PARENT TRAINING TO IMPLEMENT THREE-STEP PROMPTING: A COMPONENT ANALYSIS AND GENERALIZATION ASSESSMENT

by

Melissa A. Krabbe

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ABSTRACT
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Melissa A. Krabbe

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Parent training is a necessary component of providing treatment to a child to ensure parents are able to implement procedures in daily life. The current study assessed the components of training (including written instructions, modeling, rehearsal, and performance feedback) needed to achieve integral implementation of three-step prompting and differential reinforcement of compliance with children referred for noncompliance. In addition to the targeted task, we assessed generalization of parent behaviors to untrained tasks. The results across participants were idiosyncratic with some requiring more intensive training than others and some demonstrating generalization across tasks to greater extents than others.

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Noncompliance, defined as resistance or failure to follow instructions within a specified time period (Fischetti, Wilder, Myers, Leon- Enriquez, Sinn, & Rodriguez, 2012), is one of the most common childhood behavior problems with an estimated prevalence of 25% to 65% of children ages two to 16 years, including children of typical and atypical development (Kalb & Loeber, 2003; N'Doro, Hanley, Tiger, & Heal, 2006; Stephenson & Hanley, 2010). Kalb and Loeber have proposed that persistent noncompliance interferes with a number of areas in a child's life, including social relationships with adults and peers, the ability to participate in structured activities, and academic progress. In a survey of kindergarten teachers, the abilities to follow instructions and not be disruptive to the class were rated as essential for the academic readiness and success of young children (Lin, Lawrence, & Gorrell, 2003).

Behavioral-intervention research has included both antecedent and consequence-based strategies to increase compliance with caregiver instructions. Antecedent strategies alter the manner in which instructions are delivered. These strategies include maintaining close proximity to the individual, delivering instructions at eye level, making physical contact, obtaining eye contact with the individual (Stephenson & Hanley, 2010), providing warnings (Cote, Thompson, & McKerchar, 2005), and providing specific instructions (Bouxsein, Tiger, & Fisher, 2008). These studies showed that antecedent approaches increase child compliance with instructions, but generally fail to promote consistent compliance unless paired with consequence-based strategies as well (Cote et al.; Stephenson and Hanley)

Consequence-based strategies manipulate the consequences for compliance and non-compliance with caregiver instructions. These strategies include extinction of non-compliance (i.e., ensuring noncompliance does not result in the termination of demands; e.g., Iwata, Pace, Kalsher, Cowdery, & Cataldo, 1990) and differential reinforcement of compliance (i.e., delivering positive and/or negative reinforcement following compliance; e.g., Payne & Dozier, 2013; Piazza, Moes, & Fisher, 1996; Tarbox, Wallace, Penrod, & Tarbox, 2007). One of the more common means of implementing escape extinction is three-step prompting (based upon the graduated prompting procedure of Horner & Keilitz, 1975). This technique consists of providing progressively more intrusive prompts to complete a task. For instance, in instructing a child to put away toys, a caregiver would first prompt their child vocally (e.g., stating, “Put a block in the bucket”). If the child did not comply within 5 s, the caregiver would repeat the vocal prompt while providing a model or gestural prompt (e.g., stating, “Put the block in the bucket, like this”), while themselves placing a block in the bucket. If the child did not comply within 5 s of this model prompt, the caregiver would then repeat the vocal prompt while providing hand-over-hand guidance to complete the task. In this regard, children are required to complete every instruction (i.e., escape is prevented by the continued prompting of the caregiver). Iwata et al. demonstrated the efficacy of this approach in the treatment of escape-maintained self-injurious behavior with six children with developmental delays.

The vast majority of studies demonstrating the efficacy of three-step prompting and DRA in treating non-compliance involved implementation by members of the research team. However, to remediate noncompliance, caregivers need to implement this

intervention package with fidelity throughout the day in the normative environment. Wilder, Atwell, and Wine (2006) systematically changed the fidelity with which they implemented three-step prompting and found children's compliance was positively correlated with implementation fidelity. Thus the development of effective and efficient training procedures to prepare caregivers is of paramount importance.

Miles and Wilder (2009) evaluated behavioral skills training (BST) in teaching three-step prompting to three caregiver-child dyads. BST is a training package that includes providing instructions, modeling, guided rehearsal and feedback on implementation. In this study, parents were taught to implement three-step prompting accurately with their children and this correct implementation resulted in increased compliance with a target task. Further, these authors conducted generalization probes that indicated parents continued to implement three-step prompting accurately with this task in other settings.

Although Miles and Wilder (2009) demonstrated the efficacy of BST in teaching three-step prompting, there are a few limitations to the BST approach. BST is relatively labor intensive training procedure in that BST requires a dedicated trainer to be present to provide instructions, modeling, rehearsal, and feedback for the trainees. If approaches based solely on instruction were also effective, then implementation of three-step training could be provided inexpensively through published manuals or even online through blog posts. Similarly, if modeling of procedures alone were sufficient to teach three-step prompting, then training could be provided in large groups or perhaps distributed via video models. However, if rehearsal with feedback is a necessary component to achieve

integral implementation of three-step prompting, then the additional effort of the full BST package is justifiable.

Additionally, Miles and Wilder (2009) demonstrated that BST was effective in teaching three-step prompting with a single-target task. Clinical adoption of this teaching procedure would require that the skill of three-step prompting generalize to untargeted tasks. That is, caregivers will need to use three-step prompting to teach compliance with instructions not only to pick up toys, but also to complete academic work, to engage in self-care, and to complete household chores. It is not clear if training via BST with a single target task will result in generalized parent implementation of three-step prompting beyond the training task.

The current study addressed these limitations. First, we conducted a component analysis of BST to teach parents to implement an intervention for noncompliance including three-step prompting and differential reinforcement of compliance with their children referred for noncompliance. Second, we assessed the generalization of parent implementation across untrained instructional contexts with their children

Method

Participant and Setting

Two children and three parents participated. Terry was a 42-year-old single mother of two children who participated with her son, Jack. Jack was 10-years-old and was diagnosed with Down syndrome and attention deficit hyperactivity disorder. He was referred to our treatment program for noncompliance and had previously received behavioral intervention (three-step prompting and DRA for compliance with academic

tasks) from the research team. These direct intervention sessions were conducted in Jack's bedroom in his family's house. The current evaluation with Terry was conducted subsequent to Jack's direct intervention with the research team; she conducted all sessions at the family's kitchen table during two and a half hour visits, three days per week.

Mike, 39 years old, and Ada, 52 years old, were a married couple who participated with their son, Kevin. Kevin was a 10 year-old boy diagnosed with autism who was referred to our program for the treatment of aggression and property destruction, which were found to be maintained by escape from demands. Similar to Jack, Kevin received behavioral treatment for escape-maintained aggression and property destruction given academic tasks using three-step prompting and DRA conducted in his bedroom of the family's house. Sessions were conducted by Mike and Ada at the family's kitchen table following the completion of the treatment evaluation by our team. Mike and Ada's sessions were conducted independently during 2.5 hour visits. Typically, Mike conducted sessions before Ada returned home from work; Mike would then leave the room while Ada conducted sessions. None of the parent participants reported previous training or experience with behavior analysis or with three-step prompting, and they did not observe therapy sessions before participating in this study.

