An Evaluation of Behavioral Skills Training with the Addition of a Fluency Component

Ashley Nicole Breeden
*University of South Florida*, abreeden@mail.usf.edu

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An Evaluation of Behavioral Skills Training with the Addition of a Fluency Component

by

Ashley Breeden

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts
Department of Child and Family Studies
College of Behavioral and Community Sciences
University of South Florida

Major Professor: Timothy Weil, Ph.D.
Raymond Miltenberger, Ph.D.
Kimberly Crosland, Ph.D.

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Abstract

Behavior Skills Training (BST) typically consists of an initial informational component presented to the learners either vocally, through a handout, presentation, or both. Results from the active student responding literature indicates these methods as the least effective means of conveying important information to learners. This study sought to utilize an alternative instructional component, fluency training, and to evaluate if any effects are observed on implementation of the behavior chain of Discrete Trial Training (DTT). Teacher’s had previous training and experience on implementing DTT prior to this study—however, all teachers implemented strategies with low integrity. Teachers were trained to fluent levels on verbally stating the component steps of DTT and were then observed during probe sessions to evaluate percentage of steps implemented correctly. The probes indicate an initial improvement, but decreases over time that are consistent with results on other passive in-service trainings. Teachers then took part in a single session of Modeling, Role-Play, and Feedback. Results suggest that while fluency training had an impact on participants’ verbal performance on discrete trial information, and affected overt performance during subsequent probes, the effects were small and transient. Performance improved only after training on the components of BST and additional training had been completed in-situ.
Introduction

Fluency Training

A significant amount of practice can create complex repertoires of behavior by building fluency in sequential steps. Fluency is a mastery criterion based on fluent performers of that skill set; requiring both accuracy and speed (Berens, Boyce, Berens, Doney, & Kenzer, 2003). A fluency-based approach recognizes and provides a systematic methodology for using effective practice strategies (Binder, 1993). The many positive outcomes to fluent performance are often referred to as REAPS, or Retention Endurance Application Performance Standards. Once a performer is fluent he or she is more likely to maintain the same rate of responding and accuracy over time, thus resulting in retention of material. Fluent performers are less vulnerable to distractions and maintain greater attention, which leads to endurance and stability. Application comes from the fluent performer’s ability to acquire complex skills more quickly and easily (Berens et al., 2003). Many proponents of fluency training use SAFMEDS cards, which stands for Say All Fast, a Minute Every Day, Shuffled. The idea behind SAFMEDS is to use one-minute daily practice sessions to help students achieve high academic fluency (Potts, Eshleman, & Cooper, 1993). Flash cards are typically used for the SAFMEDS procedure, and the concentration is on verbal fluency rather than performance.

Fluency research suggests that behavioral fluency is associated with retention of skills and knowledge as well as greater resistance to distraction (Binder, 1993). Orgel (1984) compared the performance of college students who had achieved fluency criteria...
to those who completed the same course using lecture and accuracy-only criteria. The results show that students in this university calculus class who had been trained through precision teaching retained approximately twice as much material.

Most research done in the area of fluency training has been conducted with young children and adolescents, but rarely includes evaluation of adult participants or staff. It is unknown if the acquisition of knowledge gained through fluency training will translate into the acquisition of such skills. Most research suggests that rehearsal of target behaviors, as seen in Behavioral Skills Training, is necessary for skill acquisition.

According to Miltenberger (2008), behavioral skills training (BST) is a procedure consisting of instructions, modeling, behavioral rehearsal (role play), and feedback that is used to teach new behaviors or skills. BST can be successfully used with many different clients and in varying environments to increase implementation accuracy and maintenance. Because skills are acquired through rehearsal and feedback, clients have a greater understanding of the skills they have learned and how to identify target behaviors in the natural environment. In-situ assessments are observations used to evaluate the target behaviors in a natural environment. Workshops that consist of lecture alone often increase paper and pencil knowledge of behavioral skills, in other words, participants know about the principles taught more so than how to implement them correctly (Jahr, 1998). Behavioral skills training and in-situ training can increase the implementation of skills in these complex environments, therefore increasing knowledge of how to implement procedures effectively and efficiently.
Breaking Down Behavioral Skills Training

Instruction. Instruction typically consists of a lecture with information conveyed in a didactic manner by an instructor. Procedures often consist of lectures, discussions, and written or verbal information (Jahr, 1998). Instructions should be specific descriptions of what is desired from the learner because instructions are the learner’s first exposure to the behavior targeted. Instructions should specify the components in a behavior chain exactly as they are expected from the learner and in the proper sequence (Miltenberger, 2008). Low correspondence has been found between verbal competence about therapeutic techniques and applications of techniques; therefore, instruction alone is rarely enough to ensure proper application of treatment (Alavosius & Sulzer-Azaroff, 1990). BST follows the instruction component with modeling, role-play, and feedback to address this issue.

Modeling. Modeling typically follows the instruction component and consists of the instructor demonstrating the correct behavior for the learner. The purpose of modeling is for the learner to observe the correct behavior so that he or she may imitate it (Miltenberger, 2008). As seen in Wurtele, Marrs, and Miller-Perrin (1987), modeling can be live or symbolic. Live modeling consists of an instructor demonstrating the appropriate behavior(s) in the appropriate situation, whereas with symbolic modeling, the desired behavior is demonstrated on videotape, audiotape, or another form of media.

Rehearsal (Role-Play). Behavior rehearsal is the opportunity for the learner to demonstrate the behavior learned through instructions and modeling. Rehearsal is crucial to the BST procedures because it is the only way for the teacher to be sure that the learner has evoked the behavior, it allows for an opportunity to reinforce the behavior, and it
provides an opportunity to correct errors that may hinder performance of the behavior (Miltenberger, 2008). Research shows that training which includes a role-play component leads to more proficiency in applying behavioral teaching approaches (Smith, Parker, Traubman, & Ivar, 1992). Behavior rehearsal also results in greater acquisition of information and a more enhanced skill level, which decreases the number of exposures and training sessions necessary (Wurtele et al., 1987).

**Feedback.** Feedback consists of both praise and/or other reinforcers for correct performance and corrective statements for performance errors. Trainers should provide immediate feedback following the learner’s rehearsal of the behavior (Miltenberger, 2008). Feedback can increase the speed of skill acquisition as well as improve maintenance effects (Alavosius & Sulzer-Azaroff, 1990). Performance feedback or a consultation process must be continued after training to maintain treatment effects, even if the schedule is thinned (Harchik, Sherman, Sheldon, & Strouse, 1992).

**In-situ Assessment.** In-situ assessments are evaluations of the participant’s performance set up by the trainer in the natural environment without the participant’s knowledge. If the participant does not perform to mastery criterion, the trainer may immediately step in and begin a training session called in situ training (Miltenberger, 2008). In-situ assessments account for contextual fit of a treatment in that they evaluate the generalization of treatment effects within the natural environment.

**Research on BST.** Jahr (1998) developed a comprehensive overview of staff training techniques identifying the strengths and weaknesses of training procedures used in most research. The core of the behavior analytic approach to staff training includes
assessments of the client’s behavioral repertoire, identification of adequate staff training objectives, selection of procedures with proven effectiveness, and evaluation of the procedures applied in relation to acquisition, generalization, and maintenance. Jahr determined the effectiveness of these most frequently applied staff training programs based on improved client outcomes, maintenance of staff performance, transfer of skills across settings and clients, and the transfer of skills across client programs.

According to Jahr (1998), instructional procedures typically consist of lectures, discussions, and written or verbal information. When these methods are used without the addition of modeling, role-play, or feedback, they are seldom effective in teaching staff proper applications of treatment. Modeling has been found to be very effective in working with developmentally disabled individuals; however, modeling usually occurs in combination with other procedures, such as feedback, role-play, and praise. Role-play often follows modeling in BST, and the advantage of this is rapid repetition under almost identical conditions. Feedback is the final step in Behavioral Skills Training, and perhaps the most important.

