ASSESSING THE EFFECTS OF BEHAVIORAL SKILLS TRAINING ON ADULT TEACHING RESPONSES, LEARNER ACQUISITION, AND LEARNER DISRUPTIVE BEHAVIOR ACROSS RESPONSES AND INSTRUCTIONAL SKILL SETS

by

ANNE FETHERSTON

A dissertation submitted to the Graduate Faculty in Psychology

in partial fulfillment of the requirements for the degree of Doctor of Philosophy,

The City University of New York

2010

This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

_____	_____
Date	Dr. Peter Sturmey Chair of Examining Committee
_____	_____
Date	Dr. Maureen O'Connor Executive Officer

Dr. Bruce Brown
Dr. Alicia Alvero
Dr. John Brown
Dr. Dennis Reid

_____
Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

ASSESSING THE EFFECTS OF BEHAVIORAL SKILLS TRAINING ON ADULT TEACHING RESPONSES, LEARNER ACQUISITION, AND LEARNER DISRUPTIVE BEHAVIOR ACROSS RESPONSES AND INSTRUCTIONAL SKILL SETS

by

Anne Fetherston

Advisor: Professor Peter Sturmey

Behavioral Skills Training (BST) is a teaching package consisting of instructions, feedback, modeling, and rehearsal that has been effective for training staff to provide intervention to people with developmental disabilities. The purpose of the current study was to assess: (a) whether prior studies demonstrating the effectiveness of BST could be systematically replicated in a variety of teaching procedures, (b) whether the instructional skills that staff acquired during training on one response generalized to a variety of instructional programs, (c) whether positive changes in staff performance corresponded to positive behavior change in learners and (d) whether positive changes in learner behavior generalized to novel programs. Results systematically replicated and extended prior studies by demonstrating that BST resulted in positive behavior change across staff, learners, instructional programs, and various types of teaching skills. Further, for all types of instructional procedures staff displayed generalization of teaching skills to novel responses and learners displayed increases in correct responding, indicating that BST is an effective and efficient intervention procedure.

Dedication

This work is dedicated to the following:

- My godmother, Helen Margaret Regan, who was a great inspiration in many areas of my life. With her kindness, intelligence and wit she was a wonderful role model whose unwavering faith and confidence in my abilities shaped who I am today.
- William J. Desalvatore III (Sidestep), who provided encouragement when I most needed it. He helped me remain focused during challenging times and there is no doubt in my mind that his support was instrumental in the completion of my research.

.

Acknowledgements

Although this dissertation has my name alone on it, a great many people have contributed to it. I am very grateful to all those people who have provided encouragement and support throughout this process.

First, I want to thank Dr. Peter Sturmey, for his direction, guidance and kindness throughout the vicissitudes of the dissertation process. I would also like to thank my committee members, Dr. Bruce Brown and Dr. Alicia Alvero, for their insightful comments and discussions. I am grateful to Dr. Claire Poulson, who provided inspiration to pursue my interests, and to Dr. Nancy Hemmes for her guidance early in my academic career. I am also very grateful to the staff and faculty of the Psychology Department at Queens College, particularly Mrs. MaryAnne Schimatz. My gratitude is also extended to my outside readers, Dr. John Brown and Dr. Dennis Reid, and to my fellow graduate students for their ongoing feedback and insightful comments. I am particularly grateful to Laura Seiverling for her endless support and encouragement.

I am also forever grateful to my parents, Martin and Catherine Fetherston, for their patience throughout this process, and to my brothers Martin and Paul for their ongoing encouragement.

Many friends have helped me stay sane throughout this difficult process. A very special thank you to Brian Madison, my comrade in doctoral research, to Nancy Turi, my cheerleader who stuck by me for all these years, to Dr. Ann Brown, who provided unwavering calmness and encouragement throughout the years, and to Dr. Jon Silver, who believed in me. I cannot thank you enough for being there for me.

Last but not least, I am forever grateful to B.H. and J.H., who inspired me to pursue a career in Behavior Analysis.

Table of Contents

List of Figures

List of Tables

ASSESSING THE EFFECTS OF BEHAVIORAL SKILLS TRAINING ON ADULT TEACHING RESPONSES, LEARNER ACQUISITION, AND LEARNER DISRUPTIVE BEHAVIOR ACROSS RESPONSES AND INSTRUCTIONAL SKILL SETS

by

ANNE FETHERSTON

Training staff to apply intervention procedures that produce measurable results in learner performance is an important aspect of providing effective services to learners with developmental disabilities (Downs, Conley-Downs, & Rau, 2008). Behavioral Skills Training (BST) is a staff teaching procedure consisting of written instructions, verbal feedback, modeling, and skill rehearsal that produces rapid acquisition of instructional skills. BST has been effective for training both instructors and parents of learners with developmental disabilities. For example, Sarokoff and Sturmey (2004) demonstrated that BST was an effective method to train staff to implement discrete trial teaching (DTT) while working with learners who have autism. In a similar study, Seiverling, Pantelides, Ruiz, and Sturmey (2010) demonstrated that BST was effective to train staff to use Natural Language Paradigm procedures to increase vocalizations in children with autism. Likewise, Ryan, Hemmes, Sturmey, Jacobs, and Grommet (2007) demonstrated that BST was effective to train staff to implement incidental teaching procedures with children who have autism. Thus, BST is a method to train instructors rapidly and effectively in the skills that are critical for providing positive intervention for learners with autism.

BST also results in positive behavior change in parents of children with developmental disabilities. For example, Lafasakis and Sturmey (2007) demonstrated that BST was effective to train parents to implement DTT for teaching gross motor imitation skills. The parents learned to teach their children to imitate gross motor models, and their instructional skills generalized to teaching their children to imitate verbal models. Lafasakis and Sturmey also found that the parents' improved skills had a positive impact on their children's skill acquisition. Following the parents' training, the children's percentage of correct responses increased above baseline levels in both gross motor imitation and verbal imitation programs. Similarly, Dib and Sturmey (2007) found that improved adult performance following BST correlated to positive change in learner behavior. They extended prior research by demonstrating that the instructors' training corresponded to decreased levels of stereotypy emitted by the learners.

A useful way to consider the responses acquired by staff and parents through BST is a skill set. A skill set is a group of teaching responses that share a single task analysis. For example, teaching responses for training learners to imitate motor movements using DTT comprise one skill set and teaching responses for training learners to respond to incidental teaching procedures comprise another skill set. Several studies document generalization of teaching responses to novel learners and teaching tasks (Lafasakis & Sturmey, 2007; Sarokoff & Sturmey, 2007; Ward-Horner & Sturmey, 2008); however, in each of these studies, experimenters assessed generalization of adult teaching responses only to programs in which learner responses shared a similar topography. For example, Lafasakis and Sturmey trained parents to teach gross motor imitation skills and assessed generalization of adult skills to training verbal imitation skills; however, they did not

assess generalization of the adults' instructional skills to teaching child responses that did not require an imitative response, such as following one-step directions or matching to sample. The skill set for DTT can be used to teach a wide variety of responses that differ in the means by which the discriminative stimulus is presented (e.g., the instruction "Do this" plus a model, or a verbal instruction only) and the type of response required by the learner (e.g., an imitative response, performing an action, or manipulating materials). Thus, no studies so far have assessed the extent to which the effects of BST generalize from trained responses to untrained responses across a wide variety of instructional programs.

Replication of prior studies is a means to address this issue. Sidman (1960) discussed two types of replication: direct and systematic. Direct replication refers to "performing the experiment again with new subjects or by making repeated observations on the same subjects under each of several experimental conditions" (p. 73). Direct replication assesses the reliability of findings from prior studies; however, direct replication is able to show only limited generality of results, because there are few changes from the original study. In contrast, systematic replication refers to conducting an experiment under conditions that differ from the original experiment, such as variations in participant ages, histories, duration of sessions, and additional variables (Sidman, p. 111). Thus, systematic replication can both assess reliability of previous findings and demonstrate systematic replication of results across a wide variety of participants, stimuli, and settings. Furthermore, systematic replication can provide information that generates new experiments.

Although prior studies have replicated the effects of BST, demonstrating that BST is effective for training parents to use DTT (Lafasakis & Sturmey, 2007), training staff to use incidental teaching (Ryan et al., 2007), and training staff to use Natural Language Paradigm Procedures (Seiverling et al., 2010), no replication studies have demonstrated that the effects of BST on adult acquisition, learner acquisition, and learner disruptive behavior generalize from trained responses to dissimilar responses that share a single skill set. Determining whether BST can simultaneously have a positive effect on three dependent variables and whether these effects generalized to untrained responses would provide additional support that BST is an effective and efficient staff training procedure. Furthermore, previous studies have not assessed the effects of BST on the skill set for teaching activity schedule following. Therefore, the current study used both systematic and direct replication of Sarokoff and Sturmey (2004) to assess: (a) whether previous research demonstrating the effectiveness of BST could be replicated across staff, learners, and instructional programs in three different skill sets, (b) whether staff teaching responses acquired during training on one child response generalized to teaching novel child responses within a skill set; (c) whether positive changes in staff performance corresponded to increases in correct responding and decreases in disruptive behavior emitted by the learners during programs for which instructors received BST; and (d) whether positive changes in learner behavior generalized to programs for which instructors were not trained.

GENERAL METHOD

There were three experiments in this study; in each, the experimenter trained the instructors to use a different set of teaching skills. She trained DTT in the first experiment, incidental teaching in the second experiment, and teaching to activity schedule following in the third experiment. Many procedures in baseline, BST, and post-training phases were common to all experiments. In all three experiments the experimenter used the same general method; features that are specific to each experiment (e.g., operational definitions, correct responses, and materials) appear in the individual Method sections.

During all baselines the experimenter gave the instructor a list of teaching components and their operational definitions, read the list, answered any questions, and directed the instructor to work with the learner. During BST, the experimenter gave the instructor the same list of instructions, and provided feedback, rehearsal, and modeling to the instructor for one response. Procedures in post-training were identical to those in baseline.

Throughout the study the experimenter used BST to provide staff training. BST has four components: Instruction, Feedback, Rehearsal, and Modeling. During the first component, instruction, the experimenter gave each instructor a list of teaching components and the operational definitions for each component. The experimenter read the components aloud, asked the instructor if he or she had any questions, and answered them.

During the second component, feedback, the experimenter gave the instructor a graph of his or her performance during baseline. She noted that the graph displayed the

instructor's percentage correct use of the teaching components and stated the average baseline score for all components. In addition, she gave the instructor a copy of the data sheet documenting the instructor's use of the teaching components during the previous session. The experimenter stated the instructor's average percentage correct use of all teaching components and described the teaching components that the instructor performed correctly and incorrectly. She delivered positive feedback about components that the instructor implemented correctly and described the correct procedures for components that the instructor implemented incorrectly. For example, she said, "You did a great job establishing eye contact and used behavior-specific praise appropriately; however, you repeated the discriminative stimulus twice. On the next trial present it only once." The experimenter then asked the instructor if he or she had any questions, answered them, and thanked the instructor for his or her participation in the study.

During the third component, rehearsal, the instructor presented three consecutive response opportunities to the learner without interruption or feedback. After the three opportunities were completed, the experimenter provided positive feedback about the teaching components that the instructor completed correctly and corrective feedback about the components that the instructor completed incorrectly.

During the fourth component, modeling, the experimenter demonstrated correct teaching procedures for three response opportunities. For example, while modeling DTT the experimenter provided a prompt if the learner did not respond independently and correctly within 5 s of the instruction and delivered tangible reinforcers for independent correct responses only. The experimenter and the instructor alternated components three and four until 10 min elapsed.

In all experiments the procedures in post-training were identical to those in baseline.

Although BST procedures are similar across experiments, the skill sets on which the experimenter trained instructors differed substantially. DTT is a systematic procedure in which an instructor initiates the interaction by presenting a discriminative stimulus, the learner is prompted to perform the correct response, and verbal praise is delivered after the learner's response. In contrast, incidental teaching exchanges are initiated by the learner, the instructor provides a model for an expansion of language, and then provides access to a preferred item following the learner's expansion of the original initiation. Teaching activity schedules differs greatly from these procedures. While teaching an activity schedule, the instructor provides a verbal direction at the start of the schedule and verbal feedback at the end of the schedule only. All prompting is provided from behind the learner using a most-to-least prompting procedure.

Participants and Setting

The experimenter conducted all experiments at a full-day private school for learners with developmental disabilities. In all experiments, adult participants were instructors at the school and each had a minimum of a bachelor's degree in education, psychology, or a related field. In addition, all instructors had received training by service providers other than the experimenter prior to this study. The learners were between the ages of 3 and 12 years old at the start of the study and had attended the school for a range from 6 months to 5 years. All had intervention programs to ameliorate deficits in expressive and receptive language, social skills, self-care skills, and play skills, and to reduce behavioral excesses (e.g., stereotypy, self-injury, and aggression). An independent

neurologist or developmental psychologist diagnosed each learner with a developmental disability prior to the study. The experimenter paired instructors with learners based on the compatibility of their daily schedules.

The experimenter conducted daily sessions in two small classrooms, the kitchen, and a large bathroom in the learners' school. Prior to each session she placed a video camera on a tripod in one corner of the room. She aimed the camera so that it recorded all actions of the experimenter, the instructor, and the learner. The experimenter started the camera prior to any interaction between the learner and the experimenter or instructor at the beginning of each instructional period and stopped the camera at the end of each instructional period.

Materials

In all sessions, there was a token board, reinforcers (e.g., preferred toys and snacks), data sheets, pencils, timers, and instructional materials as described in the individual Method sections below.

Dependent Variables

Each of the three experiments had baseline, BST, and post-training phases. In each phase the experimenter collected data for three dependent variables: (1) percentage correct use of teaching components by instructors; (2) percentage of correct responses by learners; and (3) percentage of intervals scored for disruptive behavior by learners. In all experiments the dependent variables were further divided into trained responses and untrained responses. A trained response was a response for which the instructor received BST. For example, during DTT, one trained response was the set of skills for teaching identification of community helpers. Untrained responses were responses for which the

instructor received no training and assessed generalization of an instructor's teaching skills from the trained response to novel responses. For example, during DTT, untrained responses included the set of skills for teaching identification of related items and the set of skills for teaching number to object correspondence.

Percentage correct use of teaching components by instructors. The experimenter scored a teaching component correct if the instructor implemented each component according to its operational definition.

Percentage of correct responses by learners. The experimenter scored a learner response correct if the learner emitted an independent correct response as defined in the individual Methods.

Percentage of intervals scored for disruptive behavior by learners. In all experiments, disruptive behavior was any sound or movement unrelated to the ongoing activity or that occurred in the absence of an instruction, any repetitive movements, any verbal or physical resistance to prompting, such as dropping to the floor to avoid a prompt, or any refusals, such as saying or gesturing "No." The experimenter used 10 s momentary time sampling (MTS) to score occurrence or nonoccurrence of disruptive behavior.

Measurement Procedures and Scoring

The experimenter scored each videotape in all experiments at the end of each day. During baseline and post-training phases the experimenter collected data on all dependent variables for the trained response and for untrained responses. During the intervention phase the experimenter provided BST as previously described. At the end of the BST the experimenter observed as the instructor completed a session for the trained response. The

experimenter provided no feedback or instruction during this session and collected data on all dependent variables for the trained response only. Criterion for completion of training was 90% or greater accuracy for the trained response during three consecutive sessions. The experimenter replicated this procedure across all instructor-learner dyads in all experiments.

In each experiment, to calculate percentage correct use of teaching components by an instructor, the experimenter divided the number of correctly implemented teaching components by the total number of teaching components and multiplied the result by 100. To calculate percentage of correct responses emitted by learners, the experimenter divided the number of correct responses by the total number of responses and multiplied the result by 100. To calculate the percentage of intervals during which the learner engaged in disruptive behavior, the experimenter divided the number of intervals scored with disruptive behavior by the total number of intervals in a session and multiplied the result by 100.

Experimental Design

To demonstrate experimental control, the study used a multiple probe design.

Independent Variable

During baseline phases the experimenter provided written instructions to the staff and answered any questions. During interventions the experimenter provided BST. For example, during DTT training the experimenter conducted the training package as described in Sarokoff and Sturmey (2004). The experimenter modified this training package for incidental teaching and for teaching activity schedule following as described in the individual Method sections below.

Procedure

Terms. For the purpose of clarity, the experimenter defined terms as follows: (1) A skill set was a group of instructors' teaching responses that shared a single task analysis (e.g., DTT, incidental teaching, teaching activity schedule following). (2) An instructional period was a 20 min block of time, divided into sessions, during which the instructor provided instruction specific to the skill set in the experiment (e.g., DTT, incidental teaching, or following an activity schedule). Instructional periods were run once daily during school hours. (3) A session was a series of teaching exchanges for a single instructional program. For example, in DTT a session was 10 discrete trials of a single instructional program, and in incidental teaching a session was 10 incidental teaching exchanges.

Participant Screening. There were 11 adult-learner dyads in the study. There were four dyads in Experiment 1, four dyads in Experiment 2, and three dyads in Experiment 3. For each experiment, the experimenter screened potential adult participants to identify instructors who implemented teaching components with an average of less than 50% accuracy across all instructional programs within the skill set. During screening she observed as each potential adult participant taught the learner with whom he or she would be paired all of the instructional programs in the learner's skill set. The experimenter did not exclude any potential participants.

The experimenter also screened potential learners. For each experiment, she reviewed learners' current behavior management plans and excluded any learner who was in a baseline phase for disruptive behaviors during the school day. She also excluded any learner who had a behavior intervention procedure that classroom instructors scored

on a 1-min or shorter interval (e.g. a 1-min DRO). The experimenter excluded two potential learners from Experiment 1 and two potential learners from Experiment 3.

Finally, for each experiment she collected data on each learner's responses to identify instructional programs during which the learner demonstrated less than 50% correct responding. The experimenter observed as the instructor presented 10 response opportunities to the learner for each instructional program and scored each learner response correct or incorrect. She did not exclude any potential instructional programs.