Measurement and Interobserver Agreement

We used a paper and pencil data collection procedure and the therapist recorded (a) the accuracy with which the parent delivered instructions according to the three-step prompting procedure, (b) the accuracy with which the parent implemented differential

reinforcement, (c) the child's compliance with instructions, and (d) child problem behavior on a trial-by-trial basis (see Appendix A). Observers scored correct instruction delivery during a trial when the parent correctly (a) presented instructional materials, (b) delivered a clear vocal prompt, (c) provided a 3-s to 5-s delay, (d) provided a model prompt, (e) provided another 3-s to 5-s delay, and (f) provided hand-over-hand guidance to complete an instruction. For the parents' response to be considered correct, the parent was required to complete each portion of the instructional sequence accurately up to the point of child compliance (i.e., if a child complied following the vocal prompt, the trial ended and parents were not required to continue to the model prompt). Any instance of incorrect implementation resulted as the entire trial scored as incorrect. Observers scored correct reinforcement delivery when within 5-s of compliance to a vocal or model prompt, the parent delivered praise, preferred edible or tangible reinforcers, and a 30-s break from instruction (Kevin). Failure to deliver any aspect of the reinforcer or delivering the reinforcer following an instance of non-compliance was scored as incorrect. Child participants were scored as compliant if they completed the task within 5 s of the vocal or model prompt. Child problem behavior was scored during a trial if any instance occurred. Problem behavior for Jack was defined as (a) *vocal refusal* including "no," "I don't want to," "I hate you," "Out of here," "out," "leave," "go," "no more," and "stop touching me;" or (b) *motor refusal,* including pushing away materials, pushing his chair away from the table, pushing away the therapist's hand, elopement (i.e., attempting to escape), hitting therapist (forceful contact of his hand with any part of the therapist's body), self-hitting (forceful contact between child's hand and any part of his body);

spitting; licking the table, materials, or therapist; blowing raspberries; scribbling or drawing on papers; throwing materials; glasses, or other objects and actively turning his body away from the therapist (rotation of his entire torso so he is facing away from the therapist). Problem behavior for Kevin was defined as (a) *aggression,* including any forceful contact of any part of Kevin's body with a part of another person's body, or possession on a person (i.e. clothing), including hitting, kicking, biting, hair-pulling and grabbing/pinching (closed hand or fingers around other person's body) and objects thrown within 3 feet (horizontally) of another person and (b) *property destruction*, including any objects torn or crumpled and any objects thrown more than 3 feet away from another person's body or vertically. Each dependent measure was then converted into a percentage of trials measure by dividing the number of trials correct for each component of each task by the number of trials in the session of that task.

We assessed interobserver agreement (IOA) by having a second observer simultaneously, but independently collect data on 87% of sessions conducted by Terry, 75% of sessions conducted by Mike, and 35% of sessions conducted by Ada. Observers' records were compared on a trail-by-trial basis for each dependent measure. Trials scored identically were considered in agreement, whereas trials scored non-identically were considered in disagreement. We then calculated the percentage of trials in agreement.

For Terry, observers agreed upon instruction delivery during 94.6% of trials (range, 0% to 100%), reinforcement delivery during 97.5% of trials (range, 60% to 100%), child compliance during 100% of trials, and child problem behavior during 96.5% of trials (range, 25% to 100%). For Mike, observers agreed upon instruction

delivery during 91.1% of trials (range, 40% to 100%), reinforcement delivery during 95.5% of trials (range, 60% to 100%), child compliance during 87.9% of trials (range, 20% to 100%), and child problem behavior during 98.2% of trials (range, 80% to 100%). For Ada, observers agreed upon instruction delivery during 98% of trials (range, 80% to 100%), reinforcement delivery during 97% of trials (range, 80% to 100%), child compliance during 96.7% of trials (range, 80% to 100%), and child problem behavior during 100% of trials. The low range scores were within the first two sessions of the evaluation for each participant and likely reflect data collectors becoming increasingly familiar with the operational definitions.

Procedures (Terry and Jack).

Terry nominated four tasks with which Jack was frequently and problematically noncompliant. These tasks included a self-care task (buttoning and unbuttoning shirts, zipping and unzipping jackets, and snapping and unsnapping coats), a receptive language task (pointing to body parts when stated by the parent), a clean-up task (placing toys in a bucket), and an academic task (tracing letters).

Baseline. During baseline, Terry presented Jack with five instructions (each instruction constituted one trial) to complete each of the four nominated tasks for a total of 20 trials per session. The experimenter helped Terry keep count of the number of trials conducted and prompted Terry when it was time to present a new task. The experimenter did not provide any instruction, modeling, or feedback regarding Terry's performance. This phase established baseline levels of correct instruction and reinforcement delivery, child compliance, and problem behavior across each of the four tasks. Based upon

baseline levels, the self-care task was designated as the training task and the remaining three activities were designated as the generalization tasks.

Training. Sessions during training phases were identical to baseline except that the experimenter implemented instructional procedures prior to or during the first five trials of each session as Terry presented the target task. Terry presented the three generalization tasks without any additional prompting or feedback during the remaining 15 trials of each session. We introduced components of BST (written instructions, modeling, and feedback) sequentially and cumulatively until Terry met mastery criteria of three out of four consecutive sessions with (a) 100% implementation accuracy of both instruction delivery and reinforcement delivery and (b) no session with less than 80% implementation accuracy for either measure. We advanced to the next training step when visual inspection of Terry's performance indicated no increasing trend in the target task.

We initiated training with the *Written Instructions* phase. We provided Terry with a one-page written description of how to conduct three-step prompting and differential reinforcement (see Appendix B). This document included operational definitions of compliance, problem behavior specific to Jack, along with directions to follow in the implementation of escape- extinction plus DRA procedures, and three-step prompting with the general example of the task of counting objects. Terry could read this document for as long as she pleased prior to sessions, but the trainer retrieved the document before starting sessions. Otherwise, sessions were identical to baseline.

Sessions during the *Written Instructions and Model* phase were identical to the written instructions phase except that in addition to the written document, the trainer

modeled implementation of three-step prompting and differential reinforcement for five trials with the training task before starting the training session. Again, no performance feedback was provided.

*S*essions during the *Written Instructions, Model, and Feedback phase* were identical to the written instructions plus model phase except that the trainer provided praise for correct responding and corrective feedback for incorrect responding after each trial of the target task.

Procedures (Ada, Mike, and Kevin)

Ada and Mike nominated three tasks with which Kevin was frequently and problematically noncompliant. These tasks were folding towels, stating the value of coins, and completing math problems (addition and subtraction). Due to the severity of Kevin's aggression, we were concerned that non-integral implementation of three-step prompting placed the family at undue risk of injury. Therefore, following a baseline assessment with these three tasks, we conducted simulation training with Ada and Mike in which an experimenter played the role of the child using a fourth task. Following mastery of instruction and reinforcement delivery, we then assessed generalization to the three generalization tasks when Ada and Mike instructed Kevin.

Baseline. During baseline, Ada and Mike presented Kevin with five instructions to complete each of the three nominated tasks for a total of 15 trials per session. Similar to the evaluation with Terry, the experimenter helped keep count of the number of trials conducted and prompted the parent when it was time to present a new task. The

experimenter did not provide any instruction, modeling, or feedback regarding performance.