Jahr concludes that self-management in the form of setting daily goals, monitoring their own behavior, graphing data, and administering self-praise is essential for staff performance. Jahr suggests that four issues be considered when evaluating staff training programs. The procedures involved in educating staff personnel must contribute to significant changes in client behaviors. The improvement in staff performance should be evident under conditions other than those in which they were established. A staff-training program should prepare staff to apply their acquired skills in behavioral
techniques toward novel training objectives. The effects of the procedures involved should endure for a long time period after these procedures have been withdrawn.

Transfer of skills across settings is seldom assessed in staff-training research. Without corresponding assessments in the ordinary work setting, the significance of such training remains uncertain. Smith et al. (1992) showed that although significant improvement in treatment skills were obtained at the workshop site, no corresponding improvements in the level of functioning of the group home clients were evident during follow-up. Smith et al. conducted two experiments to assess acquisition and generalization of skills acquired in a workshop by trainees who were primary caregivers at group homes for developmentally disabled clients. The authors conducted two studies designed to examine the effects of a one-week workshop on behavioral techniques. Study 1 focused on whether participants in the workshop showed a higher level of mastery of behavioral techniques than a comparison group of personnel who worked in the same homes as the participants but who did not attend the workshops. Study 2 focused on whether the workshop was associated with improvement in clients functioning at home.

In study one, staff were divided into two groups: an experimental group that participated in a 1-week training workshop on using behavior modification with developmentally disabled clients, and a comparison group that received no training. The goal of the workshop was to enable staff trainees to become proficient at teaching new, adaptive behaviors to their developmentally disabled clients. Using shaping, chaining, and discrete trial teaching, the workshop emphasized breaking down the teaching process so that clients could achieve mastery of new behaviors (Smith et al., 1992).
The workshop was conducted in a format similar to behavioral skills training and it included instruction, role-plays, live demonstrations or modeling, and feedback. In both groups, all staff members were assessed at the beginning and end of the workshop on their knowledge of behavioral teaching approaches, as applied to developmentally delayed clients. The measures taken were one-to-one teachings, role-plays, and a paper-and pencil test. Following the workshop, the experimental group showed more proficiency than the comparison group at applying behavioral teaching approaches to one-to-one teaching and role-playing situations. However, the groups did not differ in theoretical knowledge, as measured by paper-and-pencil tests (Smith et al., 1992).

Study two addressed the question of whether the skills that the experimental group acquired from the workshop would have therapeutic effects on the clients with whom they worked. Behavioral observations were taken on group home clients before and after the workshop. Observers used an in vivo time-sampling procedure to score staff presence, staff interaction, client interaction with others, and self-stimulation. The results showed no evidence that the workshop had any effect on the functioning of the 53 developmentally disabled clients in the group homes, therefore gains from the workshop did not generalize to the home (Smith et al., 1992).

**Teacher Training.** Behavioral Skills Training may also be effective in training teachers to increase the accuracy and implementation of procedures. Sarokoff and Sturmey (2004) used a behavioral skills training package to train 3 teachers to correctly implement discrete-trial teaching. Three special education teachers and a 3-year-old child with autism participated. Each teacher taught the same child in the child’s home, keeping the environment consistent. The items were two-dimensional picture card, often known
as PECS, or three-dimensional objects. A multiple baseline across subjects was used in this study, and ten components during 10 discrete trials were measured as the dependent variable. During baseline the teacher was given a written list of definitions of the components of discrete-trial training, with no direct instruction. During instruction, the teacher was given a written copy of procedures and reviewed each component. Next, the teacher received a copy of a graph of her performance from baseline and a copy of the previous session’s data sheet. The experimenter gave feedback on the average baseline score and described her performance during the last session. This was where the basic steps of BST, instruction, model, rehearsal, and feedback were conducted. During post-training, the teacher received verbal instruction in the form of “Do discrete-trial teaching to the best of your ability.” The experimenter did not conduct any training during this condition, and the teacher’s performance was videotaped and scored later. Following training all teachers showed a large improvement in implementing discrete-trial training. According to the authors, BST was responsible for a large increase in all 3 teachers’ performance of discrete-trial teaching. This study contributed to the literature by addressing the efficacy of this staff-training package to teach highly specific skills (Sarokoff & Sturmey, 2004).

In another study conducted by Sarokoff and Sturmey (2008), the effects of the behavioral skills training on staff and student performance were assessed using a multiple baseline across participants design. The purpose of this study was to examine if skills learned during BST would generalize to novel students and skill programs, and whether corresponding changes in student correct responding occurred. The results of this intervention show that BST may result in generalization of staff performance to novel
students and novel teaching tasks. BST was also found to be highly effective, efficient, and acceptable by the participants.

Dib and Sturmey (2007) conducted a study in which they trained three teachers, who engaged in low rates of accurate discrete trial teaching, to conduct proper discrete trials with children who engage in high rates of stereotypy. Following baseline a 4-step intervention was implemented. Teachers were provided with a behavior checklist, immediate descriptive feedback, modeling of proper procedure by researcher, and continued modeling and feedback until checklist was implemented properly. Results show that as teacher implementation accuracy improved, student stereotypic behavior decreased. Results support the notion that improved teaching may minimize maladaptive behavior during instructional situation.

One consistency across BST protocols is that instructional components are primarily in service workshop delivery models; however, other instructional models may be found to be more effective at building fluid knowledge of the task analysis process. In addition, a more fluent understanding of the process may improve actual performance on other components of BST and in-situ assessments.

**In-situ assessments.** Skills that are acquired through simulation training have often been found to fail at generalizing to natural community environments, which has led to the argument for in-vivo instead of classroom-based instruction. As with in-vivo training, the effectiveness of simulation training in producing generalized responding might be affected by the extent to which variations among members of the stimulus class are represented in the training exemplars.
Behavioral skills training has been used with young children to teach safety and prevention techniques. Miltenberger et al. (2004) conducted a study on gun safety using BST. Assessments for this study took place either at school or at home, and training took place in a different room at school. For the assessment, the child was brought into a room that he/she had no previous experience with, and the researcher made up an excuse to leave him or her alone for a few minutes. The child was then videotaped while alone in the room to assess behavior around the planted gun prop. The target behaviors and scoring system were the same as in Himle, Miltenberger, Flessner and Gatheridge (2004) and included: 0-Touched the gun, 1-Did not touch the gun, 2-Did not touch the gun and left the room, 3-Did not touch the gun, left the room, and told the teacher or parent about the gun.

A multiple baseline across subjects was used to assess the effectiveness of BST and in-situ training as needed (Miltenberger et al., 2004). During baseline, no feedback was delivered following assessment. Following baseline, behavioral skills training was conducted, which included instruction, modeling, role-play, and feedback. Each child received two BST sessions followed by an assessment, and if the child did not score 3 on the assessment, two booster sessions were conducted. If the child was not successful after the two booster sessions, in-situ training was conducted. A score of 3 was obtained for three of the participants after BST, in-situ training was necessary for two, and one participant required an incentive program. The results also show that the amount of training necessary in the natural setting varies across individuals. Training is more likely to maintain if it has been individualized and exposures have been substantial. Research on firearm safety has demonstrated that the addition of an in-situ training component
increases the effectiveness and efficiency of BST (Miltenberger et al., 2004). Results of this study suggest that in-situ training is an effective method for teaching children who do not learn the skills in the initial training phase, thereby increasing the overall effectiveness of individual or group training.

Johnson et al. (2005) sought to determine whether BST with in-situ training was more effective than BST as evaluated in previous investigations, to examine the effectiveness of BST with in-situ training in teaching abduction-prevention skills to preschool children, and to evaluate the long-term maintenance of skills following training. In-situ assessments were conducted during baseline, training, and 2-week, 1-month, and 3-month follow-ups. A multiple baseline across subjects design was used.

During baseline no feedback on performance was provided. During BST an individual program consisting of instructions, modeling, rehearsal, praise, and corrective feedback was used to teach the skills to use when confronted with an abduction lure. Immediately following the BST session was an in-situ training. For the second session of BST, training began with in-situ training. Session 3 of BST began with a new confederate presenting the child with a third lure.

All of the children performed with correct safety responses during three consecutive in-situ assessments following training. Eight children required in-situ training sessions before their performance improved to criterion level. These results demonstrate that incorporating in-situ training into BST improved the acquisition and maintenance of abduction-prevention skills in preschoolers. This study provides support for incorporating in-situ training into BST as a procedure to increase both skill acquisition and long-term
maintenance. Results also suggest that in-situ training increases the effectiveness of individual BST when implemented early in training.