Baseline. At the start of each instructional period, the experimenter gave the instructor a list of the required teaching components and their operational definitions. She read the components of the list aloud, asked the instructor if he or she had any questions, and answered them. In all experiments the experimenter then stated, "Run each program to the best of your ability." Instructional programs in baseline were identical to those used during screening, and instructors received no training or feedback on their performance between screening and baseline.

Behavioral Skills Training. For all experiments, modifications specific to the experiment are in the individual Method sections below.

Post-training. All post-training procedures were identical to those in baseline.

Interobserver Agreement

Interobserver agreement (IOA) was a point-by-point comparison of data collected by two independent observers. An undergraduate student in psychology, two graduate students in ABA, and the experimenter scored IOA from videotapes for all dependent variables. They measured point-by-point agreement throughout 30% of baseline, training, and post-training sessions in all three experiments. The experimenter calculated

percentage IOA according to the following formula :[(number of agreements) divided by (number of agreements plus disagreements)] x 100.

Procedural Integrity

To ensure procedural integrity, the experimenter compiled a checklist that included each component that she used during BST (see Appendix A for the experimenter's procedural integrity checklist). As the experimenter completed each component, she put a check mark next to it. The experimenter used this checklist during all sessions. In addition, an undergraduate student in psychology randomly viewed 20% of videotapes of sessions from each condition, across all dyads. The experimenter calculated procedural integrity according to the following formula: [(number of correct components) divided by (total number of components)] X 100. Procedural integrity was 99%, 100%, and 100% for DTT, incidental teaching, and teaching an activity schedule, respectively. The experimenter calculated IOA for procedural integrity as described above. IOA between the experimenter and the undergraduate student for procedural integrity was 100%.

Social Validity

The experimenter assessed the social validity of the intervention using both questionnaires and videotapes. At the end of the entire study, she asked each instructor to complete a Likert-type scale rating the effectiveness and acceptability of his or her training (see Appendix B). (One instructor had left the school prior to the end of the study and was unavailable to complete the scale). The scale had five possible ratings, with 1 being the highest rating and 5 being the lowest rating. The remaining instructors completed a total of 27 ratings for the entire study. For Experiment 1, instructors

completed questions a, d and g; for Experiment 2, instructors completed questions b, e, and g; and for Experiment 3, instructors completed questions c, f, and g. Instructors did not complete questions that were not relevant to the experiments in which they participated. In addition, the experimenter excluded questions h and i from data analysis. because the questions did not allow instructors to rate learner behavior as it occurred within individual skill sets. Therefore, the questions did not measure the instructors' perception of the effectiveness of BST.

Additionally, two Master's degree level Board Certified Behavior Analysts who were familiar with the literature for BST, but not specifically with this study viewed 10% of videotapes of sessions from each condition, across all experiments. Then they completed a Likert-type scale rating the effectiveness of the BST (see Appendix C.) For Experiment 1, behavior analysts completed questions a and d; for Experiment 2, they completed questions b and e, and for Experiment 3, they completed questions c and f. The behavior analysts rated the entire study in questions g and h.

EXPERIMENT 1

The first experiment extended Lafasakis and Sturmey (2007) by assessing generalization of instructor's teaching skills from trained responses to untrained responses that shared the DTT skill set but varied in the presentation of the discriminative stimulus (e.g., a model or a verbal instruction) and in the response required by the learner (e.g., performing an action or imitating a model). This experiment also extended Dib & Sturmey (2007), by demonstrating that improved teaching skills in instructors are associated with decreases not only in stereotypy, but also in disruptive responses such as refusals and tantrum behavior.

Method

Participants and Setting

Sandy, James, Andy, and Jamie provided instruction. Dennis, Donald, Craig, and Chad participated as learners. Throughout the experiment Sandy worked with Dennis, James worked with Donald, Andy worked with Craig, and Jamie worked with Chad. At the time of the first baseline session, Dennis was 3 years, 11 months old, Donald was 12 years, 7 months old, Craig was 9 years, 11 months old, and Chad was 6 years, 5 months old.

Materials

Materials in Experiment 1 were various stimuli used to provide instruction DTT format listed in Appendix D.

Dependent Variables

Percentage correct use of teaching components by instructors. Examples of DTT teaching components included (a) the instructor presented an instruction once per trial

only, and (b) the instructor provided an appropriate consequence within 5 s of the learner's response. Refer to Appendix E for the complete list of teaching components that the experimenter gave to instructors and to Appendix F for a copy of the data sheet used to score instructors' responses.

Percentage of correct responses by learners. The experimenter scored a response correct if the learner performed the specified action within 5 s of an instruction. She scored incorrect any failure to respond, self-correction, any response that began more than 5 s after the instruction, or any prompted response.

Percentage of intervals scored for disruptive behavior by learners. Refer to the General Method for the definition of this variable.

Procedure

The basic procedure is in the General Method (pp 6-13). Modifications for Experiment 1 appear below.

Terms. (1) An instructional program was a set of 3-5 directions that were similar to each other in regard to (a) the type of response required by the learner (e.g., an imitative response, identifying a stimulus, or performing an action), and (b) the topography of the learner's response. For example, an instructional program for identification of community helpers included the directions, "Point to the doctor" and "Point to the policeman;" for each instruction, the learner was required point to a picture of the specified person. (2) A session consisted of 10 discrete trials of one instructional program. In any one session, the instructor presented all directions for each instructional program at least twice.

Baseline, BST, and Post-training. Instructions in Experiment 1 were specific to DTT training and the experimenter collected data on the components of DTT.

Interobserver Agreement. IOA for staff performance was 90% (range, 84-99%), 92% (range, 88-98%), 95% (range, 89-98%) and 91% (range, 86-97%) for Sandy, James, Andy, and Jamie, respectively. IOA for learner correct responses was 98% (range, 91-100%), 98% (range, 94-100%), 99% (range, 93-100%) and 99% (range, 91-100%) for Dennis, Donald, Craig, and Chad, respectively. IOA for learner disruptive behavior was 98% (range, 93-100%), 97% (range, 95-100%), 94% (range, 86-100%) and 99% (range, 93-100%) for Dennis, Donald, Craig, and Chad, respectively.

Results and Discussion

Figures 1 and 2 display the instructors' percentage correct use of DTT components during baseline, BST, and post-training phases for the trained responses and untrained responses, respectively. In each figure, each of the four legs displays data for one instructor.

During baseline, Sandy's percentage correct use of teaching steps for the trained response ranged from 20-40%. She reached 92% accuracy following the second BST and met criterion (90% accuracy during three consecutive sessions) following the fourth BST. Sandy's overall training time was four, 10 min sessions. During post-training, her percentage correct use of DTT components for the trained response ranged from 91-98%.

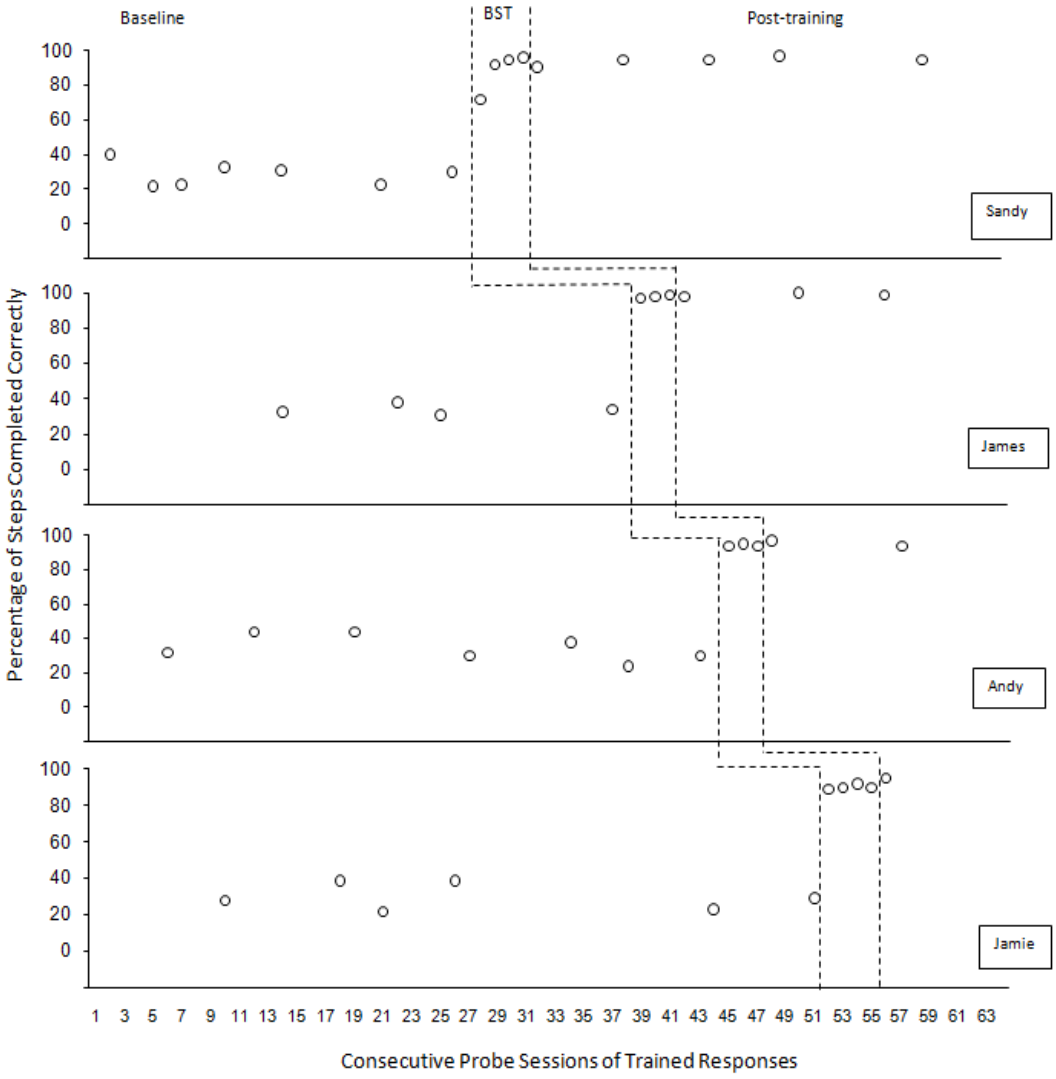
During baseline James implemented 31-38% of the DTT components correctly for the trained response. He reached 97% accuracy following the first BST and met criterion following the third BST. James' overall training time was three, 10 min sessions. During post-training, James' percentage correct use of the teaching components for the trained response ranged from 98-100%.

During baseline Andy's percentage correct use of DTT components for the trained response ranged from 24-44%. He reached 94% accuracy after the first BST and met criterion after the third BST. Andy's overall training time was three, 10 min sessions. During post-training, Andy's percentage correct use of teaching components for the trained response ranged from 94-97%.

During baseline Jamie implemented 22-39% of the DTT components correctly for the trained response. He reached 90% accuracy following the second BST and met criterion following the fourth BST. Jamie's overall training time was four, 10 min

sessions. During post-training, Jamie implemented 92-95% of the DTT components correctly for the trained response.

Figure 1. Percentage correct use of teaching steps in DTT by instructors during baseline, BST, and post-training probe sessions for trained responses. Each open circle represents the percentage of correct responses for a single probe session.

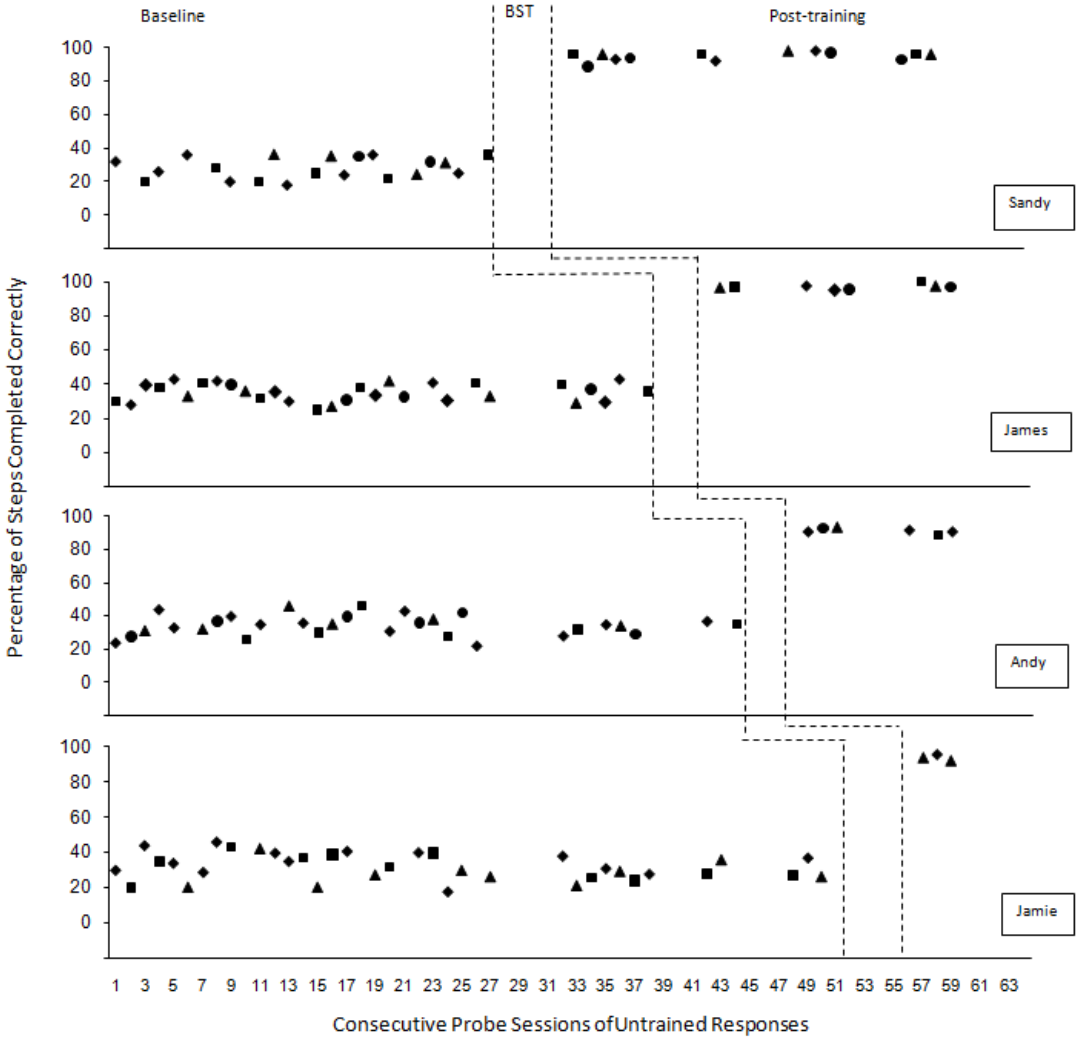


During baseline Sandy's percentage correct use of teaching components for

untrained responses ranged from 18-36%. During post-training her percentage correct use of DTT components for untrained responses ranged from 89-98% correct. During baseline James' percentage correct use of teaching components for untrained responses ranged from 25-42%. During post-training his percentage correct use of teaching components for untrained responses ranged from 95-100%. During baseline Andy's percentage correct use of DTT components for untrained responses ranged from 22-46%. During post-training his percentage correct use for untrained responses ranged from 89-94%. During baseline Jamie's percentage correct use of teaching components for untrained responses ranged from 18-46%. During post-training his percentage correct use of teaching components for untrained responses ranged from 92-96%.

As shown in Figures 1 and 2, for each instructor, teaching skills for the trained response systematically improved with the introduction BST and the effects of BST generalized to untrained responses.

Figure 2. Percentage correct use of teaching steps in DTT by instructors during baseline and post-training probe sessions for untrained responses. Each point represents the percentage of correct responses for a single probe session. Different shapes represent various instructional programs.



Figures 3 and 4 display the percentage of correct responses emitted by learners during baseline, BST, and post-training phases for the trained responses and for untrained responses, respectively. In each figure, each leg displays the data for one of the four

learners.