Training. During simulation training sessions, Ada and Mike instructed the experimenter to trace shapes on a worksheet. The experimenter followed a script to ensure an equal distribution of trials with compliance and problem behavior across sessions. In each 10-trial session, the experimenter (child) complied once following a vocal prompt, twice following a model prompt, and twice following a physical prompt. Additionally, the experimenter engaged in simulated problem behavior (either gently touching the parent to simulate a hit or by pushing away work materials) twice following a vocal prompt, twice following a model prompt, and twice following a physical prompt. The order of trials in which the experimenter engaged in problem behavior and/or compliance was randomized across sessions. This training began with a baseline to ensure neither Ada nor Mike engaged in correct instruction or reinforcement delivery prior to training. Otherwise, we sequentially and cumulatively introduced written instructions, modeling, and feedback identical to that provided to Terry.

Post-Training. Following meeting the mastery criteria in simulation training sessions, we then assessed Ada and Mike's providing of instructions and reinforcement delivery with Kevin and the three generalization tasks. These sessions were identical to those in baseline.

In-Situ Training. In-vivo training sessions were identical to baseline except that the experimenter provided instructions, modeling, and feedback on implementation of each of the generalization tasks while the parents provided instruction to Kevin.

Results

Terry and Jack

Figure 1 shows the results from Terry's evaluation with the target task (self-care) in the top panel and the generalization tasks (receptive language, clean-up, and academic tasks) in the lower three panels. Terry did not engage in any correct instruction or reinforcement deliveries during the baseline of the self-care task. Her accuracy in both measures increased upon implementation of written instructions but then returned to low levels after two sessions. Providing both written instructions and a model of correct implementation increased reinforcement delivery to mastery levels (M = 95.6% of trials); instruction delivery increased, but remained below mastery level (M = 75.6%). After nine sessions of exposure to written instructions and modeling, we then included performance feedback and saw increases in instruction delivery to mastery levels (M = 89.2%). Reinforcement delivery accuracy remained high (M = 95.4%).

Concomitant with increases in accuracy associated with the target task, we saw increases in the generalization tasks as well. Correct reinforcement delivery was at zero levels across the three tasks and correct instructions was at low levels for receptive language (M = 0%) and clean-up (M = 6.7%) tasks during baseline whereas instruction delivery for the academic task was elevated (M = 80%). When written instructions were provided prior to the self-care task, Terry's instruction delivery and reinforcement delivery increased but did not remain high in the receptive and clean-up tasks. When pre-session models of implementation were provided prior to the self-care instruction, Terry also achieved mastery level performance in reinforcement delivery across the three tasks.

Instruction delivery increased to mastery level with the receptive language task, but remained below mastery with the clean-up task (*M* = 48.9%) and the academic task (*M* = 60%). Following the introduction of performance feedback for the target task, Tracy's accuracy in instruction delivery also met mastery criteria for each of the three generalization tasks.

During this time, we also assessed levels of Jack's compliance and problem behavior at each phase of training (Figure 2 shows these data). During baseline for the target task (self-care), Jack engaged in low levels of compliance and elevated levels of problem behavior (Compliance *M* = 13.3%, Problem Behavior *M* = 93.3% of trials). During the written instructions phase, Jack's compliance began to increase (*M* = 60%) and problem behavior began to decrease (*M* = 64%). With the additions of models and feedback, Jack's compliance remained high (*Ms* = 75.6% and 98.5% for the model and model and feedback phases, respectively) and problem behavior remained low (Ms= 2.2% and 6.2% for the model and model and feedback phases, respectively). For the generalization tasks, Jack displayed similar levels of compliance and problem behavior. Baseline levels of compliance were low, while levels of problem behavior were high for both the receptive language and clean-up tasks. The academic task showed a different pattern in which compliance was high and problem behavior was at moderate levels. The written instructions phase of training was similar to the target task in that compliance increased with low-levels of problem behavior. With the addition of models and feedback during the target task, compliance remained high and problem behavior maintained at low levels.

Ada, Mike, and Kevin

For Ada, data collection began with a pre-training assessment of correct implementation of three-step prompting and DRA with Kevin for three tasks. The top three panels of Figure 3 show Ada's implementation of procedures during pre and post-training. The tasks of folding, coin value, and math all had zero levels of correct implementation for instruction and reinforcement components. The bottom panel of Figure 3 shows Ada's implementation of procedures during simulation training. During baseline, Ada engaged in zero levels of correct implementation for both components. In the written instructions phase, Ada's implementation remained low for the instruction component, but increased moderately for the reinforcement component (*M* = 47.5%). The addition of a model led to an increase in both instruction and reinforcement components in which mastery criteria was met (*Ms* = 57.5% and 80%, respectively). In the post-training assessment conducted with Kevin, Ada's correct implementation was low for instruction delivery (*Ms* = 40%, 35%, and 10% for folding, coin value, and math, respectively) and moderate to high for reinforcement delivery (*Ms* = 80%, 85%, and 70% for folding, coin value, and math, respectively). Ada did not meet the mastery criteria during post-training, so in-situ training with Kevin was implemented with the full BST package in place. Ada quickly met the mastery criteria during in-situ training for both the instruction and reinforcement components.

During this time, data were also collected on Kevin's behavior during pre and post-training probes and in-situ training with his mother. Figure 4 shows the data for this training. During pre-training probes, Kevin's problem behavior was low (*Ms* = 6.7%,

6.7%, and 33.3% for folding, coin value, and math, respectively) and data were not collected on compliance due to a data collector error. During post-training probes, Kevin's compliance was low (*Ms* = 20%, 10%, and 15% for folding, coin value, and math, respectively) and problem behavior was moderate to high (*Ms* = 55%, 55% and 40% for folding, coin value, and math respectively). During in-situ BST, levels of compliance increased for all tasks (*Ms* = 64%, 100%, and 72% for folding, coin value, and math, respectively) and problem behavior decreased to zero levels.

For Mike, data collection began in a similar manner to Ada. The top three panels of Figure 5 show Mike's implementation of procedures during pre and post-training. The tasks of folding, coin value and math all had very low levels of correct implementation for instruction and reinforcement components. The bottom panel of Figure 5 shows Mike's implementation of procedures during simulation training. During baseline, Mike engaged in zero levels of correct implementation for both components. In the written instructions phase, Mike's implementation increased drastically for the instruction component (M= 61.7%), but remained low for the reinforcement component (M= 8.3%). During the written instructions plus modeling phase, the instruction component remained high and the reinforcement component increased (M= 71.7%). During the final phase of training, Mike quickly met the mastery criteria for correct implementation of both instruction and reinforcement delivery. In the post-training assessment conducted with Kevin, Mike's correct implementation was moderate to high, and variable, across the three tasks. For instruction delivery, means of correct implementation were 73.3%, 51.1%, and 62.2% for the folding, coin value, and math tasks respectively. For

reinforcement delivery, means of correct implementation were 91.1%, 68.9%, and 82.2% for the folding, coin value, and math tasks respectively. Mike did not meet the mastery criteria during post-training, so in-situ training with Kevin was implemented with the full BST package in place. Mike very quickly met the mastery criteria during in-situ training for both the instruction and reinforcement components.

During this time, data were also collected on Kevin's behavior during pre and post-training probes and in-situ training with his father. Figure 6 shows these data. During pre-training probes, Kevin had moderate to low levels of compliance (*Ms* = 80%, 26.7%, and 0% for folding, coin value, and math, respectively) and low levels of problem behavior (*Ms* = 0%, 0%, and 13.3% for folding, coin value, and math, respectively). During post-training probes, Kevin's compliance was moderate and variable (*Ms* = 82.2%, 62.2%, and 40% for folding, coin value, and math, respectively) and problem behavior was low (*Ms* = 4.4%, 2.2% and 2.2% for folding, coin value, and math, respectively). During in-situ BST, levels of compliance increased to desirable levels for both the folding and coin value tasks but remained at moderate levels for the math task (*M* = 48%). Levels of problem behavior remained very low.