Fluency training allows for the repetition of information until verbal competency is acquired. The rapid repetition under almost identical conditions is the greatest advantage to role-play in BST. While role-play offers a person multiple opportunities to engage in the desired skills, fluency training offers a person multiple opportunities to engage in the verbal behavior surrounding a particular skill. Both concepts rely on repetition to increase accuracy over time. Thus far, research has not shown verbal knowledge of a particular skill set to affect performance on the implementation of that skill.

Research shows that although significant improvement in skills can be obtained in a workshop through role-play, rarely are those corresponding improvements seen at the same level in the natural environment (Smith et al., 1992). Behavioral Skills Training rectifies this issue by including in-situ assessments and training within the natural environment. It is unknown, however, what impact fluency with verbal descriptions of the skill sets may have on overt motor performance. Given prior research on the failure of transfer of verbal knowing to actual performance, one should not suggest that this is possible under all conditions. However, it is possible that performing at fluent levels verbally may facilitate performance at the level of motor behavior with those who have been trained in a behavioral chain, but who are implementing the chain at low levels of integrity. Additionally, an advantage of fluency is that fluent performers are less vulnerable to distractions and are less affected by issues with retention when performing stepwise skill sets (Binder, 1993). Unlike the typical lecture-type instruction in BST,
fluency training will require explicit attending to material/information before training occurs (modeling, role-play, and feedback).

Given the notion that typical instructional methods are weak but that the following components of behavioral skills training are so effective, fluency training could result in a change with experienced performers and/or accentuate other parts of BST.

The purpose of this study was to evaluate fluency training as the instructional component of behavioral skills training to see if fluent verbal behavior about a procedure translates into performance of the necessary skills. The purpose included assessing the effects of fluency training on both the outcomes of knowledge about discrete trial training and procedures implemented during daily teacher-student interactions.
Method

Participants and Setting

Four teachers who specialize in educating children with Autism served as participants. All participants were female and had received training in discrete trial implementation by the school in which this study was conducted. At the start of the current study, participants were each engaging in discrete trial training for a minimum of 2 hours each day. Each teacher had earned their Bachelor’s degree and teaching certificate, and 3 of 4 participants (Jenny, Angie, and Jackie) are currently engaged in continuing education programs. Participants were initially divided into 2 dyads with each dyad containing 2 teachers. Dyads were created in order to concurrently train 2 participants in each training phase; however, following training, each dyad was separated into concurrent multiple probes for analysis. All participants had prior exposure to training on behavior techniques, including discrete trial training. Training and assessments were conducted in classrooms at a small charter school in which the teachers worked. Classrooms contained moon-shaped tables and chairs used for table work, as well as computer stations and academic and play centers. Classrooms were large in size and contained fewer than 10 students each. Each classroom was equipped with one primary teacher and at least one teacher’s aid. Assessments were conducted each morning during the scheduled academic time.
Materials

The materials for this study include a manual on DTT, fluency note cards, a DTT task analysis, social validity questionnaires, a DTT PowerPoint, data sheets, and a video camera. The manual (Appendix A) was a 12-page word document that outlined components of discrete trial training. Fluency note cards (Appendix B) contained all pertinent information from the manual and PowerPoint and were printed on cardstock and then laminated for sturdiness and convenience. The 18-slide PowerPoint on DTT shown to participants during fluency training was created by the researcher and contained all-important information from the manual and fluency cards. The DTT task analysis (Appendix D) was used to create data sheets for recording responses. The social validity questionnaire (Appendix E) was created by the researcher and served to evaluate the participants’ satisfaction with the trainings provided. Responses were recorded using a video camera, data sheets (Appendix C), and pencils.

Design

A concurrent multiple-probe design across participants was utilized for this study. All participants received fluency training as the instructional component of Behavioral Skills Training. Phases included baseline, instruction/fluency training, post-fluency probes, behavioral skills training, behavior skills probes, and in-situ training.

Dependent Measures and Data Collection

Fluency assessments. During fluency assessments, participants were observed during vocal see/say performances of definitions for each step in the discrete trial chain. Responses per minute and number correct served as the dependent measures. Fluency was scored by recording the start and stop times of fluency assessments, and the number
of steps verbally stated correctly. The steps were not tested in order, rather, randomly presented in the stack of cards. The target aim was 11 cards per minute with a 100% correct criterion. This aim was determined by the average performance of two individuals who were considered fluent with the material. Participants were considered verbally fluent when they could state all 11 cards in one minute or less during three consecutive timings.

**Post fluency & BST probes.** During baseline and all probe phases (following the fluency training assessments), the primary dependent measure was percentage of steps in the discrete trial chain completed correctly (see behavioral chain in Appendix D). The programming used during the actual discrete trial teaching situations was based on receptive tasks that were part of the current programming for students within each participants' classroom. All probe sessions were videotaped for later coding and reliability data.

**Interobserver agreement.** IOA was computed by comparing the data from each observer on each step of the task analysis, and then computing overall percent correct from the total number of steps. For example, on any given step, agreement was denoted by either + (agree) or – (disagree). Agreement was then computed based on number of agreements (steps where both observers recorded + or -) divided by number of agreements plus disagreements and multiplied by 100. This calculation produced the percent scores listed above. The researcher and a research assistant observed 50% of sessions across all phases for each teacher via videotape. Inter-observer agreement averaged 93%, 92%, 90%, and 91% for Jackie, Jenny, Angie, and Tina, respectively.
Procedure

**Baseline.** As with Sarokoff and Sturmey (2008), each teacher was provided with brief instructions to “complete discrete trial training to the best of your ability.” Baseline sessions were conducted within the classroom with each teacher working one-on-one with a student. Performance was graphed and evaluated based on percent of steps performed correctly on the discrete trial task analysis.

**Fluency Training Protocol.** Fluency training consisted of the initial contact, direct instruction, and fluency timings.

*Initial contact.* Participants were provided with a manual on discrete trial training, which was reviewed and kept for reference between future observations. Participants then viewed a short presentation on discrete trials via PowerPoint presented by the author. The discrete trial protocol was broken into component steps and defined. Participants received their own prepared set of note cards with the necessary information for each category (Appendix B). The note cards contained the most crucial information from the PowerPoint and the manual provided to the teachers on the first day of fluency training. Note cards allowed for easy, quick, and efficient review of materials.

*Direct instruction.* During direct instruction, the researcher explained to all participants how fluency training works (accuracy and speed) and modeled for them the best way to utilize the note cards. Participants were told to study their note cards both during and outside of training in an untimed format where percent correct performance was the primary focus. When the participants reach 90% accuracy with the note cards in this format, fluency timings commenced (below).
**Fluency timings.** The participants were trained to verbally list the necessary components of discrete trials, as stated on their note cards, while requiring them to speed through the cards until the timing window ended. Fluency training typically allows for practice before timings to account for warm up time and to familiarize participants with the notion of “going fast.” Participants were provided time to warm up prior to training sessions, and participants were free to ask questions at any point during training. Mastery criterion for fluency training was to verbally state all material from the 11 note cards in less than one minute.

The aim range was determined by the rate and average time (respectively) of two fluent performers, whom were experts in DTT implementation with children. The ultimate goal was to have participants verbally fluent in discrete trial components, meaning that they were able to accurately list all steps in a discrete trial protocol within 1 min. The fluency training ended once participants completed two sessions at 100% accuracy within the goal time range.

**Post-fluency Probe.** Post-fluency probes served to evaluate the effects of fluency training on overt motor performance by the teachers. The teacher, student, and researchers sat at a table away from other adults and students as she conducted one program involving discrete trial training as the mode of teaching. Participants were told to complete discrete trials to the best of their ability (same instructions as in baseline). Participants attempted a discrete trial block one time per day for this study with no feedback. Performance was assessed based on the percent of steps correctly completed from the discrete trial task analysis. Both the primary investigator and research assistant later coded the videos for interobserver agreement.
Behavioral Skills Training: Modeling, role play & feedback. Participants received in-vivo modeling prior to each role-play attempt. The trainer showed participants how to accurately implement each step of the task analysis, while concentrating on those components that each participant had difficulty with. Role-plays consisted of the teacher completing all steps of the discrete trials with the trainer or fellow teacher acting as a child. Feedback was provided to the teacher by the trainer throughout the session both verbally and through re-modeling incorrect components. The trainer provided both praise and corrective feedback during and following each rehearsal attempt. Each role-play session was conducted until mastery (defined as 90% of the steps completely correctly) was met in a role-play. The modeling and role-play plus feedback condition continued until each participant performed two discrete trial attempts at 100% consecutively.