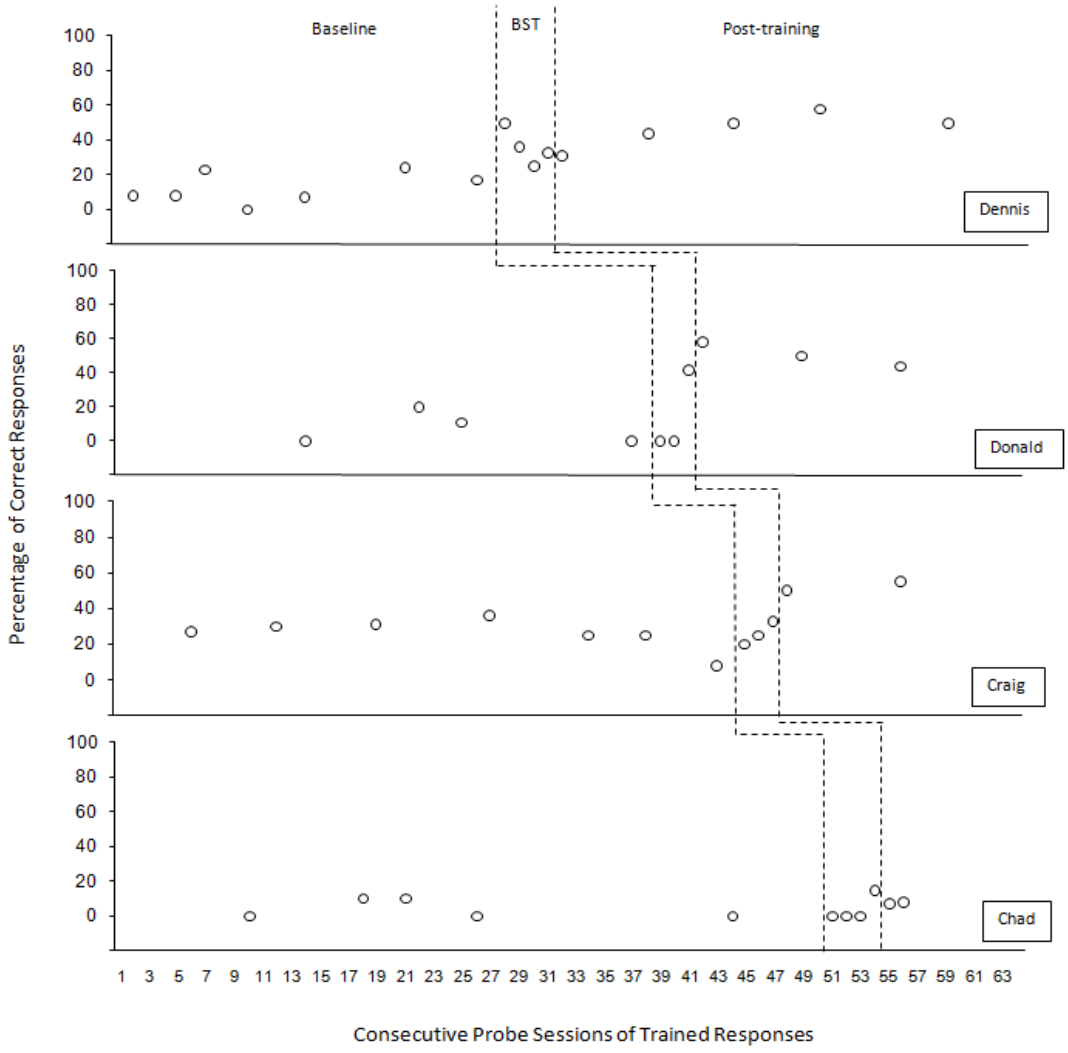
During baseline, Dennis responded correctly to the trained response in 0-24% of opportunities provided. During BST, his percentage of correct responses increased to 25-50%. During post-training, Dennis's percentage of correct responses to the trained response ranged from 31-58%.

During baseline Donald responded correctly to the trained response in 0-20% of opportunities provided. During BST his percentage of correct responses ranged from 0-42. During post-training Donald's percentage of correct responses to the trained response ranged from 44-58.

During baseline Craig responded correctly to the trained response in 8-36% of opportunities provided. During BST his percentage of correct responses ranged from 20-33. During post-training Craig's percentage of correct responses to the trained response increased to 50-55.

During baseline Chad responded correctly to the trained response in 0-10% of opportunities provided. During BST his percentage of correct responses ranged from 0-15%. During post-training Chad's percentage of correct responses to the trained response was 8%.

Figure 3. Percentage of correct responses to instructional programs by learners during baseline, BST, and post-training probe sessions for trained responses. Each open circle represents the percentage of correct responses for a single probe session.

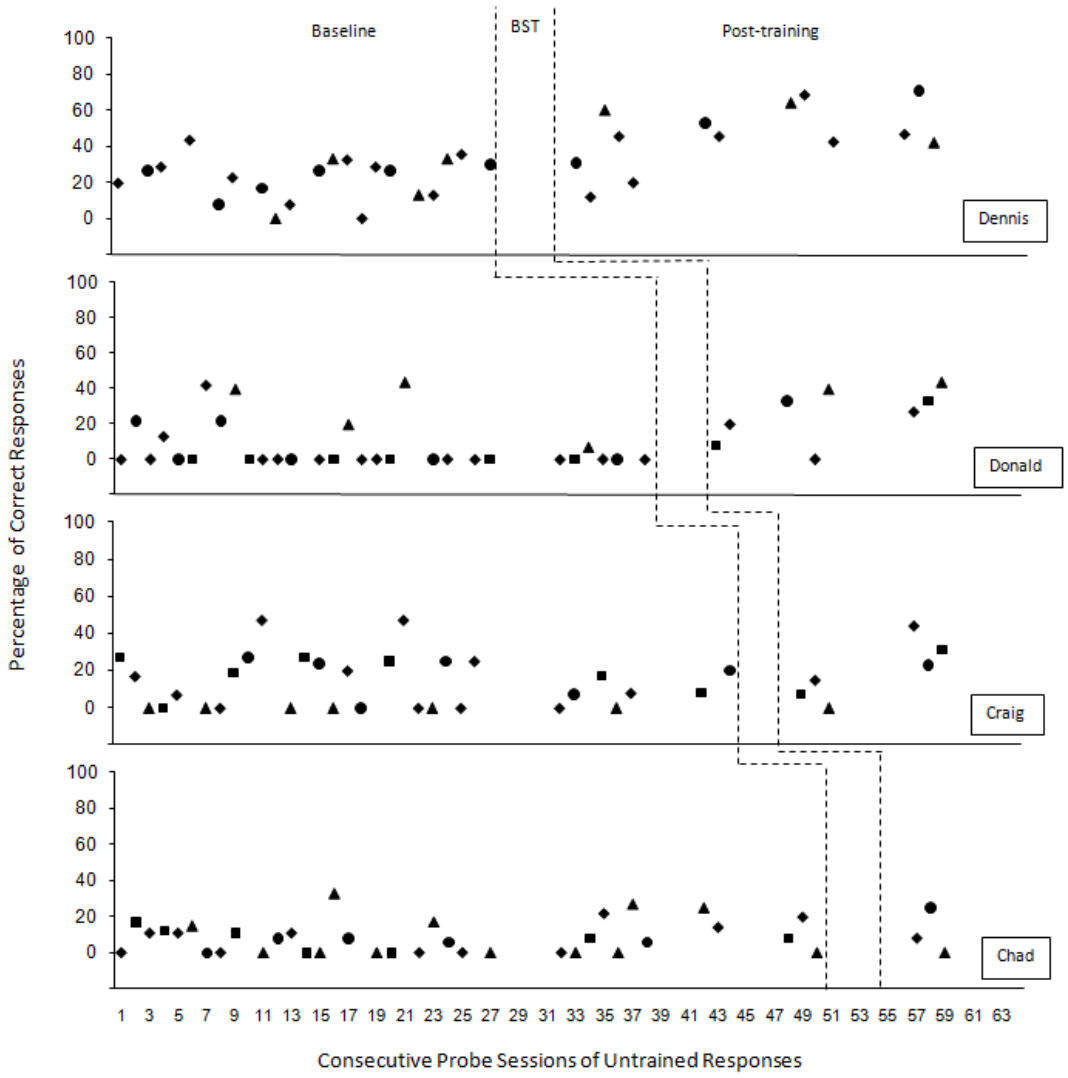


During baseline Dennis' percentage of correct responses to untrained instructor responses ranged from 0-44. During post-training his percentage of correct responses to untrained responses ranged from 12-71. During baseline Donald's percentage of correct responses to untrained responses ranged from 0-44. During post-training his percentage

of correct responses to untrained responses ranged from 0-44. During baseline Craig's percentage of correct responses to untrained responses ranged from 0-47. During post-training Craig's percentage of correct responses to untrained responses ranged from 0-44. During baseline Chad's percentage of correct responses to untrained responses ranged from 0-33. During post-training his percentage of correct responses to untrained responses ranged from 0-25.

As shown in Figures 3 and 4, Dennis, Donald and Craig showed increases in correct responding to the trained response as their instructors acquired teaching skills. They also showed increases in correct responding to untrained responses during post-training probes. Chad displayed no behavior change in response to instructors' trained responses or in post-training probes for untrained responses.

Figure 4. Percentage of correct responses to instructional programs by learners during baseline and post-training probe sessions for untrained responses. Each point represents the percentage of correct responses for a single probe session. Different shapes represent various instructional programs.



Figures 5 and 6 display the percentage of intervals scored for disruptive behavior by the learners during baseline, BST, and post-training phases for the trained responses and untrained responses, respectively.

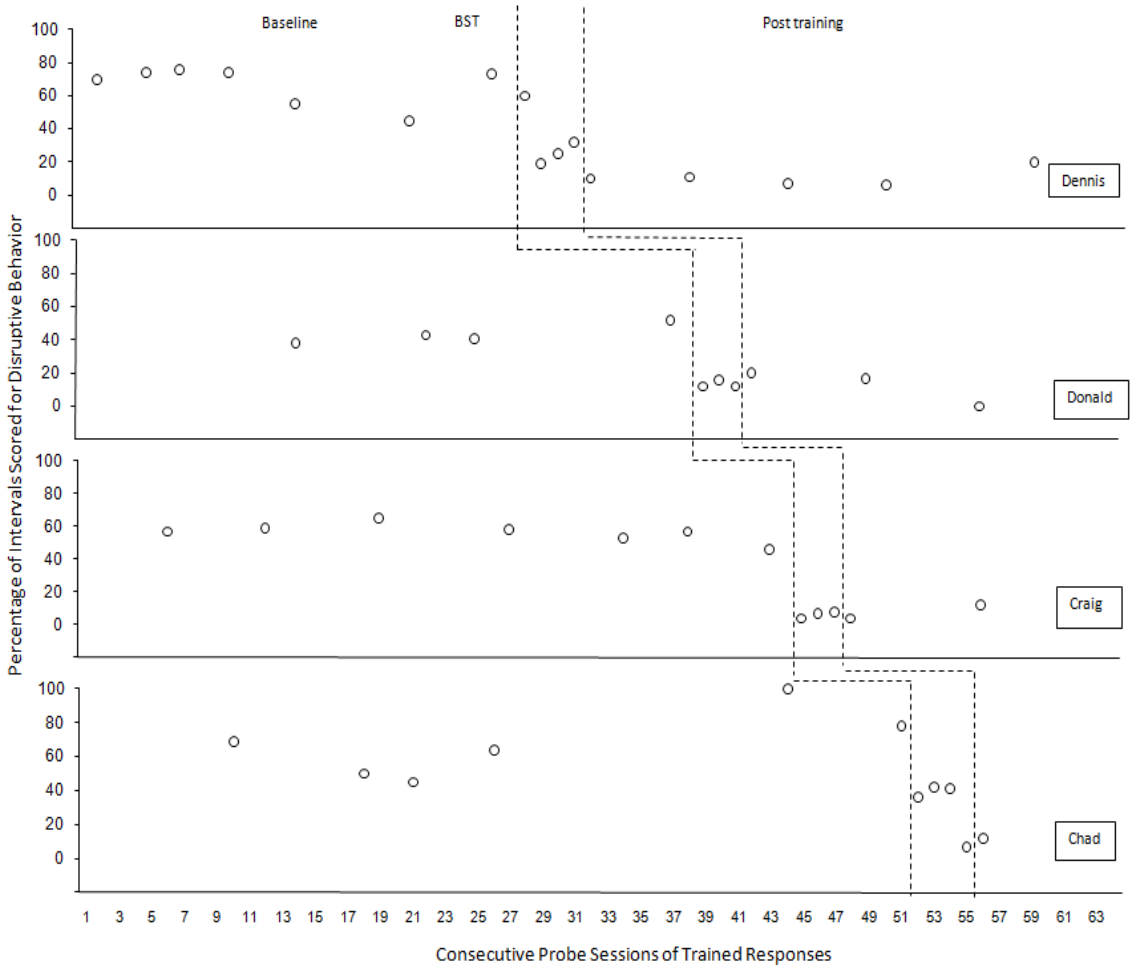
During baseline Dennis engaged in disruptive behavior in 45-76% of intervals scored during the trained response. During BST the percentage of intervals during which he engaged in disruptive behavior ranged from 19-60%. During post-training the percentage of intervals in which he displayed disruptive behavior during the trained response decreased to 6-16%.

During baseline Donald engaged in disruptive behavior in 38-52% of intervals scored during the trained response. During BST the percentage of intervals during which Donald engaged in disruptive behavior decreased to 12-16%. During post-training the percentage of intervals in which Donald engaged in disruptive behavior during the trained response ranged from 0-20%.

During baseline for the trained response Craig engaged in disruptive behavior in 46-65% of intervals scored. During BST the percentage of intervals in which he engaged in disruptive behavior decreased to 4-8%. During post-training Craig engaged in disruptive behavior in 4-12% of intervals scored.

During baseline for the trained response Chad engaged in disruptive behavior in 45-100% of intervals scored. During BST the percentage of intervals in which he engaged in disruptive behavior decreased to 7-42%. During post-training he engaged in disruptive behavior in 12% of intervals scored.

Figure 5. Percentage of intervals scored for disruptive behavior by learners during baseline, BST, and post-training probe sessions for trained responses. Open circles represent the percentage of 10 s intervals scored for disruptive behavior during a single session.



During baseline for untrained responses Dennis engaged in disruptive behavior in 45-86% of intervals scored. During post-training the percentage of intervals during which he engaged in disruptive behavior during untrained responses decreased to 0-28%. During baseline for untrained responses Donald engaged in disruptive behavior in 31-

78% of intervals scored. During post-training the percentage of intervals during which he engaged in disruptive behavior for untrained responses decreased to 4-23%. During baseline for untrained responses the percentage of intervals during which Craig engaged in disruptive behavior ranged from 24-70%. During post-training the percentage of intervals during which Craig engaged in disruptive behavior decreased to 4-17%. During baseline for the untrained responses the percentage of intervals during which Chad engaged in disruptive behavior ranged from 35-88%. During post-training the percentage of intervals during which Chad engaged in disruptive behavior for untrained responses decreased to 6-17%.

All learners showed decreases in disruptive behavior during the trained responses as their instructors acquired teaching skills. Further, they showed in decreases in disruptive behavior during the untrained responses following their instructors' training.

Figure 6. Percentage of intervals scored for disruptive behavior by learners during baseline and post-training probe sessions for untrained responses. Each point represents the percentage of 10 s intervals scored for disruptive behavior during a single session. Different shapes represent various instructional programs.

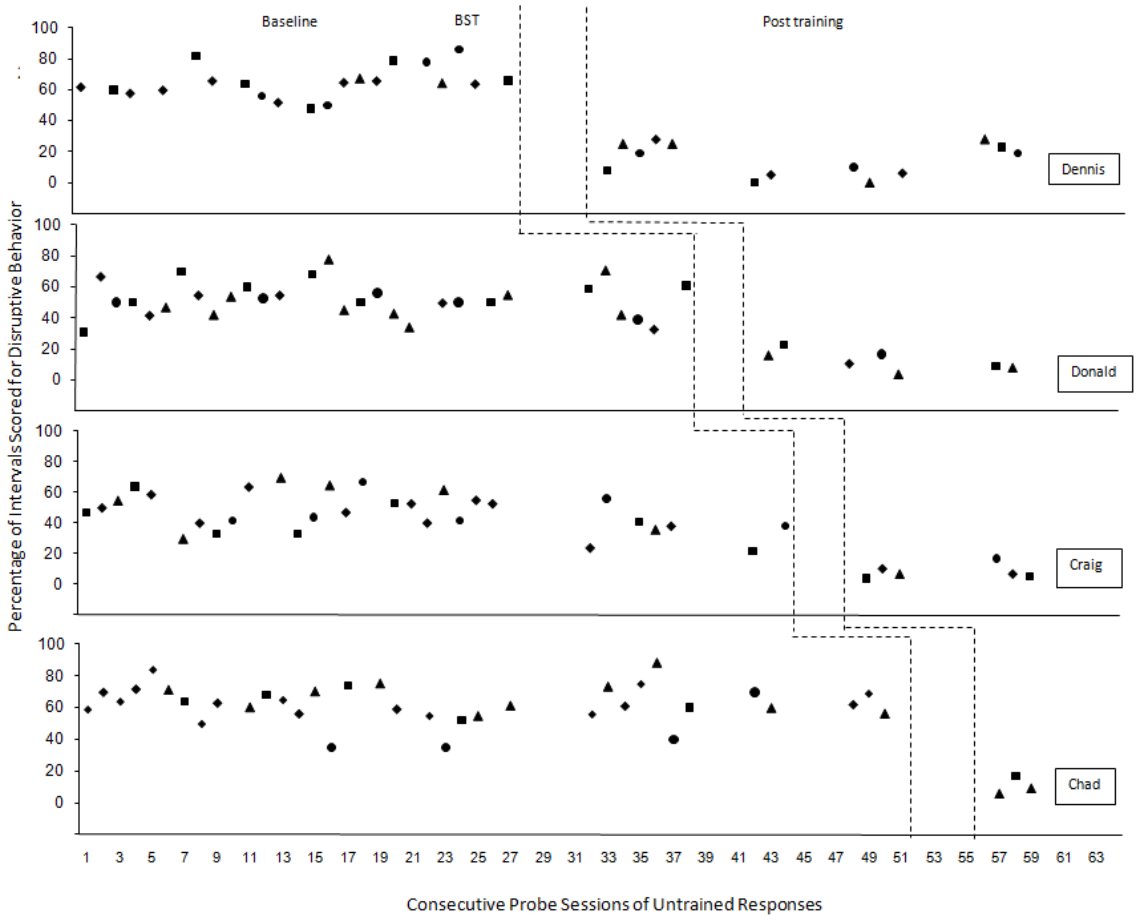


Table 1 summarizes the social validity data for all three experiments. All instructors returned social validity data for Experiment 1. Their mean ratings were 1.0, 1.8, and 1.5 for questions a, d, and g, respectively. Table 2 summarizes the two behavior analysts' ratings for all 3 experiments. The two behavior analysts who rated the tapes of trained staff in Experiment 1 gave mean ratings of 1.0 for questions a and d.

Table 1.

Social Validity Scores by Participant and Question

Question	Participant									
	1	2	3	4	5	6	7	8	9	Mean
				Experiment 1						
a.	1	1	1	1						1.0
d.	1	2	3	1						1.8
g.	1	1	3	1						1.5
				Experiment 2						
b.					1	1	1			1.0
e.					1	2	1			1.3
g.					1	1	2			1.3
				Experiment 3						
c.								1	1	1.0
f.								1	1	1.0
g.								1	1	1.0

Table 2.