Discussion

We conducted a component analysis of BST in which parents were taught to implement a treatment package including three-step prompting and differential reinforcement to increase compliance with their children. For Terry and Mike, the written instructions and model components alone increased correct implementation with the target tasks, but to sub-mastery levels. In these cases, the full BST package was necessary

to achieve mastery. Ada, however, met mastery criteria with her target task during the written instructions and model components without feedback. These data indicate that sensitivity to each component of BST may be somewhat idiosyncratic.

It is likely that some proportion of parents could implement these procedures given written instructions and a model (as was the case with Ada), whereas other parents would require behavioral rehearsal with feedback (it is also worth noting that none of the participants met mastery criteria given written instructions alone). Similar results were reported by Kelso, Miltenberger, Waters, Egemo-Helm, and Bagne (2007). Kelso et al. compared the gun safety skills of children who watched a video model versus those who engaged in a full BST package. In an assessment of safety skills during role-play, 80% of the children in the video model condition were able to correctly engage in the safety skills without the need for rehearsal or feedback. Identifying the distribution of such sensitivity to instructional procedures would be important in making broad recommendations for how compliance training can and should be delivered on a large scale.

It may be possible to create an assessment to identify caregivers who require different levels of support to master this type of intervention package. Unfortunately, it is not clear what predicts sensitivity to modeling without rehearsal in these cases, but histories of implementing behavioral intervention may be one such factor (note that Ada was a teacher and likely had greater experience implementing behavioral intervention than the other parent participants). Short of predicting which parents require more intensive training, a strong case can be made for adopting the full BST approach to

ensure *all* caregivers are trained adequately despite the additional cost and resources associated with doing so. First, the use of instructions and models alone in practice would likely involve little to no direct observation of parents actually implementing the procedures. Some proportion of parents would then implement the treatment package at sub-optimal levels which (a) may fail to affect compliance (Wilder et al., 2006), (b) result in increases in potentially dangerous problem behavior in the case of extinction bursts, (c) result in intermittent reinforcement of problem behavior and (d) the shaping of more severe forms of problem behavior. Second, the alternative to a full BST approach would be to provide all parents with access to written instructions and models, and then require those parents who are not successful in treating their children's noncompliance to seek additional support in the form of guided rehearsal and feedback. We did not assess parents' ability to identify whether they were being successful or not (i.e., whether they could accurately tact their own performance) nor is it clear that parents would seek follow up support if their initial experience was unsuccessful.

In addition to assessing the training components of BST, we also assessed generalization of the acquired skills across task types, which is important in assessing the extent to which parents can continue to implement these procedures in their natural environment. Unfortunately, these results were mixed as well. For Terry, mastery of the instructional package with a training task also resulted in mastery level performance with the generalization tasks. However, for Mike and Ada mastery of the package with the training task during simulation training did not result in sufficient generalization of implementation to the other tasks with Kevin. There are several potential reasons why

generalization may have occurred for Terry and not for Mike or Ada. Terry's training occurred with Jack in the target setting and thus the training environment may have contained sufficient natural stimuli to promote generalization. Mike and Ada received simulation training with a confederate. It is reasonable to assume that the confederate's behavior was not sufficiently like Kevin's behavior to promote generalization (e.g., the confederate simulated aggression). These data would argue against conducting simulation training, but for safety reasons we believe such an approach is warranted. Instead we recommend focusing future research efforts on promoting generalization from the simulation training to the natural environment.

To promote implementation accuracy in the generalization contexts, we conducted in-situ training with Mike and Ada, or what Stokes and Baer (1977) referred to as sequential modification to ensure their accurate implementation with Kevin. Sequential modification refers to the direct training of skills in environments in which generalization did not occur. This technique resulted in high levels of accuracy with the tasks we assessed, but if it is necessary to teach parents to implement this package in each task for which they will deliver instructions this approach will be extremely limited in its utility. The current study, like much of the research upon which the procedures were based, targeted only a single task to teach parents to implement these procedures. Providing direct training across multiple tasks (i.e., the strategy of multiple exemplar training) may be a feasible strategy to promote generalization.

These data provided an opportunity to evaluate the importance of procedural integrity of implementation upon child compliance. In Terry and Jack's case, Jack's

compliance increased to high levels and problem behavior dropped to low levels even when Terry's implementation of the instructional package was below mastery levels (e.g., at the end of the Written-Instructions phase and the Modeling phase). In Mike and Kevin's case, problem behavior remained low, but compliance occurred at variable levels prior to Mike meeting mastery levels of instructional performance. In Ada and Kevin's case, problem behavior remained high and compliance was low prior to Ada meeting mastery levels. From these data, and similar to Wilder et al. (2006), increasing the accuracy of procedural implementation resulted in superior treatment outcomes in terms of increased child compliance and decreased problem behavior.

The current study differed from Wilder et al. (2006) in that our study targeted both three-step prompting and differential reinforcement of compliance, whereas Wilder et al. targeted only three-step prompting. Although we collected data on procedural accuracy in regards to both treatment components we did not assess training on those two components separately, which would have provided greater opportunity to determine if integrity errors in implementing one component were more detrimental to treatment success than the other. For instance, St. Peter-Pipkin, Vollmer, and Sloman (2010) compared the effects of errors associated with the reinforcement and extinction components of DRA procedures. Their data indicated that errors associated with extinction were more likely to result in increases in problem behavior than were errors associated with differential reinforcement. A similar comparison with our current studies procedures may provide useful information regarding the necessity of high integrity with each component of this treatment.

Overall, the results of the current study support the use of BST in teaching compliance training procedures to parents, but also raise some concern regarding the generalization of those skills to other appropriate instructional situations. In addition to generalization of correct implementation across instructional activities, it will also be important to measure and promote generalization across settings. All generalization sessions were conducted in one location in each family's home, but to ultimately be successful parents will be required to implement these procedures across a number of settings.

Finally, it will also be worthwhile to evaluate procedures to promote generalization of child compliance even in the presence of less than ideal instruction delivery. It is worth noting that each of the three child participants had experienced three-step prompting and differential reinforcement implemented by members of the research team prior to their inclusion, each had responded to this intervention with prolonged periods of low problem behavior and high compliance, and each still each engaged in problem behavior given instructions from their parents during the baseline period of the current study and during periods of suboptimal implementation. It is not realistic to think that even with intensive training and ongoing support, every parent will be able to implement instructional procedures perfectly, or that every adult with whom a child is likely to encounter can be trained to respond similarly. Thus future research should consider identifying behavioral histories that are likely to promote generalization of compliance and hopefully lessen the requirements of parents to be near perfect in their instructive interactions with children.