Post BST probes. Probes, similar to observation and measurement in baseline and post-fluency conditions, were conducted following the behavioral skills training session. Each observation (probe) was conducted during naturalistic implementation of DTT programming at various times during the normal school day in each of the teachers’ classrooms. The programs and targets trained for each student differed depending on the individualized curriculum for each. Teachers were asked to complete discrete trial training to the best of their ability, and no further instructions or feedback were provided. Mastery criterion for post BST probes was considered to be three consecutive sessions at 90% or above.

In-situ training. If teachers did not meet mastery criterion during post BST probes, in-situ training was conducted. The researcher provided a brief instruction to
complete the discrete trials at the beginning of the session. Teachers then conducted
discrete trials as they were trained, and performance was evaluated on percentage of
correct steps. The researcher provided feedback immediately following in-situ
assessments for any errors in discrete trial training; the teacher was instructed to practice
correctly implementing any missed step. Once teachers were correctly implementing
previously missed steps during the practice, an in-situ probe was immediately conducted.
Teachers were again asked to conduct DTT to the best of their ability, and performance
was evaluated on percentage of correct steps.

Social Validity and Client Satisfaction

A final satisfaction questionnaire (Appendix E) was provided at the completion of
the study to determine if the teachers felt the training was valuable.
Results

Participant 1 (Jenny)

Baseline. (Figure 1) Jenny implemented discrete trials with an average of 38% accuracy during baseline probes. Probe data show an overall flat trend and were somewhat variable throughout baseline.

Fluency assessment performance. Jenny was among the second dyad to receive fluency training. Jenny remained in fluency training for one month and completed 21 timings until reaching mastery criterion.

Post fluency probes. (Figure 1) Jenny implemented discrete trials with an average of 52% accuracy during post fluency probes, which is a slight increase from baseline levels. Probes following fluency training had a flat trend and little variability.

Behavioral skills training. Jenny was among the second dyad to receive behavioral skills training. Jenny and Tina received behavioral skills training together, and each participant was able to play the part of the teacher as well as the child. Jenny participated in BST for one 2-hour session after school. Performance criterion for mastery was two consecutive role-plays at 100% correct implementation. Jenny performed 5 role-plays, in which corrective feedback was delivered, prior to reaching mastery criterion.

Post BST probes. (Figure 1) Jenny implemented discrete trials with an average of 69% accuracy following behavioral skills training. Level improved substantially compared to that of post fluency probes, and even more so compared to
baseline. Post BST probes have a fairly flat trend with little variability around level and trend.

**In-situ probes. (Figure 1)** Jenny implemented discrete trials with 90% accuracy following in-situ training. Level increased substantially from that of previous phases and Jenny achieved mastery for two consecutive sessions during in-situ training.

**Pencil and paper scores. (Figure 3)** Prior to fluency training, participants were given a pretest on important components of discrete trials, in which Jenny scored 44%. Following in-situ training, participants were given the exact same test again and Jenny scored 68%. Following the training provided in this study, Jenny’s test score improved by 55%.

**Participant 2 (Jackie)**

**Baseline. (Figure 1)** Jackie implemented discrete trials with an average of 33% accuracy during baseline probes. Probes had a slight downward trend and were somewhat variable throughout baseline.

**Fluency assessment performance.** Jackie was among the first dyad to receive fluency training. Jackie remained in fluency training for three weeks and completed 11 timings until reaching mastery criterion.

**Post fluency probes. (Figure 1)** Jackie performed discrete trials with an average of 46% accuracy during post fluency probes. Although still not performing with great accuracy, post fluency probes did increase slightly in level compared to those in baseline.

**Behavioral skills training.** Jackie was among the first dyad to receive behavioral skills training. Jackie participated in BST for one 2-hour session after school.
Performance criterion for mastery was two consecutive role-plays at 100% correct implementation. Jackie performed 8 role-plays, in which corrective feedback was delivered, prior to reaching mastery criterion.

Post BST probes. (Figure 1) Jackie implemented discrete trials with an average of 79% accuracy following behavioral skills training. Level of implementation improved substantially compared to post fluency and baseline probes. Post BST probes show a slight increase and then subsequent decrease following training. Due to this participant’s number of absences from work, we were not able to conduct in-situ training.

Paper and pencil scores. (Figure 3) Due to Jackie’s absences from work during the end of this study, we were not able to conduct in-situ training or acquire a posttest score.
Figure 1: The figure above represents percent of discrete trial components implemented accurately for one participant from each dyad.
Participant 3 (Tina)

**Baseline. (Figure 2)** Tina implemented discrete trials with an average of 56% accuracy during baseline probes. Probes had an overall flat trend and were quite variable throughout baseline.

**Fluency assessment performance.** Tina was among the second dyad to receive fluency training. Tina remained in fluency training for 3 weeks and completed 15 timings until reaching mastery criterion.

**Post fluency probes. (Figure 2)** Tina performed discrete trials with an average of 68% accuracy during post fluency probes. Probes following fluency training had a slight upward trend with little variability around level and trend.

**Behavioral skills training.** Tina was among the second dyad to receive behavioral skills training. Tina participated in BST for one 2-hour session after school. Performance criterion for mastery was two consecutive role-plays at 100% correct implementation. Tina performed 5 role-plays, in which corrective feedback was delivered, prior to reaching mastery criterion.

**Post BST probes. (Figure 2)** Tina implemented discrete trials with an average of 91% accuracy during the post BST probes. Level increased substantially from that of post fluency probes; however, there was a downward trend in the data and an increase in variability around level and trend. Although Tina averaged 91% accuracy, she did not demonstrate mastery levels for 3 consecutive sessions, so in-situ training was necessary.

**In-situ probes. (Figure 2)** Tina performed discrete trials with 98% accuracy following in-situ training. Level increased slightly from that of post BST probes, but
significantly from baseline and post fluency levels. Tina reached mastery criterion within two in-situ assessments.

**Paper and pencil scores.** (Figure 3) Prior to fluency training Tina scored 36% on the discrete trial pretest. Following in-situ training, Tina scored 64% on the same test. Tina’s test score improved by 78%.

**Participant 4 (Angie)**

**Baseline.** (Figure 2) Angie implemented discrete trials with an average of 50% accuracy during baseline probes. Probes had a slight downward trend and were somewhat variable throughout baseline.

**Fluency assessment performance.** Angie was among the first dyad to receive fluency training. Angie remained in fluency training for 3 weeks and completed 16 timings until reaching mastery criterion.

**Post fluency probes.** (Figure 2) Angie performed discrete trials with 76% accuracy following fluency training. Probes had an immediate upward trend followed by a subsequent downward trend. Level and variability about level and trend increased significantly from that of baseline.

**Behavioral skills training.** Angie was among the first dyad to receive behavioral skills training. Angie participated in BST for one 2-hour session after school. Performance criterion for mastery was two consecutive role-plays at 100% correct implementation. Angie performed 8 role-plays, in which corrective feedback was delivered, prior to reaching mastery criterion.

**Post BST probes.** (Figure 2) Angie implemented discrete trials with an average of 88% accuracy during post BST probes. Probes following behavioral skills
training were somewhat bimodal in that the trend was high variable. Level increased compared to the level at baseline or post fluency probes.

**In-situ probes. (Figure 2)** Angie performed discrete trials with 95% accuracy following in-situ training. Level increased slightly from that of post BST probes, but substantially from levels at baseline and post fluency probes. Angie reached mastery criterion within two in-situ assessments.