Social Validity Scores by Behavior Analysts

Question	Behavior Analyst		
	1	2	Mean
		Experiment 1	
a.	1	1	1.0
d.	1	1	1.0
		Experiment 2	
b.	1	1	1.0
e.	1	1	1.0
		Experiment 3	
c.	1	1	1.0
f.	1	1	1.0
		Overall Study	
g.	1	1	1.0
h.	1	1	1.0

In Experiment 1 the experimenter demonstrated replication of the effects of BST training on staff skill acquisition across four different instructors. Prior to training, all of the instructors implemented teaching procedures with 20-44% accuracy for trained responses. Following the introduction of BST, all instructors met criterion for teaching the trained response within four BST sessions. Three of the instructors continued to teach the trained response with 90% or greater accuracy during post-training probes; the fourth instructor continued to teach the trained response with 89% or greater accuracy. The effects of BST on instructors' teaching skills also generalized to untrained teaching responses. Prior to BST the instructors implemented teaching procedures for untrained responses with 18-46% accuracy. Following BST, the performance of all instructors increased to 89% or greater accuracy for untrained responses.

In this study the data revealed experimental control for instructors' responses and for learners' disruptive behavior. The data did not reveal experimental control over learner's acquisition. Nevertheless, improved instructor skills for trained responses correlated with improved learner skills in tree of four learners. Prior to the instructors' BST the learners displayed low rates of correct responding. For Dennis, Donald and Craig their percentage of correct responding increased as their instructors' teaching skills improved. In addition, all three learners displayed increases in correct responding to untrained responses in post-training probes. Although Chad displayed no acquisition, it is possible that he would show skill acquisition if sessions continued over a longer period of time after his instructor met criterion.

Finally, for each learner decreases in disruptive behavior occurred following his instructor's first BST session. During baseline learners engaged in disruptive behavior in

38-100% of intervals scored for the trained responses. During BST they engaged in disruptive behavior in 4-42% of total intervals. During post-training learners engaged in disruptive behavior in 0-12% of intervals scored for the trained response. Their percentage of intervals scored for disruptive behavior decreased during untrained responses also. During baseline for untrained responses learners engaged in disruptive behavior in 22-88% of intervals scored. Following their instructors' BST they engaged disruptive behavior in 0-28% of intervals scored.

Social validity ratings for Experiment 1 reveal that the intervention was generally acceptable to the staff who participated. Furthermore, the behavior analysts' ratings indicated that they found BST a highly effective and acceptable training procedure for DTT.

These results support the findings of Dib and Sturmey (2007), and Lafasakis and Sturmey (2007) who demonstrated that adults' teaching skills improved following BST and learners displayed decreased rates of stereotypy when instructors displayed improved teaching skills in DTT sessions. This experiment extended their findings by demonstrating that the learners displayed decreased levels of disruptive behavior and refusals as well as stereotypy.

EXPERIMENT 2

MacDuff, Krantz, MacDuff, and McClannahan (1988) trained staff to use incidental teaching by explaining the procedure, providing examples, and asking staff to provide a written example of how to use incidental teaching in various settings. Following the training staff increased their use of incidental teaching. The current experiment extended MacDuff et al. by demonstrating that BST is an effective and efficient procedure for training staff to use incidental teaching procedures. This experiment also extended Ryan et al. (2007) by systematically replicating their study using novel participants, settings, and materials.

Method

Participants and Setting

Lori, Mary, James, and Sandy provided instruction. Martin, Daniel Derek, and Dave participated as learners. Throughout the experiment, Lori worked with Martin, Mary worked with Daniel, James worked with Derek, and Sandy worked with Dave.

At the time of the first baseline session Martin was 10 years 4 months old, Daniel was 12 years 8 months old, Derek was 10 years 7 months old, and Dave was 5 years 6 months old.

Materials

Materials specific to Experiment 2 included various items preferred by each learner. Classroom instructors identified an item as preferred if during the week prior to the first baseline session, the learner initiated for it, played with or manipulated it, or consumed it at least twice. Instructors restricted access to preferred items during all instructional periods in Experiment 2. Access to preferred items was not restricted in the

learners' classrooms. Refer to Appendix G for a complete list instructional programs and stimuli used in Experiment 2.

Dependent Variables

Percentage correct use of teaching component by instructors. Examples of incidental teaching components included (a) the instructor requested an elaboration of an initiation by the learner and (b) the instructor provided access to an item contingent on an elaboration of the initial initiation. Refer to Appendix H for a complete list of the incidental teaching components and their operational definitions and to Appendix I for a copy of the data sheet used to score instructors' responses.

Percentage of correct learner responses. The experimenter scored a learner response correct if the learner emitted an expansion of the original initiation within 5 s of the instructor's request for an elaboration. She scored incorrect any failure to respond, any repetitions of the original initiation, or any response that occurred more than 5 s after the instructor's request for an expansion. She also scored a response incorrect if the learner only added the instructor's name to the beginning of an initiation (e.g., "James, I want…") or the word "please" to the initiation following a request for an expansion.

Percentage of intervals scored for disruptive behavior. Refer to General Method for a definition of this variable.

Procedure

Terms. (1) An instructional program was an incidental teaching program that occurred in a setting in which there were specific items available for which the learner could initiate. Instructional programs included responding to incidental teaching during a snack time, while playing, and during an unstructured time (i.e., snacks and play items

were both available). (2) A session consisted of 10 incidental teaching exchanges of a specific instructional program. (3) A learner initiation was any of the following responses: (a) touching the stimulus, (b) picking up the stimulus, (c) reaching toward the stimulus, (d) asking for the stimulus, (e) pointing to the stimulus, or (f) saying the name of the stimulus (adapted from Ryan et al., 2007). (4) An expansion of an initiation was any increase in language from the original initiation. For example, if the initiation was nonverbal (i.e., reaching toward the stimulus) then an expansion was a verbal request (word, phrase, or sentence). If the initiation was verbal then an expansion was a more complex verbal request (e.g., adding adjectives, speaking in a complete sentence).

Baseline, BST, and Post-training. Instructions in Experiment 2 were specific to incidental teaching and the experimenter collected data on the components of incidental teaching.

Interobserver Agreement. IOA for staff performance was 96% (range, 94-100), 98% (range, 96-100%), 100%, and 95% (range, 93-99%) for Lori, Megan, James, and Sandy, respectively. IOA for learner correct responses was 96% (range, 94-100%), 97% (range, 93-99%), 94% (range, 92-100%) and 100% for Martin, Daniel, Derek, and Dave, respectively. IOA for learner disruptive behavior was 100%, 99% (range, 99-100%), 99% (range, 99-100%) and 99% (range, 98-100%) for Martin, Daniel, Derek, and Dave, respectively.

Results and Discussion

Figures 7 and 8 display the instructors' percentage correct use of incidental teaching components during baseline, BST, and post-training phases for the trained responses and untrained responses, respectively. For all instructors, the use of incidental teaching skills for trained responses systematically increased above baseline levels following the introduction of BST. In addition, all instructors demonstrated improved use of incidental teaching skills for untrained responses following BST.

During baseline Lori's percentage correct use of incidental teaching components for the trained response was 20%. She reached 95% accuracy following the first BST and met criterion following the third. Lori required a total of three, 10 min training sessions to acquire the skills for incidental teaching. During post-training Lori's percent correct use of incidental teaching components for the trained response ranged from 96-98%.

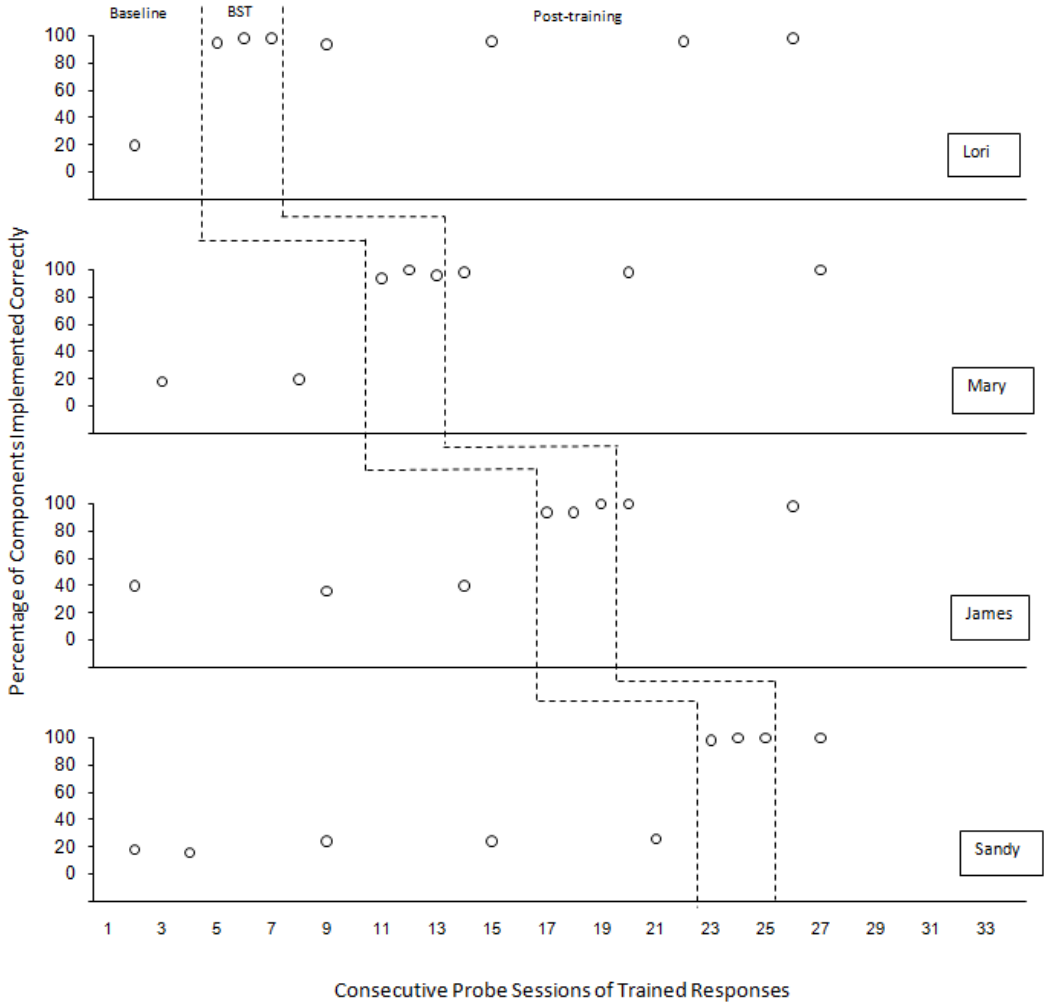
During baseline Mary's percentage correct use of incidental teaching components for the trained response ranged from 18-20%. She reached 94% accuracy after the first BST and met criterion after the third BST. Mary required a total of three, 10 min sessions to learn to implement the components of incidental teaching. During post-training Mary's percentage correct use of incidental teaching components for the trained response ranged from 98-100%.

During baseline James' percentage correct use of incidental teaching components for the trained response ranged from 36-40%. He reached 94% accuracy following the first BST and met criterion following the third BST. James required a total of three, 10 min sessions to learn to implement the components of incidental teaching. During post-training James' percentage correct use of the components of incidental teaching for the

trained response ranged from 98-100%.

During baseline Sandy's percentage correct use of incidental teaching components for the trained response ranged from 16-26%. She reached 98% accuracy after the first BST and met criterion after the third BST. Sandy required a total of three, 10 min sessions to learn to implement the components of incidental teaching. During post-training Sandy's percentage correct use of incidental teaching components for the trained response was 100%.

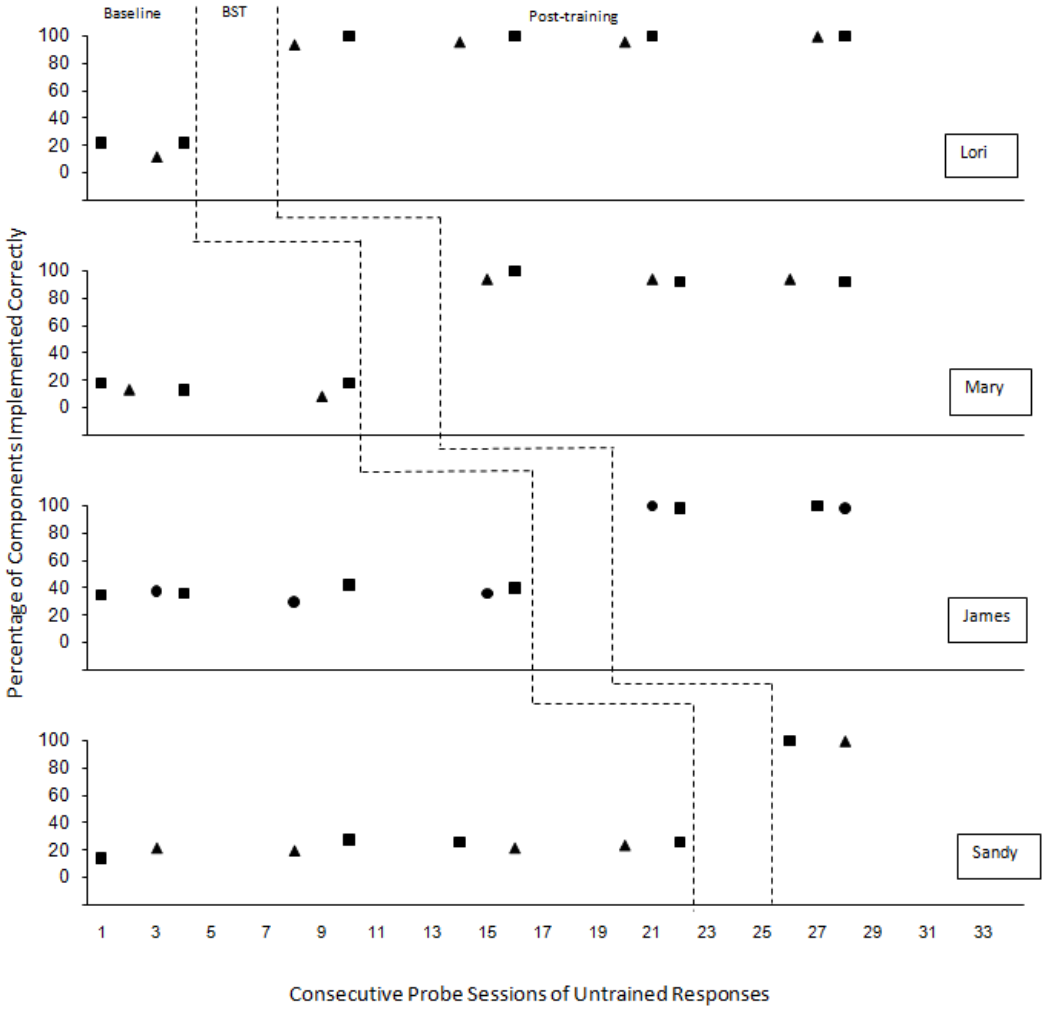
Figure 7. Percentage correct use of incidental teaching components by instructors during baseline, BST, and post-training probe sessions for trained responses. Each open circle represents the percentage of correct responses for a single probe session.



During baseline Lori's percentage correct use of incidental teaching steps for untrained responses ranged from 12-22%. During post-training her percentage correct use of incidental teaching components for untrained responses ranged from 94-100%. During baseline Mary's percentage correct use of incidental teaching components for untrained responses ranged from 8-18%. During post-training her percentage correct use of the components of incidental teaching for untrained responses ranged from 92-100%.

During baseline James' percentage correct use of incidental teaching components for untrained responses ranged from 30-42%. During post-training James implemented the components of incidental teaching for untrained responses with 98-100% accuracy. During baseline Sandy's percentage correct use of incidental teaching components for untrained responses ranged from 14-28%. During post-training her percentage correct use of the components of incidental teaching for untrained responses was 100%.

Figure 8. Percentage correct use of incidental teaching components by instructors during baseline and post-training probe sessions for untrained responses. Each point represents the percentage of correct responses for a single probe session. Different shapes represent various instructional programs.



Figures 9 and 10 display the percentage of correct responses emitted by learners during baseline, BST, and post-training phases for the trained responses and untrained responses, respectively. As instructors received BST, learners' percentage of correct responses systematically increased. Following BST the learners' percentage of correct

responses remained above baseline levels for trained responses. In addition, all learners displayed increases in correct responding to untrained responses during post-training probes.