Instruction Delivery			
Response Component:	Definition:	Correct Example:	Incorrect Example:
Materials	Necessary task materials are presented to the child.	All items are placed in front of child with (a) appropriate orientation and (b) access to materials necessary to complete instruction prior to initiating instruction.	(a) Any items are oriented away from child or are a distance greater than 30 cm from child, (b) necessary items are omitted (e.g., withholding a pen prior to a writing task), or (c) instruction is presented prior to arrangement of all materials.
Verbal Prompt	Instruction is given to the child on the task.	Declarative, directive statement of the task to be completed.	Use of questions (i.e. "will you…" or "can you…") or overly wordy.
Delay After Verbal Prompt.	A delay is given before proceeding to allow the child to respond.	Wait 5s after the delivery of each prompt for the child response, before moving onto the next prompt.	Waiting too long (i.e. should not be longer than 5s) or not long enough for the child to respond.
Model Prompt	The correct response is modeled by the instructor and the instruction is repeated.	Demonstrate the correct response, and then give another verbal prompt to the child.	Demonstration without a verbal prompt; any other prompt other than a model prompt (i.e. verbal or physical)
Delay After Model Prompt	A delay is given before proceeding to allow the child to respond.	Wait 5s after the delivery of each prompt for the child to response, before moving onto the next prompt.	Waiting too long (i.e. should not be longer than 5s) or not long enough for the child to respond.
Physical Prompt	The instructor physically guides the child to complete the correct response while repeating the instruction.	Hand-over-hand guidance is used to have the child complete the task, and the instruction is repeated.	A verbal or model prompt is delivered; the child is not physically guided to complete the task.
Reinforcement Delivery			
Response Component:	Definition:	Correct Example:	Incorrect Example:
Praise Delivery	A brief statement of praise is given to the child to mark a correct response.	Deliver a short statement of praise (i.e. "Good job", "that's right") within 5s of correct completion of a task.	No praise delivery; praise is delivered over 5s after the task had been completed correctly; praise delivered for incorrect completion or refusal of the task.
Removal of Task Materials	Materials used during the task are removed from the working area during the reinforcement period.	Remove the task materials from in front of the child (more than 30cm away) once a correct response has been given.	Task materials are left within 30cm of the child; materials removed after an incorrect response or refusal to complete the task.
Immediacy of Reinforcement	Reinforcement is delivered immediately following compliance.	Reinforcement should follow a correct response as immediately as possible (i.e. within 5s).	Reinforcement is not given or is given later than 5s after the task has been completed correctly.
Presentation of Reinforcement	Reinforcement in the form of edible and/or toy and/or attention is delivered appropriately.	Reinforcement options are presented to child; the child is asked to choose one; the child is allowed time to consume an edible or 20s to play with a toy or the child is given 30s access to a toy and attention, plus one edible.	The child is not given reinforcement options; is not allowed to choose a reinforcer; is not allowed enough time to consume the reinforcer.
Removal of Reinforcement	After the allotted reinforcement period has passed or the child has chosen a reinforcer, discontinue reinforcement or remove the reinforcer array.	Remove the array from the child's reach (more than 30cm away) after a reinforcer has been chosen; after time for consumption, remove the chosen reinforcer if it is a toy.	The array of reinforcers is left in front of the child (within 30cm); the chosen reinforcer is not removed after 20s; The reinforcement period is too long or short.

Table 1. Operational definitions for components of instruction and reinforcer delivery.

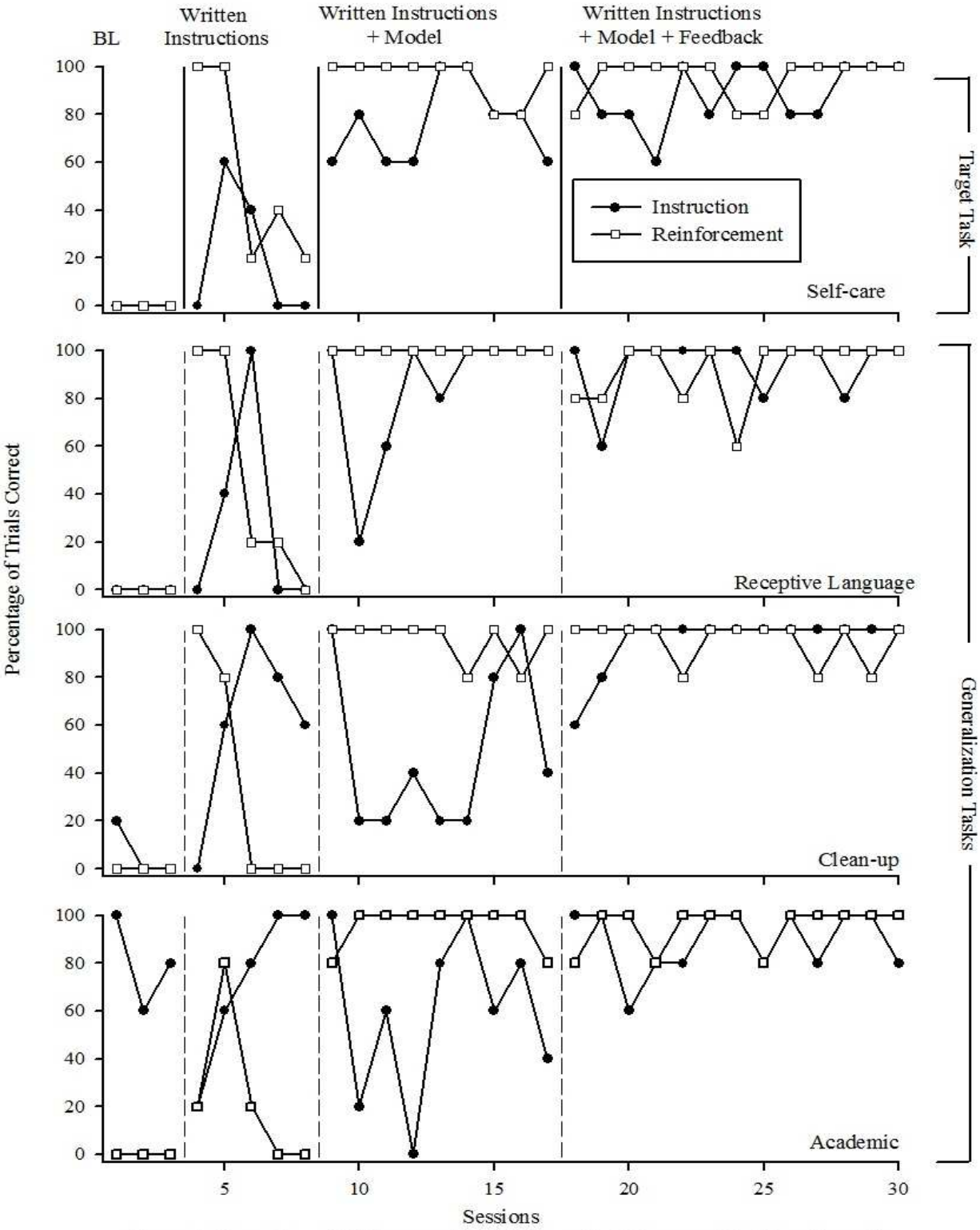

Figure 1: Percentage of trials correct instruction and reinforcement for Terry (parent).