**Paper and pencil scores. (Figure 3)** Prior to fluency training Angie scored 48% on the discrete trial pretest. Following in-situ training Angie scored 72% on the exact same test. Angie’s score improved 50% from pretest to posttest.
Figure 2: The figure above represents percent of discrete trial components implemented accurately for one participant from each dyad.
Social Validity & Client Satisfactions

Participants were provided with a satisfaction questionnaire at the conclusion of the study (Appendix E). The survey consisted of a Likert-type scale, which ranged from 0% to 100%.

![Graphs showing pre-test and post-test pencil and paper scores for Tina, Jenny, Angie, and Jackie.](image)

Figure 3: The graphs above display the pre-test and post-test pencil and paper scores.
When asked if the training was helpful, all four teachers reported a 5 indicating that it was very helpful. Teachers also indicated that they feel more confident in conducting discrete trials and that they feel the training will benefit the students that they work with by indicating a 5 for these questions as well. When asked if they would like to participate in research again, two of the participants responded that they would very much like to participate while the remaining two participants would “somewhat” like to participate in future research. Teachers found behavioral skills training to be the most beneficial part of the study. Teachers reported that they felt more confident in their abilities to teach their students following the completion of this study. The training provided throughout this study was preferred over previous training methods by 100% of participants.
Discussion

Fluency training resulted in an increased knowledge about discrete trial training; however, actual implementation of discrete trials did not improve immediately following fluency training. All participants were able to fluently discuss the components and subsequent order of discrete trials during behavioral skills training. A slight increase followed by a later decrease was seen in most participants following fluency training. The data represented in the graphs above (figure 1 & figure 2) with the exception of in-situ training are probe data, thus no intervention is in place during these assessments. The upward and subsequent downward trends seen in post-fluency probes are interesting findings given that no intervention or contingencies are in place. Behavioral skills training further improved the participants’ implementation of discrete trials, however, in-situ training was necessary to achieve mastery at 90% accuracy of 4 participants. I hypothesize that Jackie would have also reached mastery criterion had in-situ training occurred.

Behavioral skills training and in-situ training were necessary to improve participants’ “know how” of discrete trial implementation. The classic argument of know about versus know how is at question here. One would hypothesize that if participants were fluent in information about discrete trial procedure, then participants would know how to produce more accurate implementation of such trials. The current study provides support for the argument that knowing about does not generalize to knowing how. No substantial improvement was seen in performance once participants were 100% verbally
fluent in the material. An important lack of verbal and nonverbal correspondence is shown in this study. Fluency training alone did not lead to an increased ability to perform. In addition, no improvements were seen in verbal fluency once participants’ performance had increased to mastery criterion.

Teacher preparation of materials and setting improved substantially following fluency training. Teachers did a better job of preparing reinforcers and task materials, as well as clearing the work area of extraneous material. Although the more complex procedure implementations did not improve, the more simple environmental aspects did improve following fluency training alone.

Participants reached mastery in behavioral skills training role-play sessions quickly. Each dyad was only exposed to one session of BST in which modeling, role-plays, and feedback occurred. Each participant involved in this study received behavioral skills training for only one afternoon, a total of two hours. Because participants were verbally fluent with knowledge about discrete trials, the instructional component of BST was virtually nonexistent, which left the majority of the session for role-plays and feedback.

Participants’ paper and pencil test scores improved substantially between the pre-tests and post-tests. All participants were consistent in the questions missed across tests. Participants increased their knowledge about discrete trial training, as seen in their pre-test and post-test scores (figure 3), as well as their knowing how to implement discrete trials, (figure 1 and figure 2). The components in which participants improved on in the pencil and paper tests were not consistent with those components that they improved on during the actual implementation of discrete trials. Because those areas of improvement
were not the same on the verbal and motor level, we can conclude that knowing about a particular procedure does not improve knowing how to implement the procedure correctly.

**Limitations & Future Directions**

There were several limitations to this study that should be addressed in future research. The teachers who participated in this study were frequently absent throughout data collection. Each participant was absent from work 5-10 times throughout the study, in addition to occasional unavailability due to parent-teacher conferences and faculty meetings. Due to participant absences, in-situ training was not possible with one out of the four participants. Incentives were not provided to participants for completion of fluency training thus a lack of motivation might have been a factor in the length required to complete fluency practice/probes. Future studies could look at putting contingencies in place for completing fluency training in a fast and efficient manner.

Problem behaviors during discrete trials were not assessed nor were reactive strategies to such behaviors trained during fluency training or behavioral skills training. Maladaptive behaviors can present significant difficulties when implementing discrete trials and treatment integrity may decrease due to these difficulties. Future studies should address these problem behaviors and prepare teachers with antecedent and reactive strategies for such behaviors.

Modeling was conducted in vivo rather than via video. The decision to conduct in vivo modeling was made due to participants’ requests for “hands on” training. Live modeling always brings the possibility of inconsistencies within the trainer; however, the components of discrete trials are specific and consistent across settings and populations
so the likelihood of trainer inconsistency in this study is thought to be of small probability.

All participants involved in this study received the same order of interventions. Future studies should look at alternating the implementation of treatments between participants to control for possible sequencing effects. Behavioral skills training occurred during one session. Participants reached mastery in BST during a single session. Future research should consider the effects of a greater number of BST training sessions on performance. Future studies should also look at under what conditions fluency plus BST could be more or less beneficial than BST alone.

The current study sets the occasion for future studies to compare traditional behavioral skills training to BST with additional components. Behavioral skills training has been shown in the literature to be a highly effective training method for various skill sets and populations. Future studies should look at condensing the training time with incentives and creating a shorter and more efficient training model. Future studies should also look at training models for discrete trials of varying complexity.
References


Appendices
Appendix A: Training Manual

Training Manual

Ashley Breeden
Thesis Advisor: Tim Weil, PhD, BCBA
University of South Florida

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**Discrete Trials Instruction**

Discrete trials refer to the systematic and repeated introduction of stimuli that provide an opportunity for the behavior of the child to be reinforced. The tutor presents an instruction and dependent upon the child’s response, provides a consequence. Therefore, if the child responds correctly, the tutor presents a preferred item (to hopefully serve as a reinforcer) and if the child responds incorrectly, the tutor may simply withdraw her attention (extinction) for a short period of time. Often times the child requires corrective assistance; and in these cases the tutor presents a prompt following the instruction to increase the probability the child will respond correctly.

For example, when teaching a child to identify different body parts the tutor says, “Touch nose.” If the child responds correctly, the tutor would deliver a stimulus that he/she identified as preferred from the preference assessment. If, however, the child does not touch his/her nose or, perhaps, touches his/her ears, then you may prompt the correct response and then reinforce it with a preferred stimulus.

**Components of a Discrete Trial**

**Setting** - the immediate environment.

1. **Stimuli should be ready:** All task materials; data collection materials, etc. should be within tutor reach for every trial.

2. **Preference Assessment (PA):** PAs should be conducted according the child specific protocol.

3. **Refusal sensitivity:** If the child refuses a reinforcer on a trial, the tutor should conduct an unscheduled PA before the next trial.

4. **Reinforcers ready:** Reinforcers should be in bite size (smaller than a dime) pieces (if it is food), in the tutor’s hand or on the table for quick delivery.

5. **No danglers:** The reinforcer is not presented to the child BEFORE the child makes a response, only AFTER the child makes a correct response (e.g., Incorrect: “OK, we’re working for the lollipop” or “If you want the lollipop you need to work now”)

6. **Distractors removed:** The table or floor is clear from extra and unnecessary materials, foods, etc. Only the items being used for the program at hand are available.

**Antecedent** - The antecedent (once learned by the child is called the discriminative stimulus -- or SD-- because it signals that reinforcement is available to the child if he/she responds correctly) is a command or a question (e.g., “Do this,” “Clap,” “What’s your name?”).
1. **Nonvocal prompts** (eye blocking, head tilting) are used in conjunction with (variable) **vocal prompts** (“Look”, “child’s name,” etc.) to gain attention.