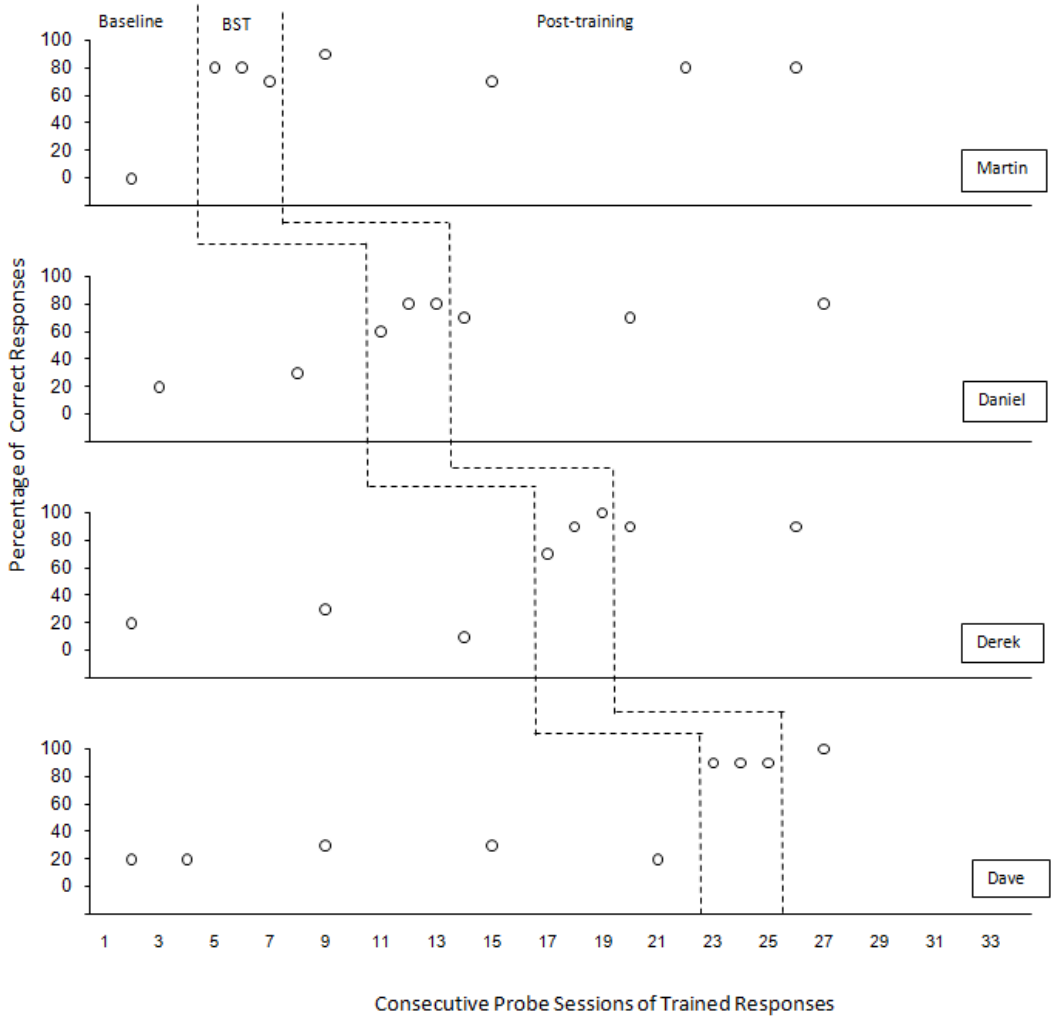
During baseline Martin responded correctly to the trained response in 0% of opportunities provided. During BST Martin's percentage of correct responses ranged from 70-80%. During post-training his percentage of correct responses to the trained response ranged from 70-90%.

During baseline Daniel's percentage of correct responses to the trained response ranged from 20-30%. During BST his percentage of correct responses ranged from 60-80%. During post-training Daniel's percentage of correct responses to the trained response ranged from 70-80%.

During baseline Derek's percentage of correct responses to the trained response ranged from 10-30%. During BST his percentage of correct responses increased to 70-100%. During post-training his percentage of correct responses to the trained response was 90%.

During baseline Dave's percentage of correct responses to the trained response ranged from 20-30%. During BST his percentage of correct responses increased to 90%. During post-training his percentage of correct responses to the trained response was 100%.

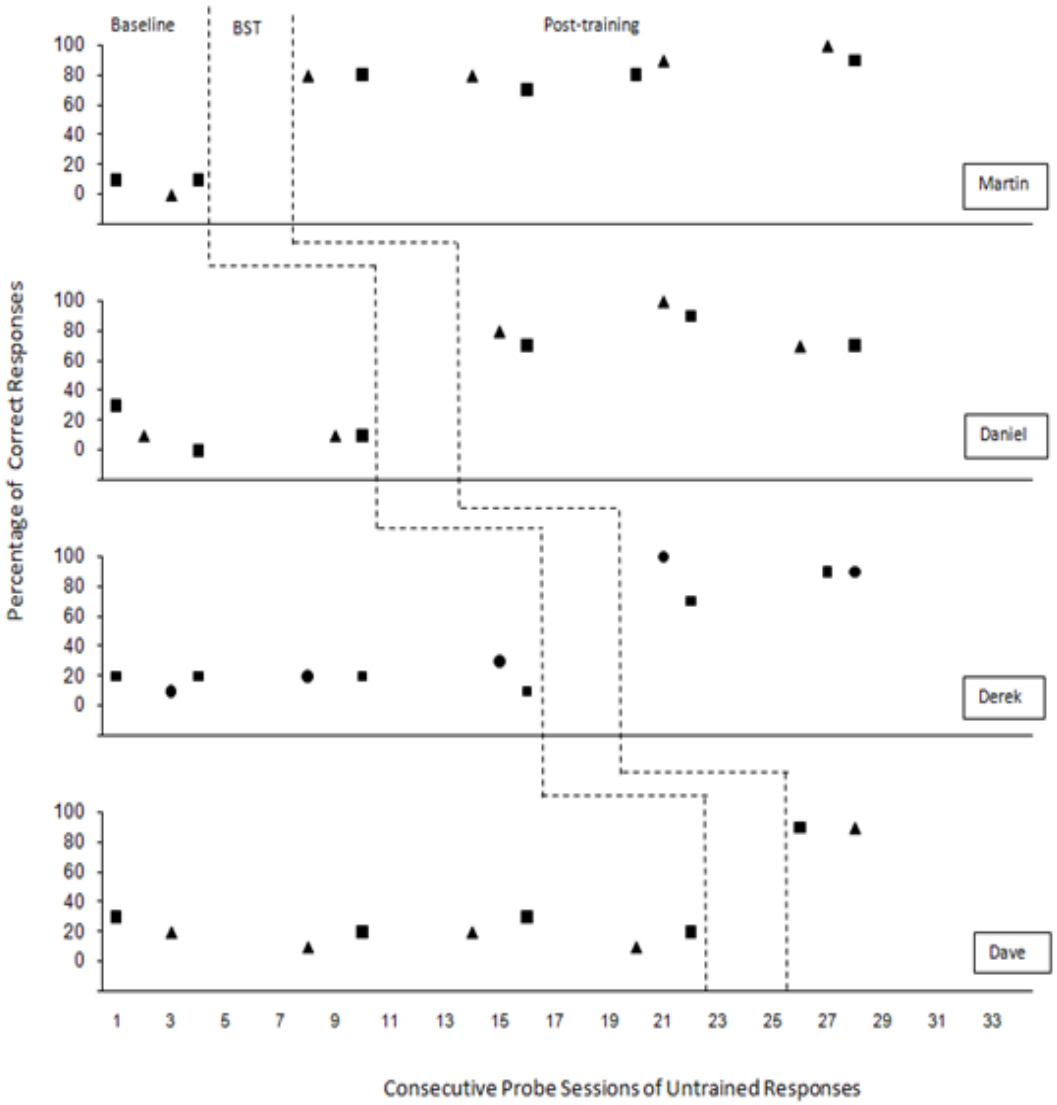
Figure 9. Percentage of correct responses by learners to requests for elaborations by instructors during baseline, BST, and post-training probe sessions to trained responses. Each open circle represents the percentage of correct responses for a single probe session.



During baseline Martin's percentage of correct responses to untrained responses ranged from 0-10%. During post-training his percentage of correct responses ranged from 70-100%. During baseline Daniel's percentage of correct responses to untrained responses ranged from 0-30%. During post-training his percentage of correct responding

increased to 70-100%. During baseline Derek's percentage of correct responses to untrained responses ranged from 10-20%. During post-training his percentage of correct responses to untrained responses ranged from 70-100%. During baseline Dave's percentage of correct responses to untrained responses ranged from 10-30%. During post-training he responded correctly to untrained responses in 90% of opportunities provided.

Figure 10. Percentage of correct responses by learners to requests for elaborations by instructors during baseline and post-training probe sessions to untrained responses. Each point represents the percentage of correct responses for a single probe session. Different shapes represent various instructional programs.



Figures 11 and 12 display the percentage of intervals scored for disruptive behavior by the learners during baseline, BST, and post-training phases for the trained

responses and untrained responses, respectively.

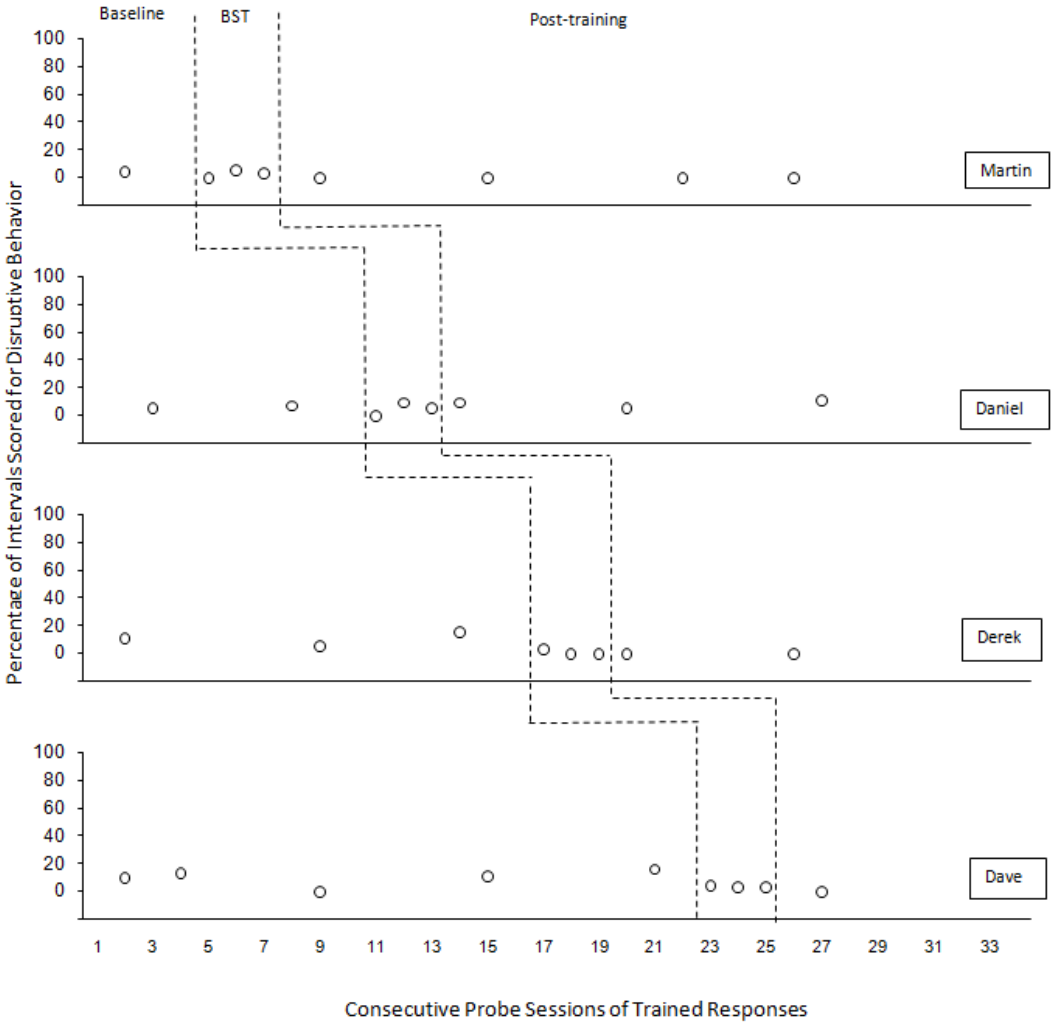
During baseline for the trained response Martin engaged in disruptive behavior in 4% of intervals scored. During BST the percentage of intervals in which Martin engaged in disruptive behavior was 0-5%. During post-training, the percentage of intervals in which he engaged in disruptive behavior during the trained response was 0%.

During baseline for the trained response the percentage of intervals in which Daniel engaged in disruptive behavior ranged from 5-7%. During BST the percentage of intervals in which Daniel engaged in disruptive behavior was 0-9%. During post-training the percentage of intervals in which Daniel engaged in disruptive behavior for the trained response ranged from 5-11%.

During baseline for the trained response Derek engaged in disruptive behavior in 5-15% of intervals scored. During BST the percentage of intervals in which Derek engaged in disruptive behaviors decreased to 0-3%. During post-training the percentage of intervals in which Derek engaged in disruptive behaviors for the trained response was 0%.

During baseline for the trained response Dave engaged in disruptive behavior in 0-16% of intervals scored. During BST the percentage of intervals in which Dave engaged in disruptive behaviors ranged from 3-4%. During post-training the percentage of intervals in which Dave engaged in disruptive behavior for the trained response was 0%.

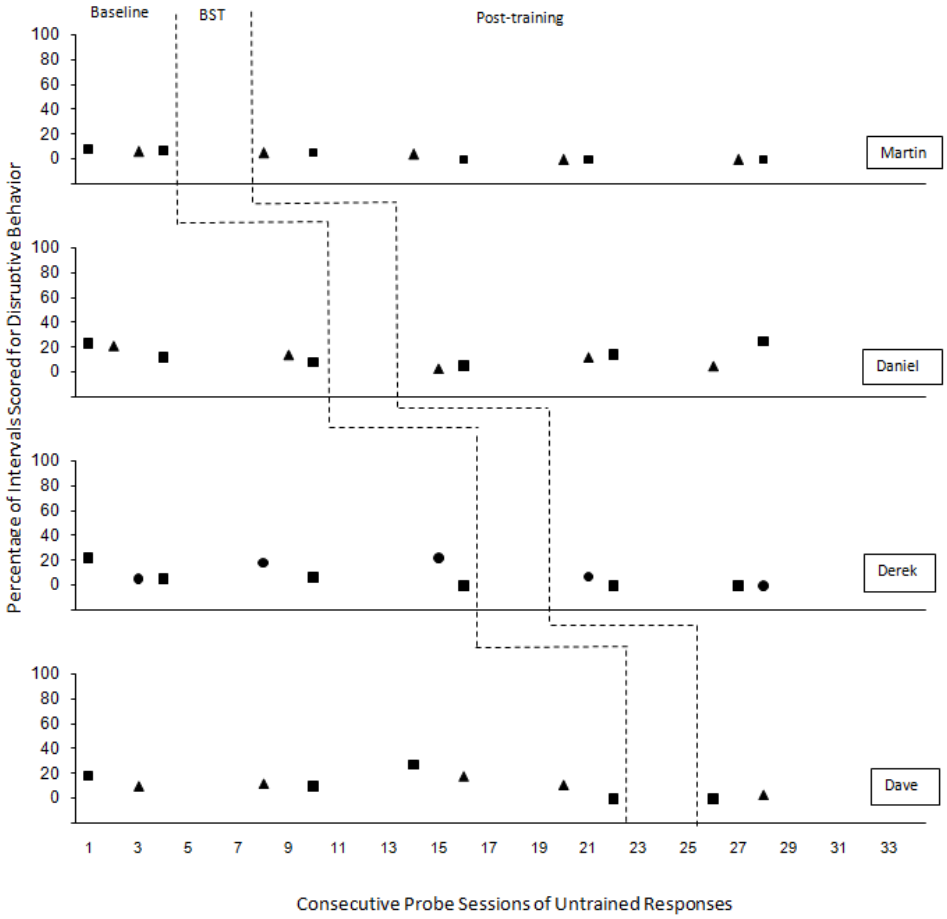
Figure 11. Percentage of intervals scored for disruptive behavior by learners during baseline, BST, and post-training probe sessions during trained responses. Each point represents the percentage of 10 s intervals scored for disruptive behavior during a single session.



During baseline for untrained responses Martin engaged in disruptive behaviors in 6-8% of intervals scored. During post-training the percentage of intervals in which he engaged in disruptive behavior decreased to 4-5%. During baseline for untrained responses Daniel engaged in disruptive behavior in 8-23% of intervals scored. During

post-training the percentage of intervals in which he engaged in disruptive behavior ranged from 3-25%. During baseline for the untrained responses the percentage of intervals in which Derek engaged in disruptive behavior ranged from 0-22%. During post-training the percentage of intervals in which he engaged in disruptive behavior ranged from 0-7%. During baseline for untrained responses the percentage of intervals in which Dave engaged in disruptive behavior ranged from 0-27%. During post-training the percentage of intervals in which Dave engaged in disruptive behaviors ranged from 2-3%.

Figure 12: Percentage of intervals scored for disruptive behavior by learners during baseline and post-training probe sessions during untrained responses. Each point represents the percentage of 10 s intervals scored for disruptive behavior during a single session. Different shapes represent various instructional programs.



. Three of four instructors returned social validity data for Experiment 2. Their mean ratings were 1.0, 1.3, and 1.3 for questions b, e, and g, respectively (see table 1). The two behavior analysts who rated the tapes of trained staff in Experiment 2 gave mean ratings of 1.0 for questions b and e (see table 2).

In Experiment 2 the experimenter demonstrated replication of the effects of BST

on instructors' responses and learners' responses across four different instructor-learner dyads. Prior to training all of the instructors correctly implemented incidental teaching components for the trained response in 16-40% of their attempts. All instructors' percentage of correct responses increased to 90% or greater accuracy following their first BST sessions. All of the instructors continued to teach the trained response with 96% or greater accuracy during post-training probes. Further, the effects of the BST generalized to the instructors' use of teaching components for untrained responses. During baseline their percentage correct use of incidental teaching components for untrained responses ranged from 8-42%. During post-training probes, all instructors implemented the components of incidental teaching for untrained responses with 92-100% accuracy.

The results also demonstrated that improved instructor skills correlated to improved learner skills. During baseline the learners' percentage of correct responding to the trained responses ranged from 0-30%. With the introduction of their instructors' BST the learners' percentage of correct responding increased to 60-100%. During post-training the learners' percentage of correct responses to the trained responses ranged from 70-100%. Similarly, during baseline the learners responded correctly to untrained responses in 0-30% of opportunities provided. During post-training the learners responded correctly to untrained responses in 70-100% of opportunities provided.

In Experiment 2 all of the learners displayed low rates of disruptive behavior during trained responses in baseline, BST, and post-training phases and during untrained responses in baseline and post-training phases. Therefore, there was no opportunity to assess the effects of BST on learner disruptive behavior.