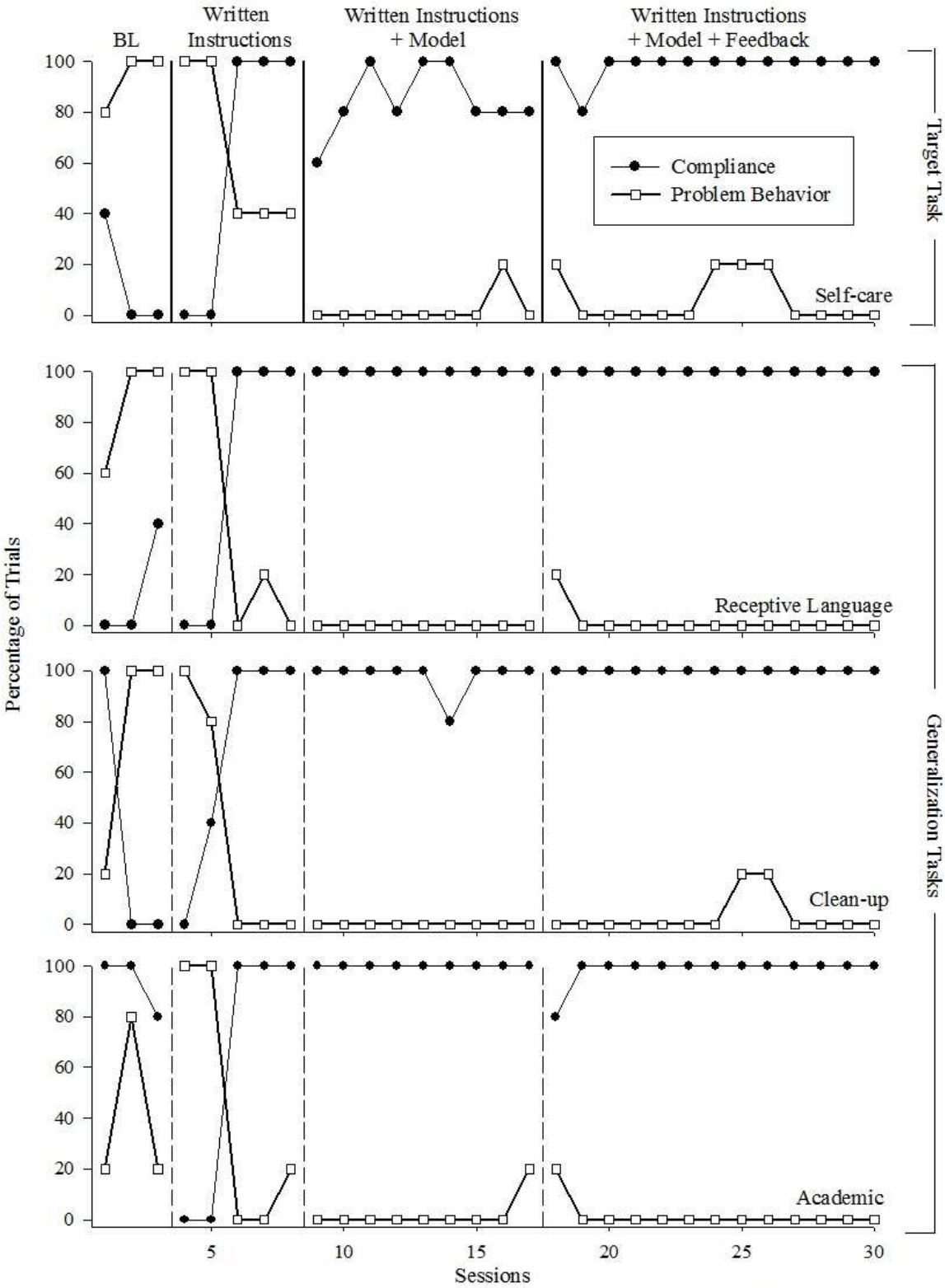

Figure 2: Percentage of trials with compliance and problem behavior for Jack (child).

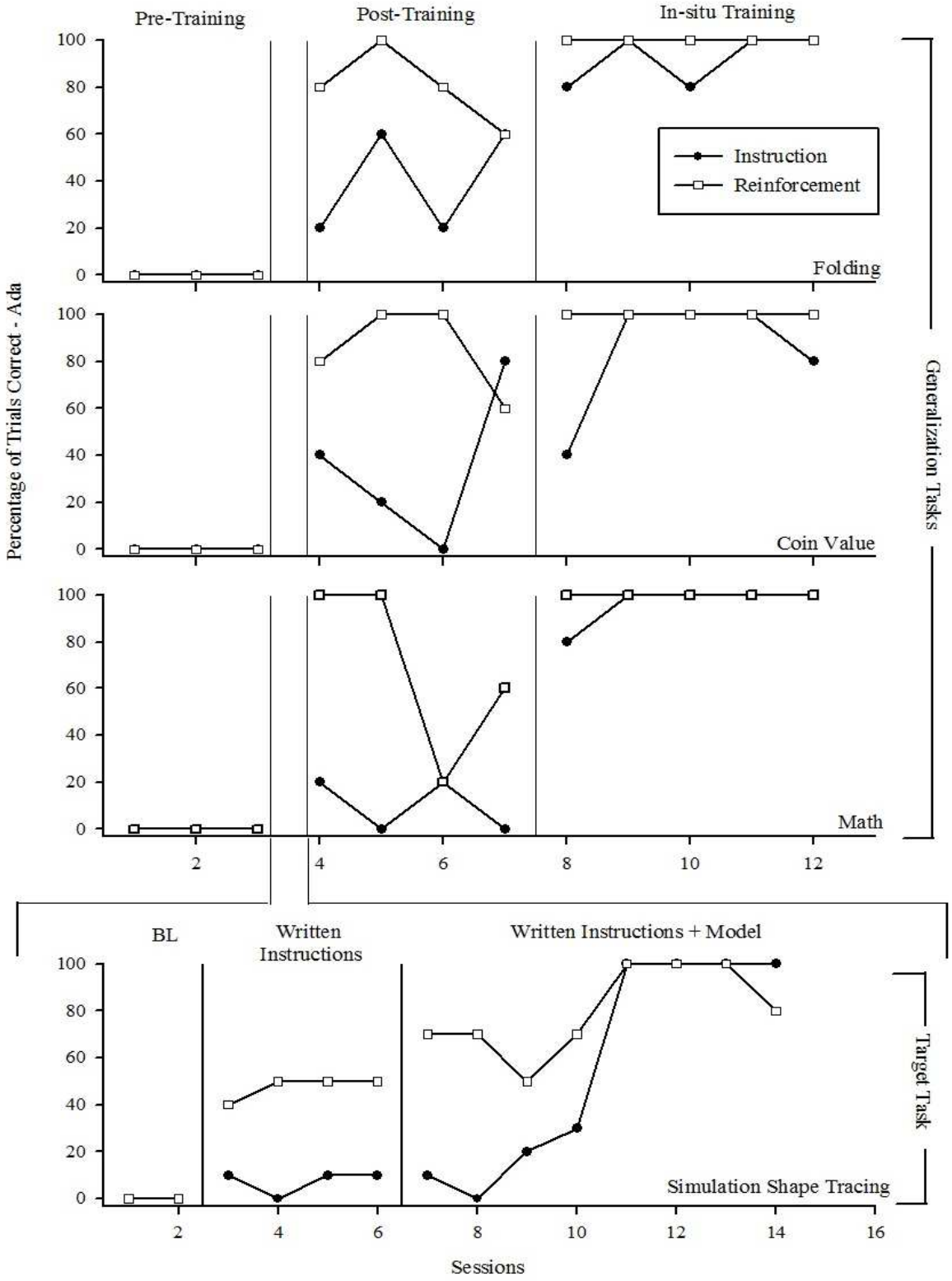

Figure 3: Percentage of trials with correct instruction and reinforcement for Ada (mother). The top three panels are pre- and post-training with Kevin. The bottom panel is simulation training conducted with a confederate.