2. Clear and discriminable (distinct beginning and a distinct end, in the form of a command, not a question - unless it is supposed to be a question)

3. Delivered when the child is attending (eye contact with tutor or materials)

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**Why is Attending Important?**

- When you deliver a reinforcer following a child’s response you strengthen the relationship between the child’s response and the antecedent
- In many cases the antecedent serves as a reinforcer for a response because the antecedent has been paired with a positive reinforcer in the past
- If a child is looking away when you give the antecedent and you reinforce the response, both the correct response and the child’s behavior of looking away are strengthened

**Things to avoid**

- Do not overuse the child’s name to gain attention
- Do not gain eye contact by orienting yourself where the child is looking - we want to reinforce the child's orienting towards the tutor

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**Response** - The child’s response to an antecedent may take one of several forms, including:

1. **Correct response:** Use consistent criteria to determine what is considered correct - - use operational definitions
2. **Incorrect response:** The child touches the wrong item, says the wrong thing, etc.
3. **No response:** This is considered an incorrect response
4. **Interferring response:** Stereotypical behavior or other responses that have little or nothing to do with responding correctly or appropriately to an instruction.
Consequence - Deliver a preferred item (indicated by the preference assessment) following a correct response. Use vocal (“e.g., “Try again”) or nonvocal (e.g., turn your head away) feedback depending on the child and the response. Avoid satiation by using smaller amounts of reinforcers and a large variety of reinforcers.

Reinforcers are:

1. **Delivered immediately**: (ordinarily) within 1 sec. of the response
2. **Contingent on the response**: correct responses are reinforced, incorrect responses are ignored or corrected.
3. **Unambiguous/natural**: smiles are paired with correct responses, not incorrect.
4. **Reinforcement schedule**: reinforcers are delivered on specific reinforcement schedule as indicated by the protocol
5. **Consumption**: If it’s food, it’s smaller than the size of a dime. Access to tangibles or activities do not exceed 5 seconds or the natural end of the activity.
6. **Secondary reinforcement**: Tangibles are paired with social praise
7. **Social praise** is varied (socials come in different forms - - “Way to go!” “Super”)
8. **Differential Reinforcement of Alternative Behavior**: The use of DRA may be necessary (e.g., child looks away while responding correctly to the antecedent and given some praise. When the child attends *and* responds to the antecedent correctly, food *and* praise are delivered).

**Inter-Trial Interval (ITI)** - The timing begins once the delivery of the reinforcer ends (if using an item that is not removed such as bubbles or pieces of food), or once the tangible is delivered (if using a food item that the child doesn’t control such as a juice box). The timing ends once the preparation for the next trial begins (e.g., establishing attention, arranging stimuli, or reinforcer assessment)

1. The duration of the ITI is 3-5 seconds (unless it requires additional time for the child to consume the food) or variable seconds when providing tangible reinforcers/activities
2. The child consumes the food (if applicable) during this time - - therefore, the trial doesn’t begin until the child is done chewing/swallowing.
Components of a Discrete Trial in Time

Prompts are extra stimuli that are used so that a behavior may occur and thus be reinforced. Once the behavior has been reinforced, less intrusive prompts are used until the prompts are no longer necessary (prompt fading). The following sections briefly describe different prompting formats that you will be using when working with your children.

**Least-To-Most (LTM)**

Least-to-Most is used to teach children skills by relying on a hierarchy of increasing assistance. The child is consistently provided with opportunities to respond independently. Therefore, this procedure inherently provides probes to determine the degree to which the child is capable of responding independently. That is, without the tutor’s assistance.

Prompts are provided in the event that the child is unable to independently perform a given behavior. Furthermore, if a prompt was unsuccessful in assisting the child, then a more intrusive prompt is provided until the child is successful. You will typically find least-to-most prompting procedures being used with maintenance items. The rationale is that the response has already been “learned” according to our criterion; thus, we are going to give the child every opportunity to perform it independently. Least-to-most prompting may also be used as a means of assessing what prompt strength is necessary. Instead of immediately providing a level where the child has previously been successful the tutor provides the antecedent alone and gradually provides increasingly intrusive prompts until the child provides the correct response.
**Most-to-Least Teaching (MTL)**

Often times, children with autism are too sensitive to making errors and, although the error is not explicitly reinforced, these children are likely to make the same error in the future. Additionally, some children become very upset when they make an error and the session becomes more focused on shaping behavior as opposed to teaching a concept. For example, a child may become frustrated following an error and engage in inappropriate behaviors (e.g., crying, hitting, leaving the work setting, etc.). The tutor may attempt to continue the task, but find it difficult to both teach the task and manage the child’s behavior.

When this is the case, Most-to-Least (MTL) teaching can be used to minimize errors, keep reinforcement levels high, and essentially, decrease the child’s frustration. Prompts are provided before the child is allowed to make an independent, and possibly incorrect, response (Maurice, Green, & Luce, 1996). The concept of MTL is nearly the reverse of LTM. The tutor presents an instruction (the antecedent) and immediately provides the child with a prompt. The prompt is child and task specific and therefore differs between children and programs. Essentially, the child is provided this level of prompting for a predetermined amount of time (until the child meets the criterion). Following this time, the prompt level is reduced in intrusiveness and the child is again presented with the instruction paired with a prompt until the criterion is met. Eventually, only the instruction is presented. Often times, a criterion is established either so if the child makes a few errors, the prompt level is increased to the previous level for that session only or until criterion is again met at that prompt level.

For example, a child learning to identify a ball is first given the instruction; “Touch ball” as the tutor takes the child’s hands, places them on the ball, and then reinforces the response. After let’s say, two 10-trial sessions of the child correctly touching the ball 80% of the time, the tutor then decreases the intrusiveness of the prompt to a partial physical (guiding the child’s hands only part of the way). Again, the instruction and prompt are presented and once criterion is met at this level, an even less intrusive prompt is presented until eventually the child responds correctly and independently.
Programmed. Programmed prompt fading essentially means that each step in the prompt hierarchy is to meet some predefined mastery criteria before moving on to the next step. Below are some common examples of prompts used to teach various behaviors.

- **Full physical**: assisting the child with physical guidance (i.e., hand-over-hand - - the teacher takes the child’s hand and forms the sign, “drink” and places the child’s hand on his/her mouth) so the behavior is completely dependent on the teacher

- **Partial physical**: physical guidance which requires the child to perform at least some aspect of the behavior independently (i.e., slight taps to the hand or arm - - the teacher takes the child’s hand and gently helps him form the sign for “drink” and then taps his/her hand in the direction of his/her mouth so he/she finishes the sign)

- **Full model**: demonstrating to the child the exact desired behavior (e.g., the teacher first signs, “drink”)

- **Partial model**: demonstrating a sample of the desired behavior (e.g., the teacher signs the “C” and brings it only partially up to her mouth)

- **Full verbal model**: demonstrating the vocal behavior in full (e.g., the teacher says, “What’s this? Say, ‘Ball’”)

- **Partial verbal model**: demonstrating the vocal behavior in part (e.g., the teacher says, “What’s this? Say, ‘B…”’)

- **Gestures**: assisting the child with non-verbal cues (e.g., leaning towards the correct behavior, eye movements, pointing, head nods, facial expressions, etc.)

- **Time delay**: systematically increasing the time between the SD (and the antecedent if applicable) and a prompt (e.g., the teacher says, “Touch nose,” waits 1 second and then provides a model). Once the child performs the behavior with a one-second-time delay it is systematically increased by one second for subsequent trials (up to 5 seconds).
Examples of Prompt Hierarchies

<table>
<thead>
<tr>
<th>LTM</th>
<th>MTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal</td>
<td>Full Physical</td>
</tr>
<tr>
<td>Gestural</td>
<td>Partial Physical</td>
</tr>
<tr>
<td>Model</td>
<td>Model</td>
</tr>
<tr>
<td>Partial Physical</td>
<td>Gestural</td>
</tr>
<tr>
<td>Full Physical</td>
<td>Verbal</td>
</tr>
</tbody>
</table>

Notice these hierarchies are the opposite in order. This is to illustrate LTM uses a minimal amount of intrusiveness and increases the intrusiveness as the child errs, giving the child an opportunity to perform independently each trial, while MTL begins with an intrusive prompt and fades to independent as the child is successful, not allowing independence until criterion is met with previous prompts. Remember, the criterion to move up or down through a hierarchy with both LTM and MTL varies per child and program.