Social validity ratings for Experiment 2 reveal that the intervention was generally acceptable to the staff who completed the scale. In addition, the behavior analysts' ratings indicated that they found BST a highly effective and acceptable training procedure for training incidental teaching procedures.

The current experiment supported previous research that demonstrated the effectiveness of staff training for incidental teaching (MacDuff et al., 1998) and the effectiveness of BST as a staff training procedure (Ryan et al., 2007). It extended previous research by demonstrating that instructors' skills for incidental teaching generalized from trained responses to novel responses after a brief training. Moreover, this experiment demonstrated that BST is correlated with a positive effect on learners' responding. Following BST learners displayed increases in correct responding not only to trained responses but also to untrained responses.

EXPERIMENT 3

To date there were no studies demonstrating the effectiveness of BST for training staff to teach activity schedules to learners with autism. Staff skills for teaching activity schedules differ greatly from DTT and incidental teaching, as there are few verbal instructions and instructors deliver prompts from behind the learner. Therefore, the third experiment extended prior research in BST (Sarokoff & Sturmey, 2004; Ryan et al., 2007) by demonstrating that BST is effective for training staff the skill set for teaching activity schedules. In addition, it extended MacDuff et al. (1993) by assessing generalization of instructor's skills from teaching trained activity schedules to teaching untrained activity schedules.

Method

Participants and Setting

James, Mary, and Nancy provided instruction. Jim, Dominic, and Dan participated as learners. Throughout the experiment, James worked with Jim, Mary worked with Dominic, and Nancy worked with Dan. At the time of the first baseline session, Jim was 12 years old, Dominic was 10 years 2 months old, and Dan was 12 years 10 months old.

Materials

Materials in Experiment 3 included items used in all activity schedules (e.g., a small binder, plastic page protectors in the binder, and pictures of the steps to complete each schedule). Refer to Appendix J for a complete list of programs and stimuli for the individual learners.

Dependent Variables

Percentage correct use of teaching components by instructor. Examples of activity schedule teaching components included (a) the instructor presented the learner with an instruction once per schedule only, and (b) the instructor delivered behavior-specific praise at the end of the entire schedule only. Refer to Appendix K for a complete list of the teaching components and their operational definitions and to Appendix L for a copy of the data sheet used to score instructors' responses.

Percentage of correct learner responses. The experimenter scored a response correct if the learner performed the step independently. She scored incorrect any skipped steps, a step that was initiated after 5 s or more, pauses of 5 s or more, self-corrections, any prompted step, or failure to respond.

Percentage of intervals scored for disruptive behavior. Refer to the General Method for the definition of this variable.

Procedure

Terms. (1) A session was 10 consecutive components of an activity schedule. (2) A learner response was independent completion of each step in an activity schedule. For example, learner responses included retrieving a fork, filling a cup with water, and pouring dressing on a salad.

Baseline, BST, and Post-training. Instructions in Experiment 3 were specific to teaching an activity schedule and data were collected on the components of teaching activity schedule following.

Interobserver agreement. IOA for staff performance was 100%, 98% (range, 97-98%), and 99% (range, 99-100%) for James, Mary, and Nancy, respectively. IOA for

learner correct responses was 100%, 99% (range, 99-100%), and 100% for Jim, Dominic, and Dan, respectively. IOA for learner disruptive behavior was 100%, 99% (range, 98-100%) and 99% (range, 99-100%) for Jim, Dominic, and Dan, respectively.

Results and Discussion

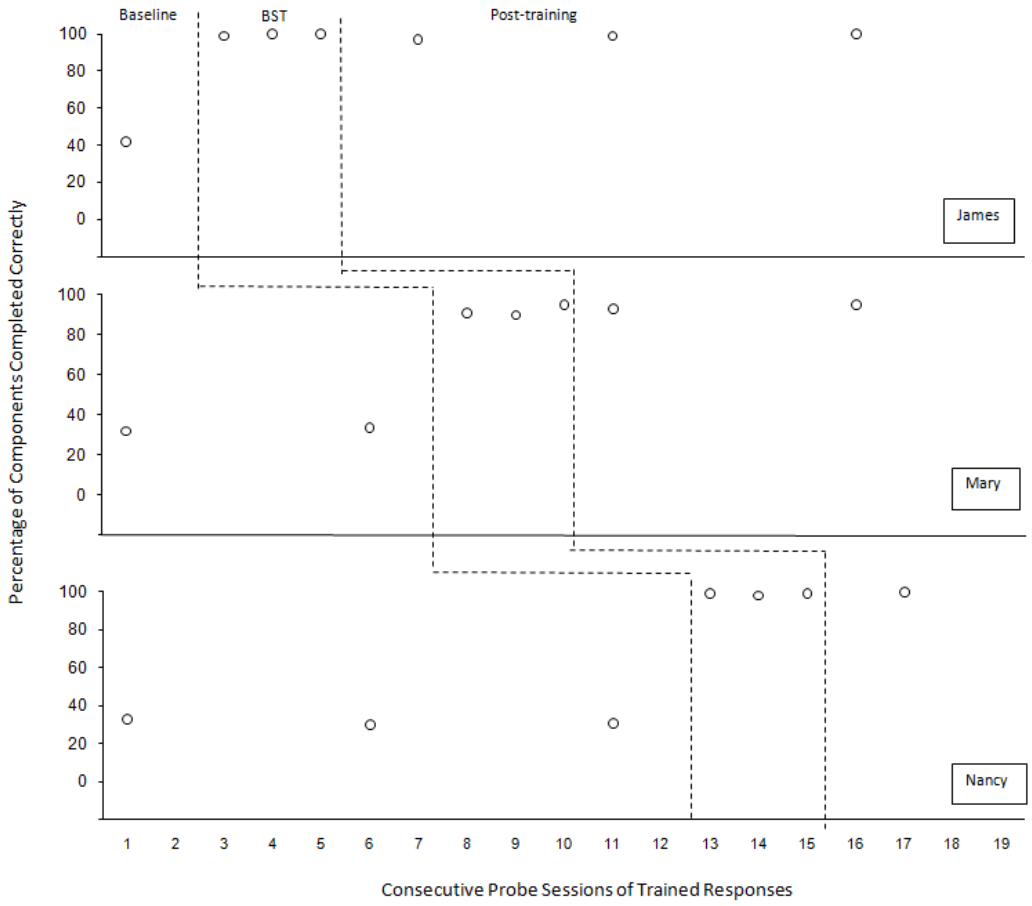
Figures 13 and 14 display the instructors' percentage correct use of activity schedule teaching components during baseline, BST, and post-training phases for the trained responses and untrained responses, respectively. In each figure, each of the three legs displays the data for one instructor. For all instructors, teaching skills for the trained response systematically improved with BST. In addition, for all instructors the effects of BST on their teaching skills generalized to untrained responses.

During baseline James's percentage correct use of teaching components for the trained response was 42%. He reached 99% accuracy following the first BST and met criterion following the third BST. Training required a total of three 10 min sessions. During post-training James's percentage correct use of activity schedule components for the trained response ranged from 97-100%.

During baseline Mary implemented 32-34% of activity schedule components correctly for the trained response. She reached 91% accuracy following the first BST and met criterion following the third BST. Mary's overall training time was three 10 min sessions. During post-training Mary's percentage correct use of teaching components for the trained response ranged from 93-95%.

During baseline Nancy's percentage correct use of activity schedule components for the trained response ranged from 31-33%. She reached 99% accuracy after the first BST and met criterion after the third BST. Nancy's overall training time was three 10 min sessions. During post-training Nancy's percentage correct use of teaching activity schedule components for the trained response was 100%.

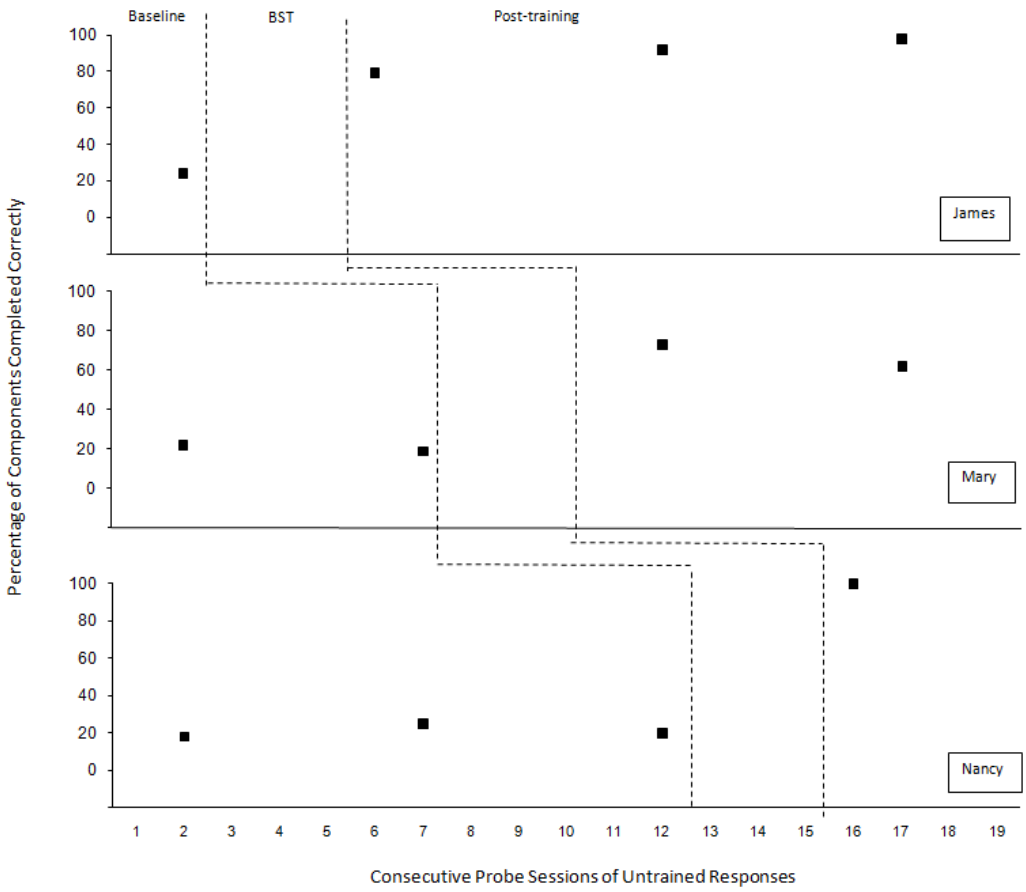
Figure 13. Percentage correct use of teaching steps in activity schedule by instructors during baseline, BST, and post-training probe sessions for trained responses. Each open circle represents the percentage of correct responses for a single probe session.



During baseline James' percentage correct use of teaching components for the untrained response was 24%. During post-training his percentage correct use of teaching components for the untrained response ranged from 79-100% correct. During baseline for the untrained response Mary's percentage correct use of activity schedule components ranged from 19-22%. During post-training her percentage correct use of activity schedule components for the untrained response ranged from 62-73%. During baseline Nancy's percentage correct use of activity schedule components for the untrained response ranged

from 18-25%. During post-training her percentage correct use for the untrained response was 100%.

Figure 14. Percentage correct use of teaching steps in activity schedule by instructors during baseline and post-training probe sessions for untrained responses. Each point represents the percentage of correct responses for a single probe session. Different shapes represent various instructional programs.



Figures 15 and 16 display the percentage of correct responses emitted by learners during baseline, BST, and post-training phases for the trained responses and untrained responses, respectively. In each figure, each leg displays the data for one of the three

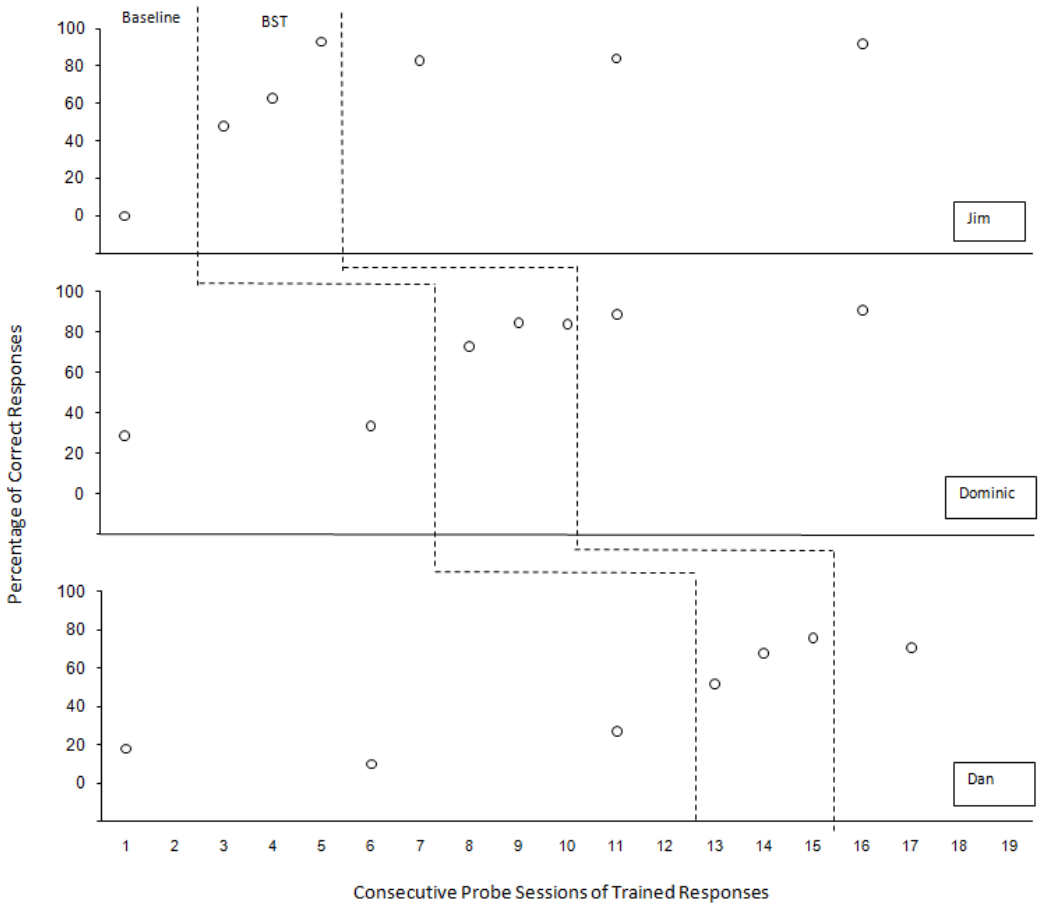
learners. With the introduction of instructors' BST all of the learners displayed increases in correct responding. The effects of BST on learner performance also generalized to untrained responses for two of the three learners.

During baseline Jim responded correctly to the trained response in 0% of opportunities provided. During BST his percentage of correct responses ranged from 48-93%. During post-training Jim's percentage of correct responses to the trained response ranged from 83-92%.

During baseline Dominic responded correctly to the trained response in 29-34% of opportunities provided. During BST his percentage of correct responses increased to 73-89%. During post-training Dominic's percentage of correct responses to the trained response ranged from 89-91.

During baseline Dan responded correctly to the trained response in 10-23% of opportunities provided. During BST his percentage of correct responses ranged from 52-76%. During post-training Dan's percentage of correct responses to the trained response was 71%.

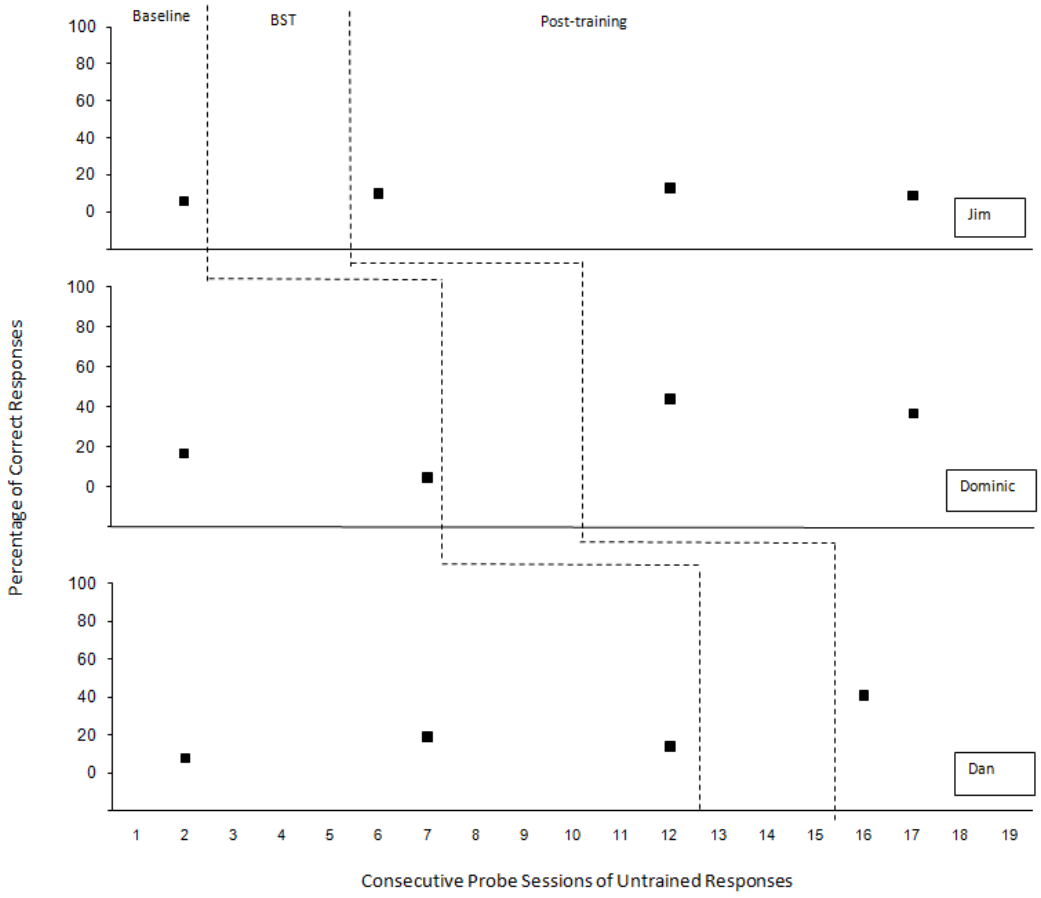
Figure 15. Percentage of correct responses to instructional programs by learners during baseline, BST, and post-training probe sessions for trained responses. Each open circle represents the percentage of correct responses for a single probe session.



