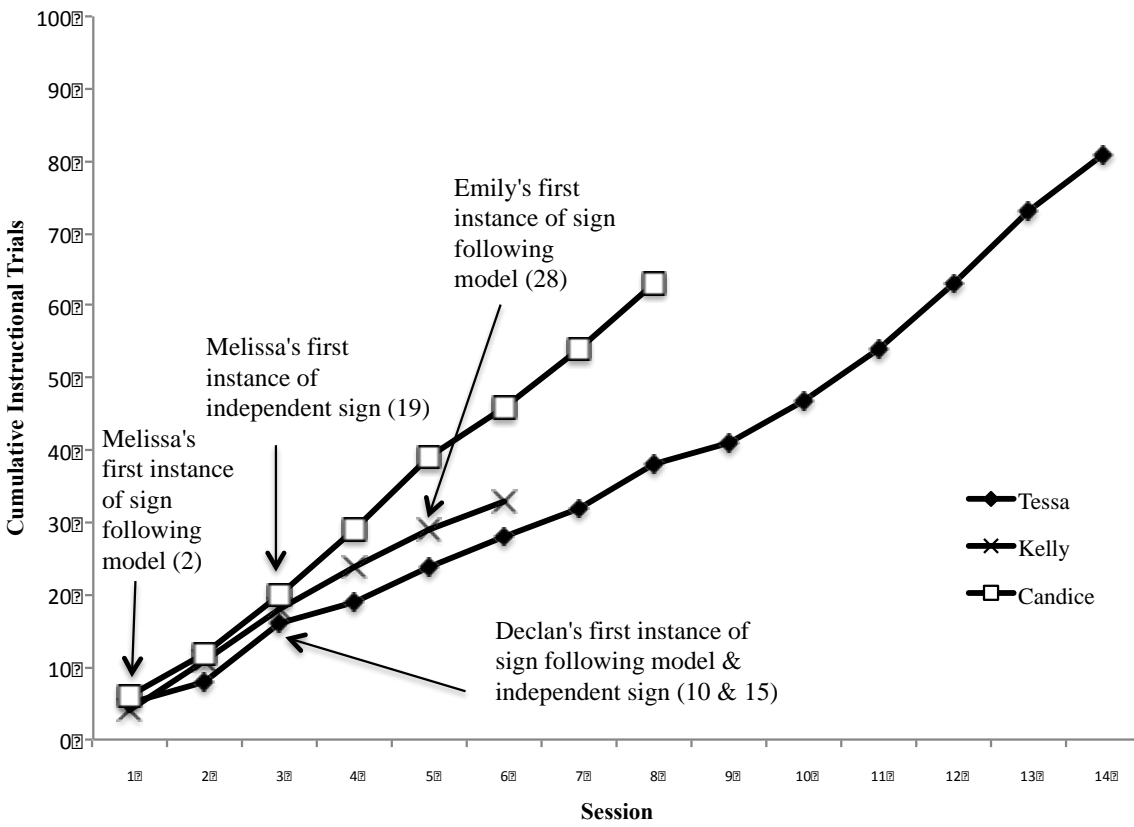


Figure 2. Cumulative number of instructional trials per session for child participants. Closed diamonds represent the cumulative number of instructional trials provided by Tessa, crosses represent instructional trials provided for Emily and open squares represent instructional trials provided for Melissa. Arrows above data points indicate the first occurrence of spontaneous and modeled signs for each child participant.