1. Mass Trial
   - 10 trials for each session until the criterion is met
   - No distracter is present (e.g., “Touch nose” only)
   - Use the most-to-least prompt hierarchy (see below)
- Mass trialing refers to presenting the new item in the absence of other items
- Continuously prompt the acquisition item (do not allow the child to respond incorrectly)
- Present the same antecedent 10 times before ending the trial block
- Indicate +p for correct responses that are prompted, -p for incorrect responses that are prompted, + for correct responses that are independent and – for incorrect responses that are independent
- **Probe prompt fading**: run a trial where you use a less intrusive prompt- if the child emits a correct response, than run trials at that prompt level- if the child emits an incorrect response, than return to the more intrusive prompt
- **Probe independence**: run a trial where you deliver the antecedent and wait for the child to respond without providing a prompt- if the child responds correctly, then run unprompted trials- if the child responds incorrectly, then end the trial and re-present the antecedent with the least intrusive prompt possible

*Mass Trial example:* 1 item, the tutor asks for this item to be identified by the child (“Touch ice cream”) and the tutor rotates the position this item (all around the table) between each trial. Data collection is on the level of prompting (e.g., full model, partial model, gesture, delay, independent) the child needs to perform the response correctly.

2. **Single Presentation**
   - Use a least-to-most prompt hierarchy
   - 10 trials each session until the criterion is met then probe
   - Probe means after holding for one day, run only 3 trials (must have 100% to move to next stage, else return to beginning of current stage)
• Fade in a distracter (previously mastered stimulus; e.g., ball) by placing the distracter away from the child by 15 inches (the acquisition stimulus remains in front of the child; e.g., cup) and moving the distracter closer to the acquisition stimulus by ½ inch every trial.

• Rotate the position of the stimuli (left or right) during and after the fade in

• Only ask for the acquisition stimulus (not the distracter; e.g., only ask for cup although ball is present on table)

• Once the items are parallel to each other, then responses can be recorded as independent (i.e., + or -).

• Indicate +p for correct responses that are prompted, -p for incorrect responses that are prompted, + for correct responses that are independent and – for incorrect responses that are independent

\[
\text{Single Presentation example: 2 items, the tutor asks for only one (e.g., the ice cream: the item taught in the previous stage) to be identified by the child (e.g., “Touch ice cream”) and the tutor rotates the position of both items (left, right, front, back, etc.) between each trial. Data collection is on the acquisition item (e.g., ice cream) only. The response can only be independent after both items are equidistant from the child (i.e., the distractor - -the car - - is faded in all the way).}
\]

3. Random Rotation

• Use a least-to-most prompt hierarchy

• One distractor present

• 10 trials each session until the criterion is met then probe

• Rotate the antecedent (so ask for the acquisition stimulus and the distracter that is previously mastered; e.g., “Touch nose” and “Touch head” are randomized)

• Rotate the position of the stimuli (left or right)
• Indicate +p for correct responses that are prompted, -p for incorrect responses that are prompted, + for correct responses that are independent and – for incorrect responses that are independent

Random Rotation example: 2 items, the tutor asks for both items (e.g., “Touch ice cream” and “Touch car”) to be identified by the child and the tutor rotates the position of both items (left, right, front, back, etc.) between each trial. Data collection is on the acquisition item (e.g., ice cream) only.

4. Extended Trial

• Use a least-to-most prompt hierarchy
• For 10 trials (data on all trials) each session until the criterion is met then probe
• Rotate the S° (including 2 or more distracters; e.g., “Touch nose,” “Touch head,” and “Touch feet” are randomized)
• Rotate the position of the stimuli (left or right)
• Indicate +p for correct responses that are prompted, -p for incorrect responses that are prompted, + for correct responses that are independent and – for incorrect responses that are independent

Extended Trial example: 3 items, the tutor asks for all three to be identified by the child (e.g., “Touch car,” “Touch spoon,” and “Touch ice cream”) and the tutor rotates the position of all three items (left, right, middle, front, back, etc.) between each trial. Data collection may be on one, two or all three of the items.
5. Maintenance

- Use a least-to-most prompt hierarchy
- Run maintenance daily
- Embed maintenance trials into acquisition trials to increase child’s reinforcement
- Conduct in a variety of environments with a variety of materials to program for generalization

Keep data to determine if a program has fallen under 80% (if so, inform the Case Manager so it can be returned to acquisition)

*Maintenance example: 3 or more items, the tutor asks for all items to be identified by the child (e.g., “Touch car,” “Touch spoon,” “Touch ice cream,” etc.) and the tutor rotates the position of all three items (left, right, middle, front, back, etc.) between each trial. Data collection is usually on all of the items.*

(1) Most intrusive prompt necessary for that child for that program faded to least intrusive prompt level.

(a) Child may begin at a simplified level of the stimulus array (e.g., 1 item presented like in Mass Trials) or at a more complicated level (e.g., 3 items presented like in Extended Trials). Typically, a more complicated array is presented since the prompt level is so intrusive.

(b) The prompt level is determined via child-specific programming (e.g., some children may need to begin with a full physical and others with a full model).
The criterion is established via child-specific programming (e.g., some children may need 3 consecutive sessions at one prompt level before fading to the next while others only need one trial at a prompt level before fading to the next).

The criterion to pass to the next prompt step (e.g., from full model to partial model), the criterion to mastery (e.g., the number of sessions at independent and at what percentage correct), and the correction procedure (i.e., what to do when the response is incorrect) is indicated in the MTL protocol.
Appendix B: Fluency Training Note Cards

Card #1: Setting

- **Stimuli should be ready**: All task materials; data collection materials, etc. should be within tutor reach for every trial.
- **Preference Assessment (PA)**: PA’s should be conducted according the child specific protocol.
- **Reinforcers ready**: Reinforcers should be in bite size (smaller than a dime) pieces (if it is food), in the tutor’s hand or on the table for quick delivery.
- **Distractors removed**: The table or floor is clear from extra and unnecessary materials, foods, etc. Only the items being used for the program at hand are available.

Card #2: Antecedent

- **Nonvocal prompts** (eye blocking, head tilting) are used in conjunction with (variable) **vocal prompts** (“Look”, “child’s name,” etc.) to gain attention.
  - Do not overuse the child’s name to gain attention
- **Clear and discriminable** (distinct beginning and a distinct end, in the form of a command, not a question - unless it is supposed to be a question)
- Delivered when the child is attending (eye contact with tutor or materials)
- Do not gain eye contact by orienting yourself where the child is looking - we want to reinforce the child’s orienting towards the tutor.

Card #3: Response

- **Correct response**: Use consistent criteria to determine what is considered correct - use operational definitions)
- **Incorrect response**: The child touches the wrong item, says the wrong thing, etc.
- **No response**: This is considered an incorrect response
- **Interferring response**: Stereotypical behavior or other responses that have little or nothing to do with responding correctly or appropriately to an instruction.
Card #4: **Consequence**

Reinforcers are:

- **Delivered immediately:** (ordinarily) within 1 sec. of the response
- **Contingent on the response:** correct responses are reinforced, incorrect responses are ignored or corrected.
- **Unambiguous/natural:** smiles are paired with correct responses, not incorrect.
- **Reinforcement schedule:** reinforcers are delivered on specific reinforcement schedule as indicated by the protocol
- **Consumption:** If it’s food, it’s smaller than the size of a dime. Access to tangibles or activities do not exceed 5 seconds or the natural end of the activity.
- **Secondary reinforcement:** Tangibles are paired with social praise
- **Social praise** is varied (socials come in different forms - - “Way to go!” “Super”)
- **Differential Reinforcement of Alternative Behavior:** The use of DRA may be necessary (e.g., child looks away while responding correctly to the antecedent and given some praise. When the child attends and responds to the antecedent correctly, food and praise are delivered).

Card #5: **Inter-Trial Interval (ITI)**

- The duration of the ITI is 3-5 seconds (unless it requires additional time for the child to consume the food) or variable seconds when providing tangible reinforcers/activities
- The child consumes the food (if applicable) during this time - - therefore, the trial doesn’t begin until the child is done chewing/swallowing.