During baseline Jim responded correctly to the untrained response in 6% of opportunities provided. During post-training his percentage of correct responses to the untrained response ranged from 11-14. During baseline Dominic's percentage of correct responses to the untrained response ranged from 5-17. During post-training he demonstrated an increase to 37-44% correct responding to the untrained response. During baseline Dan's percentage of correct responses to the untrained response ranged from 8-19. During post-training Dan's percentage of correct responses to the untrained

response was 41.

Figure 16. Percentage of correct responses to instructional programs by learners during baseline and post-training probe sessions for untrained responses. Each point represents the percentage of correct responses for a single probe session. Different shapes represent various instructional programs.



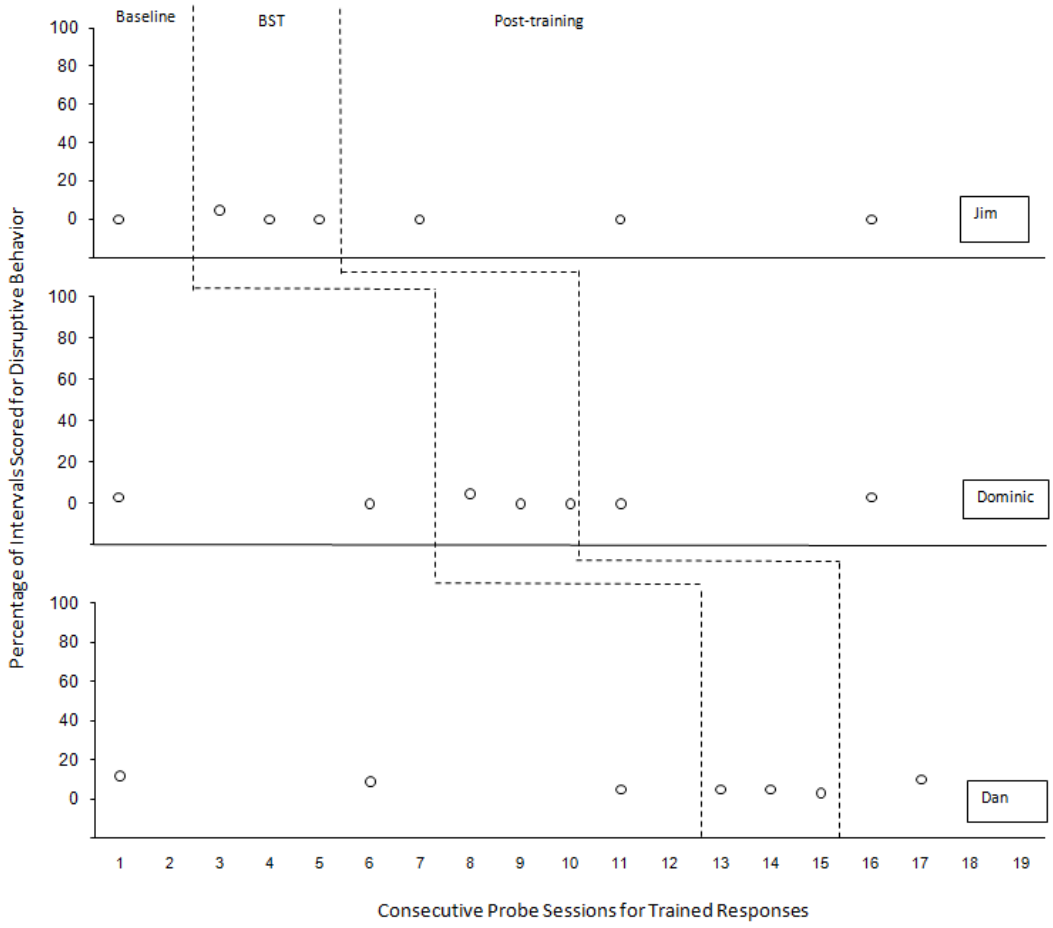
Figures 17 and 18 display the percentage of intervals scored for disruptive behavior by the learners during baseline, BST, and post-training phases for the trained responses and untrained responses, respectively. In each figure, each leg displays the data for one of the three learners.

During baseline Jim engaged in disruptive behavior in 0% of intervals scored during the trained response. During BST the percentage of intervals during which Jim engaged in disruptive behavior ranged from 0-5%. During post-training the percentage of intervals in which he engaged in disruptive behavior during the trained response was 0%.

During baseline for the trained response Dominic engaged in disruptive behavior in 0-3% of intervals scored. During BST the percentage of intervals in which Dominic engaged in disruptive behavior ranged from 0-5%. During post-training the percentage of intervals in which Dominic engaged in disruptive behavior for the trained response ranged from 0-3%.

During baseline Dan engaged in disruptive behavior in 9-12% of intervals scored during the trained response. During BST the percentage of intervals in which Dan engaged in disruptive behavior ranged from to 3-5%. During post-training the percentage of intervals in which Dan engaged in disruptive behavior during the trained response was 10%.

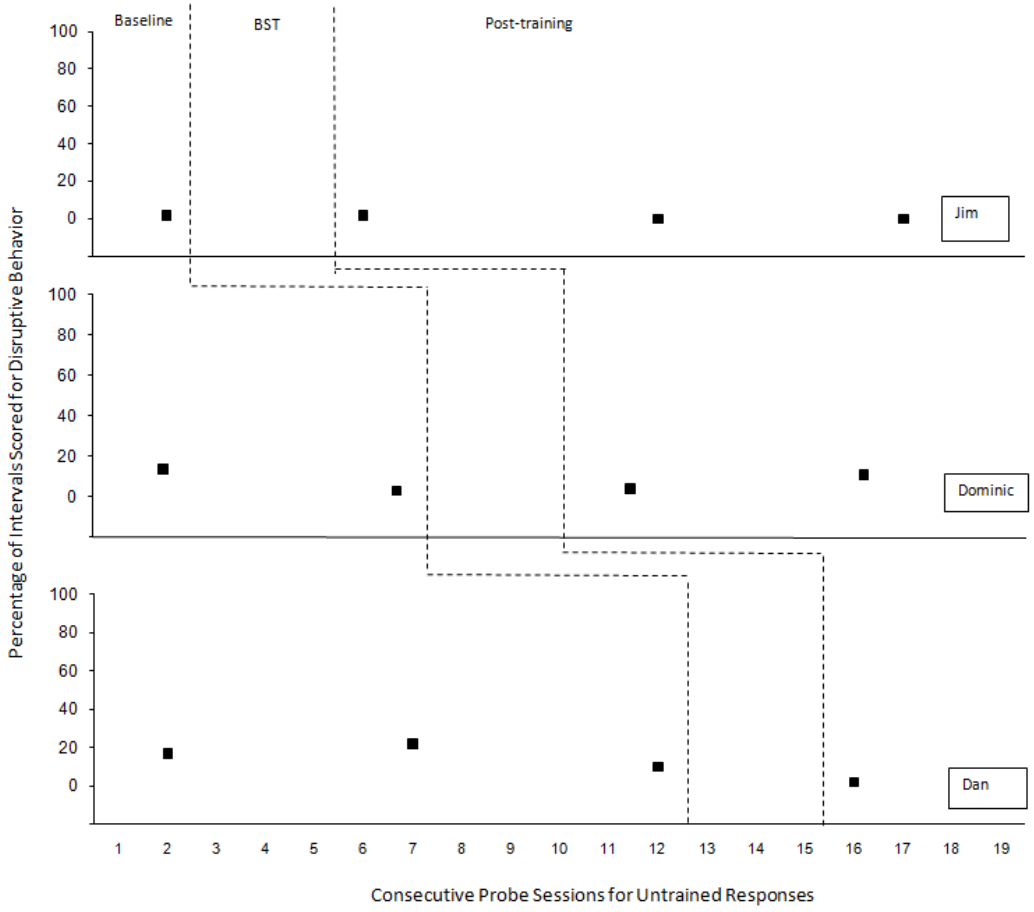
Figure 17. Percentage of intervals scored for disruptive behaviors by learners during baseline, BST, and post-training probe sessions for trained responses. Each point represents the percentage of 10 s intervals scored for disruptive behavior during a single session.



During baseline for the untrained response Jim engaged in disruptive behavior in 2% of intervals scored. During post-training the percentage of intervals in which he engaged in disruptive behavior ranged from 0-2%. During baseline for the untrained response Dominic engaged in disruptive behavior in 3-14% of intervals scored. During post-training the percentage of intervals in which he engaged in disruptive behavior for the untrained response ranged from 4-11. During baseline for the untrained response the

percentage of intervals in which Dan engaged in disruptive behavior ranged from 10-22. During post-training the percentage of intervals in which Dan engaged in disruptive behavior was 2.

Figure 18. Percentage of intervals scored for disruptive behaviors by learners during baseline and post-training probe sessions for trained responses. Each point represents the percentage of 10 s intervals scored for disruptive behavior during a single session. Different shapes represent various instructional programs.



Two of three instructors returned social validity data for Experiment 3. Their mean ratings were 1.0, 1.0, and 1.0 for questions c, f, and g (see table 1). The two

behavior analysts who rated the tapes of trained staff in Experiment 3 gave mean ratings of 1.0 for questions c and f (see table 2).

In Experiment 3 all of the instructors implemented the components for teaching an activity schedule for trained responses during baseline with 31-42% accuracy. The performance of all instructors increased to 91% or greater accuracy following the first BST session. All of the instructors continued to teach the trained response with 92-100% accuracy during post-training probes. In addition, the effects of BST on instructors' skills generalized to the untrained responses. During baseline their percentage correct use of components for teaching activity schedule following for untrained responses ranged from 18-25%. Following BST the instructors' percentage correct use of teaching activity schedule components for untrained responses increased to 62-100%. These results demonstrated that for each instructor, skills acquired during BST for a single response generalized to teaching untrained responses. Thus, BST is an effective procedure for training instructors to teach learners to follow a variety of activity schedules.

The results also demonstrated that learner's percentage of correct responding to trained responses increased as instructors' teaching skills improved. Prior to the instructors' BST the learners demonstrated low rates of correct responding. Their percentage of correct responding increased systematically with the introduction of the BST. During baseline the learners' percentage of correct responding to the trained responses ranged from 0-34%. With the introduction of their instructors' BST the learners' percentage of correct responding increased to 48-89%. During post-training the learners' percentage of correct responses to the trained responses ranged from 71-91%.

The effects of BST on learner responses also generalized to untrained responses for two of three learners. Prior to their instructors' BST Dominic and Dan responded correctly to untrained responses in 5-17% of opportunities provided. Following their instructors' BST the learners' percentage of correct responses to untrained responses ranged from 41-44%.

In Experiment 3 all of the learners displayed low rates of disruptive behavior during trained responses in baseline, BST, and post-training phases and during untrained responses in baseline and post-training phases. Therefore, there was no opportunity to assess the effects of BST on learner disruptive behavior.

Social validity ratings for Experiment 3 reveal that BST was a highly acceptable and effective training procedure to the staff who completed the scale. Furthermore, the behavior analysts' ratings indicated that they found BST a highly effective and acceptable training procedure for training staff to teach activity schedules to learners with autism.

General Discussion and Conclusion

The current study systematically replicated prior research using BST as a staff training procedure (Sidman, 1960). All three studies demonstrated experimental control over all instructors' responses; each instructor's percentage of correct responding increased above baseline levels with the introduction of BST. Further, the experimenter demonstrated systematic replication of the positive effects of BST on instructors' skills across three different types of instructional skill sets. Thus, this study provided evidence that BST is a robust and effective training procedure for multiple participants, a variety of stimuli, and various skill sets.

This study also demonstrated that the effects of BST generalized from the instructors' correct use of teaching components for trained responses to their correct use of teaching components for a variety of untrained responses. For all instructors, percentage of correct responding for untrained responses increased following BST. Because there was no difference between trained and untrained responses during baseline, and because there was an increase in responding for both trained and untrained responses following BST, it is reasonable to conclude that the training caused the change for all of the instructors' responses. These results extended the findings of Lafasakis and Sturmey (2007) who previously had found that adults trained on motor imitation displayed generalization of teaching skills to training verbal imitation.

In this study the experimenter used direct replication of Sarokoff and Sturmey (2004) for a single subject. James participated in the three successive studies. In the first experiment (DTT) his percentage correct use of teaching components for the trained response ranged from 31-38% prior to training. Following BST, his percentage correct

use of teaching components ranged from 98-100%. The effects of BST also generalized to James' teaching of untrained responses. Prior to BST his percentage correct use of teaching components for untrained responses ranged from 25-42%. Following BST his percentage correct use of teaching components ranged from 95-100%. James' data for both trained and untrained responses followed a similar pattern in Experiments 2 and 3. As James participated in all three studies, and as direct replication verifies the reliability of prior results (Sidman, 1960), James' data provide evidence that BST is an effective and powerful procedure for training staff to teach various skill sets.

The pattern of James' acquisition across the three experiments has important implications for staff training. Specifically, his improved teaching following training for one skill set did not generalize to his teaching other skill sets. Although James participated in three consecutive studies, he continued to display scores below 50% during screening on skill sets for which he had not received BST. Similarly, Mary and Sandy participated in two studies each. They too emitted less than 50% correct responding during baseline for the second skill set even though both had met criterion during the previous experiment for the first skill set. To effectively provide intervention for learners with autism, staff must identify all critical skill sets and train responses from each skill set.

Despite the robust effect of BST on staff behavior across all experiments, learners' acquisition was more variable. In Experiment 1 two of the four learners' percentage of correct responses to trained responses increased as their instructors' teaching skills improved. Only one learner displayed increased correct responding to untrained responses following his instructor's BST. In Experiment 2 all of the learner's

percentage of correct responding to the trained responses increased with the introduction of their instructors' BST and all learners displayed generalization of correct responding to untrained responses in post-training probes. In Experiment 3 all of the learners' percentage of correct responding displayed positive change following BST. Two learners also displayed generalization of correct responding to untrained responses, but the change in data from baseline to post-training probes was less robust for untrained responses than for trained responses.

The variability in learner acquisition in Experiment 1 is similar to that found by Ward-Horner and Sturmey (2008) and Seiverling et al., (2010). Ward-Horner and Sturmey suggested that some learners in their study might have displayed limited acquisition because instructional programs exceeded the learners' present ability. Likewise, in Experiment 1 it is possible that some of the learners had not yet acquired prerequisite skills for the instructional programs included in the experiment, or that their prerequisite skills were weak.

Similarly, in Experiment 3 learners displayed acquisition to instructors' trained responses, but displayed less behavior change in response to untrained responses. It is possible that lower rates of acquisition for untrained responses occurred because of variations in stimuli or deficits in the skills required by the learners to complete specific schedules. For example, the learners did not use timers in the activity schedules for trained responses, but learners were required to start and stop timers in the activity schedules for untrained responses. In future studies it would be helpful to assess learner skills with all stimuli that would be used.

Finally, the data demonstrated experimental control over learner disruptive behavior only in Experiment 1. The failure to achieve experimental control over learner disruptive behavior in Experiments 2 and 3 was due to low rates of disruptive behavior in baselines. It is possible that the measurement procedure did not detect all changes in learner behavior. For example, the experimenter did not assess latency or intensity of responses. Future studies should investigate various measures of learner behavior to more closely assess the effects of BST.

This study contributes to the literature in two ways. First, it demonstrated that prior studies supporting the effectiveness of BST for training staff to use DTT and incidental teaching skills could be systemically replicated across several variables, including instructors, learners, settings, and investigators (Dib & Sturmey, 2007, Lafasakis & Sturmey, 2006, Ryan et al., 2007, Sarokoff & Sturmey, 2004, Ward-Horner & Sturmey, 2008). Specifically, it demonstrated that the effects of BST on staff behavior generalized to a variety of instructional programs. Therefore, this study provides further evidence that BST is an effective and efficient procedure for training staff. Second, this study contributed to the literature by demonstrating that BST is an effective procedure for teaching activity schedule following. Prior research had shown that BST was effective for training DTT and incidental teaching skills; however, prior research has not demonstrated that BST is effective to train the skills necessary to teach learners to follow activity schedules. In the current study the experimenter trained instructors to teach three different activity schedules. They quickly acquired the trained responses and the effects of BST generalized to teaching the untrained responses. In addition, learners displayed improved rates of responding to trained responses as their instructors' skills improved.

Thus, BST is also an effective and efficient procedure for training staff to teach activity schedule following.

Social validity ratings by instructors indicated that BST was an acceptable and effective training procedure. In addition, staff ratings revealed that they were satisfied with their performance after training. The consistency and high positive ratings by all participants who returned questionnaires indicated that BST was a widely accepted training procedure. In addition, instructors' anecdotal comments about the training revealed that they felt the training was very useful, they felt more confident working with the learners, and they felt that their skills in the classroom had improved significantly following training. Social validity ratings by behavior analysts also revealed that they felt BST was an effective and acceptable training procedure for each experiment. Furthermore, as behavior analysts delivered the highest ratings regarding the study's overall effectiveness and indicated that they would use BST for staff training, providing additional support that BST is a socially useful training tool.