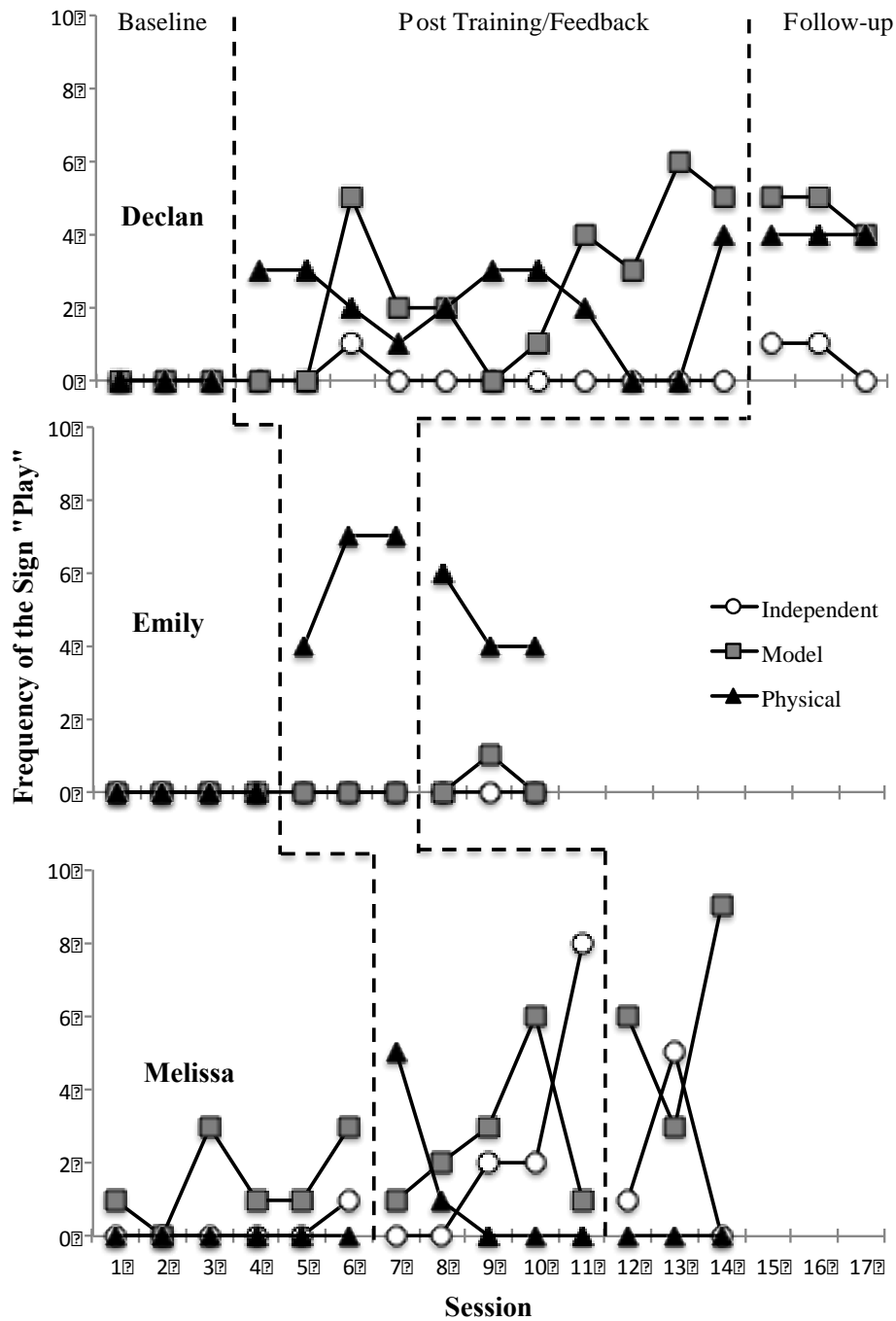


Figure 3. Open circles represent independent signs, closed squares represent imitation of the sign following the model, and filled triangles represent prompted signs for each child. Training phase consisted of a 5s constant-time-delay procedure implemented by the teacher.

APPENDIX

How to Teach a Child a Sign:

The steps below should be used as a guideline to teach a child to sign for play. Keep in mind that these steps should occur during the teaching process. The final goal will be for the child to use the newly acquired sign to request for social attention appropriately in the classroom.

1. Present/Engage the child with a preferred item or activity.
2. Wait for the child to show interest and/or make eye contact.
3. Wait up to 5 seconds for the child to independently sign.
 - a. If the child *makes the sign*, provide the item/activity
 - b. If the child *does not make the sign*, show the child how to make the sign while saying the word “play”.
4. Wait up to 5 seconds for the child to make the sign.
 - a. If the child *makes the sign*, provide the item/activity
 - b. If the child *does not make the sign*, help the child make the sign by guiding the child’s hands correctly. THEN deliver item/activity

Tips for Being Successful:

- Say “play” whenever making the sign for ‘play’.
- Switch up activities frequently (different toys, tickles, songs, etc.).
- If, at any point, the child tries to make the sign incorrectly... guide the child’s hands to perform the sign correctly and immediately provide the item/activity.
- Provide the item/activity immediately after the child signs for ‘play’.
- Provide the item/activity when child says “play”, even if the child does not sign too.
- When playing with toys, engage with the child by providing social interactions in addition to the toy play.
- If you present a model of the sign and the child shows disinterest in the item/activity (e.g., walking away, reaching for a different toy), help guide the child’s hand to make the sign and provide some sort of item/activity.

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