Card #6: **Most-to-Least Teaching (MTL)**

- Full Physical
- Partial Physical
- Model
- Gestural
- Verbal
Card #7: Mass Trial

- 10 trials for each session until the criterion is met
- No distracter is present
- Use the least-to-most prompt hierarchy

Card #8: Least-to-Most Teaching (LTM)

- Verbal
- Gestural
- Model
- Partial Physical
- Full Physical

Card #9: Single Presentation

- Use a least-to-most prompt hierarchy
- 10 trials each session until the criterion is met then probe
- Probe means after holding for one day, run only 3 trials (must have 100% to move to next stage, else return to beginning of current stage)
- Fade in a distracter (previously mastered stimulus; e.g., ball) by placing the distracter away from the child by 15 inches (the acquisition stimulus remains in front of the child; e.g., cup) and moving the distracter closer to the acquisition stimulus by 1/2 inch every trial.
- Rotate the position of the stimuli (left or right) during and after the fade in
- Only ask for the acquisition stimulus (not the distracter; e.g., only ask for cup although ball is present on table)
- Once the items are parallel to each other, then responses can be recorded as independent (i.e., + or).
- Indicate +p for correct responses that are prompted, -p for incorrect responses that are prompted, + for correct responses that are independent and – for incorrect responses that are independent.

Card #10: Random Rotation

- Use a least-to-most prompt hierarchy
- One distractor present
- 10 trials each session until the criterion is met then probe
- Rotate the antecedent (so ask for the acquisition stimulus and the distracter that is previously mastered; e.g., “Touch nose” and “Touch head” are randomized)
- Rotate the position of the stimuli (left or right)
Card #11: **Extended Trial**

- Use a least-to-most prompt hierarchy
- For 10 trials (data on all trials) each session until the criterion is met then probe
- Rotate the $S^D$ (including 2 or more distracters; e.g., “Touch nose,” “Touch head,” and “Touch feet” are randomized)
- Rotate the position of the stimuli (left or right)
- Indicate $+p$ for correct responses that are prompted, $-p$ for incorrect responses that are prompted, $+$ for correct responses that are independent and $-$ for incorrect responses that are independent
Appendix C: Data Form

Discrete Trial Data Sheet

Participant: ________________________
Session: ________________________
Date: ________________________

<table>
<thead>
<tr>
<th>TRIAL NUMBER</th>
<th>Mass Trials</th>
<th>Single Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Appropriate IRT</td>
<td>Appropriate IRT</td>
</tr>
<tr>
<td></td>
<td>No distractors</td>
<td>Lc-Pr-Pc-Pr</td>
</tr>
<tr>
<td></td>
<td>No dangers</td>
<td>No dangers</td>
</tr>
<tr>
<td></td>
<td>Child Attending</td>
<td>Proper</td>
</tr>
<tr>
<td></td>
<td>Arrangement</td>
<td>Reinforcement</td>
</tr>
<tr>
<td></td>
<td>Appropriate Stimuli</td>
<td>Stimuli Rotated</td>
</tr>
<tr>
<td></td>
<td>Rotated</td>
<td>No dangers</td>
</tr>
<tr>
<td></td>
<td>No dangers</td>
<td>Sl Rotated</td>
</tr>
<tr>
<td></td>
<td>Lc-Pr-Pc-Pr</td>
<td>Prompt fading</td>
</tr>
<tr>
<td></td>
<td>Immediate</td>
<td>Most-least prompting</td>
</tr>
<tr>
<td></td>
<td>Acq. Data recorded</td>
<td>Appropriate</td>
</tr>
<tr>
<td></td>
<td>Prompt fading</td>
<td>Data Recorded</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRIAL NUMBER</th>
<th>Random Rotation</th>
<th>Extended Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lc-Pr-Pc-Pr</td>
<td>Lc-Pr-Pc-Pr</td>
</tr>
<tr>
<td></td>
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<td>Appropriate</td>
</tr>
<tr>
<td></td>
<td>IRT</td>
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<tr>
<td></td>
<td>No distractors</td>
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</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>Reinforcement</td>
<td>Reinforcement</td>
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<tr>
<td></td>
<td>Stimuli Rotated</td>
<td>Stimuli Rotated</td>
</tr>
<tr>
<td></td>
<td>No dangers</td>
<td>No dangers</td>
</tr>
<tr>
<td></td>
<td>Sl Rotated</td>
<td>Sl Rotated</td>
</tr>
<tr>
<td></td>
<td>Prompt fading</td>
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<td>Acq. Data recorded</td>
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<tr>
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<tr>
<td></td>
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<td>Appropriate</td>
</tr>
<tr>
<td></td>
<td>Data Recorded</td>
<td>Data Recorded</td>
</tr>
</tbody>
</table>

1 2 3 4 5 6 7 8 9 10
Appendix D: Task Analysis

Instructions: The TA listed to the left is an outline of the performers task. Collect data on one trial for each type of DTT.

When conducting an observation, sit behind the adult/child, but in clear view of the teacher. The teacher should be provided with short instructions so as to not interfere with the pace of teaching.

For each sub-step listed, place a plus (+) if it was completed appropriately. If it was not completed appropriately, make a minus (-) sign.

All sub-steps must be correct for a step to be considered correct.

Compute % correct of all sub-steps completed. Do not include sub-steps not completed (e.g., if a correct response no correction sub-steps will be included in calculation). Divide the number of sub-steps correct by the total number of sub-steps attempted.

Total % correct _________________

**Step 1 Pre-Session**
- stimuli Ready
- PA conducted
- reinforcers ready
- no Danglers
- distractors removed

**Step 2 Mass Trials**
- single stimulus on table
- gain eye contact
- present SD for target only within 1 sec
- wait 3 sec for response
- provide conseq. within 1 sec
- ext/Sr+
- ITI 5 sec

**Step 3 Correction Procedure**
- Step 2 + verbal prompt following SD within 1 sec
- Step 2 + gestural prompt following SD within 1 sec
- Step 2 + model prompt following SD within 1 sec
- Step 2 + partial physical prompt following SD within 1 sec
- Step 2 + physical prompt following SD within 1 sec

**Step 4 Single Presentation**
- two stimuli on table-1 stimulus 6 inches back from the other stimulus
gain eye contact
present SD for target only within 1 sec
wait 3 sec for response
provide conseq. within 1 sec
ext/Sr+
ITI 5 sec
alternate sides

**Step 5** Correction Procedure
- Step 4 + verbal prompt following SD within 1 sec
- Step 4 + gestural prompt following SD within 1 sec
- Step 4 + model prompt following SD within 1 sec
- Step 4 + partial physical prompt following SD within 1 sec
- Step 4 + physical prompt following SD within 1 sec

**Step 6 Random Rotation**
- two stimuli on table-equidistance from child
- gain eye contact
- present SD for target or distractor within 1 sec
- wait 3 sec for response
- provide conseq. within 1 sec
- ext/Sr+
- ITI 5 sec
- alternate sides

**Step 7 Correction Procedure**
- Step 6 + verbal prompt following SD within 1 sec
- Step 6 + gestural prompt following SD within 1 sec
- Step 6 + model prompt following SD within 1 sec
- Step 6 + partial physical prompt following SD within 1 sec
- Step 6 + physical prompt following SD within 1 sec

**Step 8 Extended Trials**
- 4+ stimuli on table-various placements
- gain eye contact
- present SD for any stimulus within 1 sec
- wait 3 sec for response provide conseq. within 1 sec
- ext/Sr+
- ITI 5 sec
- randomize placement

**Step 9 Correction Procedure**
- Step 8 + verbal prompt following SD within 1 sec
- Step 8 + gestural prompt following SD within 1 sec
- Step 8 + model prompt following SD within 1 sec
- Step 8 + partial physical prompt following SD within 1 sec
- Step 8 + physical prompt following SD within 1 sec
Step 10 *Provide Differential Reinforcement*

reinforce correct response/don't reinforce incorrect or junk behavior

establish a hierarchy of reinforcement based on magnitude delivered for successive approximations
Appendix E: Training Questionnaire

Post Training Questionnaire

Please circle the number that best represents how you feel about the training you received.

1-Not at all  2-Not very  3-Undecided  4-Somewhat  5-Very Much

1. How helpful was the training provided?  
2. Do you feel more confident in conducting discrete trials?  
3. Do you think this training will benefit the students that you work with?  
4. Would you like to participate in future training opportunities?  
5. Which part of the training did you find most useful?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________