There were four main limitations to this study. First, although the training was effective for staff acquisition of teaching skills, it did not assess the skill of accurately collecting data. Staff learned to teach effectively, but anecdotal observations suggested that their data collection was not necessarily accurate. That is, in some instances staff scored prompted responses correct. This error has implications for expanding the scope of BST so that accuracy of recording is included in the training. In the current study the experimenter reported the data that she collected data for child responses; however, accurate recording of child performance by instructors is a critical aspect of providing effective intervention in the classroom. Second, while the experimenter assessed

generalization across responses, she did not assess whether the effects of BST generalized to instructor or learner performance in the classroom. Although anecdotal reports by instructors indicated that they felt their ability to provide effective intervention across instructional programs had improved, in future studies it would be beneficial to verify the accuracy of these reports with a data collection procedure. Likewise, although instructors reported that they were applying the skills acquired during BST while working with all the learners in their classroom, an important future step would be to assess generalization to novel learners. Third, learner responses in this study did not invoke complex language. Future research should assess the effects of BST for teaching instructors to train complex language programs such as commenting, reciprocal information exchange, and maintaining conversations. Finally, a more effective measure of social validity would be a useful addition to future studies. Although the questions in this study assessed whether the training were acceptable to the instructors, it did not measure whether BST in specific were an acceptable training procedure. It also failed to assess whether staff felt BST were an important aspect of the learners' education. Future studies should address the questions of acceptability and importance of BST for staff skills and for learners' intervention.

Appendix A

Procedural Integrity Checklist

Baseline

	Gave the instructor a list of the component steps for teaching a program
	Read the list aloud
	Asked if the instructor has any questions
	Answered any questions
	Thanked instructor for participating

BST: Instruction

	Gave the instructor the list of component steps identical to that which was provided in baseline
	Read the list aloud
	Asked if the instructor had any questions
	Answered any questions
	Thanked instructor for participating

BST: Feedback

	Gave the instructor a graph of his or her baseline data
	Gave the instructor a copy of the previous session's data sheet
	Described correct use of teaching components
	Described incorrect use of teaching components
	Explained correct use for components that were implemented incorrectly
	Asked if the instructor has any questions
	Answered any questions
	Thanked instructor for participating

BST: Rehearsal and Modeling

	Observed instructor providing three teaching opportunities
	Provided initial praise statement about components implemented correctly
	Provided corrective feedback for components implemented incorrectly
	Asked if the instructor has any questions
	Answered any questions
	Modeled three teaching opportunities
	Repeated rehearsal and modeling for 10 min
	Thanked instructor

Appendix B

Questionnaire Presented to Instructors to Assess Social Validity

Please complete the following questionnaire using the scale below:

1: completely agree; 2: somewhat agree; 3:agree; 4: somewhat disagree; 5:completely disagree

a) I feel that DTT is important for my student's learning.

1 2 3 4 5

b) I feel that incidental teaching is important for my student's learning.

1 2 3 4 5

c) I feel that following an activity schedule is important for my student's learning.

1 2 3 4 5

d) The training that I received for Discrete Trial Teaching is an acceptable method to me.

1 2 3 4 5

e) The training that I received for Incidental Teaching is an acceptable method to me.

1 2 3 4 5

f) The training that I received for teaching an Activity Schedule is an acceptable method to me.

1 2 3 4 5

g) I am satisfied with my performance after training.

1 2 3 4 5

h) I am satisfied with my student's skill acquisition after my training.

1 2 3 4 5

i) I am satisfied with my student's behavior after my training.

1 2 3 4 5

Appendix C

Questionnaire Presented to Behavior Analysts to Assess Social Validity

Please complete the following questionnaire using the scale below:

1: completely agree; 2: somewhat agree; 3:agree; 4: somewhat disagree; 5:completely disagree

a) I feel that DTT is an important instructional procedure.

1 2 3 4 5

b) I feel that incidental teaching is an important instructional procedure.

1 2 3 4 5

c) I feel that activity schedules are an important instructional procedure.

1 2 3 4 5

d) BST for Discrete Trial Teaching is an acceptable method to me.

1 2 3 4 5

e) BST for Incidental Teaching is an acceptable method to me.

1 2 3 4 5

f) BST for teaching to an Activity Schedule is an acceptable method to me.

1 2 3 4 5

g) This study provided training that was useful to the instructors and learners.

1 2 3 4 5

h) I would implement this procedure while training staff.

1 2 3 4 5

Appendix D

Instructional Programs and Stimuli used in Experiment 1 by Learner

Program	Materials
	Dennis
Receptive Verb Identification	picture of people sitting, eating, riding, running, drinking
Color Matching	counting bears, plastic shapes, balls, crayons in red, yellow, green, blue
Receptive Function of Objects	cars, hairbrushes, scissors, crayons, cups, baseball hats
Receptive Identification of Community Helpers	pictures of mailmen, policemen, firemen, teachers, baseball players
Matching by Association	pictures of related items (fork/knife, baseball/bat, toothbrush/toothpaste, shoe/sock)
Receptive Person Identification	pictures of learner's family members
	Donald
Receptive Sight Word Identification	words typed on 2.5 x 3.5 in. cards: cup, fork, pencil, clip, envelope
Number to Object Correspondence	small plastic shapes, counting bears, jacks

(table continued)

Sequencing	capital letters A, B, C and numbers 1, 2, 3, typed on 2.5 x 3.5 in. cards
Word to Picture Matching	pictures affixed to and corresponding words typed on 2.5 x 3.5 in. cards: bagel, computer, Skittles®, bike, scooter
Receptive Identification of Community Helpers	pictures of mailmen, policemen, firemen, teachers, baseball players
Receptive Function of Objects	pictures of pans, bubbles, keys, brooms
	Craig
Receptive Sight Word Identification	words typed on 2.5 x 3.5 in. cards: cup, fork, clip, pencil, envelope
Word to Picture Matching	pictures affixed to and corresponding words typed on 2.5 x 3.5 in. cards: CD player, goldfish, book, computer, water
Receptive Identification of Community Helpers	pictures of veterinarians, doctors, construction workers, teachers, crossing guards
Number to Object Correspondence	small plastic shapes, counting bears, jacks
Sequencing	capital letters A, B, C and numbers 1, 2, 3, typed on 2.5 x 3.5 in. cards

(table continued)

Matching by Association	pictures of related items (dog/leash, baby/bottle, wand/bubbles, key/lock, pan/spatula)
	Chad
Receptive Letter Identification	capital letters A, B, C typed in 3 different fonts on 2.5 x 3.5 in. cards
Receptive Verb Identification	picture of people sitting, eating, riding, running, drinking
Receptive Body Part Identification	no materials necessary
Receptive Person Identification	pictures of learner's family members
Receptive Object Discrimination	balls, cars, crayons, cups
Matching by Association	pictures of related items (dog/leash, baby/bottle, wand/bubbles, key/lock, shoe/sock)
Receptive Identification of Community Helpers	pictures of mailmen, policemen, firemen, teachers, baseball players

Appendix E

Components for Discrete Trial Teaching (adapted from Sarokoff & Sturmey, 2004

Behavior	Definition
Eye contact	The instructor makes eye contact with the learner for a minimum of 1 s contiguous to the delivery of an instruction.
Readiness response	The instructor gives no instruction until the student's body and face are oriented toward the instructor and his or her hands and legs are not moving.
Delivers instruction once	The verbal instruction and/or physical model are presented only one time per trial.
Presents instruction	The verbal instruction is delivered with clear articulation and matches verbatim the specific set of words defined in the instructional program.
Physical model	The physical model is delivered with precise movement and matches verbatim the specific description of movements defined in the instructional program.
Correction procedure	A predetermined prompt is delivered after the failure of a learner to respond independently and correctly within 5 s of the instruction.
Appropriate reinforcement	Only independent correct responses will be consequated with a tangible reinforcer presented contingent on a correct

(table continued)

	response. Deliver tangible reinforcers concurrent with verbal praise. No reinforcers are provided if the learner performs an incorrect response or while the learner is engaged in inappropriate or off-task behavior.
Behavior-specific praise	A behavior-specific praise statement is delivered within 1 s of a correct response.
Data collection	A plus or minus is recorded on the data sheet after each trial.
Inter-trial interval (ITI)	Following the end of a trial the instructor pauses for a minimum of 1 s before starting the next trial. The ITI must vary between trials.

Appendix F

Discrete Trial Teaching Data Sheet

Instructor:_____ Learner: _____

Target Response: _____ Date: _____

DTT Component	1	2	3	4	5	6	7	8	9	10
Establishes eye contact										
Waits for readiness response										
Delivers instruction once										
Instruction is clear and accurate										
Physical model is clear and accurate										
Predetermined prompt within 5 s										
Appropriate Reinforcement										
Behavior-specific Praise										
Data collection (+/-)										
ITI										

Appendix G

Instructional Programs and Stimuli in Experiment 2 by Learner

(restricted access adapted from Wetherby & Prizant, 1989)

Program	Stimuli
	Martin
Responding to Incidental	chocolate chip cookies in original bag
Teaching During Snack	chocolate chip cookies
	Starburst® in clear plastic snack sized bag
	Magnetix®
Responding to Incidental	Magnetix® in clear bin
Teaching During Play Sessions	Flarp Noise Putty® on high shelf
	Leapfrog® My First Leappad Alphabet
	School Bus Learning System®, turned off
	Leapfrog Leappad® with stylus removed
	Electric keyboard, turned off
	Electric keyboard, volume turned down
	Bubbles, instructor blows bubbles once only
	Bubbles with lid closed tightly
	Bubbles with wand absent
Responding to Incidental Teaching	variety of items listed above
During Unstructured Sessions	

(table continued)

	Daniel
Responding to Incidental	Chocolate chip cookies in original bag
Teaching During Snack	Chocolate chip cookies
	Starburst® in clear plastic snack sized bag
	Rice cakes in plastic wrap
	Popcorn cakes in original bag
	Snack crackers in original wrapping
	Powered juice mix, no cup
	Powdered juice mix, cup, no water
	Popcorn in plastic bag
Responding to Incidental	Koosh® ball in clear bin with drawer closed
Teaching During Play Sessions	Basketball on shelf
	Silly Putty® in store packaging
	Silly Putty® in plastic shell
	Bubbles, instructor blows bubbles once only
	Bubbles with lid closed tightly
	Bubbles with wand absent
Responding to Incidental Teaching During Unstructured Sessions	variety of items listed above
	Derek
Responding to Incidental	Mints in metal tin
Teaching During Snack	Mints in plastic tube

(table continued)

	Starburst® in clear sandwich-sized bag
	Popcorn in covered container
	Popcorn in sealed bin
	Gummy worms in clear locked box
	Unopened water bottle
Responding to Incidental	K'nex® in sandwich bags
Teaching during Play Sessions	K'nex Kids® in clear shoebox
	Bubbles, instructor blows bubbles once only
	Bubbles with lid closed tightly
	Bubbles with wand absent
	Play-doh® in unopened containers
Responding to Incidental Teaching	variety of items listed above
During Unstructured Sessions	
	<u>Dave</u>
Responding to Incidental	Oreos® in original bag
Teaching During Snack	Oreos® in sandwich bags
	Unopened juice box
	Opened juice box, straw not present
	Opened juice box, straw wrapped in plastic
	Jellybeans in store package

(table continued)

Responding to Incidental Teaching during Play Sessions	Elmo 12 Days of Christmas® turned off
	Leapfrog My First Leappad Alphabet School Bus Learning System®, turned off
	iPod® turned off
	Bubbles, instructor blows bubbles once only
	Bubbles with lid closed tightly
	Bubbles with wand absent
Responding to Incidental Teaching During Unstructured Sessions	variety of items listed above

Appendix H

Components for Incidental Teaching (adapted from Ryan et al. 2007)

Behavior	Definition
Identifies Initiation	The instructor verbally acknowledges that the learner initiated toward a stimulus within 2 s of the learner's initiation.
Withholds stimulus	The instructor blocks access to the stimulus for which the learner initiated
Prompts for elaboration	The instructor withholds the stimulus and requests a more complex or complete language form of the initiation. A prompt may include (a) open ended questions, (b) a partial model of a word or (c) a full model of a word
Provides/restricts access	The instructor delivers the stimulus for which the learner initiated contingent on the learner's using more elaborate language or denies access to the stimulus if the learner fails to emit a more complex initiation
Data collection	A plus or minus is recorded on the data sheet after each opportunity for an elaboration

Appendix I
Incidental Teaching Data Sheet

Instructor:_____ Learner: _____

Setting: _____ Date: _____

Incidental Teaching Component	1	2	3	4	5	6	7	8	9	10
Identifies Initiation (2 s)										
Withholds Stimulus										
Prompts for elaboration										
Provides access contingent on elaboration or denies access in absence of elaboration										
Data collection (+/-)										

Appendix J

Instructional Programs and Stimuli in Experiment 3 by Learner

Program	Materials
	Jim
following an activity schedule for making cereal	small box of cereal, quart of milk, small bowl, spoon, measuring cup.
following an activity schedule for brushing teeth	plastic cup, toothbrush, toothpaste, timer
	Dominic
following an activity schedule for making microwave popcorn	bag of microwave popcorn, scissors, potholder, large bowl
following an activity schedule for brushing teeth	plastic cup, toothbrush, toothpaste, timer
	Dan
following an activity schedule for making a Caesar salad	pre-made bag of salad mixings, scissors, large bowl, fork
following an activity schedule for brushing teeth	plastic cup, toothbrush, toothpaste, timer

Appendix K

Components for Teaching Independent Activity Schedule Following (adapted from MacDuff et al., 1993)

Behavior	Definition
Eye contact	The instructor makes eye contact with the learner for a minimum of one second contiguous to the delivery of an instruction.
Readiness response	The instructor gives no instruction until the student's body and face are oriented toward the instructor and his or her hands and legs are not moving.
Delivers instruction once	The verbal instruction is presented only one time per schedule.
Verbal instruction	The verbal instruction is delivered with clear articulation and matches the words defined in the program.
Physical prompting	The physical prompting is delivered with precise movement and matches the description of movements defined in the program.
Prompting level	The prompting is delivered at the level specified.

(table continued)

Error correction procedure	The instructor stops the learner, returns materials, and fully prompts the learner through the sequence of actions for which the error was made.
Appropriate reinforcement	Only independent correct responses will be consequated with an edible reinforcer delivered from behind within 1 s of the correct completion of a component. No reinforcers are delivered if the learner performs an incorrect response or engages in inappropriate or off-task behavior.
Behavior-specific praise	A behavior-specific praise statement is delivered at the end of the schedule only.
Data collection	A plus or minus is recorded on the data sheet after each step in the schedule.

Appendix L

Activity Schedule Data Sheet

Instructor:_____ Learner: _____

Target Response: _____ Date: _____

Activity Schedule Component	1	2	3	4	5	6	7	8	9	10
Eye contact										
Readiness response										
Delivers instruction once										
Verbal instruction										
Physical prompting										
Prompting level										
Error correction procedure										
Appropriate reinforcement										
Behavior Specific Praise										
Data Collection										

Bibliography

Dib, N., & Sturmey, P. (2007). Reducing student stereotypy by improving instructors' implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 40,* 339-343.

Downs, A., Downs, R. C., & Rau, K. (2008). Effects of teaching and feedback on Discrete Trial Teaching skills and student performance. *Research in Developmental Disabilities, 29,* 235-246.

Hart, B. M., & Risley, T. R. (1982*). How to use incidental teaching for elaborating language.* (pp. 6-8). Austin, TX: PRO-ED.

Kimball, J W., Kinney, E. M., Taylor, B.A., & Stromer, R. (2004). Video enhanced activity schedules for children with autism: A promising package for teaching social skills. *Education and Treatment of Children, 27,* 280-298.

Krantz, P. J., MacDuff, M. T., & McClannahan, L. E. (1993). Programming participation in family activities for learners with autism: Parents' use of photographic activity schedules. *Journal of Applied Behavior Analysis, 26,* 137-138.

Lafasakis, M., & Sturmey, P. (2007). Training parent implementation of discrete-trial teaching: Effects on generalization of parent teaching and learner correct responding. *Journal of Applied Behavior Analysis, 40,* 685-689.

MacDuff, G. S., Krantz, P. J., MacDuff, M. A., & McClannahan, L .E. (1988). Providing incidental teaching for autistic learners: A rapid training procedure for therapists. *Education and Treatment of Children, 11,* 205-217.

MacDuff, G. S., Krantz, P. J., & McClannahan, L.E. (1993). Teaching learners with

autism to use photographic activity schedules: Maintenance and generalization of complex response chains. *Journal of Applied Behavior Analysis, 26,* 89-97.

McClannahan, L. E., & Krantz, P. J. (2010). *Activity schedules for children with autism: Teaching Independent Behavior*. (2nd ed.). Bethesda, MD: Woodbine House.

Ryan, C. S., Hemmes, N. S., Sturmey, P., Jacobs, J. D., & Grommet, E. K. (2007). Effects of a brief staff training procedure on instructors' use of incidental teaching and students' frequency of initiation toward instructors. *Research in Autism Spectrum Disorders, 2,* 28-45.

Sarokoff, R. A., & Sturmey, P. (2004). The effects of behavioral skills training on staff implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 37,* 535-538.

Sarokoff, R. A., & Sturmey, P. (2007). The effects of instructions, rehearsal, modeling, and feedback on acquisition and generalization of staff use of discrete trial teaching and student correct responses. *Research in Autism Spectrum Disorders, 2,* 125-136.

Seiverling, L., Pantelides, M., Ruiz, H. H., & Sturmey, P. (2010). The effect of behavioral skills training with general-case training on staff chaining of child vocalizations within natural language paradigm. *Behavioral Interventions, 25,* 53-75.

Sidman, M. (1960). Tactics of scientific research (pp. 73-139). Boston: Authors Cooperative.

Ward-Horner, J., & Sturmey, P. (2008). The effects of general-case training and behavioral skills training on the generalization of parents' use of discrete-trial

teaching, child correct responses, and child maladaptive behavior. *Behavioral Interventions, 23,*271-284.

Wetherby, A. M., & Prizant, B. (1989). The expression of communicative intent: Assessment issues, *Seminar in Speech and Language, 10*, 77-91.