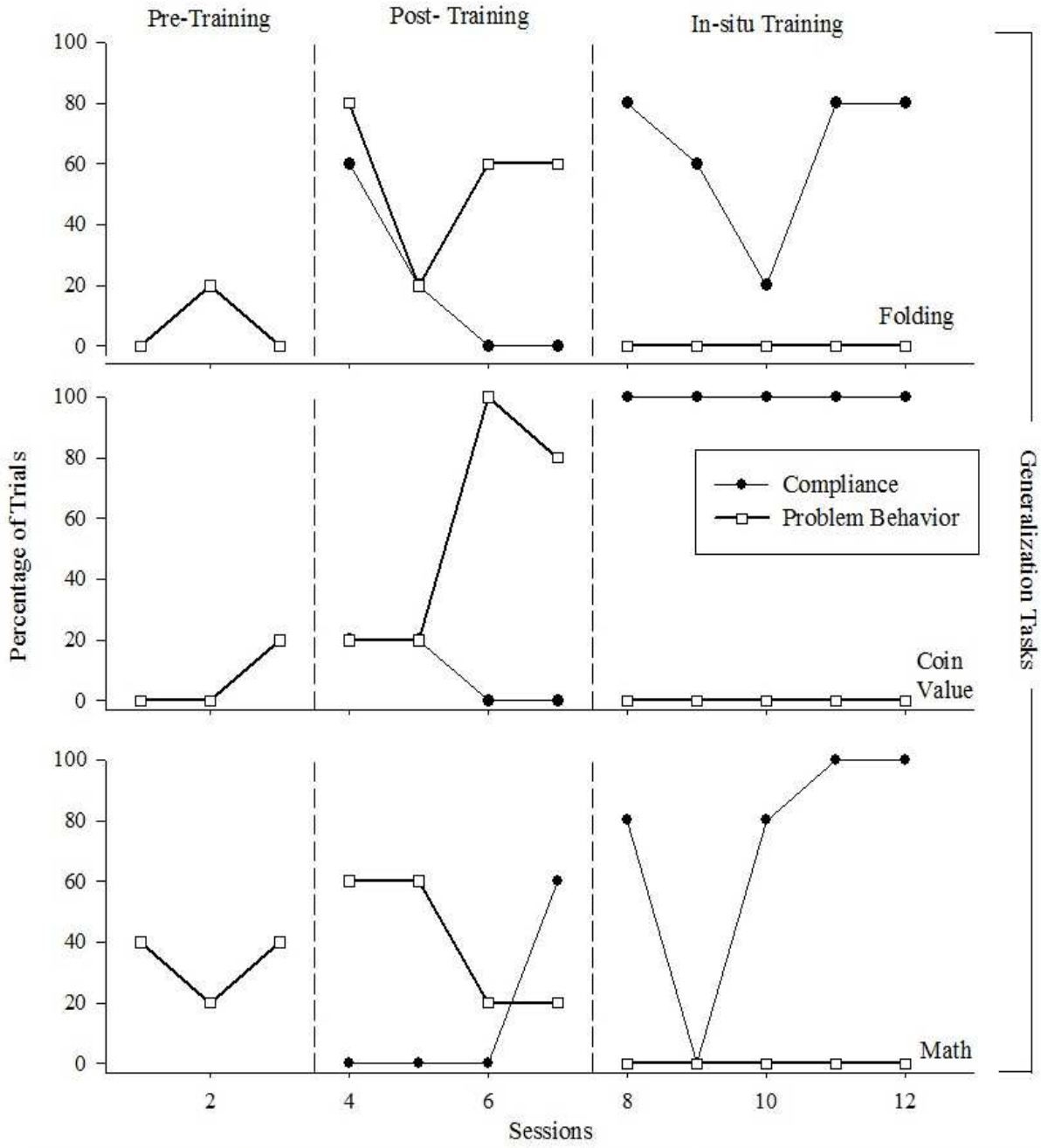

Figure 4: Percentage of trials with compliance and problem behavior for Kevin(child) with Ada (mother).

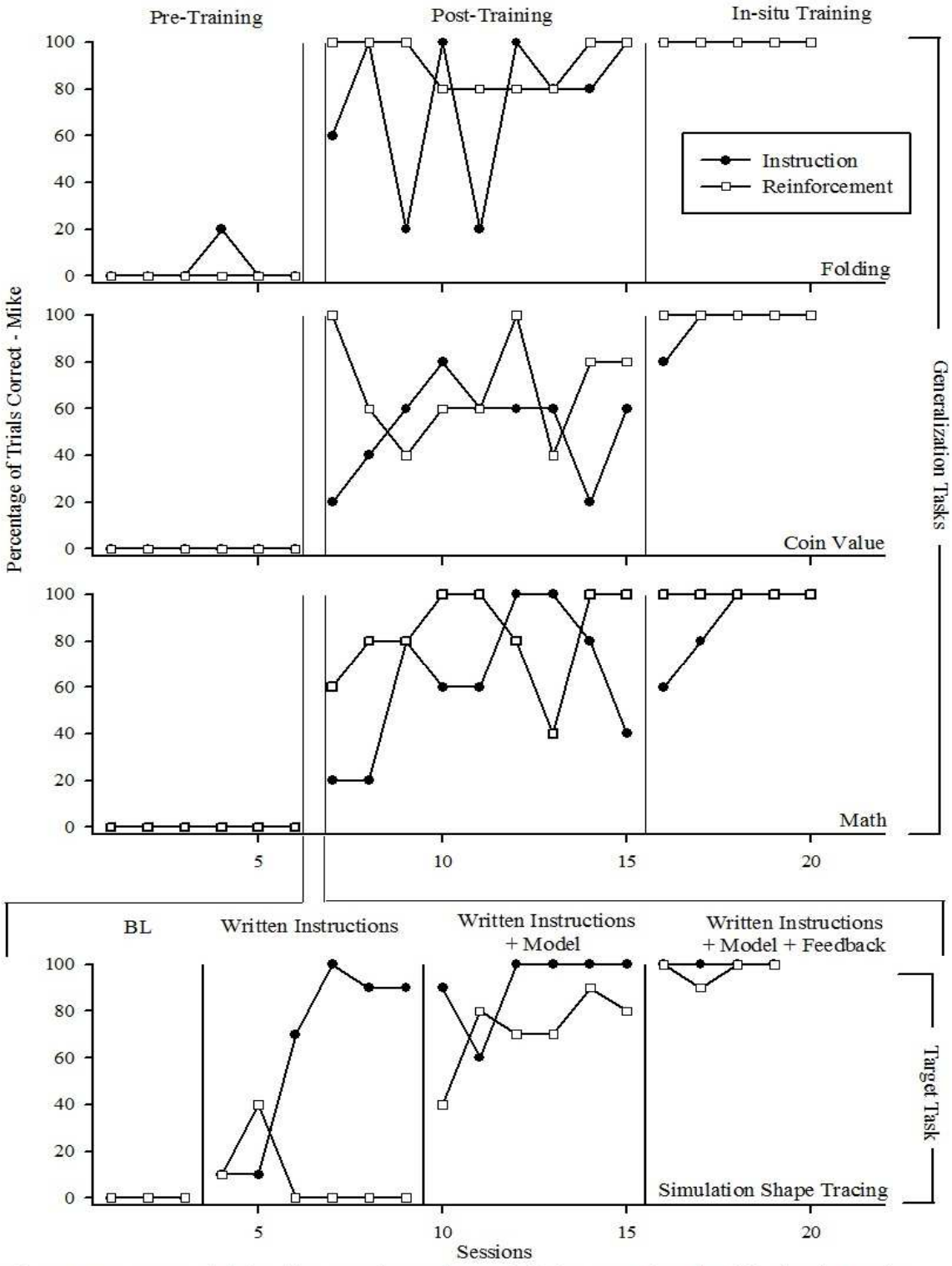

Figure 5: Percentage of trials with correct instruction and reinforcement for Mike (father). The top three panels are pre- and post-training with Kevin. The bottom panel is simulation training conducted with a confederate.

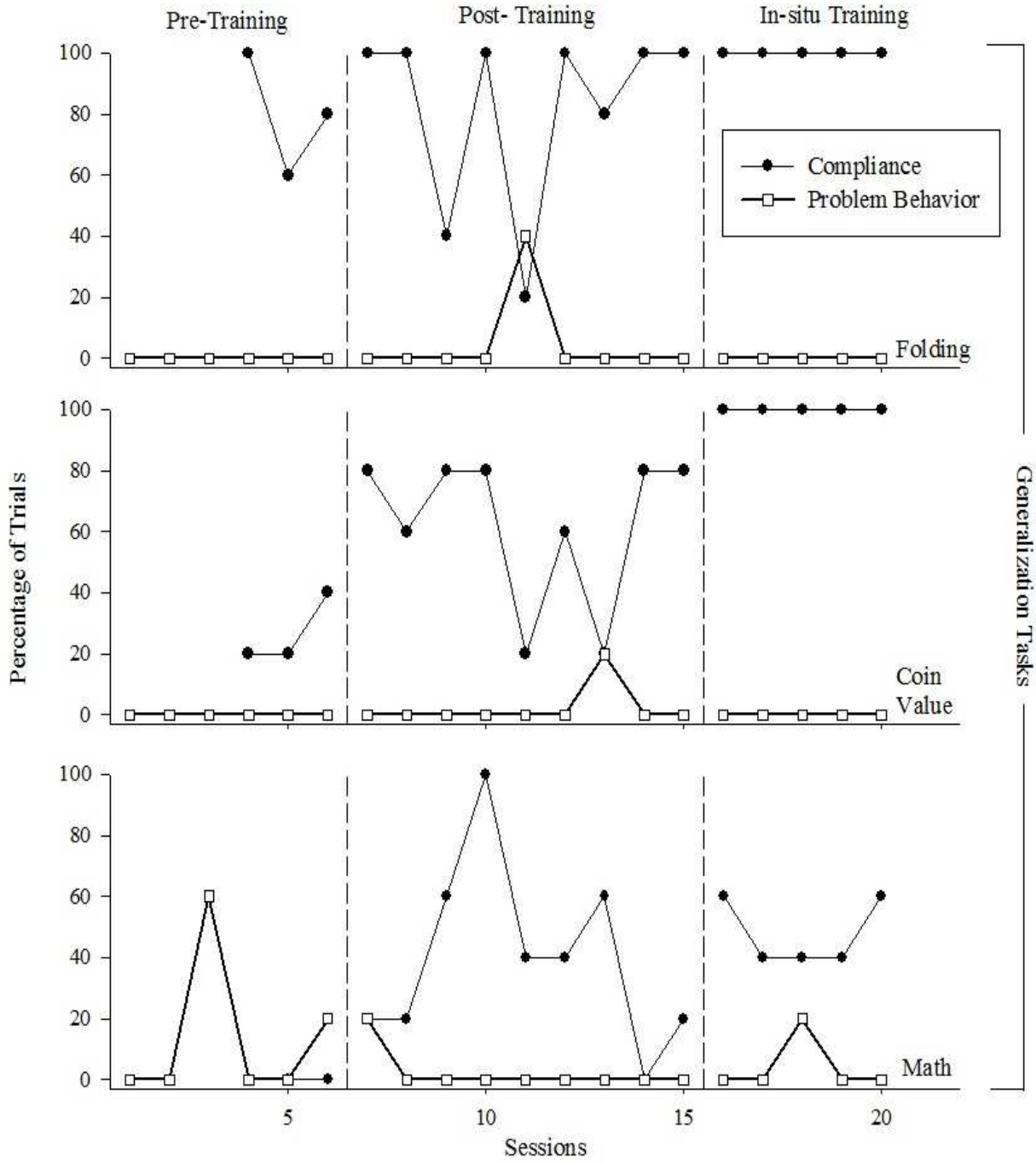

Figure 6: Percentage of trials with compliance and problem behavior for Kevin(child) with Mike (father).

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Appendix A. Behavioral skills training data sheets.

Behavior Skills Training Checklist- Three- Step Prompting

Trial 1	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 2	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 3	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 4	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 5	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 6	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 7	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 8	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 9	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Trial 10	**Material**	**Verbal**	**Delay**	**Model**	**Delay**	**Physical**	**Reinforcer**	**PB**	**Totals**
	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - R Materials + - Present RFT + - Stop RFT + - Immediate + -		+ C PB - NC
Totals	+ -	+ - C NC	+ -	+ - C NC	+ -	+ -	Praise + - Remove Mat. + - Present RFT + - Stop RFT + - Immediacy + -		+ C PB - NC

Appendix B. Written Instructions for Terry.

Target Behaviors:

Compliance is defined as completion of the instruction following either the vocal or model prompt.

Vocal refusal include "no," "I don't want to," "I hate you," "Out of here," "out," "leave," "go," "no more," and "stop touching me."

Motor refusal includes pushing away materials, pushing his chair away from the table, pushing away the therapist's hand, elopement (i.e., attempting to escape), hitting therapist (forceful contact of his hand with any part of the therapist's body), self-hitting (forceful contact between child's hand and any part of his body); spitting; licking the table, materials, or therapist; blowing raspberries; scribbling or drawing on papers; throwing materials; glasses, or other objects and actively turning his body away from the therapist (rotation of his entire torso so he is facing away from the therapist).

Materials: Academic materials, pen, reinforcer array (3 reinforcer options selected by child before beginning sessions), additional edibles to replenish array, a timer

Procedures: The following procedures are to be used when delivering instructions.

1.) Place instructional materials on the table in front of learner.

2.) Deliver instructions using three-step prompting.

   a. Initiate instruction using a directive vocal prompt (e.g., "[Child's name], count the objects").
      i. Allow approximately 5 s to complete the task. If he does not complete the task within 5 s
   b. Repeat the vocal instruction, along with the phrase "You try," after providing a model of task completion (e.g., "[Child's name], count the objects, like this. You try." while demonstrating the correct response).
      i. Allow 5 s to complete the task. If he does not complete the task within 5 s
   c. Repeat the vocal instruction and provide physical guidance to complete the task (e.g., "[Child's name], count the objects like this").
   d. Present the next instruction, beginning the sequence as in (a) above.

3.) If the child <u>completes the task</u> following either the vocal or model prompt without engaging in problem behavior:
   a. Present the reinforcer array while saying, "Good job; pick one."
   b. Allow learner to select and consume one item; block attempts to select more than one.
      i. If a toy allow 20-s access
      ii. If an edible wait for food consumption prior to continuing
   c. Initiate a new instruction as described in (2) above.

4.) If he <u>engages in problem behavior</u> during the task prompts

a.) Maintain a neutral facial expression and refrain from verbally acknowledging problem behavior.
b.) Immediately advance to the next prompt in the three prompt sequence

5.) If he engages in inappropriate sexual behavior during the task prompts, ignore the behavior and continue on with the task.